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## **ESCC QUALIFIED PARTS LIST (QPL)**

**ESCC/RP/QPL005-184 (REP 005)**

**May 2018**



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| DCR No.              | CHANGE DESCRIPTION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|----------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <a href="#">1160</a> | <p><b>Extension:</b><br/>229L W.L. Gore<br/>255K W.L. Gore<br/>328B W.L. Gore<br/>220J Souriau<br/>221J Souriau<br/>222J Souriau<br/>223H Souriau</p> <p><b>Amendment:</b><br/>350 Radiall, Editorial correction Spec numbers “3401/027-028” have been changed to 3402/027-028</p> <p><i>Extension: The validity date of the certificate is extended. The scope of the certificate might change.</i></p> <p><i>Revision: The scope of the certificate is changed. The validity date of the certificate remains the same.</i></p> |

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## **1 FOREWORD**

This document contains a list of components that have been qualified to the rules of the ESCC System and are intended for use in ESA and other spacecraft and associated equipment in accordance with the requirements of the ECSS Standard ESCC-Q-ST-60.

It is permitted to advertise the ESCC qualification status of a product provided such publicity or advertisement does not state or imply that the product is the only qualified or capability approved one of that particular type, range or family.

## **2 PROCURORS' RESPONSIBILITY**

When procuring ESCC qualified or capability approved components, the procurer is responsible for ensuring that the qualification or capability approval status is valid and that delivered components fulfill the specified requirements of the applicable ESCC specifications. The procurer is advised to utilise the ESCC non-conformance system in the event that a qualified or capability approved manufacturer delivers non-conforming components.

## **3 USE OF TABLES**

### **3.1 PUBLICATION**

The individual entries are published in sections within this document and are presented by manufacturer on the web. Please refer to our [escies.org](http://escies.org) website.

### **3.2 TYPE DESIGNATION**

The referenced type (style) designations are derived from industrial standards (i.e., JEDEC PRO-ELECTRON, MIL, IEC and CECC). The purpose is to identify the similarity of a listed qualified component to a standard type designation.

### **3.3 COMPONENTS CHARACTERISTICS**

The electrical characteristics are listed for guidance only and, unless otherwise stated, are specified at +25°C. The precise characteristics of the qualified component are defined in the referenced ESCC specification.

### **3.4 MANUFACTURER**

Plant locations are indicated in the individual listing; contact information is given in full on the appropriate web pages. Please refer to our [escies.org](http://escies.org) website.

## **4 REVISION PROCEDURE**

Amendments to the previous issue of the QPL implemented herein are indicated by the content of the "Document Changes" page and by its respective DCR number. The new issue number of the QPL document and its associate date are indicated in the front page.

## 5

**TABLE OF QUALIFIED COMPONENTS**

Components qualified to the ESCC System are grouped by component type designations. Individual components are listed within the relevant sections as indicated in Table 5.1.

| Section | Component Types          |
|---------|--------------------------|
| 01      | Capacitors               |
| 02      | Connectors               |
| 03      | Crystals and Oscillators |
| 04      | Diodes                   |
| 05      | Filters                  |
| 06      | Fuses                    |
| 07      | Inductors                |
| 08      | Microcircuits            |
| 09      | Relays                   |
| 10      | Resistors                |
| 11      | Thermistor Sensors       |
| 12      | Transistors              |
| 13      | Wires and Cables         |
| 14      | Transformers             |
| 18      | Optoelectronics          |
| 20      | Thermostats              |
| 30      | RF Passive               |
| 40      | Hybrids and Modules      |
| 50      | Cable Assembly           |
| 99      | Miscellaneous            |

## 5.1

**TABLE OF COMPONENTS**

| Components                            | Sub-Section                            | Manufacturers                                    | Certificates                                           |
|---------------------------------------|----------------------------------------|--------------------------------------------------|--------------------------------------------------------|
| <b>01</b><br>Capacitors               | Ceramic Fixed                          | AVX (N.I), Exxelia Technologies                  | 231L, 315C, 262H, 306C                                 |
|                                       | Ceramic Fixed Chip                     | AVX/TPC, Exxelia Technologies, AVX(N.I)          | 109Nrev1,323Brev1, 110N, 324Brev1, 264H, 331A          |
|                                       | Tantalum, (Solid), Fixed, Electrolytic | AVX (CZ)                                         | 196H, 327B                                             |
|                                       | Fixed Film                             | Exxelia Technologies                             | 251H, 270F, 338                                        |
|                                       | Semiconductor                          | Cobham Microwave                                 | 286C                                                   |
| <b>02</b><br>Connectors               | Multipin, Solder Contacts              | C&K Components, Souriau                          | 71Rrev1, 155M                                          |
|                                       | Multipin, Crimp Contacts               | C&K Components, Souriau, Deutsch, Axon'Cable     | 72Rrev1,156L , 25Q, 220J, 221J, 222J, 223H, 288C, 337A |
|                                       | For printed Circuit Board              | Smiths Interconnect Hypertac                     | 99P, 149M, 250H, 281E                                  |
|                                       | RF Coaxial                             | Radiall, Rosenberger                             | 68P, 283E, 329A, 350                                   |
|                                       | Microminiature, Crimp Contacts         | C&K Components, Souriau                          | 140P, 141P, 290D, 301C                                 |
| <b>03</b><br>Crystals and Oscillators | Crystals                               | Rakon                                            | 333A, 334A                                             |
| <b>04</b><br>Diodes                   | Switching                              | STMicroelectronics                               | 311C                                                   |
|                                       | Power Rectifier                        | STMicroelectronics                               | 297D, 302C, 272G, 274F                                 |
|                                       | RF/Microwave, Silicon Schottky         | Infineon                                         | 227F                                                   |
|                                       | RF/Microwave, Varactors                | API Technologies-RF2M Division, Cobham Microwave | 200H, 225G, 273F                                       |
| <b>05</b><br>Filters                  | Feedthrough                            | Exxelia Technologies                             | 252H                                                   |
|                                       | SAW                                    | Kongsberg Norspace                               | 313B                                                   |
| <b>06</b><br>Fuses                    | Thin Film                              | Schurter                                         | 284D, 336A                                             |
| <b>07</b><br>Inductors                | Fixed, RF                              | Exxelia Magnetics                                | 241Hrev1                                               |
|                                       | Power                                  | Exxelia Magnetics                                | 276Erev1                                               |
| <b>08</b><br>Microcircuits            | Digital C-MOS                          | STMicroelectronics, Microchip Technology Nantes  | 73Q, 190L, 278Erev2 312Brev1, 342rev1                  |
|                                       | Linear Switching Regulator             | ST Microelectronics                              | 344                                                    |
| <b>09</b><br>Relays                   | Non-Latching, 28Vdc Contact Rating     | REL-STPI, Leach, Leach Sarralbe                  | 102J, 205F, 318Brev1                                   |
|                                       | Latching, 28Vdc Contact Rating         | REL-STPI, Leach, Leach Sarralbe, Leach Niort     | 88J, 98H, 317Brev1, 167G, 310C,                        |

|                             |                                         |                                                           |                                                                                                                                 |
|-----------------------------|-----------------------------------------|-----------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------|
| 10<br>Resistors             | Shunts                                  | Isabellenhuetten                                          | 285D                                                                                                                            |
|                             | Fixed, Film                             | Vishay Electronic GmbH                                    | 256J, 289D                                                                                                                      |
|                             | Chip                                    | Vishay SA, Sfernice                                       | 287E, 314C                                                                                                                      |
|                             | Flexible, Foil, Heaters                 | IRCA, Minco                                               | 184M, 325A, 330A                                                                                                                |
| 11<br>Thermistor<br>Sensors | NTC                                     | TE Connectivity MEAS                                      | 266H                                                                                                                            |
|                             | PT                                      | Innovative Sensor Technology IST AG                       | 352                                                                                                                             |
| 12<br>Transistors           | Low Power, NPN                          | STMicroelectronics                                        | 233L                                                                                                                            |
|                             | Low Power, PNP                          | STMicroelectronics                                        | 234L                                                                                                                            |
|                             | MOSFET, Power, N-Channel                | STMicroelectronics, Infineon                              | 303C, 319B, 339                                                                                                                 |
|                             | MOSFET, Power, P-Channel                | STMicroelectronics                                        | 326A                                                                                                                            |
|                             | RF/Microwave, NPN, Low Power, Low Noise | Infineon                                                  | 230G, 245G, 322B                                                                                                                |
|                             | Microwave, Gallium Arsenide             | Infineon                                                  | 213G                                                                                                                            |
| 13 Wires and Cables         | Low Frequency                           | Draka Fileca, Nexans, Axon'Cable, W.L. Gore, Leoni, Tyco, | 07S, 09Q, 132P, 08R, 292D, 138M, 219L, 268G, 295D, 159N, 267H, 215L, 216L, 294D, 300D, 229L, 293D, 296D, 257H, 299D, 305C, 328B |
|                             | Coaxial, RF, Flexible                   | Nexans, W.L. Gore, Axon'Cable                             | 24S, 255K, 298D, 291D, 304C, 335A                                                                                               |
| 20<br>Thermostats           | Switches                                | Comepa                                                    | 275F                                                                                                                            |
| 30<br>RF Passive            | Circulator and Isolator                 | Cobham                                                    | 340, 347                                                                                                                        |
|                             | Attenuator and Load                     | Radiall                                                   | 185H, 178J                                                                                                                      |
| 50<br>Cable Assembly        | RF Cable Assemblies                     | Radiall                                                   | 348                                                                                                                             |

## 6 COMPONENT CERTIFICATES

### 6.1 CAPACITORS (01)

#### 6.1.1 Ceramic Fixed

| Capacitors, Ceramic, Type II, High Capacitance, Based on Case Styles BR, CV, and CH                                                                                                                                                                                                 |                                                                   |                    |                       | <b>231L</b>                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                          | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <b>3001</b><br>Detail ESCC<br><b>3001/030</b>                                                                                                                                                                                                                       | <b>AVX Limited</b><br><b>Coleraine</b><br><b>Northern Ireland</b> | Qualification      | UK Space Agency       | Jul 1996                   |
| Remarks                                                                                                                                                                                                                                                                             |                                                                   |                    |                       |                            |
| <p>Qualified Range:</p> <p>E12 series</p> <p>Variants 01 to 74 capacitance range for 50V, 100V and 200V, as per Detail Specification</p> <p>Variants 01 to 52, and 59 to 60, for 500V are qualified</p> <p>± 10% tolerance</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                   |                    |                       |                            |

| CAPACITORS,<br>CERAMIC, TYPE II, MULTIPLE LAYERS,<br>BASED ON TYPES CNC 31 to 34, NE, PE AND PLE                                                                                                                                                                                                                   |                                                      |                    |                       | 315C                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                         | Manufacturer                                         | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3001<br>Detail ESCC<br>3001/037                                                                                                                                                                                                                                                                    | Exxelia Technologies<br>Chanteloup en Brie<br>France | Qualification      | CNES                  | Nov 2011                   |
| Remarks                                                                                                                                                                                                                                                                                                            |                                                      |                    |                       |                            |
| <p>Qualified Range:</p> <p>Variants 01 to 16.<br/>16V : 2.2 to 68 µF<br/>25V: 1.2 to 39 µF</p> <p>E12 ±10% tolerance</p> <p>DIL format with equal number of leads per side<br/>Lead material : type A with type 10 finish (electro-deposited 98% Ag min.)</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                      |                    |                       |                            |

| CAPACITORS,<br>CERAMIC, TYPE II, HIGH VOLTAGE, 1.0 TO 5.0 KV,<br>BASED ON CASE STYLES VR, CV, AND CH                                                     |                                              |                    |                       | 262H                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                               | Manufacturer                                 | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3001<br>Detail ESCC<br>3001/034                                                                                                          | AVX Limited<br>Coleraine<br>Northern Ireland | Qualification      | UK Space Agency       | Sep 2000                   |
| Remarks:                                                                                                                                                 |                                              |                    |                       |                            |
| <p>Qualified Range:</p> <p>E12 series</p> <p>Variants 01 to 22 are qualified<br/>±10% tolerance</p> <p>Operating Temperature Range ( C): -55 to +125</p> |                                              |                    |                       |                            |

| CAPACITORS,<br>CERAMIC, TYPE II, 50V to 500V,<br>BASED ON TYPES CNC53 to CNC56.                                                                                                                         |                                                      |                       |                          | 306C                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                           | Manufacturer                                         | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3001                                                                                                                                                                                    | Exxelia Technologies<br>Chanteloup en Brie<br>France | Qualification         | CNES                     | Mar 2011                      |
| Detail<br>ESCC 3001/038                                                                                                                                                                                 |                                                      | Remarks:              |                          |                               |
| <p>Qualified Range:</p> <p>Variants 01 to 04, 08 to 11, 15 to 18 and 22 to 25 are qualified<br/>All values 50V to 500V<br/>E12: ±10% tolerance</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                      |                       |                          |                               |

6.1.2 Ceramic Fixed Chip

| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE     |                                     |                       |                          | 109Nrev1                          |                    |                      |                |
|--------------------------------------------------|-------------------------------------|-----------------------|--------------------------|-----------------------------------|--------------------|----------------------|----------------|
| Procurement<br>Specifications                    | Manufacturer                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date     |                    |                      |                |
| Generic<br>ESCC 3009<br>Detail ESCC              | AVX/TPC<br>St Apollinaire<br>France | Qualification         | CNES                     | Feb 1983                          |                    |                      |                |
|                                                  |                                     | Remarks:              |                          |                                   |                    |                      |                |
| 3009/003, 3009/004, 3009/005, 3009/006, 3009/022 |                                     |                       |                          |                                   |                    |                      |                |
| Qualified range:                                 |                                     |                       |                          |                                   |                    |                      |                |
| Variants 03 and 06 are qualified                 |                                     |                       |                          |                                   |                    |                      |                |
| Style                                            | Model                               | Detail<br>Spec        | Variants                 | Capacitance<br>Range              | Rated<br>Voltage   | Tolerance<br>(+%)    | TC<br>(ppm/°C) |
| 0805                                             | A_12C                               | 3009/003              | 03, 06                   | 4.7 to 9.1<br>10 to 1 500         | 50, 100<br>50, 100 | 0.5pF<br>1, 2, 5, 10 | ±30            |
| 1206                                             | A_20C                               | 3009/022              | 03, 06                   | 10 to 3 900                       | 50, 100            | 1, 2, 5, 10          | ±30            |
| 1210                                             | A_13C                               | 3009/004              | 03, 06                   | 22 to 6 800<br>8 200 to 10<br>000 | 50, 100<br>50      | 1, 2, 5, 10          | ±30            |
| 1812                                             | A_14C                               | 3009/005              | 03, 06                   | 100 to 15<br>000                  | 50, 100            | 1, 2, 5, 10          | ±30            |
| 2220                                             | A_15C                               | 3009/006              | 03, 06                   | 470 to 33<br>000                  | 50, 100            | 1, 2, 5, 10          | ±30            |
| Operating Temp. Range (°C), -55 to +125          |                                     |                       |                          |                                   |                    |                      |                |

| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE I                                 |          |                                                     |          |                    |    |                       | 323Brev1      |                                              |  |  |  |  |  |
|--------------------------------------------------------------------------------|----------|-----------------------------------------------------|----------|--------------------|----|-----------------------|---------------|----------------------------------------------|--|--|--|--|--|
| Procurement Specifications                                                     |          | Manufacturer                                        |          | Nature of Approval |    | Supervising Authority |               | Initial Qualification Date                   |  |  |  |  |  |
| Generic ESCC 3009                                                              |          | ExxeliaTechnologies<br>Chanteloup en Brie<br>France |          | Qualification      |    | CNES                  |               | Oct 2012                                     |  |  |  |  |  |
| Detail ESCC                                                                    |          |                                                     |          | Remarks:           |    |                       |               |                                              |  |  |  |  |  |
| 3009/003, 3009/004, 3009/005, 3009/006, 3009/022, 3009/037, 3009/040, 3009/042 |          |                                                     |          |                    |    |                       |               |                                              |  |  |  |  |  |
| Qualified range:                                                               |          |                                                     |          |                    |    |                       |               |                                              |  |  |  |  |  |
| Style                                                                          | Model    | Detail Spec                                         | Variants | Capacitance Range  |    |                       | Rated Voltage | Tolerance (+%)                               |  |  |  |  |  |
| 0805                                                                           | CEC202S  | 3009/003                                            | 06       | 10                 | to | 2 700                 | 16            | 0.25—0.5 –<br>1 (pF)<br>≥10pF<br>1, 2, 5, 10 |  |  |  |  |  |
|                                                                                | CEC204S  | 3009/040                                            | 02       | 10                 | to | 2 200                 | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 1 800                 | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 1 200                 | 100           |                                              |  |  |  |  |  |
| 1210                                                                           | CEC402S  | 3009/004                                            | 06       | 10                 | to | 15 000                | 16            |                                              |  |  |  |  |  |
|                                                                                | CEC404S  | 3009/040                                            | 04       | 10                 | to | 13 000                | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 10                 | to | 12 000                | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 10                 | To | 6 800                 | 100           |                                              |  |  |  |  |  |
| 1812                                                                           | CEC602S  | 3009/005                                            | 06       | 100                | to | 33 000                | 16            |                                              |  |  |  |  |  |
|                                                                                | CEC604S  | 3009/040                                            | 05       | 100                | to | 30 000                | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 100                | to | 22 000                | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 100                | to | 12 000                | 100           |                                              |  |  |  |  |  |
| 2220                                                                           | CEC702S  | 3009/006                                            | 06       | 470                | to | 68 000                | 16            |                                              |  |  |  |  |  |
|                                                                                | CEC704S  | 3009/040                                            | 06       | 470                | to | 56 000                | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 470                | to | 47 000                | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 470                | to | 27 000                | 100           |                                              |  |  |  |  |  |
| 1206                                                                           | CEC1202S | 3009/022                                            | 06       | 10                 | to | 6 800                 | 16            |                                              |  |  |  |  |  |
|                                                                                | CEC1204S | 3009/040                                            | 03       | 10                 | to | 6 200                 | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 5 600                 | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 3 900                 | 100           |                                              |  |  |  |  |  |
| 0603                                                                           | CEC1402S | 3009/037                                            | 06       | 10                 | to | 1 000                 | 16            |                                              |  |  |  |  |  |
|                                                                                | CEC1404S | 3009/040                                            | 01       | 10                 | to | 680                   | 25            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 560                   | 50            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 1                  | to | 330                   | 100           |                                              |  |  |  |  |  |
| 0402                                                                           | CEC1902S | 3009/042                                            | 06       | 12                 | to | 330                   | 10            |                                              |  |  |  |  |  |
|                                                                                | CEC1904S | 3009/040                                            | 13       | 12                 | to | 120                   | 16            |                                              |  |  |  |  |  |
|                                                                                |          |                                                     |          | 12                 | to | 100                   | 25            |                                              |  |  |  |  |  |
| Operating Temp. Range (°C), -55 to +125                                        |          |                                                     |          |                    |    |                       |               |                                              |  |  |  |  |  |

|                                                  |       |                                     |          |                    |    |                       |               |                            |  |
|--------------------------------------------------|-------|-------------------------------------|----------|--------------------|----|-----------------------|---------------|----------------------------|--|
| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE II  |       |                                     |          |                    |    |                       |               | 110N                       |  |
| Procurement Specifications                       |       | Manufacturer                        |          | Nature of Approval |    | Supervising Authority |               | Initial Qualification Date |  |
| Generic<br>ESCC 3009<br>Detail ESCC              |       | AVX/TPC<br>St Apollinaire<br>France |          | Qualification      |    | CNES                  |               | Feb 1983                   |  |
|                                                  |       |                                     |          | Remarks:           |    |                       |               |                            |  |
| 3009/008, 3009/009, 3009/010, 3009/011, 3009/023 |       |                                     |          |                    |    |                       |               |                            |  |
| Qualified range:                                 |       |                                     |          |                    |    |                       |               |                            |  |
| Style                                            | Model | Detail Spec                         | Variants | Capacitance Range  |    |                       | Rated Voltage | Tolerance (+%)             |  |
| 0805                                             | A_12G | 3009/008                            | 03, 06   | 820                | to | 47 000                | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 820                | to | 27 000                | 50            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 820                | to | 10 000                | 100           | 5, 10, 20                  |  |
| 0805                                             | A612Z | 3009/008                            | 07       | 2 700              | to | 100 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 2 700              | to | 100 000               | 50            |                            |  |
|                                                  |       |                                     |          | 2 700              | To | 47 000                | 100           |                            |  |
|                                                  |       |                                     |          | 330                | to | 15 000                | 200           |                            |  |
| 1210                                             | A_13G | 3009/009                            | 03, 06   | 3 900              | to | 220 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 3 900              | to | 150 000               | 50            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 3 900              | to | 47 000                | 100           | 5, 10, 20                  |  |
| 1210                                             | A613Z | 3009/009                            | 07       | 3 900              | to | 470 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 3 900              | to | 330 000               | 50            |                            |  |
|                                                  |       |                                     |          | 3 900              | to | 220 000               | 100           |                            |  |
|                                                  |       |                                     |          | 680                | to | 68 000                | 200           |                            |  |
| 1812                                             | A_14G | 3009/010                            | 03, 06   | 6 800              | to | 470 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 6 800              | to | 270 000               | 50            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 6 800              | to | 82 000                | 100           | 5, 10, 20                  |  |
| 1812                                             | A614Z | 3009/010                            | 07       | 22 000             | to | 1 000 000             | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 22 000             | to | 680 000               | 50            |                            |  |
|                                                  |       |                                     |          | 22 000             | to | 470 000               | 100           |                            |  |
|                                                  |       |                                     |          | 3 300              | to | 150 000               | 200           |                            |  |
| 2220                                             | A_15G | 3009/011                            | 03, 06   | 18 000             | to | 1 000 000             | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 18 000             | to | 680 000               | 50            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 18 000             | to | 180 000               | 100           | 5, 10, 20                  |  |
| 2220                                             | A615Z | 3009/011                            | 07       | 100 000            | to | 2 200 000             | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 100 000            | To | 1 500 000             | 50            |                            |  |
|                                                  |       |                                     |          | 100 000            | To | 1 000 000             | 100           |                            |  |
|                                                  |       |                                     |          | 6 800              | to | 330 000               | 200           |                            |  |
| 1206                                             | A_20G | 3009/023                            | 03, 06   | 2 200              | to | 100 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 2 200              | to | 68 000                | 50            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 2 200              | to | 22 000                | 100           | 5, 10, 20                  |  |
| 1206                                             | A620Z | 3009/023                            | 07       | 3 300              | to | 220 000               | 25            | 5, 10, 20                  |  |
|                                                  |       |                                     |          | 3 300              | to | 150 000               | 50            |                            |  |
|                                                  |       |                                     |          | 3 300              | To | 100 000               | 100           |                            |  |
|                                                  |       |                                     |          | 470                | to | 47 000                | 200           |                            |  |
| Operating Temperature Range (°C), -55 to +125    |       |                                     |          |                    |    |                       |               |                            |  |

| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE II                                |         |                                                     |          |                    |    |                       | 324Brev1      |                            |  |
|--------------------------------------------------------------------------------|---------|-----------------------------------------------------|----------|--------------------|----|-----------------------|---------------|----------------------------|--|
| Procurement Specifications                                                     |         | Manufacturer                                        |          | Nature of Approval |    | Supervising Authority |               | Initial Qualification Date |  |
| Generic<br>ESCC 3009<br>Detail ESCC                                            |         | ExxeliaTechnologies<br>Chanteloup en Brie<br>France |          | Qualification      |    | CNES                  |               | Oct 2012                   |  |
|                                                                                |         |                                                     |          | Remarks:           |    |                       |               |                            |  |
| 3009/008, 3009/009, 3009/010, 3009/011, 3009/023, 3009/038, 3009/039, 3009/043 |         |                                                     |          |                    |    |                       |               |                            |  |
| Qualified range:                                                               |         |                                                     |          |                    |    |                       |               |                            |  |
| Style                                                                          | Model   | Detail Spec                                         | Variants | Capacitance Range  |    |                       | Rated Voltage | Tolerance (+%)             |  |
| 0805                                                                           | CNC202S | 3009/008                                            | 06       | 6 800              | to | 150 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 6 800              | to | 100 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 100                | to | 47 000                | 50            |                            |  |
|                                                                                |         |                                                     |          | 68                 | to | 10 000                | 100           |                            |  |
|                                                                                |         |                                                     | 07       | 6 800              | to | 220 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 6 800              | to | 150 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 100                | to | 100 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 68                 | to | 47 000                | 100           |                            |  |
| 0805                                                                           | CNC204S | 3009/039                                            | 02       | 6 800              | to | 150 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 6 800              | to | 100 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 100                | to | 47 000                | 50            |                            |  |
|                                                                                |         |                                                     |          | 68                 | to | 10 000                | 100           |                            |  |
|                                                                                |         |                                                     | 14       | 6 800              | to | 390 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 6 800              | to | 150 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 100                | to | 100 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 68                 | to | 47 000                | 100           |                            |  |
| 1210                                                                           | CNC402S | 3009/009                                            | 06       | 33 000             | to | 560 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 33 000             | to | 330 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 220 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 56 000                | 100           |                            |  |
|                                                                                |         |                                                     | 07       | 33 000             | to | 820 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 33 000             | to | 560 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 390 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 220 000               | 100           |                            |  |
|                                                                                | CNC404S | 3009/039                                            | 04       | 33 000             | to | 560 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 33 000             | to | 330 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 220 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 56 000                | 100           |                            |  |
|                                                                                |         |                                                     | 16       | 33 000             | to | 820 000               | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 33 000             | to | 560 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 390 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 2 200              | to | 220 000               | 100           |                            |  |
| 1812                                                                           | CNC602S | 3009/010                                            | 06       | 100 000            | to | 1 200 000             | 16            | 5, 10, 20                  |  |
|                                                                                |         |                                                     |          | 100 000            | to | 680 000               | 25            |                            |  |
|                                                                                |         |                                                     |          | 3 900              | to | 470 000               | 50            |                            |  |
|                                                                                |         |                                                     |          | 3 900              | to | 120 000               | 100           |                            |  |

| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE II |          |          |    |                                        |                      |                                                  | 324Brev1              |           |
|-------------------------------------------------|----------|----------|----|----------------------------------------|----------------------|--------------------------------------------------|-----------------------|-----------|
|                                                 | CNC602S  | 3009/010 | 07 | 100 000<br>100 000<br>3 900<br>3 900   | to<br>to<br>to<br>to | 1 800 000<br>1 200 000<br>820 000<br>470 000     | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 | CNC604S  | 3009/039 | 05 | 100 000<br>100 000<br>3 900<br>3 900   | to<br>to<br>to<br>to | 1 200 000<br>680 000<br>470 000<br>120 000       | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 17 | 100 000<br>100 000<br>3 900<br>3 900   | to<br>to<br>to<br>to | 1 800 000<br>1 200 000<br>820 000<br>470 000     | 16<br>25<br>50<br>100 | 5, 10, 20 |
| 2220                                            | CNC702S  | 3009/011 | 06 | 150 000<br>150<br>22 000<br>22 000     | to<br>to<br>to<br>to | 2 700 000<br>1 500 000<br>1 000 000<br>270 000   | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 07 | 150 000<br>150 000<br>22 000<br>22 000 | to<br>to<br>to<br>to | 3 900 000<br>2 200 000<br>1 800 000<br>1 000 000 | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 | CNC704S  | 3009/039 | 06 | 150 000<br>150<br>22 000<br>22 000     | to<br>to<br>to<br>to | 2 700 000<br>1 500 000<br>1 000 000<br>270 000   | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 18 | 150 000<br>150 000<br>22 000<br>22 000 | to<br>to<br>to<br>to | 3 900 000<br>2 200 000<br>1 800 000<br>1 000 000 | 16<br>25<br>50<br>100 | 5, 10, 20 |
| 1206                                            | CNC1202S | 3009/023 | 06 | 10 000<br>10 000<br>470<br>470         | to<br>to<br>to<br>to | 270 000<br>180 000<br>82 000<br>27 000           | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 07 | 10 000<br>10 000<br>470<br>470         | to<br>to<br>to<br>to | 390 000<br>270 000<br>180 000<br>120 000         | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 | CNC1204S | 3009/039 | 03 | 10 000<br>10 000<br>470<br>470         | to<br>to<br>to<br>to | 270 000<br>180 000<br>82 000<br>27 000           | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 15 | 10 000<br>10 000<br>470<br>470         | to<br>to<br>to<br>to | 1 000 000<br>270 000<br>180 000<br>120 000       | 16<br>25<br>50<br>100 | 5, 10, 20 |
| 0603                                            | CNC1402S | 3009/038 | 06 | 390<br>390<br>10<br>10                 | to<br>to<br>to<br>to | 33 000<br>22 000<br>10 000<br>2 700              | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 |          |          | 07 | 390<br>390<br>10<br>10                 | to<br>to<br>to<br>to | 39 000<br>33 000<br>22 000<br>12 000             | 16<br>25<br>50<br>100 | 5, 10, 20 |
|                                                 | CNC1404S | 3009/039 | 01 | 390<br>390                             | to<br>to             | 33 000<br>22 000                                 | 16<br>25              | 5, 10, 20 |

