



## **EUROPEAN PREFERRED PARTS LIST**

**ESCC/RP/EPPL007-37**

**December 2018**



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## CHANGE LOG

| Reason for change | Issue | Date          |
|-------------------|-------|---------------|
| Periodic update.  | 37    | December 2018 |

## CHANGE RECORD

| Issue 37   | Paragraph                         | Page  |
|--|-----------------------------------|-------|
| Added new ESCC Rectifier and Schottky diodes, made by ST Microelectronics, France, now qualified   | 3.4 EPPL Part 1 Diodes            | 11    |
| Corrected Qualification status and accompanying note for ATMX150RHA ASIC process   | 3.8 EPPL Part 1 Microcircuits     | 16    |
| Added AD8001 Current-feedback amplifier made by Analog Devices, USA  | 3.8 EPPL Part 1 Microcircuits     | 17    |
| Removed TO-18, TO-39, TO-77, TO-78 packaged transistors made by ST Microelectronics, as a consequence of the Product Termination announced by the manufacturer for these packaging variants. Clarification Note 1 added in this respect. | 3.12 EPPL Part 1 Transistors      | 29-30 |
| Added new ESCC coaxial loads and attenuators, made by Radiall, France, now qualified.  | 3.16 EPPL Part 1 RF Passive       | 34    |
| Added mini-AVIM Optical Fibre Cable Assemblies made by Diamond, Switzerland, now qualified.  | 3.17 EPPL Part 1 Cable Assemblies | 35    |
| Added MDSA D-CLICK micro-miniature connectors made by Axon, France   | 4.2 EPPL Part 2 Connectors        | 36    |
| Edited "Qualification" column for SY1007 and SY1017CS  | 4.7 EPPL Part 2 Microcircuits     | 38    |
| Added GR718B SpaceWire Router made by Cobham Gaisler, Sweden   | 4.7 EPPL Part 2 Microcircuits     | 38    |
| Modified accompanying Note 19 related to SiGe 0.25 BiCMOS process SGB25RH made by IHP, Germany   | 4.7 EPPL Part 2 Microcircuits     | 43    |

## Contents

|      |  |    |
|------|--|----|
| 1    | INTRODUCTION.....  | 5  |
| 2    | RULES FOR INCLUSION, MAINTENANCE AND REMOVAL OF COMPONENTS IN THE EPPL ..... | 5  |
| 2.1  | ESCC QPL COMPONENTS IN THE EPPL  | 5  |
| 3    | EPPL PART 1.....   | 6  |
| 3.1  | EPPL PART1 CAPACITORS  | 6  |
| 3.2  | EPPL PART1 CONNECTORS  | 8  |
| 3.3  | EPPL PART1 CRYSTALS AND PIEZO-ELECTRIC DEVICES                               | 11 |
| 3.4  | EPPL PART1 DIODES  | 11 |
| 3.5  | EPPL PART1 FILTERS   | 13 |
| 3.6  | EPPL PART1 FUSES   | 14 |
| 3.7  | EPPL PART1 INDUCTORS   | 15 |
| 3.8  | EPPL PART1 MICROCIRCUITS   | 15 |
| 3.9  | EPPL PART1 RELAYS  | 27 |
| 3.10 | EPPL PART1 RESISTORS   | 27 |
| 3.11 | EPPL PART1 THERMISTORS   | 28 |
| 3.12 | EPPL PART1 TRANSISTORS   | 29 |
| 3.13 | EPPL PART1 WIRES AND CABLES  | 32 |
| 3.14 | EPPL PART1 THERMOSTAT  | 33 |
| 3.15 | EPPL PART1 RF PASSIVE COMPONENTS   | 34 |
| 3.16 | EPPL PART1 HYBRIDS   | 34 |
| 3.17 | EPPL PART 1 CABLE ASSEMBLIES   | 35 |
| 4    | EPPL PART 2.....   | 35 |
| 4.1  | EPPL PART2 CAPACITORS  | 35 |
| 4.2  | EPPL PART2 CONNECTORS  | 36 |
| 4.3  | EPPL PART2 CRYSTALS AND PIEZO-ELECTRIC DEVICES                               | 36 |
| 4.4  | EPPL PART2 DIODES  | 36 |
| 4.5  | EPPL PART 2 FUSES  | 37 |
| 4.6  | EPPL PART2 INDUCTORS AND TRANSFORMERS  | 37 |
| 4.7  | EPPL PART2 MICROCIRCUITS   | 38 |
| 4.8  | EPPL PART2 RELAYS  | 43 |
| 4.9  | EPPL PART 2 RESISTORS  | 44 |
| 4.10 | EPPL PART2 THERMISTORS   | 44 |
| 4.11 | EPPL PART2 RF PASSIVE COMPONENTS   | 44 |
| 4.12 | EPPL PART2 HYBRIDS   | 45 |

## 1 **INTRODUCTION**

The European Preferred Parts List (EPPL) is a publication of ESCC. It is published in the relevant section of the ESCIES website <https://escies.org>

The ESCC procedure No.12300 includes the requirements and provisions applicable to the maintenance of the EPPL. More information on the EPPL and on ESCC can be found at <https://spacecomponents.org>.

For every entry in the EPPL, manufacturers' details are available in the ESCC website at [this link](#). Active NASA GSFC component specifications S-311 are available at the [NEPP website](#). Active MIL specifications and drawings are available at the US DoS [DLA website](#). JAXA component specifications are available from their [website](#).

## 2 **RULES FOR INCLUSION, MAINTENANCE AND REMOVAL OF COMPONENTS IN THE EPPL**

The EPPL is maintained by a Technical Authority (TA) tasked to achieve conformance with ESCC Procedure No. 12300. The EPPL contains two different lists: Part 1 and Part 2.

The mentioned procedure provides requirements for the inclusion, maintenance and removal of components from the EPPL. For a certain component type, the TA has to confirm whether the component can be listed in the EPPL and, if so, in which of the two parts of the list. The requirements for listing in the EPPL Part1 and Part2 are found in the same procedure No 12300.

All readers of the EPPL are encouraged to make proposals for the addition, partial edition or complete removal of any entries to the EPPL. The relevant section of ESCIES provides means for the submission of proposals for the edition of the EPPL. The EPPL TA reviews proposals three times per year. The deadlines for submission of any proposals are always announced in ESCIES

### 2.1 **ESCC QPL COMPONENTS IN THE EPPL**

The ESCC Qualified Parts List (QPL) is updated and maintained every month. The most updated QPL can always be found at the relevant section of the ESCIES website <https://escies.org>

In accordance with ESCC12300, all component types for which a valid ESCC qualification has been certified may be listed in the EPPL Part 1.

As the EPPL is to be updated 3 times every year, there may be temporary conflicts between both QPL and EPPL publications. On one hand, component variants which have lost their ESCC qualification status may still be listed in EPPL part 1 for a short period of time and until the next revision of the EPPL is published. On the other hand, component variants which achieve ESCC qualification, as confirmed by their listing in the ESCC QPL, may not be found in the EPPL Part1 until the following update of the list is published. In case of any conflict as described above, the ESCC QPL shall prevail as it is updated more frequently.

### 3 EPPL PART 1

#### 3.1 EPPL PART1 CAPACITORS

Ceramic capacitors:

| Type          | Description                            | Specification   | Package    | Manufacturer      | Qualification | Remarks      |              |
|---------------|--|-----------------|------------|-------------------|---------------|--------------|--------------|
|               | Ceramic, Type II, High C, BR, CV, CH   | 3001/030        | see spec   | AVX / UK          | ESCC QPL      | range in QPL |              |
| CNC31 thru 34 | Ceramic, Type II                       | 3001/037        | see spec   | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
|               | Ceramic, Type II, High V 1.0 to 5.0 KV | 3001/034        | see spec   | AVX / UK          | ESCC QPL      | range in QPL |              |
| CNC53 thru 56 | Ceramic, Type II                       | 3001/038        | see spec   | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| A_12C         | Ceramic, Type I                        | 3009/003        | 0805       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_20C         | Ceramic, Type I                        | 3009/022        | 1206       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_13C         | Ceramic, Type I                        | 3009/004        | 1210       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_14C         | Ceramic, Type I                        | 3009/005        | 1812       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_15C         | Ceramic, Type I                        | 3009/006        | 2220       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| CEC20xS       | Ceramic, Type I                        | 3009/003 &/040  | 0805       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC40xS       | Ceramic, Type I                        | 3009/004 &/040  | 1210       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC60xS       | Ceramic, Type I                        | 3009/005 &/040  | 1812       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC70xS       | Ceramic, Type I                        | 3009/006 &/040  | 2220       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC120xS      | Ceramic, Type I                        | 3009/022 &/040  | 1206       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC140xS      | Ceramic, Type I                        | 3009/037 &/040  | 0603       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC190xS      | Ceramic, Type I                        | 3009/040 & /042 | 0402       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| A_12G, A612Z  | Ceramic, Type II                       | 3009/008        | 0805       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_13G, A613Z  | Ceramic, Type II                       | 3009/009        | 1210       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_14G, A614Z  | Ceramic, Type II                       | 3009/010        | 1812       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_15G, A615Z  | Ceramic, Type II                       | 3009/011        | 2220       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| A_20G, A620Z  | Ceramic, Type II                       | 3009/023        | 1206       | AVX TPC / F       | ESCC QPL      | range in QPL |              |
| CNC20xS       | Ceramic, Type II                       | 3009/008 &/039  | 0805       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CNC40xS       | Ceramic, Type II                       | 3009/009 &/039  | 1210       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CNC60xS       | Ceramic, Type II                       | 3009/010 &/039  | 1812       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CNC70xS       | Ceramic, Type II                       | 3009/011 &/039  | 2220       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CNC120xS      | Ceramic, Type II                       | 3009/023 &/039  | 1206       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CNC140xS      | Ceramic, Type II                       | 3009/038 &/039  | 0603       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
| CEC190xS      | Ceramic, Type I                        | 3009/039 & /043 | 0402       | Exxelie Tech. / F | ESCC QPL      | range in QPL |              |
|               | Ceramic, Type II, High C, chip         | 3009/034        | 1812, 1825 | AVX / UK          | ESCC QPL      | range in QPL |              |
|               | Ceramic, BME                           | TTP, Type II    | 3009/041   | see spec          | AVX / UK      | ESCC QPL     | range in QPL |

EPPL Part 1 capacitors, other technologies:

| Type                      | Description  | Specification    | Package         | Manufacturer          | Qualification | Remarks   |
|---------------------------|--|------------------|-----------------|-----------------------|---------------|---|
| TAJ                       | Solid Ta   | 3012/001         | SMD             | AVX / CzR             | ESCC QPL      | range in QPL  |
| TES                       | Solis Ta, low ESR  | 3012/004         | SMD             | AVX / CzR             | ESCC QPL      | range in QPL  |
| HT86PS                    | Reconstituted MICA, High V   | 3006/022         | see spec        | Exxelia Tech. / F     | ESCC QPL      | range in QPL  |
| PM90S                     | Self-healing metallized film   | 3006/020         | SMD and axial   | Exxelia Tech. / F     | ESCC QPL      | range in QPL  |
| PM94S                     | DC self-healing, polyterephthalate   | 3006/024         | SMD             | Exxelia Tech. / F     | ESCC QPL      | range in QPL  |
| PM907S                    | Plastic metallised   | 3006/025         | SMD             | Exxelia Tech. / F     | ESCC QPL      | range in QPL  |
| PM948S                    | Plastic metallised   | 3006/026         | SMD             | Exxelia Tech. / F     | ESCC QPL      | range in QPL  |
| 101M, 201M, 400M and 401M | Microwave, naked Si die  | 5711/002         | die             | Cobham MW / F         | ESCC QPL      | range in QPL  |
| CTC21                     | Solid Ta   | 3012/002         | SMD             | Exxelia Tantalum / F  | Not Qualified | Note 1  |
| CWS11 FH686               | 68µF, 10V  | JAXA-QTS-2040    | CASE CODE 7343H | Matsuo Electric / J   | JAXA QPL      | Recommended as output capacitor for POL DC/DC converter JAXA2020/01011DBCR** Notes 2 and 3 apply. |
| CLR79                     | 30uF -1200uF (6V)<br>25uF - 850uF (8V)<br>20uF - 750uF (10V)<br>15uF - 540uF (15V)<br>8uF - 300uF (30 V)<br>5uF - 160uF (50 V)<br>3.5uF -110uF (75V)<br>2.5uF- 86uF (100V) | MIL-PRF-39006/22 | A,B,C,D         | Vishay Tansitor / USA | MIL QPL       | Characteristic: H (80g sine, 54g random, 500g shock) shall be procured                            |
| CLR81                     | Voltage range: 6V to 100V<br>Capacitance range: 6.8µF to 2200µF  | MIL-PRF-39006/25 | A,B,C,D         | Vishay Tansitor / USA | MIL QPL       | Characteristic: H (80g sine, 54g random, 500g shock) shall be procured                            |