| CAPACITORS,<br>CERAMIC, FIXED,<br>CHIP, TYPE II |          |          |    |                        |                      |                                       | 324Brev1              |           |
|-------------------------------------------------|----------|----------|----|------------------------|----------------------|---------------------------------------|-----------------------|-----------|
|                                                 |          |          |    | 10<br>10               | to<br>to             | 10 000<br>2 700                       | 50<br>100             |           |
|                                                 |          |          | 13 | 390<br>390<br>10<br>10 | to<br>to<br>to<br>to | 100 000<br>33 000<br>22 000<br>12 000 | 16<br>25<br>50<br>100 | 5, 10, 20 |
| 0402                                            | CNC1902S | 3009/043 | 06 | 68<br>68<br>68         | To<br>To<br>to       | 12 000<br>8 200<br>5 600              | 10<br>16<br>25        | 5, 10, 20 |
|                                                 | CNC1904S | 3009/039 | 25 | 68<br>68<br>68         | To<br>To<br>to       | 12 000<br>8 200<br>5 600              | 10<br>16<br>25        |           |
| Operating Temperature Range (°C), -55 to +125   |          |          |    |                        |                      |                                       |                       |           |

| CAPACITORS, FIXED, CHIP,<br>CERAMIC, TYPE II, HIGH VOLTAGE,<br>BASED ON 1812 and 1825                          |                                              |                       |                          | 264H                             |                   |
|----------------------------------------------------------------------------------------------------------------|----------------------------------------------|-----------------------|--------------------------|----------------------------------|-------------------|
| Procurement<br>Specifications                                                                                  | Manufacturer                                 | Nature of<br>Approval | Supervising<br>Authority | Initial<br>Qualification<br>Date |                   |
| Generic<br><br>ESCC 3009<br><br>Detail ESCC<br>3009/034                                                        | AVX Limited<br>Coleraine<br>Northern Ireland | Qualification         | UK Space<br>Agency       | Feb 2001                         |                   |
|                                                                                                                |                                              | Remarks:              |                          |                                  |                   |
| Qualified Range:<br><br>Variants 01 to 12 are qualified<br>Terminations:<br>Variants 01 to 12: metallised pads |                                              |                       |                          |                                  |                   |
| Style                                                                                                          | Rated Voltage                                | Capacitance Range     |                          |                                  | Tolerance<br>(+%) |
| 1812                                                                                                           | 1.0                                          | 3 900                 | to                       | 22 000                           | 10                |
|                                                                                                                | 2.0                                          | 1 500                 | to                       | 1 800                            | 10                |
|                                                                                                                | 3.0                                          | 820                   | to                       | 1 000                            | 10                |
| 1825                                                                                                           | 1.0                                          | 27 000                | to                       | 56 000                           | 10                |
|                                                                                                                | 2.0                                          | 2 200                 | to                       | 6 800                            | 10                |
|                                                                                                                | 3.0                                          | 820                   | t0                       | 2 700                            | 10                |
| Operating Temperature Range (°C):-55 to +125                                                                   |                                              |                       |                          |                                  |                   |

| CAPACITORS, FIXED, CHIP,<br>BASE METAL ELECTRODE, CERAMIC DIELECTRIC TYPE II,<br>BASED ON TYPE TTP, 0402, 0603, 0805, 1206, 1210, 1812, 2220                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                              |                    |                       | <b>331A</b>                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Manufacturer                                                                                 | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3009</a><br>Detail ESCC<br><a href="#">3009/041</a>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <a href="#">AVX Limited</a><br><a href="#">Coleraine</a><br><a href="#">Northern Ireland</a> | Qualification      | ESA                   | Apr 2015                   |
| Remarks:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                                              |                    |                       |                            |
| <p>Qualified Range:</p> <p>E12 value series</p> <p>Variant 01 0402,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 02 0603,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 03 0805,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 04 1206,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 05 1210,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 06 1812,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Variant 07 2220,<br/>Cn as in Detail specification, 5%, 10%, 20% tolerances, 16V, 25V, 50V, 100V rated</p> <p>Terminations: Cu and Ag-loaded epoxy + Ni barrier+ Sn/Pb plating finish (10% Pb minimum)</p> <p>Operating Temperature Range (°C):-55 to +125</p> |                                                                                              |                    |                       |                            |

6.1.3 Tantalum, (Solid), Fixed, Electrolytic

| CAPACITORS,<br>LEADLESS SURFACE MOUNTED, TANTALUM,<br>SOLID ELECTROLYTE, TYPE TAJ                                                                                                                                                                                                                                                                                                                            |                                                                               |                       |                          | 196H                          |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                | Manufacturer                                                                  | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3012<br>Detail ESCC<br>3012/001                                                                                                                                                                                                                                                                                                                                                              | AVX Czech<br>Republic sro<br>Tantalum Division<br>Lanskroun<br>Czech Republic | Qualification         | ESA                      | Jun 1993                      |
| <p>Remarks:</p> <p>Qualified Range:</p> <p>Variants 01 to 07 and 11 to 17 are qualified</p> <p>Termination finish:</p> <ul style="list-style-type: none"> <li>A and B case sizes are available in NILO only, e.g.,<br/>Variant 01 (A case), Variant 02 (B case)</li> <li>C, D, E case sizes are available as Copper only, e.g.,<br/>Variant 13 (C case), Variant 14 (D case), Variant 17 (E case)</li> </ul> |                                                                               |                       |                          |                               |

| CAPACITORS,<br>LEADLESS SURFACE MOUNTED, TANTALUM,<br>SOLID ELECTROLYTE, TYPE TES |                                                                               |                    |                       | 327B                       |
|-----------------------------------------------------------------------------------|-------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                        | Manufacturer                                                                  | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3012<br>Detail ESCC<br>3012/004                                   | AVX Czech<br>Republic sro<br>Tantalum Division<br>Lanskroun<br>Czech Republic | Qualification      | ESA                   | Oct 2013                   |
| Remarks:                                                                          |                                                                               |                    |                       |                            |

Qualified Range:

Variants 01 to 05. Case styles A (1206), B (1210), C (2312), D (2917), E (2917)

| Capacitance<br>C <sub>n</sub><br>(μF) | Rated Voltage U <sub>R</sub> |        |      |        |        |        |        |        |
|---------------------------------------|------------------------------|--------|------|--------|--------|--------|--------|--------|
|                                       | 6.3V                         | 10V    | 12V  | 16V    | 20V    | 25V    | 35V    | 50V    |
| 1                                     |                              |        |      |        |        | A 3000 |        | B 2000 |
| 3.3                                   |                              |        |      |        | A 2500 |        | B 1000 | C 1000 |
| 4.7                                   |                              |        |      | A 2000 |        | B 1000 | C 600  | D 200  |
| 10                                    |                              | A 1800 |      |        | B 1000 | C 600  | D 120  |        |
| 22                                    | A 900                        |        |      | B 600  | C 400  |        | D 100  |        |
| 33                                    |                              | B 650  |      |        | C 300  | D 65   | E 65   |        |
| 47                                    | B 500                        |        |      | C 350  | D 55   | E 65   |        |        |
| 100                                   |                              | C 200  |      | D 55   | E 45   |        |        |        |
| 150                                   | C 300                        | D 45   |      | E 40   |        |        |        |        |
| 220                                   |                              | D 35   | E 35 |        |        |        |        |        |
| 330                                   | D 35                         | E 35   |      |        |        |        |        |        |
| 470                                   | E 30                         |        |      |        |        |        |        |        |

6.1.4 Fixed Film

| CAPACITORS,<br>FIXED, RECONSTITUTED MICA, HIGH VOLTAGE,<br>BASED ON TYPE HT86PS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                         |                    |                       | 251H                       |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------|-----------------------|----------------------------|------------------------|--|--|-----------|--------|----|----|-------|----|-----|----|----|-------|----|-----|----|----|-------|----|-----|-----|----|-----|----|-----|-----|----|-----|----|-----|-----|----|-----|----|------|-----|----|----|----|------|-----|----|----|----|------|------|----|----|----|------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Manufacturer                                            | Nature of Approval | Supervising Authority | Initial Qualification Date |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| Generic<br>ESCC 3006<br>Detail ESCC<br>3006/022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Exxelia<br>Technologies<br>Chanteloup en Brie<br>France | Qualification      | CNES                  | Aug 1998                   |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| Remarks:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                         |                    |                       |                            |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| <p>Qualified Range:</p> <p>All values defined by the ESCC Detail Specification</p> <table border="1"> <thead> <tr> <th colspan="3">Capacitance Range (nF)</th><th>Tol. (±%)</th><th>UR(kV)</th></tr> </thead> <tbody> <tr> <td>33</td><td>to</td><td>2 200</td><td>10</td><td>1.5</td></tr> <tr> <td>15</td><td>to</td><td>1 500</td><td>10</td><td>2.5</td></tr> <tr> <td>15</td><td>to</td><td>1 000</td><td>10</td><td>3.5</td></tr> <tr> <td>6.8</td><td>to</td><td>470</td><td>10</td><td>5.0</td></tr> <tr> <td>2.2</td><td>to</td><td>220</td><td>10</td><td>7.5</td></tr> <tr> <td>1.0</td><td>to</td><td>100</td><td>10</td><td>10.0</td></tr> <tr> <td>3.3</td><td>to</td><td>68</td><td>10</td><td>12.5</td></tr> <tr> <td>1.5</td><td>to</td><td>33</td><td>10</td><td>15.0</td></tr> <tr> <td>0.68</td><td>to</td><td>15</td><td>10</td><td>20.0</td></tr> </tbody> </table> <p>Operating Temperature Range, (°C): -55 to +125</p> |                                                         |                    |                       |                            | Capacitance Range (nF) |  |  | Tol. (±%) | UR(kV) | 33 | to | 2 200 | 10 | 1.5 | 15 | to | 1 500 | 10 | 2.5 | 15 | to | 1 000 | 10 | 3.5 | 6.8 | to | 470 | 10 | 5.0 | 2.2 | to | 220 | 10 | 7.5 | 1.0 | to | 100 | 10 | 10.0 | 3.3 | to | 68 | 10 | 12.5 | 1.5 | to | 33 | 10 | 15.0 | 0.68 | to | 15 | 10 | 20.0 |
| Capacitance Range (nF)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                         |                    | Tol. (±%)             | UR(kV)                     |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | to                                                      | 2 200              | 10                    | 1.5                        |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | to                                                      | 1 500              | 10                    | 2.5                        |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 15                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | to                                                      | 1 000              | 10                    | 3.5                        |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 6.8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | to                                                      | 470                | 10                    | 5.0                        |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 2.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | to                                                      | 220                | 10                    | 7.5                        |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 1.0                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | to                                                      | 100                | 10                    | 10.0                       |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 3.3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | to                                                      | 68                 | 10                    | 12.5                       |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | to                                                      | 33                 | 10                    | 15.0                       |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |
| 0.68                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | to                                                      | 15                 | 10                    | 20.0                       |                        |  |  |           |        |    |    |       |    |     |    |    |       |    |     |    |    |       |    |     |     |    |     |    |     |     |    |     |    |     |     |    |     |    |      |     |    |    |    |      |     |    |    |    |      |      |    |    |    |      |

| CAPACITORS, FIXED, SURFACE MOUNT, D.C. SELF-HEALING,<br>NON-INDUCTIVE, POLYTEREPHTHALATE, DIELECTRIC,<br>BASED ON TYPE PM94S                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                              |                    |                       | 270F                       |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------|-----------------------|----------------------------|------------------------|--|--|-----------|-------|-----|----|----|----|----|-----|----|----|----|----|------|----|----|----|-----|------|----|-----|----|-----|------|----|-----|----|-----|------|----|-----|----|-----|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Manufacturer                                 | Nature of Approval | Supervising Authority | Initial Qualification Date |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| Generic<br>ESCC 3006                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Exxelia Technologies<br>Marmoutier<br>France | Qualification      | CNES                  | Aug 2002                   |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| Detail<br>ESCC 3006/024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                              | Remarks:           |                       |                            |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| Qualified range:<br><br>E12 series<br>Sizes Available 01, 02, 03, 04<br>Maximum dimensions (mm):<br>01: 10.7 x 10.7 x B<br>02: 15.5 x 15.5 x B<br>03: 16.5 x 15.5 x B<br>04: 18.5 x 17.0 x B<br>Where B= 6, 8, 10, 12, 14, 15 depending on capacitance value<br><br><table><tr><th colspan="3">Capacitance Range (µF)</th><th>Tol. (±%)</th><th>UR(V)</th></tr><tr><td>2.2</td><td>to</td><td>47</td><td>10</td><td>50</td></tr><tr><td>1.5</td><td>to</td><td>22</td><td>10</td><td>63</td></tr><tr><td>0.56</td><td>to</td><td>12</td><td>10</td><td>100</td></tr><tr><td>0.33</td><td>to</td><td>5.6</td><td>10</td><td>200</td></tr><tr><td>0.22</td><td>to</td><td>4.7</td><td>10</td><td>250</td></tr><tr><td>0.10</td><td>to</td><td>1.8</td><td>10</td><td>400</td></tr></table><br>Operating Temperature Range, (°C): -55 to +125 |                                              |                    |                       |                            | Capacitance Range (µF) |  |  | Tol. (±%) | UR(V) | 2.2 | to | 47 | 10 | 50 | 1.5 | to | 22 | 10 | 63 | 0.56 | to | 12 | 10 | 100 | 0.33 | to | 5.6 | 10 | 200 | 0.22 | to | 4.7 | 10 | 250 | 0.10 | to | 1.8 | 10 | 400 |
| Capacitance Range (µF)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                              |                    | Tol. (±%)             | UR(V)                      |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 2.2                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | to                                           | 47                 | 10                    | 50                         |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 1.5                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | to                                           | 22                 | 10                    | 63                         |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 0.56                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | to                                           | 12                 | 10                    | 100                        |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 0.33                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | to                                           | 5.6                | 10                    | 200                        |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 0.22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | to                                           | 4.7                | 10                    | 250                        |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |
| 0.10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | to                                           | 1.8                | 10                    | 400                        |                        |  |  |           |       |     |    |    |    |    |     |    |    |    |    |      |    |    |    |     |      |    |     |    |     |      |    |     |    |     |      |    |     |    |     |

| CAPACITORS,<br>FIXED, SELF-HEALING, NON-INDUCTIVE, PET DIELECTRIC,<br>BASED ON TYPES PM907S AND PM948S                                                            |                                                 |                       |                          | 338                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                     | Manufacturer                                    | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3006                                                                                                                                              | Exxelia<br>Technologies<br>Marmoutier<br>France | Qualification         | CNES                     | Mar 2016                      |
| Detail ESCC<br>3006/025<br>3006/026                                                                                                                               |                                                 | Remarks:              |                          |                               |
| Qualified range:<br><br>All variants in the ESCC Detail specifications 3006/025 and 3006/026 are qualified.<br><br>Operating Temperature Range, (°C): -55 to +125 |                                                 |                       |                          |                               |

6.1.5 Semiconductor

| CAPACITORS,<br>MICROWAVE, SILICON, NAKED DIE, MOS,<br>BASED ON TYPES 101M, 201M, 400M AND 401M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                           |                       |                          | 286D                          |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------|-----------------------|--------------------------|-------------------------------|------|------------------------|--------------------|--------------|-----------------|----|-----------------|--------------------|--------------|------------|--------------|---------|-----------------|----|--------------|--------------------|-----|-----------------|------------|--------------|----------------|----------|---------------|-----|----------|------------------------------------------|-----------------|-------------------------|--------------|----------------|-----------------|------------|----------|-------|-----|----------|-----|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Manufacturer                              | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| Generic<br>ESCC 5010<br>Detail ESCC<br>5711/002                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | COBHAM<br>MICROWAVE<br>Les Ulis<br>France | Qualification         | CNES                     | Dec 2008                      |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                           | Remarks:              |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| Qualified range:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                           |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| All variants defined by the ESCC Detail Specification                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                           |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| <table><tr><th>Type</th><th>Capacitance Range (pF)</th><th>U<sub>R</sub>(V)</th></tr><tr><td>400M106A &amp; C</td><td>8.2, 10, 12, 15</td><td rowspan="5">40</td></tr><tr><td>400M10xA &amp; 107C</td><td>18, 22, 27, 33, 39</td></tr><tr><td>400M108A &amp; C</td><td>47, 56, 68</td></tr><tr><td>400M110A &amp; C</td><td>81, 100</td></tr><tr><td>400M113J &amp; 114J</td><td>10</td></tr><tr><td>101M106A &amp; C</td><td>3.9, 4.7, 5.6, 6.8</td><td rowspan="3">100</td></tr><tr><td>101M10xA &amp; 107C</td><td>10, 12, 15</td></tr><tr><td>101M108A &amp; C</td><td>22, 27, 33, 39</td></tr><tr><td>201M106C</td><td>2.2, 2.7, 3.3</td><td rowspan="5">200</td></tr><tr><td>201M106A</td><td>0.1X (201M106C, -107C, -108C) + 210M106C</td></tr><tr><td>201M10xA &amp; 107C</td><td>3.9, 4.7, 5.6, 6.8, 8.2</td></tr><tr><td>201M108A &amp; C</td><td>10, 12, 15, 18</td></tr><tr><td>201M111J &amp; 112J</td><td>0.25 &amp; 0.4</td></tr><tr><td>401M111J</td><td>0.125</td><td rowspan="2">400</td></tr><tr><td>401M112J</td><td>0.2</td></tr></table> |                                           |                       |                          |                               | Type | Capacitance Range (pF) | U <sub>R</sub> (V) | 400M106A & C | 8.2, 10, 12, 15 | 40 | 400M10xA & 107C | 18, 22, 27, 33, 39 | 400M108A & C | 47, 56, 68 | 400M110A & C | 81, 100 | 400M113J & 114J | 10 | 101M106A & C | 3.9, 4.7, 5.6, 6.8 | 100 | 101M10xA & 107C | 10, 12, 15 | 101M108A & C | 22, 27, 33, 39 | 201M106C | 2.2, 2.7, 3.3 | 200 | 201M106A | 0.1X (201M106C, -107C, -108C) + 210M106C | 201M10xA & 107C | 3.9, 4.7, 5.6, 6.8, 8.2 | 201M108A & C | 10, 12, 15, 18 | 201M111J & 112J | 0.25 & 0.4 | 401M111J | 0.125 | 400 | 401M112J | 0.2 |
| Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Capacitance Range (pF)                    | U <sub>R</sub> (V)    |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 400M106A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 8.2, 10, 12, 15                           | 40                    |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 400M10xA & 107C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 18, 22, 27, 33, 39                        |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 400M108A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 47, 56, 68                                |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 400M110A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 81, 100                                   |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 400M113J & 114J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10                                        |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 101M106A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 3.9, 4.7, 5.6, 6.8                        | 100                   |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 101M10xA & 107C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 10, 12, 15                                |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 101M108A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 22, 27, 33, 39                            |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 201M106C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 2.2, 2.7, 3.3                             | 200                   |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 201M106A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.1X (201M106C, -107C, -108C) + 210M106C  |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 201M10xA & 107C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 3.9, 4.7, 5.6, 6.8, 8.2                   |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 201M108A & C                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 10, 12, 15, 18                            |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 201M111J & 112J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0.25 & 0.4                                |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 401M111J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.125                                     | 400                   |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| 401M112J                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 0.2                                       |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |
| Operating Temperature Range, (°C): -55 to +150                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                           |                       |                          |                               |      |                        |                    |              |                 |    |                 |                    |              |            |              |         |                 |    |              |                    |     |                 |            |              |                |          |               |     |          |                                          |                 |                         |              |                |                 |            |          |       |     |          |     |

## 6.2 CONNECTORS (02)

### 6.2.1 Multipin, Solder Contacts

| CONNECTORS,<br>ELECTRICAL, SOLDER AND WIRE WRAP CONTACTS,<br>RECTANGULAR RECEPTACLE AND PLUG,<br>BASED ON TYPE D*M |                                                                                                                                                                                                   |                    |                       | 71Rev1                     |
|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                         | Manufacturer                                                                                                                                                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic ESCC 3401                                                                                                  | C&K Components<br>Dole<br>France                                                                                                                                                                  | Qualification      | CNES                  | Feb 1981                   |
| Detail ESCC                                                                                                        |                                                                                                                                                                                                   | Remarks            |                       |                            |
| 3401/001, 3401/004, 3401/022, 3401/040, 3401/072, 3401/080                                                         |                                                                                                                                                                                                   |                    |                       |                            |
| Qualified range:                                                                                                   |                                                                                                                                                                                                   |                    |                       |                            |
| Shell Size:                                                                                                        | E, A, B, C, D, F                                                                                                                                                                                  |                    |                       |                            |
| Range of Contacts:                                                                                                 | 9, 15, 25, 37 and 50 size 20 contacts for standard density layout<br>3W3 to 8W8, 5W1 to 47W1 combined contact arrangements<br>15, 26, 44, 62, 78 and 104 size 22 contacts for high density layout |                    |                       |                            |
| Mounting Type:                                                                                                     | Blank: standard mounting holes; Y: floating mount; E: captive nuts                                                                                                                                |                    |                       |                            |
| Range of Connectors:                                                                                               | 3401/001: Variants 01 & 02                                                                                                                                                                        |                    |                       |                            |
| Range of Contacts:                                                                                                 | 3401/004: Variants 01 to 25;<br>3401/022: 01 to 97;<br>3401/040: 01 to 17;<br>3401/080: 01<br>3401/072: Variants 05 to 19, 25 to 39, 46 to 55, 61 to 65, 72, 73, 76 to 80                         |                    |                       |                            |
| Termination type:                                                                                                  | solder bucket, straight PCB, 90° PCB, wire wrap                                                                                                                                                   |                    |                       |                            |
| Coaxial contact arrangements:                                                                                      | 3401/004 variants 01 to 25                                                                                                                                                                        |                    |                       |                            |
| Power contact arrangements:                                                                                        | 3401/040 variants 01 to 17                                                                                                                                                                        |                    |                       |                            |
| Gold-plated non-magnetic coating                                                                                   |                                                                                                                                                                                                   |                    |                       |                            |
| Operating Temperature Range (°C): -55 to +125                                                                      |                                                                                                                                                                                                   |                    |                       |                            |

| CONNECTORS,<br>ELECTRICAL, SOLDER AND WIRE WRAP CONTACTS,<br>NON-REMOVABLE, RECTANGULAR RECEPTACLE AND PLUG,<br>BASED ON TYPE D*M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                   |                    |                       | 155M                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification      | CNES                  | Sep 1988                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                   | Remarks            |                       |                            |
| 3401/001, 3401/022, 3401/072                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                   |                    |                       |                            |
| <p>Qualified range:</p> <p>Complete range as defined in the Detail Specifications are qualified except for:</p> <ul style="list-style-type: none"><li>• high density 104 contacts arrangement</li><li>• coaxial and power contacts and arrangement</li></ul> <p>Range of Connectors:     3401/001: variants 01 to 02</p> <p>Range of Contacts:        Size 20 : 9, 15, 25, 37 and 50 contacts,<br/>Size 22: 15, 26, 44, 62, 78 contacts<br/>3401/022: variants 01 to 16 &amp; 44 to 57 &amp; 65 to 80<br/>3401/072: variants 01 to 65</p> <p>Mounting Type:            blank: standard mounting holes; Y: floating mount; E: captive nuts</p> <p>Gold-plated non-magnetic coating</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                   |                    |                       |                            |

6.2.2 Multipin, Crimp Contacts

| CONNECTORS, ELECTRICAL, CRIMP CONTACTS,<br>RECTANGULAR RECEPTACLE AND PLUG,<br>BASED ON TYPE D*MA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                  |                    |                       | 72Rev1                     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Manufacturer                     | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | C&K Components<br>Dole<br>France | Qualification      | CNES                  | Feb 1981                   |
| Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                  |                    |                       |                            |
| 3401/002, 3401/005, 3401/020, 3401/021                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                  |                    |                       |                            |
| <p>Qualified range:</p> <p>Complete range defined in the corresponding Detail Specifications are qualified.</p> <p>Shell size: E, A, B, C, D, F</p> <p>Range of Connectors: 3401/002: Variants 01 &amp; 02</p> <p>Range of Contacts: 3401/005: variants 01 to 08<br/>3401/020 variants 01 &amp; 02<br/>3401/021: variants 01 &amp; 02</p> <p>9, 15, 25, 37 and 50 size 20* contacts for standard density layout<br/>15, 26, 44, 62, 78 and 104 size 22** contacts for high density layout</p> <p>*Accepts wire sizes :<br/>-AWG # 20 to 24 (standard bucket: variants 01 and 02) per 3401/005<br/>-AWG # 26 and 28 (reduced bucket: variants 03 and 04) per 3401/005<br/>-AWG # 18 and 20 (large bucket: variants 05 to 06) per 3401/005<br/>** Accepts wire sizes<br/>AWG # 22 to 26 (standard bucket: variants 07 to 08) per 3401/005</p> <p>Mounting Type: Blank: standard mounting holes; Y: floating mount; E: captive nuts</p> <p>Connector Savers; For usage with above connector range</p> <p>Gold-plated non-magnetic coating</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                  |                    |                       |                            |

| CONNECTORS AND CONNECTOR SAVER,<br>ELECTRICAL, CRIMP CONTACTS,<br>REMOVABLE RECTANGULAR RECEPTACLE AND PLUG,<br>BASED ON TYPE D*MA,                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                                   |                    |                       | 156L                       |
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| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification      | CNES                  | Sep 1988                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                   | Remarks            |                       |                            |
| 3401/002, 3401/005, 3401/020, 3401/021, 3401/022, 3401/072                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                   |                    |                       |                            |
| <p>Qualified range:</p> <p>Complete range as defined in the Detail Specifications are qualified except for high density 104 contacts arrangement</p> <p>Accessories variants qualified:      3401/022: variants 01 to 16 &amp; 44 to 57 &amp; 65 to 80<br/>3401/072: variants 01 to 65</p> <p>Range of Connectors:      3401/002: variants 01 and 02<br/>3401/005: variants 01 to 08<br/>3401/021 &amp; 022: variants 01 and 02</p> <p>Range of contacts:      9, 15, 25, 37 and 50 contacts size 20 for standard contact arrangements<br/>15, 26, 44, 62, 78 contacts size 22 for high density contact arrangements</p> <p>                                         - Accepts wire sizes AWG # 20 to 24 (standard bucket: variants 01 and 02)<br/>                                         - Accepts wire sizes AWG # 26 and 28 (reduced bucket: variants 03 and 04)<br/>                                         - Accepts wire size AWG# 18 and 20 (large bucket: variants 05 and 06)<br/>                                         - Accepts wire size AWG # 22, 24 and 26 (contact AWG # 22 for high density, contact arrangements, variants 07 and 08)</p> <p>Connector Savers:      For usage with connector range defined above</p> <p>Gold-plated non-magnetic coating</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                   |                    |                       |                            |

| CONNECTORS MINIATURE, ELECTRICAL, CIRCULAR,<br>PUSH-PULL COUPLING, REMOVABLE CRIMP CONTACTS,<br>BASED ON TYPE DBAS                                                                                                                                                                                                                                                                                                                  |                                                |                       |                          | 25Q                           |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                   | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                 | TE Connectivity<br>Deutsch<br>Evreux<br>France | Qualification         | CNES                     | Jul 1979                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                | Remarks               |                          |                               |
| 3401/008, 3401/009, 3401/012, 3401/064                                                                                                                                                                                                                                                                                                                                                                                              |                                                |                       |                          |                               |
| <p>Qualified range:</p> <p>3401/008: Variant 01<br/>3401/009: Variants 01 to 20<br/>3401/012: Variants 01 to 04<br/>3401/064: Variants 01 to 41</p> <p>Circular Multicontact connectors</p> <p>Standard contact arrangements with 3, 7, 12, 19, 27, 37 or 61 contacts in wire size AWG #20</p> <p>Special contact arrangements with contacts size AWG 22, 20, 16, 12 and 8</p> <p>Operating Temperature Range (°C): -65 to +200</p> |                                                |                       |                          |                               |