Note1. The CTC21 preferred range is limited to 10% tolerance and is restricted to the following values: (330µF, 6.3V), (150 µF, 6.3V), (220µF, 10V), (100µF, 10V), (150µF, 16V), (68µF, 16V), (100µF, 20V), (47µF, 20V), (68µF, 25V), (33µF, 25V), (47µF, 40V), (22µF, 40V), (15µF, 50V), (22µF, 63V), (10µF, 63V)

Note 2: The following documents are available at JAXA Qualified EEE parts database <https://eepitnl.tksc.jaxa.jp/en/>

- General specification : JAXA-QTS-2040 , JAXA-QTS-2040 Appendix K
- Detail specification : JAXA-QTS-2040/K201
- Application data sheet : JAXA-ADS- 2040/K201

Note 3: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use.

3.2 EPPL PART1 CONNECTORS  
Multipin, solder and crimp contacts:

| Type                    | Description   | Specification  | Package     | Manufacturer | Qualification | Remarks      |
|-------------------------|---|--|-------------|--------------|---------------|--------------|
| D*M                     | Rectangular receptacles and plugs, solder and wire wrap contacts                                      | 3401/001<br>3401/004<br>3401/022<br>3401/040<br>3401/072<br>3401/080<br>3401/085 | Rectangular | C&K / F      | ESCC QPL      | range in QPL |
| D*M                     | Rectangular receptacles and plugs, solder and wire wrap contacts                                      | 3401/001<br>3401/022<br>3401/072   | Rectangular | Souriau / F  | ESCC QPL      | range in QPL |
| D*MA                    | Rectangular receptacles and plugs, crimp contacts   | 3401/002<br>3401/005<br>3401/020<br>3401/021<br>3401/085                         | Rectangular | C&K / F      | ESCC QPL      | range in QPL |
| D*MA                    | Rectangular receptacles and plugs, crimp contacts   | 3401/002<br>3401/005<br>3401/020<br>3401/021<br>3401/022<br>3401/072             | Rectangular | Souriau / F  | ESCC QPL      | range in QPL |
| DBAS                    | Miniature circular push-pull coupling, removable crimp contacts                                       | 3401/008<br>3401/009<br>3401/012<br>3401/064                                     | Circular    | Deutsch / F  | ESCC QPL      | range in QPL |
| MIL-C-38999, series I   | Circular, bayonet coupling, scoop-proof, removable crimp contacts                                     | 3401/052<br>3401/058<br>3401/062   | Circular    | Souriau / F  | ESCC QPL      | range in QPL |
| MIL-C-38999, series II  | Circular, bayonet coupling, removable crimp contacts  | 3401/044<br>3401/045<br>3401/062   | Circular    | Souriau / F  | ESCC QPL      | range in QPL |
| MIL-C-38999, series III | Circular, triple-start self-locking coupling, scoop-proof, removable and non-removable crimp contacts | 3401/056<br>3401/058<br>3401/062<br>3401/066<br>3401/070                         | Circular    | Souriau / F  | ESCC QPL      | range in QPL |