| CONNECTORS, ELECTRICAL, CIRCULAR,<br>BAYONET COUPLING, SCOOP-PROOF,<br>REMOVABLE CRIMP CONTACTS,<br>BASED ON TYPE MIL-C-38999, SERIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                   |                    |                       | 220J                       |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|-----------------------|----------------------------|--------------|-------------|---|----|---|------|----|------|----|------|----|-----|----|-----|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification      | CNES                  | May 1995                   |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                   | Remarks            |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 3401/052, 3401/058, 3401/062                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                   |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| <p>Qualified range:</p> <p>All connector variants are qualified<br/>For 3401/058, variants 01 to 14 are qualified<br/>For 3401/062, variants 01 to 27 are qualified</p> <p># 20 with standard contact arrangements 3, 6, 10, 19, 26, 32, 41, 53, 61<br/># 22 with high density arrangements 6, 13, 22, 37, 55, 66, 79, 100, 128</p> <table><tr><th>Contact size</th><th>Ratings (A)</th></tr><tr><td>4</td><td>80</td></tr><tr><td>8</td><td>46.0</td></tr><tr><td>12</td><td>23.0</td></tr><tr><td>16</td><td>13.0</td></tr><tr><td>20</td><td>7.5</td></tr><tr><td>22</td><td>5.0</td></tr></table> <p>Other arrangements with contact sizes: 20, 16, 12, 8</p> <p>Receptacle and Plug Shell Sizes: 09, 11, 13, 15, 17, 19, 21, 23, 25</p> <p>Operating Temperature Range (°C): -65 to +200</p> |                                                                   |                    |                       |                            | Contact size | Ratings (A) | 4 | 80 | 8 | 46.0 | 12 | 23.0 | 16 | 13.0 | 20 | 7.5 | 22 | 5.0 |
| Contact size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | Ratings (A)                                                       |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 80                                                                |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 46.0                                                              |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 23.0                                                              |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 13.0                                                              |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 7.5                                                               |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |
| 22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 5.0                                                               |                    |                       |                            |              |             |   |    |   |      |    |      |    |      |    |     |    |     |

| CONNECTORS, ELECTRICAL, CIRCULAR, BAYONET COUPLING,<br>REMOVABLE CRIMP CONTACTS,<br>BASED ON TYPE MIL-C-38999, SERIES II                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                   |                    |                       | 221J                       |              |             |    |      |    |      |    |     |    |     |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|-----------------------|----------------------------|--------------|-------------|----|------|----|------|----|-----|----|-----|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |              |             |    |      |    |      |    |     |    |     |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification      | CNES                  | May 1995                   |              |             |    |      |    |      |    |     |    |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                   | Remarks            |                       |                            |              |             |    |      |    |      |    |     |    |     |
| 3401/044, 3401/045, 3401/062                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                   |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |
| <p>Qualified range:</p> <p>For 3401/044, all variants are qualified<br/>For 3401/045, variants 01 to 08 are qualified<br/>For 3401/062, variants 01 to 27 are qualified</p> <table><tr><th>Contact size</th><th>Ratings (A)</th></tr><tr><td>12</td><td>23.0</td></tr><tr><td>16</td><td>13.0</td></tr><tr><td>20</td><td>7.5</td></tr><tr><td>22</td><td>5.0</td></tr></table> <p># 20 with standard contact arrangements 3, 6, 10, 18, 26, 32, 41, 55, 61<br/># 22 with high density arrangements 6, 13, 22, 37, 55, 66, 79, 100, 128</p> <p>Other arrangements with contact sizes: 20, 16, 12</p> <p>Receptacle and Plug Shell Sizes: 08, 10, 12, 14, 16, 18, 20, 22, 24</p> <p>Operating Temperature Range (°C): -65 to +200</p> |                                                                   |                    |                       |                            | Contact size | Ratings (A) | 12 | 23.0 | 16 | 13.0 | 20 | 7.5 | 22 | 5.0 |
| Contact size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Ratings (A)                                                       |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 23.0                                                              |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 13.0                                                              |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 7.5                                                               |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |
| 22                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 5.0                                                               |                    |                       |                            |              |             |    |      |    |      |    |     |    |     |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|--------------------|-------------|------------------|-------------|---|------|--|--|---|------|----|------|----|------|----|-----|----|------|----|-----|----|-----|--|--|----|-----|--|--|
| CONNECTORS, MINIATURE, ELECTRICAL, CIRCULAR, TRIPLE-START<br>SELF- LOCKING COUPLING, SCOOP-PROOF, REMOVABLE AND NON-<br>REMOVABLE CRIMP CONTACTS<br>BASED ON TYPE MIL-C-38999, SERIES III                                                                                                                                                                                                                                                          |                                                                   |                       |                          | 222J                          |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                      | Manufacturer                                                      | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Generic<br>ESCC 3401<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification         | CNES                     | May 1995                      |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                   | Remarks               |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 3401/056, 3401/058, 3401/062, 3401/066, 3401/070                                                                                                                                                                                                                                                                                                                                                                                                   |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Qualified range:<br><br>3401/056, all variants are qualified<br>3401/058, variants 01 to 14 are qualified<br>3401/062, variants 28 to 54 are qualified<br>3401/066, variants 01 and 02 are qualified<br>3401/058 crimp contacts and<br>3401/066 triax contacts to be mounted on 3401/056 connectors<br>3401/070 connector receptacles with PCB contacts                                                                                            |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| <table><tr><td>Crimp contact size</td><td>Ratings (A)</td><td>PCB contact size</td><td>Ratings (A)</td></tr><tr><td>4</td><td>80.0</td><td></td><td></td></tr><tr><td>8</td><td>46.0</td><td>16</td><td>10.0</td></tr><tr><td>12</td><td>23.0</td><td>20</td><td>5.0</td></tr><tr><td>16</td><td>13.0</td><td>22</td><td>3.0</td></tr><tr><td>20</td><td>7.5</td><td></td><td></td></tr><tr><td>22</td><td>5.0</td><td></td><td></td></tr></table> |                                                                   |                       |                          |                               | Crimp contact size | Ratings (A) | PCB contact size | Ratings (A) | 4 | 80.0 |  |  | 8 | 46.0 | 16 | 10.0 | 12 | 23.0 | 20 | 5.0 | 16 | 13.0 | 22 | 3.0 | 20 | 7.5 |  |  | 22 | 5.0 |  |  |
| Crimp contact size                                                                                                                                                                                                                                                                                                                                                                                                                                 | Ratings (A)                                                       | PCB contact size      | Ratings (A)              |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 4                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 80.0                                                              |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 46.0                                                              | 16                    | 10.0                     |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 23.0                                                              | 20                    | 5.0                      |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 13.0                                                              | 22                    | 3.0                      |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 7.5                                                               |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| 22                                                                                                                                                                                                                                                                                                                                                                                                                                                 | 5.0                                                               |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| #20 with standard contact arrangements (3, 4, 5, 6, 7, 8, 10, 18, 19, 26, 32, 41, 53, 55, 61 contacts)<br>#22 with high density arrangements (6, 13, 22, 37, 55, 66, 79, 100, 128 contacts)                                                                                                                                                                                                                                                        |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Other arrangements with contact sizes:# 20, 16, 12, 8 ,4                                                                                                                                                                                                                                                                                                                                                                                           |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Receptacle and Plug Shell Sizes: 09, 11, 13, 15, 17, 19, 21, 23, 25. Triax contacts                                                                                                                                                                                                                                                                                                                                                                |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |
| Operating Temperature Range (°C): -65 to +200                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                   |                       |                          |                               |                    |             |                  |             |   |      |  |  |   |      |    |      |    |      |    |     |    |      |    |     |    |     |  |  |    |     |  |  |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                   |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|--------------|-------------|---|----|----|----|----|----|----|-----|-----|-----|
| CONNECTORS, MINIATURE, ELECTRICAL, CIRCULAR, TRIPLE-<br>START SELF- LOCKING COUPLING, SCOOP-PROOF, HERMETIC<br>RECEPTACLE AND FEEDTHROUGH<br>BASED ON TYPE MIL-C-38999, SERIES III                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                   |                       |                          | 223H                          |              |             |   |    |    |    |    |    |    |     |     |     |
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Manufacturer                                                      | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |              |             |   |    |    |    |    |    |    |     |     |     |
| Generic<br>ESCC 3401<br>Detail ESCC<br>3401/057                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | SOURIAU<br>Connection<br>Technology<br>Marolles en Brie<br>France | Qualification         | CNES                     | May 1995                      |              |             |   |    |    |    |    |    |    |     |     |     |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                   | Remarks               |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| Qualified range:<br><br>All variants are qualified.<br><br><table><tr><td>Contact size</td><td>Ratings (A)</td></tr><tr><td>8</td><td>33</td></tr><tr><td>12</td><td>17</td></tr><tr><td>16</td><td>10</td></tr><tr><td>20</td><td>5.0</td></tr><tr><td>22D</td><td>3.0</td></tr></table><br># 20 with standard contact arrangements (3, 6, 10, 19, 26, 32, 41, 53, 61 contacts)<br># 22 with high density arrangements (6, 13, 22, 37, 55, 66, 79, 100, 128 contacts)<br><br>Receptacle Shell Sizes: 09, 11, 13, 15, 17, 19, 21, 23, 25<br><br>Receptacle (contacts # 8, 12, 16, 20, 22D) and Feedthrough (contacts # 8, 12, 16, 20, 22D)<br><br>Operating Temperature Range (°C): -65 to +200 |                                                                   |                       |                          |                               | Contact size | Ratings (A) | 8 | 33 | 12 | 17 | 16 | 10 | 20 | 5.0 | 22D | 3.0 |
| Contact size                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Ratings (A)                                                       |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| 8                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 33                                                                |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| 12                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 17                                                                |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| 16                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 10                                                                |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| 20                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | 5.0                                                               |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |
| 22D                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             | 3.0                                                               |                       |                          |                               |              |             |   |    |    |    |    |    |    |     |     |     |

| CONNECTORS, MINIATURE, ELECTRICAL, CIRCULAR, TRIPLE-START<br>SELF- LOCKING COUPLING, SCOOP-PROOF, HERMETIC<br>RECEPTACLE AND FEEDTHROUGH<br>BASED ON TYPE MIL-C-38999, SERIES III                                                                                                                                                                                                                                                                                    |                                                       |                       |                          | <b>288C</b>                   |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                        | Manufacturer                                          | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC <b>3401</b><br>Detail ESCC<br><b>3401/079</b>                                                                                                                                                                                                                                                                                                                                                                                                        | <b>AXON' CABLE<br/>S.A.<br/>Montmirail<br/>France</b> | Qualification         | CNES                     | May 2009                      |
| <p>Remarks</p> <p>Qualified range:</p> <p>Variants 01 to 18 are qualified</p> <p>Variants 01 to 08: Plug 3 and 4 Lugs, Straight and Right Angle with pin contact<br/>Variants 09 to 18: Bulkhead Jacks, 3 and 4 Lugs, Straight and Right Angle with solder contact</p> <p>All cables are 77Ω MIL-STD-1553B Data Bus twisted shielded pairs</p> <p>Working Voltage: 200 Vrms<br/>Rated Current (contact): 1A</p> <p>Operating Temperature Range (°C): -55 to +150</p> |                                                       |                       |                          |                               |

| FAST LOCKING SCREW LOCK ASSEMBLIES<br>FOR RECTANGULAR CONNECTORS 3401/001,<br>3401/002 AND CONNECTOR SAVERS<br>3401/020, 3401/080                        |                                  |                       |                          | 337A                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                            | Manufacturer                     | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401<br>Detail ESCC<br>3401/085                                                                                                          | C&K Components<br>Dole<br>France | Qualification         | CNES                     | Jan 2016                      |
| Remarks                                                                                                                                                  |                                  |                       |                          |                               |
| <p>Qualified range:</p> <p>All Variants are qualified. Variant 06 is mandatory where applicable</p> <p>Operating Temperature Range (°C): -55 to +150</p> |                                  |                       |                          |                               |

6.2.3 For printed Circuit Board

| CONNECTORS,<br>ELECTRICAL, REMOVABLE CONTACTS, CRIMP WIRE-WRAP<br>SOLDER AND SAVER, PRINTED CIRCUIT BOARD,<br>BASED ON TYPE HE 801                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                         |                       |                          | 99P                           |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Manufacturer                                                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | Smiths<br>Interconnect<br>Hypertac Saint-<br>Aubin-Lès-Elbeuf<br>France | Qualification         | CNES                     | Nov 1982                      |
| Detail ESCC<br>3401/016<br>3401/017                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                         | Remarks               |                          |                               |
| <p>Qualified range:</p> <p>All Variants are qualified.</p> <p>Shell specifications and sizes: 3401/016</p> <p>Contacts:           3401/017 Crimp wire-wrap solder and savers, 1 to 22 and 64 to 70</p> <p>                          2 rows: 17, 29, 41, 53, 65, 72, 84, 96, 120 contacts</p> <p>                          3 rows: 62, 80, 98, 160 contacts</p> <p>                          Ratings: 5 A (1 contact AWG 22)</p> <p>                                  1.5 A (&gt;31 contacts, AWG 22)</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                         |                       |                          |                               |

| CONNECTORS,<br>ELECTRICAL, NON-REMOVABLE SOLDER AND WIRE-WRAP<br>CONTACTS AND SAVERS, PRINTED CIRCUIT BOARD,<br>BASED ON TYPE KMC |                                                                         |                       |                          | 149M                          |
|-----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                     | Manufacturer                                                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401<br>Detail ESCC<br>3401/039                                                                                   | Smiths<br>Interconnect<br>Hypertac Saint-<br>Aubin-Lès-Elbeuf<br>France | Qualification         | CNES                     | Mar 1987                      |
|                                                                                                                                   |                                                                         | Remarks               |                          |                               |
| Qualified range:                                                                                                                  |                                                                         |                       |                          |                               |
| Contacts: 3 rows contacts: 26, 44, 62, 80, 98, 144<br>Contact codes: 10, 30, 31, 40, 50, 51 and 91<br>Ratings: 2 A (1 contact)    |                                                                         |                       |                          |                               |
| Guiding and locking devices codes: 110, 121, 143, 201, 202, 204, 206, 703                                                         |                                                                         |                       |                          |                               |
| Operating Temperature Range (°C): -55 to +125                                                                                     |                                                                         |                       |                          |                               |

|                                                                                                                                                                                                                                                           |                                                                         |                       |                          |                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| CONNECTORS AND SAVERS, ELECTRICAL,<br>RECTANGULAR, NON-REMOVABLE,<br>PRINTED CIRCUIT BOARD,<br>BASED ON TYPE MHD                                                                                                                                          |                                                                         |                       |                          | 250H                          |
| Procurement<br>Specifications                                                                                                                                                                                                                             | Manufacturer                                                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401                                                                                                                                                                                                                                      | Smiths<br>Interconnect<br>Hypertac Saint-<br>Aubin-Lès-Elbeuf<br>France | Qualification         | CNES                     | Aug 1998                      |
| Detail ESCC<br>3401/065                                                                                                                                                                                                                                   |                                                                         | Remarks               |                          |                               |
| Qualified range:<br><br>Contacts: 52, 100, 152, 200, 252, 300, 352 and 400<br>Codes: 10, 11, 12, 30, 31, 43, 45, 47 and 91<br><br>Guiding and Locking Devices Codes: 110, 111, 121, 124, 134 and 201<br><br>Operating Temperature Range (°C): -55 to +125 |                                                                         |                       |                          |                               |

| CONNECTORS,<br>ELECTRICAL, CRIMP CONTACTS, Z-AXIS INTERPOSER,<br>PRINTED CIRCUIT BOARD,<br>BASED ON TYPE RX                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                         |                       |                          | 281E                          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Manufacturer                                                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401<br>Detail ESCC<br>3401/076                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Smiths<br>Interconnect<br>Hypertac Saint-<br>Aubin-Lès-Elbeuf<br>France | Qualification         | CNES                     | Aug 1998                      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                                         | Remarks               |                          |                               |
| <p>Qualified range:</p> <p>All design envelops specified in Table 1(a) of ESCC Detail Specification are qualified</p> <p>Max number of rows: 11<br/>Max number of contacts: 660</p> <p>Locking and Guiding Devices: -Through holes only<br/>-M2 studs with locking nuts and washers<br/>-Locating pins not available</p> <p>Rated current: 1A each contact</p> <p>Total contact compression range: 0.1 to 0.65 mm per contact</p> <p>Compression force: 1.6N per contact</p> <p>Torque for locking devices: 10 N-cm</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                         |                       |                          |                               |

6.2.4 RF Coaxial

| CONNECTORS,<br>RF, COAXIAL, SOLDER AND CRIMP CONTACTS, MALE, FEMALE<br>ADAPTORS AND CONNECTING PIECES,<br>BASED ON TYPE SMA                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                  |                       |                          | 68P                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Manufacturer                                     | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3402                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | RADIALL<br>Saint-Quentin-<br>Fallavier<br>France | Qualification         | CNES                     | Feb 1981                      |
| Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                  | Remarks               |                          |                               |
| 3402/001, 3402/002, 3402/003                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                  |                       |                          |                               |
| <p>Qualified range:</p> <p>3402/001 Pin contact (Plug). Variants 01 to 47 (except 11, 19, 31 –not in use)</p> <p>3402/002 socket contact (Receptacle). Variants 01 to 85 (except 33, 35, 52 –not in use)</p> <p>3402/003 Adapters. Variants 01 to 14</p> <p>Frequency Range 0-18 GHz</p> <p>Crimp or solder type contact for flexible and semi-rigid cables, contacts for micro strip</p> <p>Shell material and finish: Beryllium copper gold plated, copper or nickel underplate; stainless steel, electro- passivated or gold plated.</p> <p>Operating Temperature Range (°C): See Detail Specifications</p> |                                                  |                       |                          |                               |

| CONNECTORS,<br>RF, COAXIAL, SOLDER AND CRIMP CONTACTS, MALE, FEMALE<br>ADAPTORS AND CONNECTING PIECES,<br>BASED ON TYPE SMA 2.9                                                                                                                                                                                                                                                                                                                                     |                                                 |                       |                          | 283E                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                       | Manufacturer                                    | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3402                                                                                                                                                                                                                                                                                                                                                                                                                                                | RADIAL<br>Saint-Quentin-<br>Fallavier<br>France | Qualification         | CNES                     | Dec 2007                      |
| Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                 | Remarks               |                          |                               |
| 3402/021, 3402/022, 3402/023                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                 |                       |                          |                               |
| <p>Qualified range:</p> <p>3402/021 Pin contact (Plug). Variants 01 to 05 and 07<br/>3402/022 Socket contact (Receptacle). Variants 01 to 05<br/>3402/023 Adapters. Variants 01 to 06</p> <p>Frequency Range 0-40 GHz<br/>50 Ohms</p> <p>Crimp or solder type contact for flexible and semi-rigid cables, contacts for micro strip</p> <p>Shell material and finish: passivated amagnetic stainless steel.</p> <p>Operating Temperature Range (°C): -65 to +165</p> |                                                 |                       |                          |                               |

| CONNECTORS,<br>RF, COAXIAL, SOLDER AND CRIMP CONTACTS, MALE, FEMALE<br>ADAPTORS AND CONNECTING PIECES,<br>BASED ON TYPES SMA, SMA 2.92 TNC and SMP                                                                                                                                                                                                                                        |                                      |                       |                          | 329A                          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                             | Manufacturer                         | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3402<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                       | Rosenberger<br>Fridolfing<br>Germany | Qualification         | DLR                      | Dec 2013                      |
|                                                                                                                                                                                                                                                                                                                                                                                           |                                      | Remarks               |                          |                               |
| 3402/001, 3402/002, 3402/003 (SMA range)<br>3402/008, 3402/009, 3402/010 (TNC range)<br>3402/021, 3402/022, 3402/023 (SMA 2.9 range)<br>3402/024, 3402/025, 3402/026 (SMP range)                                                                                                                                                                                                          |                                      |                       |                          |                               |
| Qualified range:<br><br>3402/001: 1 to 10, 12 to 18, 20 to 30, 32 to 35, 37 to 47<br>3402/002: 1 to 24, 27 to 32, 34, 36 to 51, 53 to 61, 65 to 71<br>3402/003: 1 to 6, 8 to 14<br>3402/008: 1 to 7;<br>3402/009: 1 to 5;<br>3402/010: 1 to 5<br>3402/021: 1 to 5, 7;<br>3402/022: 1 to 5;<br>3402/023: 1 to 6<br>3402/024: 1 to 26, 28 to 35;<br>3402/025: 1 to 14;<br>3402/026: 1 to 13 |                                      |                       |                          |                               |

|                                                                                                                                                                                                                                                                 |                                              |                    |                       |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------|--------------------|-----------------------|----------------------------|
| CONNECTORS,<br>RF COAXIAL TNC,<br>VERY HIGH POWER, 50 OHMS,<br>BASED ON TYPE TNC-VHP                                                                                                                                                                            |                                              |                    |                       | 350                        |
| Procurement Specifications                                                                                                                                                                                                                                      | Manufacturer                                 | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic ESCC 3402                                                                                                                                                                                                                                               | RADIALL<br>Saint-Quentin-Fallavier<br>France | Qualification      | CNES                  | Jan 2018                   |
| Detail ESCC                                                                                                                                                                                                                                                     |                                              | Remarks            |                       |                            |
| 3402/027, 3402/028                                                                                                                                                                                                                                              |                                              |                    |                       |                            |
| Qualified range:<br>3402/027 Variants 01 & 02<br>3402/028 Variants 01 to 06<br><br>Frequency Range 0-8 GHz designed for RF Power Applications<br><br>Panel connectors, straight and right angle adaptators<br><br>Operating Temperature Range (°C): -65 to +165 |                                              |                    |                       |                            |

6.2.5 Microminiature, Crimp Contacts

| CONNECTORS,<br>ELECTRICAL, RECTANGULAR, MICROMINIATURE,<br>CRIMP CONTACT,<br>BASED ON TYPE MDM                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                     |                                                                                |                          | 140P                          |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------------------------------------------------------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Manufacturer                        | Nature of<br>Approval                                                          | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | C&K<br>COMPONENTS<br>Dole<br>France | Qualification                                                                  | CNES                     | Oct 1986                      |
| Detail<br>ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                     | Remarks<br>3401/029 termination types GMR7580 and<br>CMR7590 are NOT qualified |                          |                               |
| 3401/029, 3401/041, 3401/032, 3401/087                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                     |                                                                                |                          |                               |
| Qualified range:<br><br>3401/029: 01 and 02<br>3401/041: 01 to 07<br>3401/032: 03, 04, 07 to 17<br>3401/087: 01 to 56<br><br>Layout: 9 - 15 - 21- 25 - 31 - 37 - 51 Contacts,<br>Non removable crimp contacts<br><br>Termination types: AWG 25: Uninsulated rigid wire.<br>Bent and straight PCB - Max rated: 2.5 A<br>AWG 26: ESCC 390101302, ESCC 390100256, ESCC 390101203<br>- Max rated: 2.5 A<br>AWG 28: ESCC 390101301, ESCC 390100261, ESCC 390101202<br>- Max rated: 1.5 A<br>Solder bucket – Max rated 2.5 A<br><br>Nickel or Gold Plated Shells<br><br>Operating Temperature Range (°C): -55 to +125 |                                     |                                                                                |                          |                               |

| CONNECTORS,<br>ELECTRICAL, MICROMINIATURE,<br>CRIMP CONTACT, SINGLE-IN-LINE,<br>BASED ON TYPE MTB                                                                                                                                           |                                     |                       |                          | 141P                          |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                               | Manufacturer                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401<br>Detail ESCC<br>3401/031                                                                                                                                                                                             | C&K<br>COMPONENTS<br>Dole<br>France | Qualification         | CNES                     | Oct 1986                      |
| Remarks<br>3401/029 termination types GMR7580 and<br>CMR7590 are NOT qualified                                                                                                                                                              |                                     |                       |                          |                               |
| Qualified range: 3401/031: 01 and 02                                                                                                                                                                                                        |                                     |                       |                          |                               |
| Insulator sizes: 5 through 50 contacts,                                                                                                                                                                                                     |                                     |                       |                          |                               |
| Termination types: AWG 25: Uninsulated rigid wire. Bent PCB - Max rated: 2.5 A<br>AWG 26: ESCC 390101302 - Max rated: 2.5 A<br>AWG 28: ESCC 390101301 - Max rated: 1.5 A<br>Solder bucket – Max rated 2.5 A<br>Non removable crimp contacts |                                     |                       |                          |                               |
| Operating Temperature Range (°C): -55 to +125                                                                                                                                                                                               |                                     |                       |                          |                               |

| CONNECTORS,<br>ELECTRICAL, RECTANGULAR, MICROMINIATURE, REMOVABLE<br>CRIMP CONTACT,<br>BASED ON TYPE MDMA |                                     |                       |                          | 290D                          |
|-----------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                             | Manufacturer                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401                                                                                      | C&K<br>COMPONENTS<br>Dole<br>France | Qualification         | CNES                     | Jun 2009                      |
| Detail ESCC<br>3401/077<br>3401/078                                                                       |                                     | Remarks               |                          |                               |
| Qualified range: All variants are qualified                                                               |                                     |                       |                          |                               |
| Range of Contacts: 9, 15, 21, 25, 31, 37, 51                                                              |                                     |                       |                          |                               |
| Accepts wires AWG 24, AWG 26, AWG 28 and 2xAWG 28 in crimping barrel AWG 24                               |                                     |                       |                          |                               |
| Accepts wires AWG 26 and 28 in crimping barrel AWG 26                                                     |                                     |                       |                          |                               |
| Max. rating for 1 isolated contact:                                                                       |                                     |                       |                          |                               |
| AWG 24 wire: 3.5 A                                                                                        |                                     |                       |                          |                               |
| AWG 26 wire and uninsulated AWG 25 solid wire: 2.5 A                                                      |                                     |                       |                          |                               |
| AWG 28 wire: 1.5 A                                                                                        |                                     |                       |                          |                               |
| Working Voltage (Max.) 150Vrms                                                                            |                                     |                       |                          |                               |
| Nickel or Gold Plated Shells                                                                              |                                     |                       |                          |                               |
| Operating Temperature Range (°C): -55 to +125                                                             |                                     |                       |                          |                               |

| CONNECTORS,<br>ELECTRICAL, RECTANGULAR, MICROMINIATURE, REMOVABLE<br>AND NON- REMOVABLE, GAUGE 26, PCB PIN CONTACT,<br>BASED ON TYPE 8MCG                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                   |                       |                          | 301C                          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Manufacturer                                                      | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 3401                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | SOURIAU<br>CONNECTION<br>TECHNOLOGY<br>Marolles en Brie<br>France | Qualification         | CNES                     | Jun 2010                      |
| Detail<br>ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                   | Remarks               |                          |                               |
| 3401/081, 3401/082, 3401/083, 3401/084                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                   |                       |                          |                               |
| <p>Qualified range:</p> <p>3401/081: Shell variant 01 (glass-fibre reinforced thermoplastic), variant 02 (aluminium alloy).</p> <p>Contacts arrangements: 7, 13, 25, 51, 104 contacts.<br/>Contacts termination: OL3 (straight PCB), 1A7N (900 PCB 2.54mm spacing), 1B7N (900 PCB 2.54mm spacing).<br/>Gold-plated shells.</p> <p>3401/082: Shell variant 01 (glass-fibre reinforced thermoplastic), variant 02 (aluminium alloy).</p> <p>Contacts arrangements: 7, 13, 25, 51, 104 contacts.</p> <p>3401/083: Contacts variant 01 (male crimp barrel 26), 02 (female crimp barrel 26), 03 (male crimp barrel 24), 04 (female crimp barrel 24).</p> <p>Accepts wires AWG 24, 26, 28</p> <p>3401/084: Accessories variants 01 to 62.</p> <p>Operating Temperature Range (°C): -55 to +125</p> |                                                                   |                       |                          |                               |

6.3 CRYSTALS (03)

| CRYSTALS, TO-5 CAN                                                                                                                                                                                                                                       |                                             |                                                                                                                                                                                                                                                        |                       | 333A                       |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                               | Manufacturer                                | Nature of Approval                                                                                                                                                                                                                                     | Supervising Authority | Initial Qualification Date |
| Generic<br><br>ESCC 3501<br><br>Detail ESCC<br><br>3501/018                                                                                                                                                                                              | RAKON France<br>Pont Sainte Marie<br>France | Qualification                                                                                                                                                                                                                                          | CNES                  | Sept 2015                  |
|                                                                                                                                                                                                                                                          |                                             | Previously qualified in Argenteuil site                                                                                                                                                                                                                |                       | (Oct. 1979)                |
|                                                                                                                                                                                                                                                          |                                             | Remarks<br>Upon receipt of a request for any retired Variant, the Manufacturer will allocate a new Specific Crystal Identification Number in accordance with 3501/018. It will have identical crystal characteristics to those of the retired variant. |                       |                            |
| Qualified range:<br><br>All variants are qualified.<br><br>Types covered by similarity:<br><br>All variants previously specified in (retired) specifications:<br>3501/001, 3501/008, 3501/011, 3501/012<br><br>TO-5 Can (T 807)<br><br>Frequency Ranges: |                                             |                                                                                                                                                                                                                                                        |                       |                            |
|                                                                                                                                                                                                                                                          | AT (MHz)                                    | SC (MHz)                                                                                                                                                                                                                                               |                       |                            |
| P1                                                                                                                                                                                                                                                       | 14 to 35                                    | 15 to 38                                                                                                                                                                                                                                               |                       |                            |
| P3                                                                                                                                                                                                                                                       | 20 to 100                                   | 22 to 110                                                                                                                                                                                                                                              |                       |                            |
| P5                                                                                                                                                                                                                                                       | 45 to 140                                   | 55 to 140                                                                                                                                                                                                                                              |                       |                            |

| CRYSTALS, TO-8 CAN                                                                                                                                                                                                                 |                                             |                                                                                                                                                                                                                                                        |                       | 334A                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                         | Manufacturer                                | Nature of Approval                                                                                                                                                                                                                                     | Supervising Authority | Initial Qualification Date |
| Generic<br><br>ESCC 3501<br><br>Detail ESCC<br><br>3501/019                                                                                                                                                                        | RAKON France<br>Pont Sainte Marie<br>France | Qualification                                                                                                                                                                                                                                          | CNES                  | Sept 2015                  |
|                                                                                                                                                                                                                                    |                                             | Previously qualified in Argenteuil site                                                                                                                                                                                                                |                       | (Oct. 1979)                |
|                                                                                                                                                                                                                                    |                                             | Remarks<br>Upon receipt of a request for any retired Variant, the Manufacturer will allocate a new Specific Crystal Identification Number in accordance with 3501/019. It will have identical crystal characteristics to those of the retired variant. |                       |                            |
| Qualified range:<br><br>All variants are qualified.<br><br>Types covered by similarity:<br><br>All variants previously specified in (retired) specifications: 3501/002, 3501/009<br><br>TO-8 Can (T 1507)<br><br>Frequency Ranges: |                                             |                                                                                                                                                                                                                                                        |                       |                            |
|                                                                                                                                                                                                                                    |                                             | AT (MHz)                                                                                                                                                                                                                                               | SC (MHz)              |                            |
| P1                                                                                                                                                                                                                                 |                                             | 3 to 20                                                                                                                                                                                                                                                | 3 to 22               |                            |
| P3                                                                                                                                                                                                                                 |                                             | 10 to 30                                                                                                                                                                                                                                               | 10 to 33              |                            |
| P5                                                                                                                                                                                                                                 |                                             | 15 to 65                                                                                                                                                                                                                                               | 16 to 71              |                            |

6.4 DIODES (04)

6.4.1 Switching

| DIODES, SWITCHING,<br>BASED ON TYPE 1N6640U AND 1N6642U     |                                        |                       |                          | 311C                          |        |
|-------------------------------------------------------------|----------------------------------------|-----------------------|--------------------------|-------------------------------|--------|
| Procurement<br>Specifications                               | Manufacturer                           | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |        |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5101/026<br>5101/027 | STmicroelectronics<br>Rennes<br>France | Qualification         | CNES                     | May 2011                      |        |
|                                                             |                                        | Remarks               |                          |                               |        |
| Qualified range:                                            |                                        |                       |                          |                               |        |
| Type                                                        | Variants                               | V <sub>BR</sub> (V)   | V <sub>RWM</sub> (V)     | I <sub>FSM</sub> (A)          | Case   |
| 1N6640U                                                     | 07, 08                                 | 75                    | 75                       | 2                             | LCC2-D |
| 1N6642U                                                     | 07, 08                                 | 100                   | 100                      | 2                             | LCC2-D |
| Operating Temperature Range (°C): -65 to +175               |                                        |                       |                          |                               |        |

### 6.4.2 Power Rectifier

| DIODES, POWER RECTIFIER,<br>BASED ON TYPES 1N5806U AND 1N5811U                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                        |                       |                          |                               | 297D        |        |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------|--------------------------|-------------------------------|-------------|--------|------|------|----------|------------|-------------|-------------|------|----------|---------|--------|-----|-----|----|--------|----------|---------|--------|-----|-----|-----|--------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Manufacturer                           | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |             |        |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
| Generic<br>ESCC 5000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | STmicroelectronics<br>Rennes<br>France | Qualification         | CNES                     | Nov 2009                      |             |        |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
| Detail ESCC<br>5101/013<br>5101/014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                        | Remarks               |                          |                               |             |        |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
| <p>Qualified range:</p> <table border="1"> <thead> <tr> <th>ESCC</th> <th>Type</th> <th>Variants</th> <th>VBR<br/>(V)</th> <th>VRWM<br/>(V)</th> <th>IFSM<br/>(A)</th> <th>Case</th> </tr> </thead> <tbody> <tr> <td>5101/014</td> <td>1N5806U</td> <td>13, 14</td> <td>160</td> <td>150</td> <td>33</td> <td>LCC2-A</td> </tr> <tr> <td>5101/013</td> <td>1N5811U</td> <td>11, 12</td> <td>160</td> <td>150</td> <td>100</td> <td>LCC2-B</td> </tr> </tbody> </table> <p>Operating Temperature Range (°C): -65 to +175</p> |                                        |                       |                          |                               |             |        | ESCC | Type | Variants | VBR<br>(V) | VRWM<br>(V) | IFSM<br>(A) | Case | 5101/014 | 1N5806U | 13, 14 | 160 | 150 | 33 | LCC2-A | 5101/013 | 1N5811U | 11, 12 | 160 | 150 | 100 | LCC2-B |
| ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | Type                                   | Variants              | VBR<br>(V)               | VRWM<br>(V)                   | IFSM<br>(A) | Case   |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
| 5101/014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1N5806U                                | 13, 14                | 160                      | 150                           | 33          | LCC2-A |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |
| 5101/013                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 1N5811U                                | 11, 12                | 160                      | 150                           | 100         | LCC2-B |      |      |          |            |             |             |      |          |         |        |     |     |    |        |          |         |        |     |     |     |        |

| DIODES, POWER SCHOTTKY,<br>BASED ON TYPES 1N5819U AND 1N5822U                                           |                                        |                       |                          | 302C                          |                  |
|---------------------------------------------------------------------------------------------------------|----------------------------------------|-----------------------|--------------------------|-------------------------------|------------------|
| Procurement<br>Specifications                                                                           | Manufacturer                           | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |                  |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5106/020<br>5106/021                                             | STmicroelectronics<br>Rennes<br>France | Qualification         | CNES                     | Sep 2010                      |                  |
|                                                                                                         |                                        | Remarks               |                          |                               |                  |
| Qualified range:<br><br>Variants 01 and 02 of 5106/020 and Variants 02 and 03 of 5106/021 are qualified |                                        |                       |                          |                               |                  |
| Type                                                                                                    | VRWM (V)                               | dV/dt (V/μs)          | IR (μA)<br>@VR=40        | IFSM (A)                      | IO (A) @<br>Tamb |
| 1N5819U                                                                                                 | 40                                     | 10 000                | 15 (DC)                  | 25                            | 1                |
| 1N5822U                                                                                                 | 40                                     | 10 000                | 80 (pulse)               | 80                            | 3                |
| Package Type: LCC2-B                                                                                    |                                        |                       |                          |                               |                  |
| Operating Temperature Range (°C): -65 to +150                                                           |                                        |                       |                          |                               |                  |

| DIODES, POWER, SCHOTTKY BARRIER,<br>BASED ON TYPE STPS20100 |                                        |                      |                       | 272G                       |
|-------------------------------------------------------------|----------------------------------------|----------------------|-----------------------|----------------------------|
| Procurement Specifications                                  | Manufacturer                           | Nature of Approval   | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 5000<br>Detail ESCC                         | STmicroelectronics<br>Rennes<br>France | Qualification        | CNES                  | Nov 2002                   |
|                                                             |                                        | Remarks              |                       |                            |
| 5106/016, 5106/017, 5106/018, 5106/019                      |                                        |                      |                       |                            |
| Qualified range:                                            |                                        |                      |                       |                            |
| ESCC Comp. No.                                              | Variants                               | Package types        | Based on              | Test Vehicles              |
| 5106/016                                                    | 05, 06. 07, 11                         | TO-254, SMD0.5, SMD1 | STPS20100             | 33125118ZR                 |
| 5106/017                                                    | 01, 02                                 | SMD0.5               | STPS1045S             | 33125209ZN                 |
| 5106/018                                                    | 02                                     | SMD1                 | STPS6045              |                            |
| 5106/019                                                    | 03, 05                                 | TO254, SMD1          | STPS40100             |                            |
| Maximum Ratings for 5106/016                                |                                        |                      |                       |                            |
|                                                             |                                        | VRRM                 | 100 V                 |                            |
|                                                             |                                        | Io                   | 2 x 20 A              |                            |
|                                                             |                                        | dV/dt                | 10000 V/μs            |                            |
|                                                             |                                        | Tj                   | + 175 °C              |                            |

|                                                                                                                                                                                                                              |                                                 |                       |                          |                               |      |       |    |                                                 |    |          |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-----------------------|--------------------------|-------------------------------|------|-------|----|-------------------------------------------------|----|----------|
| DIODES, SILICON, POWER RECTIFIER,<br>HIGH EFFICIENCY, FAST RECOVERY,<br>BASED ON TYPES BYW81 AND BYV54                                                                                                                       |                                                 |                       |                          | 274F                          |      |       |    |                                                 |    |          |
| Procurement<br>Specifications                                                                                                                                                                                                | Manufacturer                                    | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |      |       |    |                                                 |    |          |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5103/029<br>5103/031                                                                                                                                                                  | STmicroelectronics<br>Rennes<br>France          | Qualification         | CNES                     | Aug 2003                      |      |       |    |                                                 |    |          |
| Remarks                                                                                                                                                                                                                      |                                                 |                       |                          |                               |      |       |    |                                                 |    |          |
| Qualified range:<br><br>5103/029 variants 05, 07 and 08 are qualified (types BYW81-200)<br>5103/031 variant 02 to 05 are qualified (types BYV54-200)<br><br>Package Types: TO254, TO254AA and SMD0.5.<br><br>Maximum Ratings |                                                 |                       |                          |                               |      |       |    |                                                 |    |          |
| <table><tr><td>VRRM</td><td>200 V</td></tr><tr><td>Io</td><td>40 A for BYV 54-200, 15 and 30 A for BYW-81-200</td></tr><tr><td>Tj</td><td>+ 150 °C</td></tr></table>                                                         |                                                 |                       |                          |                               | VRRM | 200 V | Io | 40 A for BYV 54-200, 15 and 30 A for BYW-81-200 | Tj | + 150 °C |
| VRRM                                                                                                                                                                                                                         | 200 V                                           |                       |                          |                               |      |       |    |                                                 |    |          |
| Io                                                                                                                                                                                                                           | 40 A for BYV 54-200, 15 and 30 A for BYW-81-200 |                       |                          |                               |      |       |    |                                                 |    |          |
| Tj                                                                                                                                                                                                                           | + 150 °C                                        |                       |                          |                               |      |       |    |                                                 |    |          |
| Operating Temperature Range (°C): -55 to +150                                                                                                                                                                                |                                                 |                       |                          |                               |      |       |    |                                                 |    |          |

6.4.3 RF/Microwave, Silicon Schottky

| DIODES, MICROWAVE, SILICON, SCHOTTKY, GENERAL PURPOSE, BASED ON TYPES BAS 40, BAS 70, AND MICROWAVE, SILICON, PIN, BASED ON TYPES BXY42, BXY43 AND BXY44                                  |                                                         |                    |                       | <b>227F</b>                |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                | Manufacturer                                            | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <b>5010</b><br>Detail ESCC                                                                                                                                                | <b>INFINEON Technologies AG</b><br>Neubiberg<br>Germany | Qualification      | DLR                   | Sep 1995                   |
| Remarks<br>Revision F includes devices previously qualified under Certificates 224 and 236.                                                                                               |                                                         |                    |                       |                            |
| <b>5512/020, 5513/017, 5513/030</b>                                                                                                                                                       |                                                         |                    |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 and 03 are qualified (5512/020)</p> <p>Variants 01 and 02 are qualified (5513/017)</p> <p>Variants 01, 02, 05, and 06 are qualified (5513/030)</p> |                                                         |                    |                       |                            |

6.4.4 RF/Microwave, Varactors

| DIODES,<br>MICROWAVE, SILICON, PIN AND VARACTORS                                                             |                                                                                                                                                                             |                    |                       | 200H                       |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                   | Manufacturer                                                                                                                                                                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic                                                                                                      | API Technologies<br>RF2M<br>Milton Keynes<br>England                                                                                                                        | Qualification      | UK Space Agency       | Dec 1993                   |
| ESCC 5010<br>Detail ESCC                                                                                     |                                                                                                                                                                             | Remarks            |                       |                            |
| 5513/007, 5513/009, 5513/010, 5513/014, 5513/015, 5512/001, 5512/003, 5512/004, 5512/005, 5512/006, 5512/007 |                                                                                                                                                                             |                    |                       |                            |
| Qualified range:                                                                                             |                                                                                                                                                                             |                    |                       |                            |
| ESCC Spec No.                                                                                                | Component Type                                                                                                                                                              |                    |                       |                            |
| 5513/007                                                                                                     | ML4207 to ML 4209, variants 01-03, 06, 08-13, 17, 19, 21-27, 30, 32-37, 41, 43, 45-51, 54, 56-61, 65, 67, 69-72                                                             |                    |                       |                            |
| 5513/009                                                                                                     | ML4610, ML4617 to ML4619, variants 01-03, 06, 08-13, 17, 19, 21-23, 25-28, 31, 33-38, 42, 44, 46-48, 50-53, 56, 58-63, 67, 69, 71-73, 75-78, 81, 83-88, 92, 94, 96-99       |                    |                       |                            |
| 5513/010                                                                                                     | ML4611, ML4612, ML4614, ML4615, variants 01-03, 06, 08-13, 17, 19, 21-23, 25-28, 31, 33-38, 42, 44, 46-48, 50-53, 56, 58-63, 67, 69, 71-73, 75-78, 81, 83-88, 92, 94, 96-99 |                    |                       |                            |
| 5513/014                                                                                                     | ML4622 to ML4624, variants 01-03, 06, 08-13, 17, 19, 21-23, 25-28, 31, 33-38, 42, 45-47, 49-52, 55, 57-58, 61, 63                                                           |                    |                       |                            |
| 5513/015                                                                                                     | ML4627 to ML4629, variants 01-03, 06, 08-13, 17, 19, 21-23, 25-28, 31, 33-38, 42, 45-47, 49-52, 55, 57-58, 61, 63                                                           |                    |                       |                            |
| 5512/001                                                                                                     | ML4402, ML4404 to ML4409 and ML40721, variants 01-03,05, 07-12, 14-18, 20, 22-27, 29-33, 35, 37-42, 44-48, 50, 52-57, 59-63, 65, 67-72, 74-78, 80, 82-84, 86, 88, 90-92     |                    |                       |                            |
| 5512/003                                                                                                     | ML4310 to ML4319, variants 01-02, 05-06, 09-13, 16-17, 20-24, 27-28, 31-35, 38-39, 42-46, 49-50, 53-57, 60-61, 64-68, 71-72, 75- 79, 83-85, 89-91, 95                       |                    |                       |                            |
| 5512/004                                                                                                     | ML4331 to ML4335, variants 01-02, 05-06, 09-13, 16-17, 20-24, 27-28, 31-35, 38-39, 42-46, 49-50, 53-55                                                                      |                    |                       |                            |
| 5512/005                                                                                                     | ML4336 to ML4343, variants 01-02, 06-08, 12-14, 18-20, 24-26, 30-32, 36-38, 42-44, 48                                                                                       |                    |                       |                            |
| 5512/006                                                                                                     | ML4351 to ML4354, variants 01-02, 05-06, 09-13, 16-17, 20-24, 27-28, 31-35, 38-39, 42-44                                                                                    |                    |                       |                            |
| 5512/007                                                                                                     | ML4355 to ML4365, variants 01-02, 06-08, 12-14, 18-20, 24-26, 30-32, 36-38, 42-44, 47-48, 51-52, 55-56                                                                      |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125 and +150                                                       |                                                                                                                                                                             |                    |                       |                            |

| DIODES,<br>MICROWAVE, SILICON, MULTIPLIER AND PIN,<br>BASED ON TYPES DH 2XX AND DH 50XXX |                                                      |                                                                                            |                       | 225G                       |
|------------------------------------------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| Procurement Specifications                                                               | Manufacturer                                         | Nature of Approval                                                                         | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 5010<br>Detail ESCC                                                      | COBHAM<br>MICROWAVE<br>Villebon Sur Yvette<br>France | Qualification                                                                              | CNES                  | Jun 1995                   |
|                                                                                          |                                                      | Remarks<br>Certificate 259C has been merged with this certificate beginning February 2012. |                       |                            |
| 5513/031, 5513/032, 5513/033, 5513/034, 5513/036, 5513/037, 5513/038, 5512/016,          |                                                      |                                                                                            |                       |                            |
| Qualified range:                                                                         |                                                      |                                                                                            |                       |                            |
| ESCC Spec No.                                                                            | Component Type                                       |                                                                                            |                       |                            |
| 5513/031                                                                                 | DH 50151 to DH 50157, Variants 01 to 56              |                                                                                            |                       |                            |
| 5513/032                                                                                 | DH 50033 to DH 50037, Variants 01 to 40              |                                                                                            |                       |                            |
| 5513/033                                                                                 | DH 50201 to DH 50209, Variants 01 to 70              |                                                                                            |                       |                            |
| 5513/034                                                                                 | DH 50251 to DH 50256, Variants 01 to 41              |                                                                                            |                       |                            |
| 5513/036                                                                                 | DH 50052 to DH 50057, Variants 01 to 48              |                                                                                            |                       |                            |
| 5513/037                                                                                 | DH 50071 to DH 50077, Variants 01 to 56              |                                                                                            |                       |                            |
| 5513/038                                                                                 | DH 50101 to DH 50107, Variants 01 to 56              |                                                                                            |                       |                            |
| 5512/016                                                                                 | DH 267, Variants 10 to 15 and 16                     |                                                                                            |                       |                            |
| 5512/016                                                                                 | DH 292, Variants 20 to 25 and 26                     |                                                                                            |                       |                            |
| 5512/016                                                                                 | DH 256, Variants 30 to 35 and 36                     |                                                                                            |                       |                            |
| 5512/016                                                                                 | DH 252, Variants 40 to 45 and 46                     |                                                                                            |                       |                            |
| 5512/016                                                                                 | DH 294, Variants 50 to 55 and 56                     |                                                                                            |                       |                            |
| Operating Temperature Range (°C): -55 to +125                                            |                                                      |                                                                                            |                       |                            |

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                      |                       |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-----------------------|--------------------------|----------------------------|----------|-----------------|---------------|----------|--------|----------|----------|---------|----------|----------|---------|----------|----------|---------|----------|----------|---------|----------|----------|---------|----------|----------|----------|----------|----------|----------|----------|
| DIODES,<br>MICROWAVE, SILICON, MULTIPLIER AND PIN,<br>BASED ON TYPES DH 2XX AND DH 50XXX                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                      |                       |                          | 273F                       |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Manufacturer                                         | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| Generic<br>ESCC 5010<br>Detail ESCC<br>5512/023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | COBHAM<br>MICROWAVE<br>Villebon Sur Yvette<br>France | Qualification         | CNES                     | Jun 2003                   |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                      |                       |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| Qualified range:<br><br>All Variants are qualified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                                      |                       |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| <table><tr><td>Variants</td><td>Cj(typ.) (-4 V)</td><td>Based on Type</td></tr><tr><td>01 to 09</td><td>1.0 pF</td><td>DH 76010</td></tr><tr><td>10 to 18</td><td>1.50 pF</td><td>DH 76015</td></tr><tr><td>19 to 27</td><td>2.20 pF</td><td>DH 76022</td></tr><tr><td>28 to 36</td><td>2.30 pF</td><td>DH 76033</td></tr><tr><td>37 to 45</td><td>4.70 pF</td><td>DH 76047</td></tr><tr><td>46 to 54</td><td>6.80 pF</td><td>DH 76068</td></tr><tr><td>55 to 63</td><td>10.00 pF</td><td>DH 76100</td></tr><tr><td>64 to 72</td><td>15.00 pF</td><td>DH 76150</td></tr></table> |                                                      |                       |                          |                            | Variants | Cj(typ.) (-4 V) | Based on Type | 01 to 09 | 1.0 pF | DH 76010 | 10 to 18 | 1.50 pF | DH 76015 | 19 to 27 | 2.20 pF | DH 76022 | 28 to 36 | 2.30 pF | DH 76033 | 37 to 45 | 4.70 pF | DH 76047 | 46 to 54 | 6.80 pF | DH 76068 | 55 to 63 | 10.00 pF | DH 76100 | 64 to 72 | 15.00 pF | DH 76150 |
| Variants                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Cj(typ.) (-4 V)                                      | Based on Type         |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 01 to 09                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.0 pF                                               | DH 76010              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 10 to 18                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 1.50 pF                                              | DH 76015              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 19 to 27                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.20 pF                                              | DH 76022              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 28 to 36                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 2.30 pF                                              | DH 76033              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 37 to 45                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 4.70 pF                                              | DH 76047              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 46 to 54                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 6.80 pF                                              | DH 76068              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 55 to 63                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 10.00 pF                                             | DH 76100              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| 64 to 72                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 15.00 pF                                             | DH 76150              |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |
| Maximum ratings:<br><br>VR = 20 V at IR = 10 μA and Tamb = +25 °C<br><br>Operating Temperature Range (°C): -55 to +155                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                      |                       |                          |                            |          |                 |               |          |        |          |          |         |          |          |         |          |          |         |          |          |         |          |          |         |          |          |          |          |          |          |          |

## 6.5 FILTERS (05)

### 6.5.1 Feedthrough

|                                                                                                                                                                  |                                                      |                      |                       |                            |                   |                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------|----------------------|-----------------------|----------------------------|-------------------|-------------------|
| FILTERS, PI-, C-, AND L- TYPES, FEEDTHROUGH, ELECTROMAGNETIC INTERFERENCE SUPPRESSION, HERMETICALLY AND NON-HERMETICALLY SEALED, BASED ON TYPES SFC, SFL AND SFP |                                                      |                      |                       |                            | 252H              |                   |
| Procurement Specifications                                                                                                                                       | Manufacturer                                         | Nature of Approval   | Supervising Authority | Initial Qualification Date |                   |                   |
| Generic ESCC 3008                                                                                                                                                | EXXELIA Technologies<br>Chanteloup en Brie<br>France | Qualification        | CNES                  | Aug 1998                   |                   |                   |
| Detail ESCC                                                                                                                                                      |                                                      | Remarks              |                       |                            |                   |                   |
| 3008/014, 3008/020, 3008/021, 3008/025, 3008/026, 3008/027, 3008/028, 3008/029, 3008/030, 3008/031, 3008/032, 3008/033                                           |                                                      |                      |                       |                            |                   |                   |
| <p>Qualified range:</p> <p>All Variants are qualified.</p>                                                                                                       |                                                      |                      |                       |                            |                   |                   |
| Domain                                                                                                                                                           | Style                                                | Detail Specification | Variants              | Capacitance Range (nF)     | Rated Current (A) | Rated Voltage (V) |
| SFC, Hermetic, Glass Fill                                                                                                                                        | SFC 060                                              | 3008/026             | 01 to 06              | 0.68 to 220                | 10                | 25 to 200         |
|                                                                                                                                                                  | SFC 100                                              | 3008/027             | 01 to 06              | 1.0 to 1000                | 10                | 25 to 200         |
| SFP, Hermetic, Glass Fill                                                                                                                                        | SFP 060                                              | 3008/021             | 01 to 14              | 2.4 to 89.6                | 10                | 35 to 500         |
|                                                                                                                                                                  | SFP 100                                              | 3008/028             | 01 to 06              | 0.16 to 1312               | 10                | 50 to 300         |
| SFL, Hermetic, Glass Fill                                                                                                                                        | SFL 100                                              | 3008/029             | 01 to 48              | 17.6 to 1600               | 5, 10, 15         | 40 to 300         |
| Capacitance Range (pF)                                                                                                                                           |                                                      |                      |                       |                            |                   |                   |
| SFC, Non-Hermetic, Resin Fill                                                                                                                                    | SFC 035                                              | 3008/031             | 01 to 06              | 470 to 22 000              | 10                | 25 to 200         |
|                                                                                                                                                                  | SFC 040                                              | 3008/032             | 01 to 12              | 470 to 22 000              | 10                | 25 to 200         |
|                                                                                                                                                                  | SFC 060                                              | 3008/033             | 01 to 12              | 680 to 220 000             | 10                | 25 to 200         |
| SFP, Non-Hermetic, Resin Fill                                                                                                                                    | SFP 035                                              | 3008/025             | 01 to 20              | 2 400 to 35 200            | 10                | 35 to 200         |
|                                                                                                                                                                  | SFP 040                                              | 3008/014             | 01 to 40              | 750 to 4 800               | 10 (DC 7 LF)      | 70 to 250         |
|                                                                                                                                                                  | SFP 060                                              | 3008/030             | 01 to 28              | 2 400 to 89 600            | 10                | 35 to 500         |
| SFC, Mixed fill, for soldering                                                                                                                                   | SFC 030V                                             | 3008/020             | 01 to 12              | 470 to 22 000              | 1.0 to 5.0        | 25 to 200         |
| Operating Temperature Range (°C): -55 to +125                                                                                                                    |                                                      |                      |                       |                            |                   |                   |

6.5.2 SAW

| SAW FILTERS<br>(TRANSVERSAL BAND PASS/RESONATOR/NOTCH/ LOW LOSS<br>IMPEDANCE ELEMENT) |                              |                       |                          | 313B                       |
|---------------------------------------------------------------------------------------|------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                         | Manufacturer                 | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3502<br>Detail ESCC<br>3502/002                                       | Kongsberg Norspace<br>Norway | Qualification         | ESA/ESTEC                | Aug 2011                   |
| Remarks                                                                               |                              |                       |                          |                            |
|                                                                                       |                              |                       |                          |                            |

6.6 FUSES (06)

6.6.1 Thin Film

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 |                    |                       |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|--------------------|-----------------------|----------------------------|
| FUSES,<br>SURFACE MOUNT, THIN FILM,<br>0.14 TO 3.5 AMPS, BASED ON TYPE MGA-S                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                 |                    |                       | 284D                       |
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Manufacturer                    | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4008<br>Detail ESCC<br>4008/001                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Schurter Lucerne<br>Switzerland | Qualification      | ESA/ESTEC             | Jun 2008                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                 | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 to 12 are qualified.</p> <p>Rated Voltage (VAC or VDC): 125V/125V, 63V/125V and 32V/125V by variant</p> <p>Rated Current (I<sub>R</sub>): 0.14 to 3.5 A by variant</p> <p>AC Interrupt Current (A): 50 at maximum rated voltage, power factor&gt; 0.95</p> <p>DC Interrupt Current (A): at maximum rated voltage, time constant ≤ 1 ms</p> <p>Variants 01 to 10: 300, Variants 11 and 12: 50</p> <p>Operating Temperature Range, (°C): -50 to +125 (90% I<sub>R</sub> to 107% I<sub>R</sub>)</p> |                                 |                    |                       |                            |

| FUSES,<br>SOLID STATE, THIN FILM,<br>BASED ON TYPE HCSF                                                                                  |                                    |                       |                          | 336A                       |
|------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                                                                            | Manufacturer                       | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 4008                                                                                                                     | Schurter<br>Lucerne<br>Switzerland | Qualification         | ESA/ESTEC                | Jun 2016                   |
| Detail ESCC<br>4008/002                                                                                                                  |                                    | Remarks               |                          |                            |
| Qualified range:<br><br>Variants 24, 26, 28, 32 are qualified.<br><br>Operating Temperature Range, (°C): -50 to +125 (106% IR to 80% IR) |                                    |                       |                          |                            |