(continued) EPPL Part 1 connectors, crimp contacts:

| Type                         | Description  | Specification | Package  | Manufacturer | Qualification | Remarks      |
|------------------------------|--|---------------|----------|--------------|---------------|--------------|
| MIL-C-38999, series III      | Circular, triple-start self-locking coupling, scoop-proof, hermetic receptacle and feedthrough | 3401/057      | Circular | Souriau / F  | ESCC QPL      | range in QPL |
| ACB1, MIL-STD-1553B DATA BUS | Triaxial, bayonet coupling, non-removable crimp contacts                                       | 3401/079      | Triaxial | Axon / F     | ESCC QPL      | range in QPL |

EPPL Part 1 PCB connectors:

| Type | Description                       | Specification        | Package  | Manufacturer | Qualification | Remarks      |
|------|-----------------------------------|----------------------|----------|--------------|---------------|--------------|
| H801 | PCB removable crimp contacts      | 3401/016<br>3401/017 | see spec | Hypertac / F | ESCC QPL      | range in QPL |
| KMC  | PCB non removable solder contacts | 3401/039             | see spec | Hypertac / F | ESCC QPL      | range in QPL |
| MHD  | PCB non removable solder contacts | 3401/065             | see spec | Hypertac / F | ESCC QPL      | range in QPL |
| RX   | PCB, Z axis interposer, crimp     | 3401/076             | see spec | Hypertac / F | ESCC QPL      | range in QPL |

EPPL Part 1 Coaxial connectors:

| Type | Description                                       | Specification                    | Package  | Manufacturer | Qualification | Remarks      |
|------|---|----------------------------------|----------|--------------|---------------|--------------|
| SMA  | Coaxial, solder and crimp, male, female, adaptors | 3402/001<br>3402/002<br>3402/003 | see spec | Radial / F   | ESCC QPL      | range in QPL |

(continued) EPPL Part1 coaxial connectors:

| Type          | Description                                       | Specification  | Package  | Manufacturer    | Qualification | Remarks      |
|---------------|---|--|----------|-----------------|---------------|--------------|
| SMA 2.9       | Coaxial, solder and crimp, male, female, adaptors | 3402/021<br>3402/022<br>3402/023   | see spec | Radiall / F     | ESCC QPL      | range in QPL |
| Coaxial range | SMA, TNC, SMA 2.9, SMP                            | 3402/001<br>3402/002<br>3402/003<br>3402/008<br>3402/009<br>3402/010<br>3402/021<br>3402/022<br>3402/023<br>3402/024<br>3402/025<br>3402/026 | see spec | Rosenberger / G | ESCC QPL      | range in QPL |

EPPL Part 1 Micro-miniature connectors:

| Type | Description   | Specification                                | Package     | Manufacturer | Qualification | Remarks      |
|------|---|--|-------------|--------------|---------------|--------------|
| MDM  | Rectangular, Micro-miniature, crimp                                     | 3401/029<br>3401/041<br>3401/032<br>3401/087 | Rectangular | C&K / F      | ESCC QPL      | range in QPL |
| MTB  | Micro-miniature, crimp contact, single-in-line                          | 3401/031                                     | see spec    | C&K / F      | ESCC QPL      | range in QPL |
| MDMA | Rectangular, Micro-miniature, removable crimp                           | 3401/077<br>3401/078                         | Rectangular | C&K / F      | ESCC QPL      | range in QPL |
| 8MCG | Micro-miniature, removable and non-removable, gauge 26, PCB PIN contact | 3401/081<br>3401/082<br>3401/083<br>3401/084 | Rectangular | Souriau / F  | ESCC QPL      | range in QPL |