6.7 INDUCTORS (07)

6.7.1 Fixed, RF

| INDUCTORS, FIXED, RF,<br>MINIATURE, MOULDED, SURFACE MOUNT,<br>BASED ON SERIES MSC1 10k, 12k, 20k and H01                |                                                        |                    |                       | 241Hrev1                      |                               |                                       |
|--------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|--------------------|-----------------------|-------------------------------|-------------------------------|---------------------------------------|
| Procurement Specifications                                                                                               | Manufacturer                                           | Nature of Approval | Supervising Authority | Initial Qualification Date    |                               |                                       |
| Generic<br>ESCC 3201<br>Detail ESCC<br>3201/008                                                                          | Exxelia Magnetics<br>(Microspire)<br>Illange<br>France | Qualification      | ESA/ESTEC             | Jun 2016                      |                               |                                       |
| Remarks<br>09/2017: PID updated following the qualification of new leadframe suppliers and upgrade to ESCC 3201 Issue 6. |                                                        |                    |                       |                               |                               |                                       |
| Qualified range:<br><br>Variants 01 to 05 are qualified                                                                  |                                                        |                    |                       |                               |                               |                                       |
| Series No.                                                                                                               | Range (μH)                                             | Tolerance (±%)     | Q min.                | Min. SRF f <sub>r</sub> (MHz) | Max. DCR, R <sub>dc</sub> (Ω) | Rated DC Current, I <sub>R</sub> (mA) |
| 10k                                                                                                                      | 0.010- 10                                              | 2.0, 5.0, 10       | 60 - 42               | 1000 -33                      | 0.025 -3.3                    | 750 - 87                              |
| 12k                                                                                                                      | 12- 1000                                               | 2.0, 5.0, 10       | 56 - 12               | 26 - 1.5                      | 2.0 - 120                     | 110 - 15                              |
| 20k                                                                                                                      | 0.010 -1000                                            | 10                 | 75 - 30               | 1000 - 1.7                    | 0.04 - 80                     | 1000 - 25                             |
| H01                                                                                                                      | 0.380 - 100                                            | 15                 | 30                    | 8                             | 0.029 - 3.8                   | 1500 - 100                            |
| Dielectric Withstanding Voltage (DWV): 200 Vrms                                                                          |                                                        |                    |                       |                               |                               |                                       |
| Operating Temperature Range (°C): -55 to +125                                                                            |                                                        |                    |                       |                               |                               |                                       |

6.7.2 Power

|                                                                                            |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
|--------------------------------------------------------------------------------------------|-----------------------------------------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|-------|------|----------------------------|------|
| INDUCTORS, POWER, MOULDED,<br>SURFACE MOUNT,<br>BASED ON SERIES SESI AND CMC               |                                                     |      |                                                                                                                                                                  |                       |       |      | 276Erev1                   |      |
| Procurement Specifications                                                                 | Manufacturer                                        |      | Nature of Approval                                                                                                                                               | Supervising Authority |       |      | Initial Qualification Date |      |
| Generic ESCC 3201                                                                          | Exxelia Magnetics (Microspire)<br>Illange<br>France |      | Qualification                                                                                                                                                    | ESA/ESTEC             |       |      | Jun 2016                   |      |
| Detail ESCC 3201/009<br>3201/010                                                           |                                                     |      | Remarks<br>09/2017: PID updated following the qualification of new leadframe suppliers and upgrade to ESCC 3201 Issue 6.<br>Termination finish shall be Sn60Pb40 |                       |       |      |                            |      |
| Qualified range:                                                                           |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
| 3201/009: Variants 01 to 08 are qualified<br>3201/010 Variants 01, 03 and 05 are qualified |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
| Component types:                                                                           |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
| 3201/009                                                                                   |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
| SESI                                                                                       | 14SR                                                | 15SR | 15WR                                                                                                                                                             | 18WR                  | 9.1WR | 22WR | 32WR                       | 32PR |
| Variant                                                                                    | 01                                                  | 02   | 03                                                                                                                                                               | 04                    | 05    | 06   | 07                         | 08   |
| 3201/010                                                                                   |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |
| CMC                                                                                        | 15WR                                                | 18WR | 22WR                                                                                                                                                             |                       |       |      |                            |      |
| Variant                                                                                    | 01                                                  | 03   | 05                                                                                                                                                               |                       |       |      |                            |      |
| Operating Temperature Range (°C): -55 to +125                                              |                                                     |      |                                                                                                                                                                  |                       |       |      |                            |      |

## 6.8 MICROCIRCUITS (08)

### 6.8.1 Digital C-MOS

| MICROCIRCUITS, DIGITAL,<br>C-MOS-B, 4000B SERIES                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                     |                    |                       | 73Q                        |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Manufacturer                                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 9000                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | ST<br>Microelectronics<br>Rennes<br>France                          | Qualification      | CNES                  | Apr 1981                   |
| Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                     | Remarks:           |                       |                            |
| 9201/041, 9201/042, 9201/043, 9201/045, 9201/047, 9201/048, 9201/052, 9201/055, 9201/061, 9201/063, 9201/064, 9201/065, 9201/066, 9201/082, 9202/039, 9202/040, 9202/042, 9202/043, 9202/044, 9202/045, 9202/046, 9202/047, 9202/048, 9202/049, 9202/051, 9202/065, 9203/022, 9203/023, 9203/038, 9204/020, 9204/021, 9204/022, 9204/023, 9204/025, 9204/026, 9204/028, 9204/036, 9204/041, 9204/045, 9204/052, 9204/054, 9205/010, 9205/011, 9206/003, 9207/003, 9207/007, 9209/001, 9306/014, 9306/015, 9306/016, 9306/022, 9306/026, 9401/010, 9401/013, 9401/030, 9407/003, 9408/005, 9408/006, 9408/009, 9408/011, 9408/012, 9408/025, 9409/002, 9409/005 |                                                                     |                    |                       |                            |
| Qualified range:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                     |                    |                       |                            |
| 9201/041                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad 2-input NOR gate                                               |                    | 4001B                 |                            |
| 9201/042                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Dual 4-input NOR gate                                               |                    | 4002B                 |                            |
| 9202/039                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 4-bit full adder                                                    |                    | 4008B                 |                            |
| 9201/043                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad 2-input NAND gate                                              |                    | 4011B                 |                            |
| 9203/023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Dual D-type flip-flop                                               |                    | 4013B                 |                            |
| 9306/014                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8-stage synchronous static shift register                           |                    | 4014B                 |                            |
| 9306/015                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Dual 4-stage static shift register with serial input/parallel input |                    | 4015B                 |                            |
| 9204/020                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Decade counter/divider                                              |                    | 4017B                 |                            |
| 9204/021                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Presettable divide-by-N counter                                     |                    | 4018B                 |                            |
| 9202/051                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad AND/OR select gate                                             |                    | 4019B                 |                            |
| 9204/022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 14-stage ripple carry binary counter/divider                        |                    | 4020B                 |                            |
| 9306/016                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 8-stage static shift register                                       |                    | 4021B                 |                            |
| 9204/023                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Octal counter/divider                                               |                    | 4022B                 |                            |
| 9201/045                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Triple 3-input NAND gates                                           |                    | 4023B                 |                            |
| 9203/022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Dual J-K master slave flip-flop                                     |                    | 4027B                 |                            |
| 9205/010                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | BCD-to-decimal or binary-to-octal decoder                           |                    | 4028B                 |                            |
| 9204/025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Presettable up/down counter binary or BCD decade                    |                    | 4029B                 |                            |
| 9201/047                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad 2-input exclusive OR gates                                     |                    | 4030B                 |                            |
| 9204/026                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 12-stage ripple carry binary counter/divider                        |                    | 4040B                 |                            |
| 9202/040                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad true/complement buffer with unbuffered outputs                 |                    | 4041UB                |                            |
| 9202/042                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Quad NOR 3-state R/S latches                                        |                    | 4043B                 |                            |

| MICROCIRCUITS, DIGITAL,<br>C-MOS-B, 4000B SERIES |                                                                                                  |        | 73Q |
|--------------------------------------------------|--------------------------------------------------------------------------------------------------|--------|-----|
| 9202/043                                         | Quad NAND 3-state R/S latch                                                                      | 4044B  |     |
| 9202/044                                         | Micropower phase-locked loop                                                                     | 4046B  |     |
| 9207/003                                         | Low power monostable/astable multivibrator                                                       | 4047B  |     |
| 9202/045                                         | Hex buffer/converter (inverting type)                                                            | 4049UB |     |
| 9202/046                                         | Hex buffer/converter (non-inverting type)                                                        | 4050B  |     |
| 9202/047                                         | Analogue multiplexer/demultiplexer                                                               | 4051B  |     |
| 9202/048                                         | Analogue multiplexer/demultiplexer                                                               | 4052B  |     |
| 9202/049                                         | Triple 2-channel analogue multiplexer/demultiplexer                                              | 4053B  |     |
| 9209/001                                         | 4-bit magnitude comparator                                                                       | 4063B  |     |
| 9204/052                                         | 14-stage ripple-carry binary counter/divider and oscillator                                      | 4060B  |     |
| 9408/005                                         | Quad bilateral switch                                                                            | 4066B  |     |
| 9408/009                                         | Analogue multiplexer/demultiplexer                                                               | 4067B  |     |
| 9201/061                                         | 8-input NAND gate                                                                                | 4068B  |     |
| 9401/010                                         | Hex inverter                                                                                     | 4069UB |     |
| 9201/048                                         | Quad exclusive OR gate                                                                           | 4070B  |     |
| 9201/063                                         | Quad 2-input OR gate                                                                             | 4071B  |     |
| 9201/082                                         | Dual 4-input OR gate                                                                             | 4072B  |     |
| 9201/064                                         | Triple 3-input AND gate                                                                          | 4073B  |     |
| 9201/065                                         | Triple 3-input OR gate                                                                           | 4075B  |     |
| 9306/022                                         | 4-bit D-type register with 3-state output                                                        | 4076B  |     |
| 9201/055                                         | Quad exclusive NOR gate                                                                          | 4077B  |     |
| 9201/052                                         | Quad 2-input AND gate                                                                            | 4081B  |     |
| 9201/066                                         | Dual 4-input AND gate                                                                            | 4082B  |     |
| 9409/002                                         | Quad 2-input NAND gate with Schmitt trigger input                                                | 4093B  |     |
| 9306/026                                         | 8-stage shift and store bus register with synchronous serial outputs and 3-state parallel output | 4094B  |     |
| 9206/003                                         | Dual monostable multivibrator                                                                    | 4098B  |     |
| 9408/006                                         | 8-channel multiplexer with 3-state output                                                        | 4512B  |     |
| 9408/012                                         | 4-bit latch/4-to-16 decoder                                                                      | 4514B  |     |
| 9205/011                                         | 4-bit latch/4-to-16 line decoder                                                                 | 4515B  |     |
| 9204/045                                         | Synchronous quad presettable up/down binary counter                                              | 4516B  |     |
| 9204/028                                         | Dual binary up counter                                                                           | 4520B  |     |
| 9202/065                                         | 8-bit priority encoder                                                                           | 4532B  |     |
| 9207/007                                         | Dual monostable multivibrator with reset                                                         | 4538B  |     |
| 9408/011                                         | Dual 1-of-4 decoder/demultiplexer                                                                | 4555B  |     |
| 9408/025                                         | Dual 1-of-4 decoder/demultiplexer (output low on select)                                         | 4556B  |     |
| 9204/036                                         | Presettable 8-bit synchronous down-counter                                                       | 40103B |     |
| 9409/005                                         | Hex Schmitt-trigger                                                                              | 40106B |     |
| 9401/013                                         | Dual 2-input NAND buffer/driffer                                                                 | 40107B |     |
| 9407/003                                         | Quad low-to-high 3-state voltage level shifter                                                   | 40109B |     |
| 9204/054                                         | Programmable 4-bit binary counter with                                                           | 40161B |     |

| MICROCIRCUITS, DIGITAL,<br>C-MOS-B, 4000B SERIES                           |                                                           | 73Q    |
|----------------------------------------------------------------------------|-----------------------------------------------------------|--------|
|                                                                            | asynchronous clear                                        |        |
| 9203/038                                                                   | Hex D-type flip-flop                                      | 40174B |
| 9204/041                                                                   | Presetable binary up/down counter (dual clock with reset) | 40193B |
| <p>Package Types:</p> <p>Ceramic Dual-in-Line</p> <p>Ceramic Flat Pack</p> |                                                           |        |

| MICROCIRCUITS,<br>DIGITAL, MONOLOTHIC, HIGH SPEED CMOS,<br>54HC AND 54HCT SERIES |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |                       |                          | 190L                          |
|----------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|-----------------------|--------------------------|-------------------------------|
| Procurement<br>Specifications                                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | Manufacturer                               | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification<br>Date |
| Generic<br>ESCC 9000<br>Detail ESCC                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | ST<br>Microelectronics<br>Rennes<br>France | Qualification         | CNES                     | Nov 1992                      |
|                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            | Remarks               |                          |                               |
|                                                                                  | 9201/105, 9201/106, 9201/107, 9201/108, 9201/109, 9201/110, 9201/111, 9201/113, 9201/114, 9201/117, 9201/118, 9201/119, 9201/120, 9201/123, 9202/072, 9202/075, 9203/050, 9203/052, 9203/053, 9203/054, 9203/059, 9203/060, 9203/064, 9203/070, 9203/073, 9204/059, 9204/062, 9204/065, 9204/066, 9204/069, 9204/070, 9204/071, 9204/074, 9204/076, 9205/013, 9205/017, 9205/019, 9205/021, 9205/023, 9207/006, 9208/003, 9209/004, 9209/005, 9306/041, 9306/042, 9306/043, 9306/047, 9306/048, 9306/050, 9306/051, 9306/052, 9306/054, 9401/033, 9401/034, 9401/037, 9401/038, 9401/039, 9401/044, 9401/047, 9401/048, 9401/049, 9402/009, 9405/013, 9405/014, 9408/038, 9408/046, 9408/047, 9408/048, 9408/052, 9408/054, 9408/057, 9408/059, 9408/064, 9408/065, 9409/007, 9410/017, |                                            |                       |                          |                               |
| Qualified range:                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                            |                       |                          |                               |
| ESCC<br>Spec. No.                                                                | Component Type                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                            |                       | Component Type           | Note                          |
| 9201/105                                                                         | Quad 2-input NAND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |                       | 54HC 00                  | 1                             |
| 9201/113                                                                         | Quad 2-input NOR gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                            |                       | 02                       | 1                             |
| 9201/114                                                                         | Quad 2-input NAND gate with open drain output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                            |                       | 03                       | 1                             |
| 9401/033                                                                         | Hex inverter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |                       | 04                       | 1                             |
| 9201/106                                                                         | Quad 2-input positive AND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                            |                       | 08                       | 1                             |
| 9201/107                                                                         | Triple 3-input NAND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                       | 10                       | 1                             |
| 9201/117                                                                         | Triple 3-input AND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |                       | 11                       | 1                             |
| 9409/007                                                                         | Hex Schmitt trigger inverter                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                            |                       | 14                       | 1                             |
| 9201/118                                                                         | Dual 4-input NAND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |                       | 20                       | 1                             |
| 9201/108                                                                         | Dual 4-input AND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                            |                       | 21                       | 1                             |
| 9201/109                                                                         | Triple 3-input NOR gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                            |                       | 27                       | 1                             |
| 9201/110                                                                         | 8-input NAND gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |                       | 30                       | 1                             |
| 9201/111                                                                         | Quad 2-input OR gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                            |                       | 32                       | 1                             |
| 9203/050                                                                         | Dual D-type flip-flop with preset and clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                            |                       | 74                       | 1                             |
| 9209/004                                                                         | 4-bit magnitude comparator                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |                                            |                       | 85                       | 1                             |
| 9201/119                                                                         | Quad 2-input exclusive OR gate                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                            |                       | 86                       | 1                             |
| 9306/048                                                                         | Dual J-K positive edge triggered flip-flop with preset and clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                            |                       | 109                      | 1                             |
| 9207/006                                                                         | Dual positive or negative edge Schmitt-retriggerable monostable multivibrator with clear                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                       | 123                      | 1                             |
| 9401/039                                                                         | Quad bus buffer with 3 state output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                            |                       | 125                      | 1                             |
| 9201/120                                                                         | Quad 2-input NAND gate with Schmitt-trigger input                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                            |                       | 132                      | 1                             |
| 9205/013                                                                         | 3-to-8 line decoder/demultiplexer with address latch and inverted output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                            |                       | 137                      | 1                             |
| 9408/046                                                                         | 3-to-8 line decoder/demultiplexer with inverted output                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                            |                       | 54HC 138                 | 1                             |

| MICROCIRCUITS,<br>DIGITAL, MONOLITHIC, HIGH SPEED CMOS,<br>54HC AND 54HCT SERIES |                                                                           |      | 190L |   |
|----------------------------------------------------------------------------------|---------------------------------------------------------------------------|------|------|---|
| 9205/017                                                                         | Dual 2-to-4 line decoder/demultiplexer with inverted output               | 54HC | 139  | 1 |
| 9410/017                                                                         | 8-line to 3-line priority encoder                                         |      | 148  | 1 |
| 9408/054                                                                         | 8-line to 1-line data selector/multiplexer                                |      | 151  | 1 |
| 9408/038                                                                         | Dual 4-line to 1-line data selectors/multiplexer                          |      | 153  | 1 |
| 9205/023                                                                         | 4-to-16 line decoder/demultiplexer with inverted output                   |      | 154  | 1 |
| 9408/057                                                                         | Quad 2-line to 1-line data selector/multiplexer                           |      | 157  | 1 |
| 9408/059                                                                         | Quad 2-line to 1-line data selector/multiplexer with inverted output      |      | 158  | 1 |
| 9204/062                                                                         | Synchronous presettable 4-bit decade counter with direct clear            |      | 160  | 1 |
| 9204/059                                                                         | Asynchronous 4-bit binary counter                                         |      | 161  | 1 |
| 9306/041                                                                         | 8-bit SIPO shift register                                                 |      | 164  | 1 |
| 9306/042                                                                         | 8-bit PISO shift register                                                 |      | 165  | 1 |
| 9306/043                                                                         | 8-bit PISO shift register                                                 |      | 166  | 1 |
| 9306/052                                                                         | Hex D-type edge-triggered flip-flop with clear                            |      | 174  | 1 |
| 9203/052                                                                         | Quad D-type edge-triggered flip-flop with clear                           |      | 175  | 1 |
| 9204/066                                                                         | Synchronous 4-bit up/down binary counter                                  |      | 191  | 1 |
| 9204/065                                                                         | Synchronous 4-bit up/down binary counter (dual clock with clear)          |      | 193  | 1 |
| 9306/047                                                                         | 4-bit PIPO shift register                                                 |      | 194  | 1 |
| 9205/021                                                                         | 3-line to 8-line decoder/demultiplexer with address latch                 |      | 237  | 1 |
| 9401/034                                                                         | Octal bus buffer with inverted 3-state output                             |      | 240  | 1 |
| 9401/048                                                                         | Octal bus buffer with 3-state output                                      |      | 244  | 1 |
| 9405/013                                                                         | Octal bus transceiver with 3-state output                                 |      | 245  | 1 |
| 9408/048                                                                         | 1-to-8 data selector/multiplexer with 3-state output                      |      | 251  | 1 |
| 9408/047                                                                         | Quad 2-line to 1-line data selector/multiplexer with 3-state output       |      | 257  | 1 |
| 9203/073                                                                         | 8-bit addressable latch                                                   |      | 259  | 1 |
| 9203/053                                                                         | Octal D-type edge-triggered flip-flop with clear                          |      | 273  | 1 |
| 9208/003                                                                         | 9-bit odd/even parity generator/checker                                   |      | 280  | 1 |
| 9202/075                                                                         | 4-bit binary full adder with fast carry                                   |      | 283  | 1 |
| 9401/044                                                                         | Hex bus buffer with 3-state output                                        |      | 367  | 1 |
| 9203/059                                                                         | Octal D-type transparent latch with 3-state output                        |      | 373  | 1 |
| 9203/060                                                                         | Octal D-type edge-triggered flip-flop with 3-state output                 |      | 374  | 1 |
| 9204/074                                                                         | Dual 4-bit negative edge-triggered binary counter                         |      | 393  | 1 |
| 9401/049                                                                         | Octal bus buffer with inverted 3-state output                             |      | 540  | 1 |
| 9401/047                                                                         | Octal bus buffer with 3-state output                                      |      | 541  | 1 |
| 9202/072                                                                         | Octal D-type transparent latch with 3-state output                        |      | 573  | 1 |
| 9203/054                                                                         | Octal D-type edge-triggered flip-flop with 3-state output                 |      | 574  | 1 |
| 9204/071                                                                         | 8-bit binary counter with 3-state output register                         |      | 590  | 1 |
| 9306/051                                                                         | 8-bit shift register with 3-state output register                         |      | 595  | 1 |
| 9306/054                                                                         | 8-bit PISO shift register                                                 |      | 597  | 1 |
| 9209/005                                                                         | 8-bit identify comparator                                                 |      | 688  | 1 |
| 9204/070                                                                         | Asynchronous negative-edge-triggered 14-bit binary counter                |      | 4020 | 1 |
| 9204/069                                                                         | Asynchronous negative edge-triggered 12-bit binary counter                |      | 4040 | 1 |
| 9401/037                                                                         | Hex buffer/converter with inverted output                                 |      | 4049 | 1 |
| 9401/038                                                                         | Hex buffer/converter                                                      |      | 4050 | 1 |
| 9408/064                                                                         | Analogue multiplexer/demultiplexer                                        |      | 4051 | 1 |
| 9408/065                                                                         | Analogue multiplexer/demultiplexer (triple 2-channel)                     |      | 4053 | 1 |
| 9204/076                                                                         | Asynchronous negative-edge-triggered 14-bit binary counter and oscillator | 54HC | 4060 | 1 |
| 9408/052                                                                         | Quad bilateral switch                                                     | 54HC | 4066 | 1 |

| MICROCIRCUITS,<br>DIGITAL, MONOLITHIC, HIGH SPEED CMOS,<br>54HC AND 54HCT SERIES                                                                                    |                                                     |       | 190L |   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------|------|---|
| 9201/123                                                                                                                                                            | 8-input OR/NOR gate                                 |       | 4078 | 1 |
| 9306/050                                                                                                                                                            | 8-bit SIPO shift latch register with 3-state output |       | 4094 | 1 |
| 9205/019                                                                                                                                                            | 4-to-16 line decoder/latch                          |       | 4514 | 1 |
| 9203/070                                                                                                                                                            | Dual D-type flip-flop with preset and clear         | 54HCT | 74   | 1 |
| 9402/009                                                                                                                                                            | Octal bus buffer with 3-state output                |       | 244  | 1 |
| 9405/014                                                                                                                                                            | Octal bus transceiver with 3-state output           |       | 245  | 1 |
| 9203/064                                                                                                                                                            | Octal D-type transparent latch with 3-state output  |       | 373  | 1 |
| <p><b>NOTES</b>, 1. These parts have successfully passed radiation testing to 50 kRads.</p> <p>Package Types:</p> <p>Ceramic Dual-in-Line<br/>Ceramic Flat Pack</p> |                                                     |       |      |   |

| INTEGRATEC CIRCUITS,<br>SILICON MONOLITHIC, CMOS GATE/EMBEDDED ARRAY<br>BASED ON TYPE MH1RT |                                          |                    |                       | <b>278rev2</b>             |
|---------------------------------------------------------------------------------------------|------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                  | Manufacturer                             | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 9000<br>Detail ESCC<br>9202/076                                             | Microchip Technology<br>Nantes<br>France | Qualification      | ESA/ESTEC             | Dec 2006                   |
| Remarks                                                                                     |                                          |                    |                       |                            |
|                                                                                             |                                          |                    |                       |                            |

|                                                                                             |                                                                                                     |                    |                        |                            |
|---------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------|--------------------|------------------------|----------------------------|
| INTEGRATEC CIRCUITS,<br>SILICON MONOLITHIC, CMOS CELL-BASED ARRAY<br>BASED ON TYPE ATC18RHA |                                                                                                     |                    |                        | 312Brev1                   |
| Procurement Specifications                                                                  | Manufacturer                                                                                        | Nature of Approval | Supervising Authority  | Initial Qualification Date |
| Generic ESCC 9000<br>Detail ESCC                                                            | Microchip Technology<br>Nantes<br>France                                                            | Qualification      | CNES                   | Aug 2012                   |
|                                                                                             |                                                                                                     | Remarks            |                        |                            |
| 9202/080, 9512/004, 9304/009                                                                |                                                                                                     |                    |                        |                            |
| Qualified range:                                                                            |                                                                                                     |                    |                        |                            |
| 9202/080:                                                                                   | INTEGRATEC CIRCUITS, SILICON MONOLITHIC, CMOS CELL-BASED ARRAY                                      |                    | BASED ON TYPE ATC18RHA |                            |
| 9512/004:                                                                                   | INTEGRATEC CIRCUITS, SILICON, 32-BIT SPARC PROCESSOR,                                               |                    | BASED ON TYPE AT697F   |                            |
| 9304/009:                                                                                   | INTEGRATEC CIRCUITS, SILICON MONOLITHIC, CMOS DIGITAL, FIELD PRO GRAMMABLE GATE ARRAY, 280000 GATES |                    | BASED ON TYPE ATF280F  |                            |

|                                                                                                        |                                          |                    |                       |                            |
|--------------------------------------------------------------------------------------------------------|------------------------------------------|--------------------|-----------------------|----------------------------|
| INTEGRATEC CIRCUITS, CMOS<br>CELL-BASED ARRAY<br>BASED ON TYPE ATMX150RHA—Ph1 DIGITAL ONLY 7MGATES 5ML |                                          |                    |                       | 342rev1                    |
| Procurement Specifications                                                                             | Manufacturer                             | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 9000<br>Detail ESCC<br>9202/083                                                        | Microchip Technology<br>Nantes<br>France | Qualification      | ESA/ESTEC             | Aug 2016                   |
| Remarks                                                                                                |                                          |                    |                       |                            |
|                                                                                                        |                                          |                    |                       |                            |

6.8.2 Linear Switching Regulator

|                                                                                     |                                         |                    |                       |                            |
|-------------------------------------------------------------------------------------|-----------------------------------------|--------------------|-----------------------|----------------------------|
| IINTEGRATEC CIRCUITS,<br>PULSE WIDTH MODULATOR,<br>BASED ON TYPES ST1843 AND ST1845 |                                         |                    |                       | 344                        |
| Procurement Specifications                                                          | Manufacturer                            | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 9000<br>Detail ESCC<br>9108/020<br>9108/021                         | ST Microelectronics<br>Rennes<br>France | Qualification      | CNES                  | Nov 2016                   |
| Remarks                                                                             |                                         |                    |                       |                            |
| Qualified range:<br><br>Variants 01, 02                                             |                                         |                    |                       |                            |

6.9 RELAYS (09)

6.9.1 Non-Latching, 28Vdc Contact Rating

| RELAY, NON-LATCHING,<br>ELECTROMAGNETIC,<br>TYPE T **                                                                                                                                                                        |                                            |                    |                       | 102J                       |                |               |                       |       |              |          |              |              |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------|-----------------------|----------------------------|----------------|---------------|-----------------------|-------|--------------|----------|--------------|--------------|
| Procurement Specifications                                                                                                                                                                                                   | Manufacturer                               | Nature of Approval | Supervising Authority | Initial Qualification Date |                |               |                       |       |              |          |              |              |
| Generic<br>ESCC 3601<br>Detail ESCC<br>3601/002                                                                                                                                                                              | REL-STPI<br>St Jean de la Ruelle<br>France | Qualification      | CNES                  | Feb 1983                   |                |               |                       |       |              |          |              |              |
| Remarks                                                                                                                                                                                                                      |                                            |                    |                       |                            |                |               |                       |       |              |          |              |              |
| Qualified range:<br><br>Variants 01 to 06 are qualified                                                                                                                                                                      |                                            |                    |                       |                            |                |               |                       |       |              |          |              |              |
| <table><tr><td>Contact Rating</td><td>1 A at 28 Vdc</td></tr><tr><td>Contact Configuration</td><td>2 PDT</td></tr><tr><td>Package Type</td><td>TO-5 Can</td></tr><tr><td>Coil Voltage</td><td>5 - 26.5 Vdc</td></tr></table> |                                            |                    |                       |                            | Contact Rating | 1 A at 28 Vdc | Contact Configuration | 2 PDT | Package Type | TO-5 Can | Coil Voltage | 5 - 26.5 Vdc |
| Contact Rating                                                                                                                                                                                                               | 1 A at 28 Vdc                              |                    |                       |                            |                |               |                       |       |              |          |              |              |
| Contact Configuration                                                                                                                                                                                                        | 2 PDT                                      |                    |                       |                            |                |               |                       |       |              |          |              |              |
| Package Type                                                                                                                                                                                                                 | TO-5 Can                                   |                    |                       |                            |                |               |                       |       |              |          |              |              |
| Coil Voltage                                                                                                                                                                                                                 | 5 - 26.5 Vdc                               |                    |                       |                            |                |               |                       |       |              |          |              |              |
| Operating Temperature Range (°C): -65 to +125                                                                                                                                                                                |                                            |                    |                       |                            |                |               |                       |       |              |          |              |              |

| RELAY, NON-LATCHING,<br>ELECTROMAGNETIC,<br>TYPE E 215       |                                            |                    |                       | 205F                       |
|--------------------------------------------------------------|--------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                   | Manufacturer                               | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3601<br>Detail ESCC<br>3601/007              | REL-STPI<br>St Jean de la Ruelle<br>France | Qualification      | CNES                  | Jan 1994                   |
| Remarks                                                      |                                            |                    |                       |                            |
| Qualified range:<br><br>Variants 03, 04 and 06 are qualified |                                            |                    |                       |                            |
| Contact Rating                                               | 15 A at 28 Vdc                             |                    |                       |                            |
| Contact Configuration                                        | 2 PDT                                      |                    |                       |                            |
| Package Type                                                 | Half cubic inch can                        |                    |                       |                            |
| Coil Voltage                                                 | 12 and 28Vdc                               |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125                |                                            |                    |                       |                            |

|                                                              |                             |                    |                       |                            |
|--------------------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| RELAY, NON-LATCHING,<br>ELECTROMAGNETIC,<br>TYPE M300        |                             |                    |                       | 318Brev1                   |
| Procurement Specifications                                   | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3601<br>Detail ESCC<br>3601/007              | Leach<br>Sarralbe<br>France | Qualification      | CNES                  | Feb 2012                   |
| Remarks                                                      |                             |                    |                       |                            |
| Qualified range:<br><br>Variants 03, 04 and 06 are qualified |                             |                    |                       |                            |
| Contact Rating                                               | 15 A at 28 Vdc              |                    |                       |                            |
| Contact Configuration                                        | 2 PDT                       |                    |                       |                            |
| Package Type                                                 | Half cubic inch can         |                    |                       |                            |
| Coil Voltage                                                 | 12 and 28Vdc                |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125                |                             |                    |                       |                            |

6.9.2 Latching, 28Vdc Contact Rating

|                                                 |                                                  |                                                                                                                                                                                   |                       |                            |
|-------------------------------------------------|--------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| RELAY,<br>LATCHING, ELECTROMAGNETIC,<br>TYPE TL |                                                  |                                                                                                                                                                                   |                       | 88J                        |
| Procurement Specifications                      | Manufacturer                                     | Nature of Approval                                                                                                                                                                | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3602                            | REL-STPI<br>Saint Jean de la<br>Ruelle<br>France | Qualification                                                                                                                                                                     | CNES                  | Jan 1982                   |
| Detail ESCC<br>3602/002                         |                                                  | Remarks<br>As from September 2015, in relation to NCCS 2STPI501 , each delivery of TL26 parts shall be subject to an official prior agreement by the ESCC Executive during a MRB. |                       |                            |
| Qualified range:                                |                                                  |                                                                                                                                                                                   |                       |                            |
| Variants 01 to 06 are qualified                 |                                                  |                                                                                                                                                                                   |                       |                            |
| Contact Rating                                  | 1 A at 28 Vdc                                    |                                                                                                                                                                                   |                       |                            |
| Contact Configuration                           | 2 PDT                                            |                                                                                                                                                                                   |                       |                            |
| Package Type                                    | TO-5 can                                         |                                                                                                                                                                                   |                       |                            |
| Coil Voltage                                    | 26.5 Vdc                                         |                                                                                                                                                                                   |                       |                            |
| Operating Temperature Range (°C): -65 to +125   |                                                  |                                                                                                                                                                                   |                       |                            |

|                                                        |                                                  |                    |                       |                            |
|--------------------------------------------------------|--------------------------------------------------|--------------------|-----------------------|----------------------------|
| RELAY,<br>LATCHING, ELECTROMAGNETIC,<br>TYPE EL415     |                                                  |                    |                       | 98H                        |
| Procurement Specifications                             | Manufacturer                                     | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3602<br>Detail ESCC<br>3602/004        | REL-STPI<br>Saint Jean de la<br>Ruelle<br>France | Qualification      | CNES                  | Jan 1982                   |
| Remarks                                                |                                                  |                    |                       |                            |
| Qualified range:                                       |                                                  |                    |                       |                            |
| Variants 04, 06 and 09 and 14, 16 and 19 are qualified |                                                  |                    |                       |                            |
| Contact Rating                                         | 15A at 28Vdc                                     |                    |                       |                            |
| Contact Configuration                                  | 4PDT Package                                     |                    |                       |                            |
| Package Type                                           | Cubic inch can                                   |                    |                       |                            |
| Coil Voltage                                           | 28Vdc                                            |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125          |                                                  |                    |                       |                            |

|                                                        |                             |                    |                       |                            |
|--------------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| RELAY,<br>LATCHING, ELECTROMAGNETIC,<br>TYPE M402      |                             |                    |                       | 317Brev1                   |
| Procurement Specifications                             | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3602<br>Detail ESCC<br>3602/004        | LEACH<br>Sarralbe<br>France | Qualification      | CNES                  | Feb 2012                   |
| Remarks                                                |                             |                    |                       |                            |
| Qualified range:                                       |                             |                    |                       |                            |
| Variants 04, 06 and 09 and 14, 16 and 19 are qualified |                             |                    |                       |                            |
| Contact Rating                                         | 15A at 28Vdc                |                    |                       |                            |
| Contact Configuration                                  | 4PDT Package                |                    |                       |                            |
| Package Type                                           | Cubic inch can              |                    |                       |                            |
| Coil Voltage                                           | 28Vdc                       |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125          |                             |                    |                       |                            |

|                                                     |                                            |                    |                       |                            |
|-----------------------------------------------------|--------------------------------------------|--------------------|-----------------------|----------------------------|
| RELAY,<br>LATCHING, ELECTROMAGNETIC,<br>TYPE EL215  |                                            |                    |                       | 167G                       |
| Procurement Specifications                          | Manufacturer                               | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic ESCC 3602                                   | REL STPI<br>St Jean de la Ruelle<br>France | Qualification      | CNES                  | Feb 1990                   |
| Detail ESCC 3602/009                                |                                            | Remarks            |                       |                            |
| Qualified range:                                    |                                            |                    |                       |                            |
| Variants 03, 04, 06 and 13, 14 and 16 are qualified |                                            |                    |                       |                            |
| Contact Rating                                      | 15A at 28Vdc                               |                    |                       |                            |
| Contact Configuration                               | 2PDT Package                               |                    |                       |                            |
| Package Type                                        | Half-cubic inch can                        |                    |                       |                            |
| Coil Voltage                                        | 28Vdc                                      |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125       |                                            |                    |                       |                            |

|                                                     |                             |                    |                       |                            |
|-----------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| RELAY,<br>LATCHING, ELECTROMAGNETIC,<br>TYPE M302   |                             |                    |                       | 310C                       |
| Procurement Specifications                          | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3602<br>Detail ESCC<br>3602/009     | LEACH<br>Sarralbe<br>France | Qualification      | CNES                  | Feb 1990                   |
| Remarks                                             |                             |                    |                       |                            |
| Qualified range:                                    |                             |                    |                       |                            |
| Variants 03, 04, 06 and 13, 14 and 16 are qualified |                             |                    |                       |                            |
| Contact Rating                                      | 15A at 28Vdc                |                    |                       |                            |
| Contact Configuration                               | 2PDT Package                |                    |                       |                            |
| Package Type                                        | Half-cubic inch can         |                    |                       |                            |
| Coil Voltage                                        | 28Vdc                       |                    |                       |                            |
| Operating Temperature Range (°C): -65 to +125       |                             |                    |                       |                            |

6.10 RESISTORS (10)

6.10.1 Shunts

| RESISTORS,<br>FIXED, CHIP, METAL FOIL,<br>BASED ON TYPES SMV-PW AND SM*-PT                                                                                                                                                                                  |                                                                     |                    |                       | 285D                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                  | Manufacturer                                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4001<br>Detail ESCC<br>4001/027<br>4001/028                                                                                                                                                                                                 | ISABELLENHÜTTE<br>HEUSLER<br>GmbH & Co. KG<br>Dillenburg<br>Germany | Qualification      | DLR                   | Nov 2008                   |
| Remarks                                                                                                                                                                                                                                                     |                                                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>ESCC 4001/027 variants 01, 02 and 03 are qualified (SMP-PW, SMS-PW, SMT-PW)<br/>ESCC 4001028 variant 02 is qualified (SMV-PW)</p> <p>Tolerance (%) = <math>\pm 1</math></p> <p>Operating Temperature Range (°C): -55 to +170</p> |                                                                     |                    |                       |                            |

6.10.2 Fixed, Film

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------|--------------------|-----------------------|----------------------------|-----------|-----------|--------------|--------------|----------------|-----|----|-----|----------------|-----|--|--|----------------|-----|--|--|----------------|-----|----|-----|----------------|-----|--|--|----------------|-----|--|--|-----------------|-----|----|-----|-----------------|-----|--|--|----------------|-----|----|-----|----------------|-----|--|--|----------------|-----|--|--|----------------|-----|----|-----|----------------|-----|--|--|----------------|-----|--|--|-----------------|-----|----|-----|-----------------|-----|--|--|
| RESISTORS,<br>FILM, FIXED, SURFACE MOUNT, NON-HERMETICALLY SEALED,<br>BASED ON TYPE MS1                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                |                    |                       | 256J                       |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Manufacturer                                                   | Nature of Approval | Supervising Authority | Initial Qualification Date |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| Generic<br>ESCC 4001<br>Detail ESCC<br>4001/022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | VISHAY Electronic GmbH Division<br>Draloric<br>Selb<br>Germany | Qualification      | DLR                   | Oct 1999                   |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                | Remarks            |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| Qualified range:                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| <table><tr><td>Range (Ω)</td><td>Tol. (±%)</td><td>TC (±ppm/°C)</td><td>Value Series</td></tr><tr><td>43.2 - 1.004 M</td><td>0.1</td><td>50</td><td>E96</td></tr><tr><td>10.0 - 1.004 M</td><td>0.5</td><td></td><td></td></tr><tr><td>2.20 - 5.114 M</td><td>1.0</td><td></td><td></td></tr><tr><td>43.2 - 1.004 M</td><td>0.1</td><td>25</td><td>E96</td></tr><tr><td>10.0 - 1.004 M</td><td>0.5</td><td></td><td></td></tr><tr><td>10.0 - 1.004 M</td><td>1.0</td><td></td><td></td></tr><tr><td>43.2 - 0.2213 M</td><td>0.1</td><td>15</td><td>E96</td></tr><tr><td>10.0 - 0.5113 M</td><td>0.5</td><td></td><td></td></tr><tr><td>43.2 - 1.004 M</td><td>0.1</td><td>50</td><td>E96</td></tr><tr><td>10.0 - 1.004 M</td><td>0.5</td><td></td><td></td></tr><tr><td>2.20 - 5.114 M</td><td>1.0</td><td></td><td></td></tr><tr><td>43.2 - 1.004 M</td><td>0.1</td><td>25</td><td>E96</td></tr><tr><td>10.0 - 1.004 M</td><td>0.5</td><td></td><td></td></tr><tr><td>10.0 - 1.004 M</td><td>1.0</td><td></td><td></td></tr><tr><td>43.2 - 0.2213 M</td><td>0.1</td><td>15</td><td>E96</td></tr><tr><td>10.0 - 0.5113 M</td><td>0.5</td><td></td><td></td></tr></table> |                                                                |                    |                       |                            | Range (Ω) | Tol. (±%) | TC (±ppm/°C) | Value Series | 43.2 - 1.004 M | 0.1 | 50 | E96 | 10.0 - 1.004 M | 0.5 |  |  | 2.20 - 5.114 M | 1.0 |  |  | 43.2 - 1.004 M | 0.1 | 25 | E96 | 10.0 - 1.004 M | 0.5 |  |  | 10.0 - 1.004 M | 1.0 |  |  | 43.2 - 0.2213 M | 0.1 | 15 | E96 | 10.0 - 0.5113 M | 0.5 |  |  | 43.2 - 1.004 M | 0.1 | 50 | E96 | 10.0 - 1.004 M | 0.5 |  |  | 2.20 - 5.114 M | 1.0 |  |  | 43.2 - 1.004 M | 0.1 | 25 | E96 | 10.0 - 1.004 M | 0.5 |  |  | 10.0 - 1.004 M | 1.0 |  |  | 43.2 - 0.2213 M | 0.1 | 15 | E96 | 10.0 - 0.5113 M | 0.5 |  |  |
| Range (Ω)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Tol. (±%)                                                      | TC (±ppm/°C)       | Value Series          |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1                                                            | 50                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 2.20 - 5.114 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.0                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1                                                            | 25                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.0                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 0.2213 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.1                                                            | 15                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 0.5113 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1                                                            | 50                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 2.20 - 5.114 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.0                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.1                                                            | 25                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 1.004 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 1.0                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 43.2 - 0.2213 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.1                                                            | 15                 | E96                   |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| 10.0 - 0.5113 M                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 0.5                                                            |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| Critical R = 160 kΩ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |
| Operating Temperature Range (°C): -55 to +125                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                |                    |                       |                            |           |           |              |              |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                |     |    |     |                |     |  |  |                |     |  |  |                 |     |    |     |                 |     |  |  |

| RESISTORS,<br>FILM, FIXED, SURFACE MOUNT, NON-HERMETICALLY SEALED,<br>BASED ON TYPE TNPS |                                                                   |                    |                       | 289D                       |  |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------|--------------------|-----------------------|----------------------------|--|
| Procurement Specifications                                                               | Manufacturer                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |  |
| Generic<br>ESCC 4001<br>Detail ESCC<br>4001/029                                          | VISHAY Electronic<br>GmbH Division<br>Draloric<br>Selb<br>Germany | Qualification      | DLR                   | May 2009                   |  |
|                                                                                          |                                                                   | Remarks            |                       |                            |  |

Qualified range:

Variants 01, 02 and 03 are qualified

| Variant Number | Style (Note 1) | Resistance Range $R_n$ |                   | Tolerance ( $\pm$ %) | Value Series | Temperature Coefficient TC ( $\pm 10^{-6}/^{\circ}\text{C}$ ) | Critical Resistance (k $\Omega$ ) | Weight max (g) |
|----------------|----------------|------------------------|-------------------|----------------------|--------------|---------------------------------------------------------------|-----------------------------------|----------------|
|                |                | Min ( $\Omega$ )       | Max (M $\Omega$ ) |                      |              |                                                               |                                   |                |
| 01             | 0603           | 10                     | 0.221             | 0.1, 0.5, 1          | E96          | 15, 25, 50                                                    | 56.25                             | 0.002          |
| 02             | 0805           | 10                     | 0.422             | 0.1, 0.5, 1          | E96          | 15, 25, 50                                                    | 180                               | 0.006          |
| 03             | 1206           | 10                     | 1                 | 0.1, 0.5, 1          | E96          | 15, 25, 50                                                    | 160                               | 0.008          |

Operating Temperature Range ( $^{\circ}\text{C}$ ): -55 to +125

6.10.3 Chip

|                                                                                                                                                                                                                                                              |                                                    |                                                                        |                       |                              |              |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|------------------------------------------------------------------------|-----------------------|------------------------------|--------------|
| RESISTORS,<br>FILM, FIXED, CHIP AND ARRAY, THIN FILM,<br>BASED ON TYPES PHR; PFRR; PRAHR/CNWHR                                                                                                                                                               |                                                    |                                                                        |                       | 287E                         |              |
| Procurement Specifications                                                                                                                                                                                                                                   | Manufacturer                                       | Nature of Approval                                                     | Supervising Authority | Initial Qualification Date   |              |
| Generic<br>ESCC 4001<br>Detail ESCC<br>4001/023<br>4001/025                                                                                                                                                                                                  | VISHAY S.A.<br>Division Sfernice<br>Nice<br>France | Qualification                                                          | CNES                  | Feb 2009                     |              |
| Remarks<br>Components under ESCC QML qualification. Refer to<br>Technology Flow description in REP006.                                                                                                                                                       |                                                    |                                                                        |                       |                              |              |
| Qualified range:<br><br>Type PHR, Variants 01 to 08, 13 and 14 are qualified<br>Type PFRR, Variants 09 to 12 and 15 are qualified<br>Type PRAHR/CNWHR, Variants 01 to 42 are qualified                                                                       |                                                    |                                                                        |                       |                              |              |
| 4001/023                                                                                                                                                                                                                                                     | PHR                                                | High Stability and Precision Chip                                      |                       |                              |              |
| 4001/023                                                                                                                                                                                                                                                     | PFRR                                               | High Stability and Precision Chip with Established Reliability Level R |                       |                              |              |
| 4001/025                                                                                                                                                                                                                                                     | PRA/CNWHR                                          | High Stability and Precision Surface Mount Array                       |                       |                              |              |
| The Established Reliability Level R is evaluated according to the ESCC Basic Specification 26000.                                                                                                                                                            |                                                    |                                                                        |                       |                              |              |
| Lead material is E with either Type 2 or Type 4 finish. The terminal material and finish of some of these variants makes them unsuitable for solder assembly methods. They shall be assembled using glue or wire bond techniques. See Detail specifications. |                                                    |                                                                        |                       |                              |              |
| Operating Temperature Range, (°C): -55 to +155                                                                                                                                                                                                               |                                                    |                                                                        |                       |                              |              |
| Type PHR:                                                                                                                                                                                                                                                    |                                                    |                                                                        |                       |                              |              |
| Detail Specification                                                                                                                                                                                                                                         | Style                                              | Critical R (kΩ)                                                        | Rated Dissipation (W) | Limiting Element Voltage (V) | Type Variant |
| 4001/023                                                                                                                                                                                                                                                     | 0402                                               | 18                                                                     | 0.050                 | 30                           | 13; 14       |
|                                                                                                                                                                                                                                                              | 0603                                               | 12.25                                                                  | 0.100                 | 35                           | 01; 05       |
|                                                                                                                                                                                                                                                              | 0805                                               | 45                                                                     | 0.125                 | 75                           | 02; 06       |
|                                                                                                                                                                                                                                                              | 1206                                               | 40                                                                     | 0.250                 | 100                          | 03; 07       |
|                                                                                                                                                                                                                                                              | 2010                                               | 45                                                                     | 0.500                 | 150                          | 04; 08       |

RESISTORS,  
FILM, FIXED, CHIP AND ARRAY, THIN FILM,  
BASED ON TYPES PHR; PFRR; PRAHR/CNWHR

**287E**

| Variant | Style | Resistance Range (Note 1) |                           | Tolerance (±%) (Note 2) | Temperature Coefficient (10 <sup>-6</sup> /°C) (Note 2) | Weight (g) |
|---------|-------|---------------------------|---------------------------|-------------------------|---------------------------------------------------------|------------|
|         |       | Min (Ω)                   | Max (MΩ)                  |                         |                                                         |            |
| 01, 05  | 0603  | 10                        | 0.200<br>(0.160 for TC°C) | 0.01; 0.02; 0.05; 0.1   | ±5; ±10; ±25                                            | 0.003      |
| 02, 06  | 0805  | 10                        | 0.250                     | 0.01; 0.02; 0.05; 0.1   | ±5; ±10; ±25                                            | 0.004      |
| 03, 07  | 1206  | 10                        | 1.000                     | 0.01; 0.02; 0.05; 0.1   | ±5; ±10; ±25                                            | 0.01       |
| 04, 08  | 2010  | 10                        | 3.000                     | 0.01; 0.02; 0.05; 0.1   | ±5; ±10; ±25                                            | 0.03       |
| 13, 14  | 0402  | 10                        | 0.100<br>(0.067 for TC°C) | 0.01; 0.02; 0.05; 0.1   | ±5; ±10; ±25                                            | 0.002      |

Notes:

1.

| Variant | Style | Critical Resistance (KΩ) |
|---------|-------|--------------------------|
| 01 - 05 | 0603  | 12.25                    |
| 02 - 06 | 0805  | 45                       |
| 03 - 07 | 1206  | 40                       |
| 04 - 08 | 2010  | 45                       |
| 13 - 14 | 0402  | 18                       |

2.

| Resistance (Ω) | Available Tolerances (±%) | Series                            |
|----------------|---------------------------|-----------------------------------|
| 10 ≤ R < 50    | 0.1                       | Any value in the resistance range |
| 50 ≤ R < 100   | 0.05 and 0.1              |                                   |
| 100 ≤ R < 250  | 0.02; 0.05 and 0.1        |                                   |
| R ≥ 250        | 0.01; 0.02; 0.05 and 0.1  |                                   |

| Resistance (Ω) | Temperature Coefficient (ppm/°C) | Series                            |
|----------------|----------------------------------|-----------------------------------|
| 10 ≤ R < 20    | E: 25 (-55°C; +155 °C)           | Any value in the resistance range |
| 20 ≤ R < 50    | Y: 10 (-55°C; +155 °C)           |                                   |
| 20 ≤ R < 50    | Z: 5 (+22°C; +70 °C)             |                                   |
| R ≥ 50         | C: 5 (-55°C; +155 °C)            |                                   |

RESISTORS,  
FILM, FIXED, CHIP AND ARRAY, THIN FILM,  
BASED ON TYPES PHR; PFRR; PRAHR/CNWHR

**287E**

Type PFRR:

| Detail Specification | Style | Critical R (kΩ) | Rated Dissipation (W) | Limiting Element Voltage (V) | Type Variant |
|----------------------|-------|-----------------|-----------------------|------------------------------|--------------|
| 4001/023             | 0402  | 32              | 0.050                 | 40                           | 15           |
|                      | 0603  | 25              | 0.100                 | 50                           | 09           |
|                      | 0805  | 80              | 0.125                 | 100                          | 10           |
|                      | 1206  | 90              | 0.250                 | 150                          | 11           |
|                      | 2010  | 80              | 0.500                 | 200                          | 12           |

| Style                        | Resistance Range (Ω) | Tolerance (±%) | Temperature Coefficient TC(±10 <sup>-6</sup> /°C) |
|------------------------------|----------------------|----------------|---------------------------------------------------|
| 0402; 0603; 0805; 1206; 2010 | From 100 to ≤ 100K   | 0.05; 0.1      | 10; 25                                            |
| 0603; 0805; 1206; 2010       | From 100 to ≤ 261K   | 0.05; 0.1      | 10; 25                                            |
| 0805; 1206; 2010             | From 261K to ≤ 301K  | 0.05; 0.1      | 10; 25                                            |
| 1206; 2010                   | From 301K to ≤ 1M    | 0.05; 0.1      | 10; 25                                            |
| 2010                         | From 1M to 3M01      | 0.05; 0.1      | 10; 25                                            |

Type PRAHR/CNWHR:

| Detail Specification | Style  | Critical R (K Ω) | Rated Dissipation (W/resistor) | Limiting Element Voltage (V/resistor) | Type Variant      |                        |
|----------------------|--------|------------------|--------------------------------|---------------------------------------|-------------------|------------------------|
|                      |        |                  |                                |                                       | Same Ohmic Values | Different Ohmic Values |
| 4001/025             | PRA100 | 12.25            | 0.100                          | 35                                    | 01 to 07          | 22 to 28               |
|                      | PRA135 | 56.25            | 0.100                          | 75                                    | 08 to 14          | 29 to 35               |
|                      | PRA182 | 100              | 0.100                          | 100                                   | 15 to 21          | 36 to 42               |

| Style                  | Resistance Range (Ω) | Tolerance (±%) |           | Temperature Coefficient TC(±10 <sup>-6</sup> /°C) |          |
|------------------------|----------------------|----------------|-----------|---------------------------------------------------|----------|
|                        |                      | Absolute       | Relative  | Absolute                                          | Relative |
| PRA100; PRA135; PRA182 | From 100 to 200K     | 0.1; 0.5; 1    | 0.05; 0.1 | 10                                                | 3; 5     |
| PRA135; PRA182         | From 200K to 250K    | 0.1; 0.5; 1    | 0.05; 0.1 | 10                                                | 3; 5     |
| PRA182                 | From 250K to 1M      | 0.1; 0.5; 1    | 0.05; 0.1 | 10                                                | 3; 5     |

Number of Resistors per Array: 2 to 8

|                                                                                                                                                                             |                                                    |                    |                             |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------|--------------------|-----------------------------|----------------------------|
| RESISTORS,<br>FIXED, CHIP, THICK FILM,<br>BASED ON TYPE CHP                                                                                                                 |                                                    |                    |                             | 314C                       |
| Procurement Specifications                                                                                                                                                  | Manufacturer                                       | Nature of Approval | Supervising Authority       | Initial Qualification Date |
| Generic<br>ESCC 4001<br>Detail ESCC<br>4001/026                                                                                                                             | VISHAY S.A.<br>Division Sfernice<br>Nice<br>France | Qualification      | CNES                        | Oct 2011                   |
|                                                                                                                                                                             |                                                    | Remarks            |                             |                            |
| Qualified range:<br><br>Type CHPHR, variants 01 to 10 are qualified.<br><br>Type CHPFR, variants 11 to 20 are qualified.<br><br>The qualified range is restricted as below: |                                                    |                    |                             |                            |
| Style                                                                                                                                                                       | Critical R (KΩ)                                    | Rated Dissipation  | Limited Element Voltage (V) | Type Variant               |
| 0603                                                                                                                                                                        | 25                                                 | 0.100              | 50                          | 01, 06, 11, 16             |
| 0805                                                                                                                                                                        | 50                                                 | 0.200              | 100                         | 02, 07, 12, 17             |
| 1206                                                                                                                                                                        | 160                                                | 0.250              | 200                         | 03, 08, 13, 18             |
| 2010                                                                                                                                                                        | 180                                                | 0.500              | 300                         | 04, 09, 14, 19             |
| 2512                                                                                                                                                                        | 112.5                                              | 0.800              | 300                         | 05, 10, 15, 20             |
| Style                                                                                                                                                                       | Range(Ω)                                           | Tol. (±%)          | TC(±ppm/°C)                 |                            |
| 0603;0805;1206;2010;2512                                                                                                                                                    | From 1 to < 10                                     | 2; 5               | 200                         |                            |
| 0603;0805;1206;2010;2512                                                                                                                                                    | From 10 to < 1M                                    | 1; 2; 5            | 100; 200                    |                            |
| 0603;0805;1206;2010;2512                                                                                                                                                    | From 1M to ≤ 10M                                   | 2; 5               | 200                         |                            |
| Lead material is E with either Type 2 or Type 4 finish                                                                                                                      |                                                    |                    |                             |                            |
| Operating Temperature Range (°C): -55 to +155                                                                                                                               |                                                    |                    |                             |                            |

6.10.4 Flexible, Foil, Heaters

| RESISTORS,<br>HEATERS,<br>FLEXIBLE SINGLE AND DOUBLE LAYER                                                                                                    |                                                  |                            |                       | 184M                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|----------------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                    | Manufacturer                                     | Nature of Approval         | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4009<br>Detail ESCC<br>4009/002                                                                                                               | IRCA<br>RICA Division<br>Vitorio Veneto<br>Italy | Qualification              | ESA                   | Apr 1992                   |
| Remarks                                                                                                                                                       |                                                  |                            |                       |                            |
| Qualified range:<br><br>Variants 01 through 48 are qualified<br><br><br><br><br><br><br><br><br><br>Single, double layer and magnetically compensated heaters |                                                  |                            |                       |                            |
| Maximum Ohmic density                                                                                                                                         |                                                  | 200 Ω/cm2                  |                       |                            |
| Tolerances                                                                                                                                                    |                                                  | ±2, 3, 5, 10 %             |                       |                            |
| Resistance                                                                                                                                                    |                                                  | 1 to 5000 Ω                |                       |                            |
| Heating Area                                                                                                                                                  |                                                  | 1.6 to 1300 cm2            |                       |                            |
| Terminal Lead                                                                                                                                                 |                                                  | 20, 22, 24, 26, 28, 30 AWG |                       |                            |
| Temperature coefficient                                                                                                                                       |                                                  | (10-6/°C): 175             |                       |                            |
| Operating Temperature Range (°C): -65 to +200                                                                                                                 |                                                  |                            |                       |                            |

| RESISTORS,<br>HEATERS,<br>FLEXIBLE SINGLE AND DOUBLE LAYER |                              |                                                 |                       | 325B                       |
|------------------------------------------------------------|------------------------------|-------------------------------------------------|-----------------------|----------------------------|
| Procurement Specifications                                 | Manufacturer                 | Nature of Approval                              | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4009<br>Detail ESCC<br>4009/003            | Minco SAS<br>Aston<br>France | Qualification                                   | CNES                  | Mar 2013                   |
| Remarks                                                    |                              |                                                 |                       |                            |
| Qualified range:                                           |                              |                                                 |                       |                            |
| Variants 01, 02 and 03 are qualified                       |                              |                                                 |                       |                            |
| Single, double layer heaters                               |                              |                                                 |                       |                            |
| Special characteristics:                                   |                              |                                                 |                       |                            |
| Maximum Ohmic density                                      |                              | 70 Ω/cm2                                        |                       |                            |
| Rated Power density                                        |                              | 0.38 (variants 01, 03), 0.54 (variant 02) W/cm2 |                       |                            |
| Resistance                                                 |                              | 1 to 5000 Ω                                     |                       |                            |
| Heating Area                                               |                              | 0.26 to 1000 cm2                                |                       |                            |
| Terminal Lead                                              |                              | 20 to 30 AWG                                    |                       |                            |
| Resistance Tolerance                                       |                              | (%) : ±1 to ±10                                 |                       |                            |
| Operating Temperature Range (°C):                          |                              |                                                 |                       |                            |
| -65 to +150 for variants 01 and 03;                        |                              |                                                 |                       |                            |
| -65 to +200 for variant 02                                 |                              |                                                 |                       |                            |

| RESISTORS,<br>HEATERS,<br>FLEXIBLE SINGLE AND DOUBLE LAYER |                                                  |                    |                       | 330A                       |
|------------------------------------------------------------|--------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                 | Manufacturer                                     | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4009                                       | IRCA<br>RICA Division<br>Vitorio Veneto<br>Italy | Qualification      | ESA                   | Jan 2015                   |
| Detail ESCC<br>4009/004                                    |                                                  | Remarks            |                       |                            |
| Qualified range:                                           |                                                  |                    |                       |                            |
| All variants are qualified                                 |                                                  |                    |                       |                            |
| Single, double layer heaters                               |                                                  |                    |                       |                            |
| Special characteristics:                                   |                                                  |                    |                       |                            |
| Maximum Ohmic density                                      |                                                  | 330 Ω/cm2          |                       |                            |
| Rated power density                                        |                                                  | 0.38               |                       |                            |
| Resistance                                                 |                                                  | 1 to 10000 Ω       |                       |                            |
| Heating Area                                               |                                                  | 1.66 to 1300 cm2   |                       |                            |
| Terminal Lead                                              |                                                  | 20 to 30 AWG       |                       |                            |
| Resistance Tolerance                                       |                                                  | (%) : ±2 to ±10    |                       |                            |
| Operating Temperature Range (°C): -65 to +150              |                                                  |                    |                       |                            |

6.11 THERMISTORS (11)

6.11.1 NTC

| THERMISTORS,<br>(THERMALLY SENSITIVE RESISTORS), NTC,<br>BASED ON TYPES G15K4D489 AND *K3A35*                                                                                                                                                   |                                                          |                    |                       | 266H                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                      | Manufacturer                                             | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 4006<br>Detail ESCC<br>4006/013<br>4006/014                                                                                                                                                                                     | TE Connectivity<br>MEAS (Betatherm)<br>Galway<br>Ireland | Qualification      | ESA                   | Jul 2001                   |
| <p>Remarks<br/>Refer to variants table 1(a) in the Detail Specifications for resistance to temperature characteristics.</p>                                                                                                                     |                                                          |                    |                       |                            |
| <p>Qualified range:</p> <p>4006/013: Variants 01 to 05 and 06 to 07 are qualified.</p> <p>4006/014: Variants 08, 09 and 13 are qualified.</p> <p>Operating Temperature Range (°C):</p> <p>4006/013 : -55 to +115<br/>4006/014 : -60 to +160</p> |                                                          |                    |                       |                            |

6.11.2 PTC platinum

|                                                                                                      |                                                                        |                                           |                                                           |                                                         |                                                      |
|------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------|-------------------------------------------|-----------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------|
| RESISTANCE TEMPERATURE DETECTOR,<br>THIN FILM PLATINUM SENSOR,<br>PTC, RANGE 100 TO 2000 OHMS AT 0°C |                                                                        |                                           |                                                           | 352                                                     |                                                      |
| Procurement Specifications                                                                           | Manufacturer                                                           | Nature of Approval                        | Supervising Authority                                     | Initial Qualification Date                              |                                                      |
| Generic<br>ESCC 4006<br>Detail ESCC<br>4006/015                                                      | Innovative Sensor<br>Technology IST AG,<br>Ebnat-Kappel<br>Switzerland | Qualification                             | ESA                                                       | February 2018                                           |                                                      |
| Remarks                                                                                              |                                                                        |                                           |                                                           |                                                         |                                                      |
| Qualified range: variants 01 to 10                                                                   |                                                                        |                                           |                                                           |                                                         |                                                      |
| Variant Number                                                                                       | Based on Type<br>(Article Number)                                      | Nominal<br>R <sub>z</sub> (Ω)<br>(at 0°C) | Operating<br>Temperature<br>Range<br>T <sub>op</sub> (°C) | Maximum<br>Operating<br>Current<br>I <sub>OP</sub> (mA) | Maximum<br>Rated<br>Current<br>I <sub>MAX</sub> (mA) |
| 01                                                                                                   | P0K1.232.7W (010.02991)                                                | 100                                       | -50 to +150                                               | 1                                                       | 4                                                    |
| 02                                                                                                   | P0K1.232.7W (010.02992)                                                | 100                                       | -200 to +200                                              | 1                                                       | 4                                                    |
| 03                                                                                                   | P0K2.232.7W (010.02993)                                                | 200                                       | -50 to +150                                               | 0.7                                                     | 2.8                                                  |
| 04                                                                                                   | P0K2.232.7W (010.02994)                                                | 200                                       | -200 to +200                                              | 0.7                                                     | 2.8                                                  |
| 05                                                                                                   | P0K5.232.7W (010.02995)                                                | 500                                       | -50 to +150                                               | 0.45                                                    | 1.3                                                  |
| 06                                                                                                   | P0K5.232.7W (010.02996)                                                | 500                                       | -200 to +200                                              | 0.45                                                    | 1.3                                                  |
| 07                                                                                                   | P1K0.232.7W (010.02997)                                                | 1000                                      | -50 to +150                                               | 0.3                                                     | 1.3                                                  |
| 08                                                                                                   | P1K0.232.7W (010.02998)                                                | 1000                                      | -200 to +200                                              | 0.3                                                     | 1.3                                                  |
| 09                                                                                                   | P2K0.232.7W (010.02998)                                                | 2000                                      | -50 to +150                                               | 0.2                                                     | 0.9                                                  |
| 10                                                                                                   | P2K0.232.7W (010.03000)                                                | 2000                                      | -200 to +200                                              | 0.2                                                     | 0.9                                                  |

## 6.12 TRANSISTORS (12)

### 6.12.1 Low Power, NPN

|                                                                                          |                                        |                        |                        |                            |                       |        |        |        |        |        |
|------------------------------------------------------------------------------------------|----------------------------------------|------------------------|------------------------|----------------------------|-----------------------|--------|--------|--------|--------|--------|
| TRANSISTORS,<br>LOW AND HIGH POWER,<br>NPN                                               |                                        |                        |                        | 233L                       |                       |        |        |        |        |        |
| Procurement Specifications                                                               | Manufacturer                           | Nature of Approval     | Supervising Authority  | Initial Qualification Date |                       |        |        |        |        |        |
| Generic ESCC 5000                                                                        | STMicroelectronics<br>Rennes<br>France | Qualification          | CNES                   | Sep 1996                   |                       |        |        |        |        |        |
| Detail ESCC                                                                              |                                        | Remarks                |                        |                            |                       |        |        |        |        |        |
| 5201/001, 5201/002, 5201/003, 5201/004, 5201/011, 5201/019, 5203/010, 5203/016, 5207/002 |                                        |                        |                        |                            |                       |        |        |        |        |        |
| Qualified range:                                                                         |                                        |                        |                        |                            |                       |        |        |        |        |        |
| ESCC Specification No.                                                                   | Component Type                         | Package                | Qualified Variants     |                            |                       |        |        |        |        |        |
| 5201/001                                                                                 | 2N 2484                                | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05, 06, 07 |                            |                       |        |        |        |        |        |
| 5201/002                                                                                 | 2N 2222A                               | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05, 11, 12 |                            |                       |        |        |        |        |        |
| 5201/019                                                                                 | 2N 5551                                | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05, 08, 09 |                            |                       |        |        |        |        |        |
| 5201/004                                                                                 | 2N 3700                                | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05, 06, 07 |                            |                       |        |        |        |        |        |
| 5203/010                                                                                 | 2N 5154                                | TO-257, SMD.5, TO-39   | 01, 02, 04, 05, 06, 07 |                            |                       |        |        |        |        |        |
| 5203/016                                                                                 | BUX 77ESY                              | TO-257                 | 06, 07                 |                            |                       |        |        |        |        |        |
| 5207/002                                                                                 | 2N 2920A                               | TO-77, LCCC6, FP-8     | 03, 06, 12, 15, 16, 17 |                            |                       |        |        |        |        |        |
| 5201/003                                                                                 | 2N 2219                                | TO-39                  | 01, 02                 |                            |                       |        |        |        |        |        |
| 5201/011                                                                                 | 2N 3019                                | TO-39                  | 03, 04                 |                            |                       |        |        |        |        |        |
| Maximum ratings:                                                                         |                                        |                        |                        |                            |                       |        |        |        |        |        |
|                                                                                          | 2N2219                                 | 2N222 A                | 2N2484                 | 2N3019                     |                       | 2N5551 | 2N3700 | 2N5154 | BUX 77 | 2N292A |
| V <sub>CBO</sub> (V):                                                                    | 75                                     | 75                     | 60                     | 140                        | BV <sub>CBO</sub> (V) | 180    | 140    | 100    | 100    | 60     |
| V <sub>CEO</sub> (V):                                                                    | 40                                     | 50                     | 60                     | 80                         | BV <sub>CEO</sub> (V) | 160    | 80     | 80     | 80     | 60     |
| Operating Temperature Range (°C): -65 to +200                                            |                                        |                        |                        |                            |                       |        |        |        |        |        |

### 6.12.2 Low Power, PNP

|                                                            |                                        |                        |                          |                            |        |        |
|------------------------------------------------------------|----------------------------------------|------------------------|--------------------------|----------------------------|--------|--------|
| TRANSISTORS,<br>LOW AND HIGH POWER,<br>PNP                 |                                        |                        |                          | 234L                       |        |        |
| Procurement<br>Specifications                              | Manufacturer                           | Nature of<br>Approval  | Supervising<br>Authority | Initial Qualification Date |        |        |
| Generic<br>ESCC 5000<br>Detail ESCC                        | STMicroelectronics<br>Rennes<br>France | Qualification          | CNES                     | Sep 1996                   |        |        |
|                                                            |                                        | Remarks                |                          |                            |        |        |
| 5202/001, 5202/002, 5202/014, 5204/002, 5204/006, 5207/005 |                                        |                        |                          |                            |        |        |
| Qualified range:                                           |                                        |                        |                          |                            |        |        |
| ESCC<br>Specification No.                                  | Component Type                         | Package                | Qualified Variants       |                            |        |        |
| 5202/002                                                   | 2N 2905A                               | TO-39                  | 01, 02                   |                            |        |        |
| 5202/001                                                   | 2N 2907A                               | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05,06, 07    |                            |        |        |
| 5202/014                                                   | 2N 5401                                | TO-18, LCCC3, LCCC3 +1 | 01, 02, 04, 05, 06, 07   |                            |        |        |
| 5204/002                                                   | 2N 5153                                | TO-39, TO-257, SMD.5   | 01, 02, 04, 05, 06, 07   |                            |        |        |
| 5204/006                                                   | BUX 78ESY                              | TO-257                 | 06, 07                   |                            |        |        |
| 5207/005                                                   | 2N 3810                                | TO-78, LCCC6, FP       | 01, 02, 07, 09, 10, 11   |                            |        |        |
| Maximum Rating                                             |                                        |                        |                          |                            |        |        |
|                                                            | 2N 2905A                               | 2N2907A                | 2N3810                   | 2N5153                     | BUX 78 | 2N5401 |
| BV <sub>CBO</sub> (V)                                      | 60                                     | 60                     | 60                       | 100                        | 100    | 160    |
| BV <sub>CEO</sub> (V)                                      | 60                                     | 60                     | 60                       | 80                         | 80     | 150    |
| Operating Temperature Range (°C): -65 to +200              |                                        |                        |                          |                            |        |        |

6.12.3 MOSFET, Power, N-Channel

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|--------------------|-----------------------|----------------------------|---------------------|--------------------------------------|----------------------------|-----------------------------------------------|---------------------|---------------------------------|------------------------|--------------------------------------|------------------------|------|--------------------|-----------------------------------|
| TRANSISTORS, MOSFET, N-CHANNEL, POWER,<br>BASED ON TYPES STRH100N10, STRH40N6,<br>STRH100N6 AND STRH8N10                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                               |                    |                       | 303C                       |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Manufacturer                                  | Nature of Approval | Supervising Authority | Initial Qualification Date |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| Generic<br>ESCC 5000<br>Detail ESCC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | STMicroelectronics<br>Rennes<br>France        | Qualification      | CNES                  | Oct 2010                   |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                               | Remarks            |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| 5205/021, 5205/022, 5205/023, 5205/024                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                               |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| Qualified range:<br><br>5205/021 & 5205/022: Variants 01 and 02 are qualified<br>5205/023 & 5205/024: Variant 01 is qualified<br><br>Package Types:TO-254AA, SMD.5 for STRH40N6 and STRH8N10<br><br>Maximum Ratings for 5205/021:<br><table><tr><td>V<sub>GS(th)</sub></td><td>2 –4.5 min/max, I<sub>D</sub>=1 mA</td></tr><tr><td>r<sub>DS(on)</sub> (m Ω):</td><td>35, V<sub>GS</sub>=12V, I<sub>D</sub>=24A</td></tr><tr><td>I<sub>DS</sub> (A)</td><td>48, T<sub>case</sub> (°C)= +25</td></tr><tr><td>V<sub>DS</sub> (Vdc):</td><td>100 over Top , V<sub>GS</sub>= 0 V</td></tr><tr><td>V<sub>GS</sub> (Vdc):</td><td>± 20</td></tr><tr><td>P<sub>TOT</sub>:</td><td>170 W at T<sub>case</sub> ≤+25 C</td></tr></table><br>Operating Temperature Range (°C): -55 to +150 |                                               |                    |                       |                            | V <sub>GS(th)</sub> | 2 –4.5 min/max, I <sub>D</sub> =1 mA | r <sub>DS(on)</sub> (m Ω): | 35, V <sub>GS</sub> =12V, I <sub>D</sub> =24A | I <sub>DS</sub> (A) | 48, T <sub>case</sub> (°C)= +25 | V <sub>DS</sub> (Vdc): | 100 over Top , V <sub>GS</sub> = 0 V | V <sub>GS</sub> (Vdc): | ± 20 | P <sub>TOT</sub> : | 170 W at T <sub>case</sub> ≤+25 C |
| V <sub>GS(th)</sub>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 2 –4.5 min/max, I <sub>D</sub> =1 mA          |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| r <sub>DS(on)</sub> (m Ω):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 35, V <sub>GS</sub> =12V, I <sub>D</sub> =24A |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| I <sub>DS</sub> (A)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 48, T <sub>case</sub> (°C)= +25               |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| V <sub>DS</sub> (Vdc):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 100 over Top , V <sub>GS</sub> = 0 V          |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| V <sub>GS</sub> (Vdc):                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | ± 20                                          |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |
| P <sub>TOT</sub> :                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 170 W at T <sub>case</sub> ≤+25 C             |                    |                       |                            |                     |                                      |                            |                                               |                     |                                 |                        |                                      |                        |      |                    |                                   |

|                                                                                                                                         |                                                     |                                                                                                                                                                                                                                                     |                       |                            |
|-----------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|----------------------------|
| TRANSISTORS, POWER, MOSFET,<br>N-CHANNEL,<br>BASED ON TYPE BUY **CS***                                                                  |                                                     |                                                                                                                                                                                                                                                     |                       | 319B                       |
| Procurement Specifications                                                                                                              | Manufacturer                                        | Nature of Approval                                                                                                                                                                                                                                  | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 5000<br>Detail ESCC                                                                                                     | Infineon<br>Technologies AG<br>Neubiberg<br>Germany | Qualification                                                                                                                                                                                                                                       | DLR                   | Aug 2012                   |
|                                                                                                                                         |                                                     | Remarks<br>These devices have a TID tested capability of 100 kRad (Si) SEE tested : LET (MeV-cm <sup>2</sup> /mg) 56 @ V <sub>GS</sub> = -10V, V <sub>DS</sub> = 250V SOA and SE SOA derating graphs are incorporated in the Detail Specifications. |                       |                            |
| 5205/026, 5205/027, 5205/028, 5205/030                                                                                                  |                                                     |                                                                                                                                                                                                                                                     |                       |                            |
| Qualified range:<br><br>5205/026 — variant 01R<br>5205/027 — variant 01R<br>5205/028 — variant 01R<br>5205/030 — variants 01R, 02R, 03R |                                                     |                                                                                                                                                                                                                                                     |                       |                            |

| TRANSISTORS, POWER, MOSFET,<br>N-CHANNEL, RADHARD<br>BASED ON TYPE BUY 15CS                                                                                                                                                                                                                                                                    |                                                     |                    |                       | 339                        |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------|-----------------------|----------------------------|----------------------------------|-----|---------------------|----|--------------------------|-----|--------------------------|-----|----------------------|----|-----------------------------|------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                     | Manufacturer                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5205/031                                                                                                                                                                                                                                                                                                | Infineon<br>Technologies AG<br>Neubiberg<br>Germany | Qualification      | DLR                   | May 2016                   |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| Remarks<br>These devices have a TID tested capability of 100 kRad (Si) SEE tested : LET (MeV-cm <sup>2</sup> /mg) 56 @ V <sub>GS</sub> = -10V, V <sub>DS</sub> = 250V SOA and SE SOA derating graphs are incorporated in the Detail Specifications.                                                                                            |                                                     |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| Qualified range:<br><br>All Variants are qualified.<br><br>Package:SMD0.5, SMD2, TO-254AA, TO-257AA<br><br>Maximum ratings:                                                                                                                                                                                                                    |                                                     |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| <table><tr><td>r<sub>DS(ON)</sub> (mΩ) @ 25 °C</td><td>150</td></tr><tr><td>I<sub>DS</sub> (A)</td><td>23</td></tr><tr><td>V<sub>DS</sub> (V) max.</td><td>150</td></tr><tr><td>V<sub>GS</sub> (V) max.</td><td>±20</td></tr><tr><td>P<sub>tot</sub> (W)</td><td>75</td></tr><tr><td>R<sub>th(j-c)</sub> (°C/W)</td><td>1.66</td></tr></table> |                                                     |                    |                       |                            | r <sub>DS(ON)</sub> (mΩ) @ 25 °C | 150 | I <sub>DS</sub> (A) | 23 | V <sub>DS</sub> (V) max. | 150 | V <sub>GS</sub> (V) max. | ±20 | P <sub>tot</sub> (W) | 75 | R <sub>th(j-c)</sub> (°C/W) | 1.66 |
| r <sub>DS(ON)</sub> (mΩ) @ 25 °C                                                                                                                                                                                                                                                                                                               | 150                                                 |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| I <sub>DS</sub> (A)                                                                                                                                                                                                                                                                                                                            | 23                                                  |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| V <sub>DS</sub> (V) max.                                                                                                                                                                                                                                                                                                                       | 150                                                 |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| V <sub>GS</sub> (V) max.                                                                                                                                                                                                                                                                                                                       | ±20                                                 |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| P <sub>tot</sub> (W)                                                                                                                                                                                                                                                                                                                           | 75                                                  |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| R <sub>th(j-c)</sub> (°C/W)                                                                                                                                                                                                                                                                                                                    | 1.66                                                |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |
| Operating Temperature Range (°C): Top = - 55 to +150                                                                                                                                                                                                                                                                                           |                                                     |                    |                       |                            |                                  |     |                     |    |                          |     |                          |     |                      |    |                             |      |

6.12.4 MOSFET, Power, P-Channel

|                                                                                                                        |                                         |                       |                          |                            |
|------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------------------|----------------------------|
| TRANSISTORS, MOSFET,<br>P-CHANNEL, POWER,<br>TYPE STRH40P10 and STRH12P10                                              |                                         |                       |                          | 326B                       |
| Procurement<br>Specifications                                                                                          | Manufacturer                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5205/025<br>5205/029                                                            | ST Microelectronics<br>Rennes<br>France | Qualification         | DLR                      | Mar 2013                   |
| Remarks<br>These devices have a TID tested capability of 100kRAD(Si).                                                  |                                         |                       |                          |                            |
| Qualified range:<br><br>Variants 01 and 02 in 5205/025 are qualified.<br>Variants 01 and 02 in 5205/029 are qualified. |                                         |                       |                          |                            |

6.12.5 RF/Microwave, NPN, Low Power, Low Noise

| TRANSISTORS, MICROWAVE,<br>SMALL SIGNAL, BIPOLAR,<br>BASED ON TYPE BFY 193 |                                                     |                       |                          | 230G                       |
|----------------------------------------------------------------------------|-----------------------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                              | Manufacturer                                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5611/006                            | Infineon<br>Technologies AG<br>Neubiberg<br>Germany | Qualification         | DLR                      | Jun 1996                   |
|                                                                            |                                                     | Remarks               |                          |                            |
| Qualified range:                                                           |                                                     |                       |                          |                            |
| Variants 01 to 08                                                          |                                                     |                       |                          |                            |
| Characteristics for BFY 193:                                               |                                                     |                       |                          |                            |
| V <sub>CEO</sub> (V) max.                                                  |                                                     | 12                    |                          |                            |
| V <sub>CBO</sub> (V)max.                                                   |                                                     | 20                    |                          |                            |
| h <sub>FE</sub> min/max.                                                   |                                                     | 50/175                | @ VCE = 8.0 V, IC = 30mA |                            |
| NF (dB) max.                                                               | @ 2 GHz                                             | 2.9                   | @ VCE = 5.0 V, IC = 15mA |                            |
| MAG/MSG (dB) min.                                                          | @ 2 GHz                                             | 12.5                  | @ VCE = 5.0 V, IC = 40mA |                            |
| f <sub>T</sub> (GHz) min.                                                  | @ 500 MHz                                           | 6.5                   | @ VCE = 5.0 V, IC = 40mA |                            |
| Package: “ Micro-X1”                                                       |                                                     |                       |                          |                            |
| Total Power Dissipation (P <sub>tot</sub> ) = 580 mW                       |                                                     |                       |                          |                            |
| Operating Temperature Range (°C): Top = - 65 to +200                       |                                                     |                       |                          |                            |

| TRANSISTORS, MICROWAVE,<br>SMALL SIGNAL, BIPOLAR,<br>BASED ON TYPE BFY 450                        |                                                     |                    |                       | 245G                       |
|---------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                        | Manufacturer                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 5000<br>Detail ESCC<br>5611/008                                                   | Infineon<br>Technologies AG<br>Neubiberg<br>Germany | Qualification      | DLR                   | Jun 1997                   |
| Remarks                                                                                           |                                                     |                    |                       |                            |
| Qualified range:<br><br>Variants 01, 02 and 03 are qualified.<br><br>Characteristics for BFY 450: |                                                     |                    |                       |                            |
| V <sub>CEO</sub> (V) max.                                                                         |                                                     | 4.5                |                       |                            |
| V <sub>CBO</sub> (V) max.                                                                         |                                                     | 15                 |                       |                            |
| I <sub>C</sub> (mA) max.                                                                          |                                                     | 100                |                       |                            |
| I <sub>B</sub> (mA) max.                                                                          |                                                     | 10                 |                       |                            |
| h <sub>FE</sub> min/max.                                                                          |                                                     | 50/150             |                       | @ VCE = 1.0 V, IC = 20mA   |
| NF (dB) max.                                                                                      | @ 1.8 GHz                                           | 2.0                |                       | @ VCE = 2.0 V, IC = 10mA   |
| f <sub>T</sub> (GHz) min.                                                                         | @ 1.0 GHz                                           | 18                 |                       | @ VCE = 3.0 V, IC = 90mA   |
| Package: “ Micro-X1”                                                                              |                                                     |                    |                       |                            |
| Total Power Dissipation (Ptot) = 450 mW                                                           |                                                     |                    |                       |                            |
| Operating Temperature Range (°C): Top = - 65 to +175                                              |                                                     |                    |                       |                            |

|                                                                                                                                                                                                                          |                                                  |                    |                       |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------|-----------------------|----------------------------|
| TRANSISTORS, MICROWAVE,<br>SMALL SIGNAL, BIPOLAR,<br>BASED ON TYPES BFY 640, 640B, 650B and 740B                                                                                                                         |                                                  |                    |                       | 322B                       |
| Procurement Specifications                                                                                                                                                                                               | Manufacturer                                     | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 5010<br>Detail ESCC                                                                                                                                                                                      | Infineon Technologies AG<br>Neubiberg<br>Germany | Qualification      | DLR                   | Jun 1997                   |
| Remarks<br>This certificate, from its issue B, release in May 2016, includes in its scope of qualification some devices previously listed in the QPL under certificates No. 320 and 321, which are no longer maintained. |                                                  |                    |                       |                            |
| 5611/009, 5611/010, 5611/011                                                                                                                                                                                             |                                                  |                    |                       |                            |
| Qualified range:<br><br>5611/009: variants 01, 02, 03<br>5611/010: variants 01, 02, 03, 04<br>5611/011: variant 01                                                                                                       |                                                  |                    |                       |                            |

6.12.6 Microwave, Gallium Arsenide

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     |                       |                          |                            |  |  |             |         |          |                |     |    |                |     |      |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-----------------------|--------------------------|----------------------------|--|--|-------------|---------|----------|----------------|-----|----|----------------|-----|------|
| TRANSISTORS, HIGH ELECTRON MOBILITY,<br>GALLIUM ARSENIDE, MICROWAVE, LOW NOISE, SMALL SIGNAL,<br>BASED ON TYPE CFY 67                                                                                                                                                                                                                                                                                                                                                                                             |                                                     |                       |                          | 213G                       |  |  |             |         |          |                |     |    |                |     |      |
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | Manufacturer                                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |  |  |             |         |          |                |     |    |                |     |      |
| Generic<br>ESCC 5010<br>Detail ESCC<br>5613/004                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Infineon<br>Technologies AG<br>Neubiberg<br>Germany | Qualification         | DLR                      | Apr 1994                   |  |  |             |         |          |                |     |    |                |     |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     | Remarks               |                          |                            |  |  |             |         |          |                |     |    |                |     |      |
| Qualified range:<br><br>All variants are qualified<br><br>Characteristics (@ 12 GHz):<br><table><tr><td colspan="2"></td><td>NFmin. (dB)</td><td>Ga (dB)</td></tr><tr><td rowspan="2">5613/004</td><td>variants 1 &amp; 3</td><td>0.8</td><td>11</td></tr><tr><td>Variants 2 &amp; 4</td><td>1.0</td><td>10.5</td></tr></table><br>Package: Micro-X<br><br>Total Power Dissipation (P <sub>tot</sub> ) = 200 mW derated from +31 °C T <sub>amb</sub><br><br>Operating Temperature Range (°C): Tstg = - 65 to +150 |                                                     |                       |                          |                            |  |  | NFmin. (dB) | Ga (dB) | 5613/004 | variants 1 & 3 | 0.8 | 11 | Variants 2 & 4 | 1.0 | 10.5 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     | NFmin. (dB)           | Ga (dB)                  |                            |  |  |             |         |          |                |     |    |                |     |      |
| 5613/004                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | variants 1 & 3                                      | 0.8                   | 11                       |                            |  |  |             |         |          |                |     |    |                |     |      |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | Variants 2 & 4                                      | 1.0                   | 10.5                     |                            |  |  |             |         |          |                |     |    |                |     |      |

6.13 WIRES AND CABLES (13)

6.13.1 Low Frequency

| WIRES AND CABLES,<br>LOW FREQUENCY, POLYIMIDE INSULATION BASED ON TYPES FA<br>3901-1, FA 3901-2                                                                                                                                                                                                                                                                  |                                         |                       |                          | 07S                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                    | Manufacturer                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/001<br>3901/002                                                                                                                                                                                                                                                                                                      | Draka Fileca<br>Ste-Genevieve<br>France | Qualification         | CNES                     | Jan 1979                   |
| Remarks                                                                                                                                                                                                                                                                                                                                                          |                                         |                       |                          |                            |
| <p>Qualified range:</p> <p>FA 3901-1<br/>All Variants defined in the Detail Specification 3901/001 are qualified except those based on AWG 12-14 FA</p> <p>FA 3901-2<br/>Variants 31 to 73 and 74 to 91 as defined in the Detail Specification 3901/002 are qualified</p> <p>Voltage Rating, maximum (Vrms): 600</p> <p>Temperature Range (°C): -100 to +200</p> |                                         |                       |                          |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, POLYIMIDE INSULATION<br>BASED ON TYPES 1871-1872                                                                                                                                                                                               |                             |                    |                       | 09Q                        |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                         | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901                                                                                                                                                                                                                                                               | Nexans<br>Draveil<br>France | Qualification      | CNES                  | Jan 1979                   |
| Detail ESCC<br>3901/001<br>3901/002                                                                                                                                                                                                                                                |                             | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Medium weight 1871 - n/1871 - 871 (3901/001): Variants 24 to 47 are qualified<br/>Light weight1872 - n/1872 - 872 (3901/002): Variants 31 to 73 are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -100 to +200</p> |                             |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, POLYIMIDE INSULATION<br>BASED ON TYPES 3901001**B and 3901002**B                                                                      |                                     |                    |                       | 132P                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                | Manufacturer                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/001<br>3901/002                                                                                                               | AXON' CABLE<br>Montmirail<br>France | Qualification      | CNES                  | Jan 1979                   |
|                                                                                                                                                                           |                                     | Remarks            |                       |                            |
| Qualified range:<br><br>3901/001: variants 24 to 47<br>3901/002: variants 31 to 73<br><br>Voltage Rating, maximum (Vrms): 600<br><br>Temperature Range (°C): -100 to +200 |                                     |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPES MTV-BTV                                                      |                             |                    |                       | 08R                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                    | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/013                                                                                               | Nexans<br>Draveil<br>France | Qualification      | CNES                  | Jan 1979                   |
| Remarks                                                                                                                                       |                             |                    |                       |                            |
| Qualified range:<br><br>Variants 01 to 77 are qualified<br><br>Voltage Rating, maximum (Vrms):600<br><br>Temperature Range (°C): -100 to +200 |                             |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION, BASED ON TYPES<br>3901013**B                                                     |                                     |                    |                       | 292D                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                      | Manufacturer                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/013                                                                                                 | AXON' CABLE<br>Montmirail<br>France | Qualification      | CNES                  | Jun 2009                   |
| Remarks                                                                                                                                         |                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -100 to +200</p> |                                     |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPES SPC 2110                                                     |                                        |                    |                       | 138M                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                    | Manufacturer                           | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/009                                                                                               | W.L. Gore & Co<br>Pleinfeld<br>Germany | Qualification      | DLR                   | Aug 1986                   |
| Remarks                                                                                                                                       |                                        |                    |                       |                            |
| Qualified range:<br><br>Variants 01 to 66 are qualified<br><br>Voltage Rating, maximum (Vrms):600<br><br>Temperature Range (°C): -200 to +200 |                                        |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPES SPL                                                                 |                                        |                    |                       | 219L                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                           | Manufacturer                           | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/019                                                                                                      | W.L. Gore & Co<br>Pleinfeld<br>Germany | Qualification      | DLR                   | Nov 1994                   |
|                                                                                                                                                      |                                        | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 to 94 are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                        |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPES 3901019**B                                                     |                                     |                    |                       | 268G                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                      | Manufacturer                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/019                                                                                                 | AXON' CABLE<br>Montmirail<br>France | Qualification      | CNES                  | Jun 2002                   |
| Remarks                                                                                                                                         |                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                     |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPES 3901019                                                                                                                                                                                                                                                                                                                      |                                                       |                    |                       | 295D                       |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                    | Manufacturer                                          | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901                                                                                                                                                                                                                                                                                                                                                                                          | LEONI Special<br>Cables GmbH<br>Friesoythe<br>Germany | Qualification      | DLR                   | Oct 2009                   |
| Detail ESCC<br>3901/019                                                                                                                                                                                                                                                                                                                                                                                       |                                                       | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>All variants are qualified with the exception of variants 01, 09, 17, 24, 25, 32, 48, 56, 64, 72, and 79</p> <p>AWG 12 to 28 inclusive are qualified</p> <p>Conductor according to ISO 2635 (except AWG 28)</p> <p>For silver coated strands the silver thickness shall be 2.0µm minimum</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                                       |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, 600V, SILVER-PLATED COPPER, EXTRUDED<br>CROSSLINKED FLUOROPOLYMER INSULATION,<br>BASED ON TYPE 55/995X     |                                                |                    |                       | 159N                       |
|------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                     | Manufacturer                                   | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC 3901/012                                                                                                   | Tyco Electronics<br>Dorcan, Swindon<br>England | Qualification      | UK Space Agency       | Feb 1989                   |
| Remarks<br>This product is not intended for human space flight applications.                                                                   |                                                |                    |                       |                            |
| Qualified range:<br><br>Variants 01 to 80 are qualified<br><br>Voltage Rating, maximum (Vrms): 600<br><br>Temperature Range (°C): -100 to +200 |                                                |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, 600V, SILVER-PLATED COPPER,<br>EXTRUDED CROSSLINKED FLUOROPOLYMER INSULATION,<br>BASED ON TYPE 3901012**B                      |                                                                                     |                    |                       | <b>267H</b>                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                         | Manufacturer                                                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3901</a><br>Detail ESCC<br><a href="#">3901/012</a>                                                                                    | <a href="#">AXON' CABLE</a><br><a href="#">Montmirail</a><br><a href="#">France</a> | Qualification      | CNES                  | Mar 2002                   |
| Remarks<br>This product is not intended for human space flight applications.                                                                                       |                                                                                     |                    |                       |                            |
| Qualified range:<br><br>All variants are qualified<br><br>Wire code ISO 2635<br><br>Voltage Rating, maximum (Vrms):600<br><br>Temperature Range (°C): -100 to +200 |                                                                                     |                    |                       |                            |

| POWER WIRES FOR CRIMPING,<br>LOW FREQUENCY,<br>BASED ON TYPE SPP                                                                                                                                                              |                                         |                    |                       | 215L                       |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                    | Manufacturer                            | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/017                                                                                                                                                                               | W.L. Gore & Co.<br>Pleinfeld<br>Germany | Qualification      | DLR                   | Jul 1994                   |
| Remarks                                                                                                                                                                                                                       |                                         |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>I<sub>max</sub> (A): 45, 81 and 133 for AWG: 8, 4, and 0, respectively</p> <p>Temperature Range (°C): -200 to +200</p> |                                         |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, INSULATED,<br>POLYIMIDE/FLUOROTHERMOPLAST,<br>BASED ON TYPE SPM                                                                                                                                                                                                                                  |                                         |                       |                          | 216L                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                        | Manufacturer                            | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/018                                                                                                                                                                                                                                                                                      | W.L. Gore & Co.<br>Pleinfeld<br>Germany | Qualification         | DLR                      | Jul 1994                   |
| Remarks                                                                                                                                                                                                                                                                                                                              |                                         |                       |                          |                            |
| <p>Qualified range:</p> <p>Variants 01 to 88 are qualified.</p> <p>Expanded PTFE, extruded polyimide/ FEP, sintered PTFE insulated wires.<br/>Expanded PTFE, extruded polyimide/fluorothermoplast insulated cables, shielded and jacketed.</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                         |                       |                          |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, INSULATED,<br>POLYIMIDE/FLUOROTHERMOPLAST,<br>BASED ON TYPE 3901018                                                                                                                                                                                                                                                                                       |                                                       |                    |                       | 294D                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                    | Manufacturer                                          | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/018                                                                                                                                                                                                                                                                                                                                               | LEONI Special<br>Cables GmbH<br>Friesoythe<br>Germany | Qualification      | DLR                   | Oct 2009                   |
| Remarks                                                                                                                                                                                                                                                                                                                                                                                       |                                                       |                    |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 to 88 are qualified.</p> <p>Expanded PTFE, extruded polyimide/ FEP, sintered PTFE insulated wires.<br/>Expanded PTFE, extruded polyimide/fluorothermoplast insulated cables, shielded and jacketed.</p> <p>Conductor silver thickness shall be 2.0µm minimum</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                                       |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, INSULATED,<br>POLYIMIDE/FLUOROTHERMOPLAST,<br>BASED ON TYPE SPM                                                                                                                                                                            |                                     |                       |                          | 300D                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                  | Manufacturer                        | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/018                                                                                                                                                                                                                                | AXON' CABLE<br>Montmirail<br>France | Qualification         | CNES                     | Dec 2009                   |
| Remarks                                                                                                                                                                                                                                                                        |                                     |                       |                          |                            |
| <p>Qualified range:</p> <p>Variants 01 to 88 are qualified<br/>AWG 30 and 32 variants are qualified.</p> <p>Expanded PTFE, extruded polyimide/ FEP, sintered PTFE insulated wires.</p> <p>Voltage Rating, maximum (Vrms) : 600</p> <p>Temperature Range (°C): -200 to +200</p> |                                     |                       |                          |                            |

| POLYIMIDE INSULATED<br>SHIELDED CABLES WITH DRAIN WIRE,<br>LOW FREQUENCY, BASED ON TYPE SPLD                                                               |                                                                                             |                    |                       | <b>229L</b>                |
|------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                 | Manufacturer                                                                                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3901</a><br>Detail ESCC<br><a href="#">3901/021</a>                                                                            | <a href="#">W.L. Gore &amp; Co.</a><br><a href="#">Pleinfeld</a><br><a href="#">Germany</a> | Qualification      | DLR                   | Feb 1996                   |
| Remarks                                                                                                                                                    |                                                                                             |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants (01 to 41) are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                                                                             |                    |                       |                            |

| POLYIMIDE INSULATED<br>SHIELDED CABLES WITH DRAIN WIRE,<br>LOW FREQUENCY, BASED ON TYPES 3901021**B                                             |                                                                                     |                    |                       | <b>293D</b>                |
|-------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                      | Manufacturer                                                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3901</a><br>Detail ESCC<br><a href="#">3901/021</a>                                                                 | <a href="#">AXON' CABLE</a><br><a href="#">Montmirail</a><br><a href="#">France</a> | Qualification      | CNES                  | Jun 2009                   |
| Remarks                                                                                                                                         |                                                                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants are qualified</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                                                                     |                    |                       |                            |

|                                                                                                                                                   |                                                       |                    |                       |                            |
|---------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|--------------------|-----------------------|----------------------------|
| POLYIMIDE INSULATED<br>SHIELDED CABLES WITH DRAIN WIRE,<br>LOW FREQUENCY, BASED ON TYPES 3901021                                                  |                                                       |                    |                       | 296D                       |
| Procurement Specifications                                                                                                                        | Manufacturer                                          | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/021                                                                                                   | LEONI<br>Special Cables<br>GmbH Friesoythe<br>Germany | Qualification      | DLR                   | Oct 2009                   |
| Remarks                                                                                                                                           |                                                       |                    |                       |                            |
| Qualified range:<br><br>All variants 01 to 41 are qualified<br><br>Voltage Rating, maximum (Vrms):600<br><br>Temperature Range (°C): -200 to +200 |                                                       |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, 600V, SILVER-PLATED COPPER, EXTRUDED<br>CROSSLINKED MODIFIED ETFE, LIGHTWEIGHT                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                |                       |                          | 257H                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|-----------------------|--------------------------|----------------------------|
| Procurement<br>Specifications                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Manufacturer                                   | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | Tyco Electronics<br>Dorcan, Swindon<br>England | Qualification         | UK Space<br>Agency       | Oct 1999                   |
| ESCC 3901                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                | Remarks               |                          |                            |
| Detail ESCC<br>3901/020<br>3901/022                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                |                       |                          |                            |
| <p>Qualified range:</p> <p>3901/020: All variants (01 to 80) are qualified<br/>3901/022: All variants (01 to 72) are qualified.</p> <p>Wires and Cables variants consist of 1, 2, 3 and 4 cores with and without jackets and shields</p> <p>ESCC Detail Specification No. 3901/020 cables are silver-plated copper braided, and<br/>ESCC Detail Specification No. 3901/022 cables are silver-plated copper spiral shielded,</p> <p>Wire sizes are in accordance with ISO 2635.</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -100 to +200</p> |                                                |                       |                          |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, FLUROPOLYMER INSULATION, 600V,<br>BASED ON TYPE CSWL                                                                                                                                                                                                                                                                                                                                                               |                                     |                    |                       | 299D                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                                             | Manufacturer                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/024                                                                                                                                                                                                                                                                                                                                                                                                        | AXON' CABLE<br>Montmirail<br>France | Qualification      | CNES                  | Dec 2009                   |
| Remarks                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 to 64 are qualified (AWG 30 variants is qualified)</p> <p>Wires and Cables variants consist of 1, 2, 3 and 4 cores with and without jackets and shields</p> <p>NOTE: The high strength toughened fluoropolymer PTFE tape (HST-F) use for the manufacturing of the primary insulation of the wire is named "ART tape".</p> <p>Voltage Rating, maximum (Vrms):600</p> <p>Temperature Range (°C): -200 to +200</p> |                                     |                    |                       |                            |

| WIRES AND CABLES,<br>LOW FREQUENCY, FLUROPOLYMER INSULATION, 600V,<br>BASED ON TYPE CSWL                                                                                                                                                                                                                                                                           |                                   |                    |                       | 305C                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                         | Manufacturer                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3901<br>Detail ESCC<br>3901/024                                                                                                                                                                                                                                                                                                                    | W.L. Gore<br>Pleinfeld<br>Germany | Qualification      | DLR                   | Jan 2011                   |
|                                                                                                                                                                                                                                                                                                                                                                    |                                   | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 to 64 inclusive are qualified</p> <p>The specification contains 64 variants with several wire sizes, single wires and cables with several cores, either shielded or unshielded.</p> <p>Cable construction: 1, 2, 3 and 4 twisted wires are in one core with or without shield</p> <p>Voltage Rating, maximum (Vrms):600</p> |                                   |                    |                       |                            |

| WIRES AND CABLES,<br>LIGHTWEIGHT, EXTRA THIN, FLUORTHHERMOPLASTIC / POLYIMIDE<br>INSULATED WIRES AND CABLES BASED ON TYPE CSC                                                                                                                                                                                                                                                                             |                                                     |                    |                       | <b>328B</b>                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                | Manufacturer                                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3901</a><br>Detail ESCC<br><a href="#">3901/025</a>                                                                                                                                                                                                                                                                                                                           | <a href="#">W.L. Gore<br/>Pleinfeld<br/>Germany</a> | Qualification      | DLR                   | Jun 2014                   |
| Remarks                                                                                                                                                                                                                                                                                                                                                                                                   |                                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>All variants 01 to 21 are qualified</p> <p>The specification contains 21 variants with several wire sizes, single wires and cables with several cores, either shielded or unshielded.</p> <p>Cable construction: 1, 2, 3 and 4 twisted wires are in one core with or without shield</p> <p>Maximum voltage: 600 Vrms</p> <p>Operating temperature range (°C): -200 to +200</p> |                                                     |                    |                       |                            |

6.13.2 Coaxial, RF, Flexible

| WIRES AND CABLES, RF COAXIAL,<br>PTFE/POLYIMIDE INSULATION,<br>BASED ON TYPE 50 CIS                                                                                                                                                                                                                                |                             |                    |                       | 24S                        |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                                                                                                                         | Manufacturer                | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3902<br>Detail ESCC<br>3902/001                                                                                                                                                                                                                                                                    | Nexans<br>Draveil<br>France | Qualification      | CNES                  | Jul 1979                   |
|                                                                                                                                                                                                                                                                                                                    |                             | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Variants 01, 02, and 03 are qualified</p> <p>Miniature flexible 50 ohm coaxial cable<br/>PTFE Dielectric<br/>Polyimide Jacketed, Double Shield and Shielded / Jacketed</p> <p>Maximum voltage: 900 Vrms</p> <p>Operating temperature range (°C): -80 to +200 (- 100 for variant 01)</p> |                             |                    |                       |                            |

|                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   |                    |                       |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------|--------------------|-----------------------|----------------------------|
| WIRES AND CABLES,<br>RADIO FREQUENCY, FLEXIBLE, COAXIAL, TRIAXIAL AND SYMMETRIC,<br>BASED ON TYPES GCX, GTX, GSC AND GBL                                                                                                                                                                                                                                                                                                   |                                   |                    |                       | 255K                       |
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                                                                 | Manufacturer                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3902<br>Detail ESCC<br>3902/002                                                                                                                                                                                                                                                                                                                                                                            | W.L. Gore<br>Pleinfeld<br>Germany | Qualification      | DLR                   | Jan 1999                   |
|                                                                                                                                                                                                                                                                                                                                                                                                                            |                                   | Remarks            |                       |                            |
| <p>Qualified range:</p> <p>Variants 03 to 06, 10 to 13 and 20 to 30 are qualified</p> <p>Variants encompass coaxial, triaxial, and balanced shielded line</p> <p>Operating Voltage (Continuous), maximum ratings, (Vrms):</p> <p>Variants 03: 180</p> <p>Variants 04, 10, 21, 22, 23, 24: 200</p> <p>Variants 06, 25: 250</p> <p>All Other Variants: 300</p> <p>AWG Range: 20, 22, 24, 26, 28, 30 dependent on variant</p> |                                   |                    |                       |                            |

| WIRES AND CABLES,<br>RADIO FREQUENCY, FLEXIBLE, COAXIAL, TRIAXIAL AND SYMMETRIC,<br>BASED ON TYPE 3902/002                                                                                                |                                     |                    |                       | 298D                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                                                                | Manufacturer                        | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3902<br>Detail ESCC<br>3902/002                                                                                                                                                           | AXON' CABLE<br>Montmirail<br>France | Qualification      | CNES                  | Dec 2009                   |
| Remarks                                                                                                                                                                                                   |                                     |                    |                       |                            |
| <p>Qualified range:</p> <p>Variants 03 to 06, 10 to 13 and 20 to 30 are qualified</p> <p>Variants encompass coaxial, triaxial, and balanced shielded line</p> <p>Temperature range (°C): -200 to +180</p> |                                     |                    |                       |                            |

|                                                                                                                                                                                                                                                                             |                                     |                                           |                          |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------|-------------------------------------------|--------------------------|----------------------------|---------|-----------|-------------------------------------------|-------------|----|------------------|-----|-----|----|------------------|-----|-----|
| WIRES AND CABLES,<br>SPACEWIRE, ROUND, QUAD SYMMETRIC, FLEXIBLE,<br>BASED ON TYPE SPACEWIRE                                                                                                                                                                                 |                                     |                                           |                          | 291D                       |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| Procurement<br>Specifications                                                                                                                                                                                                                                               | Manufacturer                        | Nature of<br>Approval                     | Supervising<br>Authority | Initial Qualification Date |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| Generic<br>ESCC 3902<br>Detail ESCC<br>3902/003                                                                                                                                                                                                                             | AXON' CABLE<br>Montmirail<br>France | Qualification                             | CNES                     | Dec 2009                   |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| Remarks                                                                                                                                                                                                                                                                     |                                     |                                           |                          |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| Qualified range:<br><br>Variant 01 AWG 28/07 (white) and variant 02 AWG 26/07 (blue) are qualified                                                                                                                                                                          |                                     |                                           |                          |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| <table><tr><td>Variant</td><td>Data Rate</td><td>Operating Voltage<br/>(Continuous), (Vrms)</td><td>Current (A)</td></tr><tr><td>01</td><td>100Mb/s - 400MHz</td><td>200</td><td>1.5</td></tr><tr><td>02</td><td>200Mb/s - 400MHz</td><td>200</td><td>2.5</td></tr></table> |                                     |                                           |                          |                            | Variant | Data Rate | Operating Voltage<br>(Continuous), (Vrms) | Current (A) | 01 | 100Mb/s - 400MHz | 200 | 1.5 | 02 | 200Mb/s - 400MHz | 200 | 2.5 |
| Variant                                                                                                                                                                                                                                                                     | Data Rate                           | Operating Voltage<br>(Continuous), (Vrms) | Current (A)              |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| 01                                                                                                                                                                                                                                                                          | 100Mb/s - 400MHz                    | 200                                       | 1.5                      |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| 02                                                                                                                                                                                                                                                                          | 200Mb/s - 400MHz                    | 200                                       | 2.5                      |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |
| Temperature range (°C): -200 to +180                                                                                                                                                                                                                                        |                                     |                                           |                          |                            |         |           |                                           |             |    |                  |     |     |    |                  |     |     |

|                                                                                                           |                                   |                                   |                       |                            |
|-----------------------------------------------------------------------------------------------------------|-----------------------------------|-----------------------------------|-----------------------|----------------------------|
| WIRES AND CABLES,<br>SPACEWIRE, ROUND, QUAD SYMMETRIC, FLEXIBLE,<br>BASED ON TYPE SPACEWIRE               |                                   |                                   |                       | 304C                       |
| Procurement Specifications                                                                                | Manufacturer                      | Nature of Approval                | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3902<br>Detail ESCC<br>3902/003                                                           | W.L. Gore<br>Pleinfeld<br>Germany | Qualification                     | DLR                   | Jan 2011                   |
| Remarks                                                                                                   |                                   |                                   |                       |                            |
| Qualified range:<br><br>Variant 01 AWG 28/07 (white) and Variant 02 AWG 26/07 (blue) are qualified, 100 Ω |                                   |                                   |                       |                            |
| Variant                                                                                                   | Data Rate                         | Operating Voltage<br>(Continuous) | Current (A)           |                            |
| 01                                                                                                        | 100 Mb/s                          | 400 MHz 200 V                     | 1.5                   |                            |
| 02                                                                                                        | 200 Mb/s                          | 400 MHz 200 V                     | 2.5                   |                            |
| Temperature range (°C): -200 to +180                                                                      |                                   |                                   |                       |                            |

| WIRES AND CABLES,<br>SPACEWIRE, ROUND, QUAD SYMMETRIC, FLEXIBLE,<br>BASED ON TYPE SPACEWIRE         |                                            |                    |                       | <b>335A</b>                |
|-----------------------------------------------------------------------------------------------------|--------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                          | Manufacturer                               | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <b>3902</b><br>Detail ESCC<br><b>3902/004</b>                                       | <b>AXON' CABLE</b><br>Montmirail<br>France | Qualification      | CNES                  | Oct 2015                   |
| Remarks                                                                                             |                                            |                    |                       |                            |
| <p>Qualified range:</p> <p>Variant 01 is qualified.</p> <p>Temperature range (°C): -100 to +150</p> |                                            |                    |                       |                            |

6.14 THERMOSTATS (20)

6.14.1 Switches

|                                                                                                                                                                                                                                                          |                              |                       |                          |                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------|-----------------------|--------------------------|----------------------------|
| SWITCHES, THERMOSTATIC,<br>BIMETALLIC, SPST, OPENING CONTACT,<br>BASED ON TYPE TH 47                                                                                                                                                                     |                              |                       |                          | 275F                       |
| Procurement<br>Specifications                                                                                                                                                                                                                            | Manufacturer                 | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3702                                                                                                                                                                                                                                     | COMEPA<br>BAGNOLET<br>France | Qualification         | CNES                     | Mar 2004                   |
| Detail ESCC<br>3702/001                                                                                                                                                                                                                                  |                              | Remarks               |                          |                            |
| <p>Qualified range:</p> <p>Variants 01 to 03 are qualified</p> <p>Range of Components: Grade 1 and Grade Y</p> <p>Maximum Ratings:</p> <p>Rated Current (I<sub>R</sub>): 4 A (30 Vdc resistive)</p> <p>Operating Temperature Range (°C), -50 to +150</p> |                              |                       |                          |                            |

6.15 RF PASSIVE (30)

6.15.1 Circulator and Isolator

|                                                                                                                                                       |                                                   |                       |                          |                            |
|-------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------|-----------------------|--------------------------|----------------------------|
| ISOLATORS AND CIRCULATORS, LOW POWER, KA-BAND<br>(22GHz—32 GHz), WITH NON-INTEGRAL<br>SMA 2.9 COAXIAL CONNECTORS,<br>BASED ON TYPES BK1XXX and BK3XXX |                                                   |                       |                          | 340                        |
| Procurement<br>Specifications                                                                                                                         | Manufacturer                                      | Nature of<br>Approval | Supervising<br>Authority | Initial Qualification Date |
| Generic<br>ESCC 3202                                                                                                                                  | Cobham Microwave<br>Villebon-sur Yvette<br>France | Qualification         | CNES                     | Jun 2016                   |
| Detail ESCC<br>3202/026                                                                                                                               |                                                   | Remarks               |                          |                            |
| Qualified range:<br><br>Variants 01 and 02 are qualified                                                                                              |                                                   |                       |                          |                            |

| ISOLATORS, HIGH POWER,<br>COAXIAL, S AND C BAND,<br>BASED ON TYPES BE1xE2-105 and BG1xE2-206                |                                                                                                   |                    |                       | <b>347</b>                 |
|-------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                  | Manufacturer                                                                                      | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC <a href="#">3202</a><br>Detail ESCC<br><a href="#">3202/022</a><br><a href="#">3202/023</a> | <a href="#">Cobham Microwave</a><br><a href="#">Villebon-sur Yvette</a><br><a href="#">France</a> | Qualification      | CNES                  | Jun 2016                   |
| Remarks                                                                                                     |                                                                                                   |                    |                       |                            |
| <p>Qualified range:</p> <p>Variants 01 and 02 are qualified</p>                                             |                                                                                                   |                    |                       |                            |



6.15.2 Attenuator and Load

|                                                                        |                                              |                        |                       |                            |
|------------------------------------------------------------------------|----------------------------------------------|------------------------|-----------------------|----------------------------|
| PASSIVE DEVICES,<br>R.F. COAXIAL LOADS, 0-22 GHZ<br>BASED ON TYPE R404 |                                              |                        |                       | 185H                       |
| Procurement Specifications                                             | Manufacturer                                 | Nature of Approval     | Supervising Authority | Initial Qualification Date |
| Generic ESCC 3403                                                      | RADIALL<br>Saint-Quentin-Fallavier<br>France | Qualification          | CNES                  | Jul 1992                   |
| Detail ESCC 3403/006                                                   |                                              | Remarks                |                       |                            |
| Qualified range:                                                       |                                              |                        |                       |                            |
| All variants are qualified. 50 ohms DC to 22 GHz                       |                                              |                        |                       |                            |
| Type                                                                   | Detail Spec.                                 | Frequency Range ( GHz) | Rated Pin (W)         | Impedance (Ω)              |
| 3403/006                                                               | 3403/006                                     | 0-22                   | 1                     | 50                         |
| Type                                                                   | VSWR max                                     |                        |                       |                            |
|                                                                        | 0<f(GHz)≤4                                   | 4<f(GHz)≤12.4          | 12.4<f(GHz)≤18        | 18<f(GHz)≤22               |
| 1                                                                      | 1.05                                         | 1.15                   | 1.20                  | 1.30                       |
| 2                                                                      | 1.05                                         | 1.15                   | 1.20                  | 1.25                       |
| Operating Temperature Range (°C), -50 to +150                          |                                              |                        |                       |                            |

| R.F. ATTENUATORS FIXED, COAXIAL<br>BASED ON TYPE R413                                                                                                           |                                                  |                    |                       | 178J                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|--------------------|-----------------------|----------------------------|
| Procurement Specifications                                                                                                                                      | Manufacturer                                     | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3403<br>Detail ESCC<br>3403/005                                                                                                                 | RADIALL<br>Saint-Quentin-<br>Fallavier<br>France | Qualification      | CNES                  | Jan 1991                   |
| Remarks                                                                                                                                                         |                                                  |                    |                       |                            |
| Qualified range:<br><br>Variants 01 to 31<br><br>Frequency range (GHz): 0 - 22<br>Attenuation (dB): 0 - 20<br><br>Operating Temperature Range (°C), -55 to +125 |                                                  |                    |                       |                            |

6.1 CABLE ASSEMBLY

6.1.1 RF Cable Assemblies

|                                                                                                                                                                                                                                                                                                                                                                                      |                                      |                    |                       |                            |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------|--------------------|-----------------------|----------------------------|
| RF Flexible Cable Assembly,<br>TNC, Very High Power, 50 Ohms, DC to 8GHz, based on type TNC-VHP                                                                                                                                                                                                                                                                                      |                                      |                    |                       | 348                        |
| Procurement Specifications                                                                                                                                                                                                                                                                                                                                                           | Manufacturer                         | Nature of Approval | Supervising Authority | Initial Qualification Date |
| Generic<br>ESCC 3408<br>Detail ESCC 3408/001                                                                                                                                                                                                                                                                                                                                         | Radiall<br>Chateau-Renault<br>France | Qualification      | CNES                  | April 2018                 |
| Remarks                                                                                                                                                                                                                                                                                                                                                                              |                                      |                    |                       |                            |
| Qualified range: see specification                                                                                                                                                                                                                                                                                                                                                   |                                      |                    |                       |                            |
| NOTE 1: Actual RF Power-handling capability could only be verified directly by qualification test up to 350W@2 GHz and 200W@4GHz due to limitations in test equipment.                                                                                                                                                                                                               |                                      |                    |                       |                            |
| NOTE 2: Regarding Total Dose radiation testing, insertion loss degradation affects these cables as they are made with PTFE dielectric (see ESCC 3408/001 Para. 1.8). Conformance with the specification's maximum Insertion Loss could only be verified by test up to 10 MRad while the material integrity of the cable's jacket was verified through further testing up to 120MRad. |                                      |                    |                       |                            |