### 3.3 EPPL PART1 CRYSTALS AND PIEZO-ELECTRIC DEVICES

| Type  | Description | Specification | Package | Manufacturer | Qualification | Remarks |
|-------|-------------|---------------|---------|--------------|---------------|---------|
| T1507 | 2.5 – 20MHz | 3501/019      | TO8     | Rakon / F    | ESCC QPL      | Note 1  |
| T807  | 15 – 140MHz | 3501/018      | TO5     | Rakon / F    | ESCC QPL      | Note 1  |

Note1. Operating temperature range depends on type variant

### 3.4 EPPL PART1 DIODES

Switching diodes:

| Type    | Description | Specification | Package | Manufacturer | Qualification | Remarks      |
|---------|-------------|---------------|---------|--------------|---------------|--------------|
| 1N6640U | 75V, 2A     | 5101/027      | LCC2-D  | ST /F        | ESCC QPL      | range in QPL |
| 1N6642U | 100V, 2A    | 5101/026      | LCC2-D  | ST /F        | ESCC QPL      | range in QPL |

Rectifier diodes:

| Type                      | Description                     | Specification            | Package              | Manufacturer         | Qualification            | Remarks         |
|---------------------------|---------------------------------|--------------------------|----------------------|----------------------|--------------------------|-----------------|
| 1N5416,5417,5418,5420     | Power rectifiers                | MIL-PRF-19500/411        | Axial                | Microsemi / USA      | MIL QML                  |                 |
| 1N5614, 5616, 5618        | Power rectifiers                | MIL-PRF-19500/427        | Axial                | Microsemi / USA      | MIL QML                  |                 |
| 1N5806US                  | Power rectifier                 | MIL-PRF-19500/477        | D-5A                 | Microsemi / USA      | MIL QML                  |                 |
| 1N5806U                   | Power rectifier                 | 5101/014                 | LCC2-A               | ST /F                | ESCC QPL                 | Range as in QPL |
| 1N5811U                   | Power rectifier                 | 5101/013                 | LCC2-B               | ST /F                | ESCC QPL                 |                 |
| 1N5819U                   | Power rectifier                 | 5101/021                 | LCC2-B               | ST /F                | ESCC QPL                 |                 |
| 1N5822U                   | Power rectifier                 | 5106/020                 | LCC2-B               | ST /F                | ESCC QPL                 |                 |
| BYV54-200                 | Ultrafast 60A                   | 5103/031                 | TO254                | ST /F                | ESCC QPL                 |                 |
| BYW81-200                 | Dual ultrafast                  | 5103/029                 | SMD .5               | ST /F                | ESCC QPL                 |                 |
| <a href="#">STTH60400</a> | <a href="#">Power rectifier</a> | <a href="#">5103/032</a> | <a href="#">SMD1</a> | <a href="#">ST/F</a> | <a href="#">ESCC QPL</a> |                 |
| STPS1045                  | Schottky barr.                  | 5106/017                 | SMD                  | ST /F                | ESCC QPL                 |                 |
| STPS6045                  | Schottky barr.                  | 5106/018                 | SMD                  | ST /F                | ESCC QPL                 |                 |
| STPS20100                 | Schottky barr.                  | 5106/016                 | SMD                  | ST /F                | ESCC QPL                 |                 |
| STPS40100                 | Schottky barr.                  | 5106/019                 | SMD                  | ST /F                | ESCC QPL                 |                 |
| STPS60A150, 80A150        | Schottky barrier                | 5106/023                 | SMD0.5               | ST/F                 | ESCC QPL                 |                 |

EPPL Part1 Voltage regulator, reference/Zener diodes:

| Type                       | Description    | Specification     | Package  | Manufacturer    | Qualification | Remarks |
|----------------------------|----------------|-------------------|----------|-----------------|---------------|---------|
| 1N6320U thru 1N6336US      | Si V regulator | MIL-PRF-19500/533 | MELF     | Microsemi / USA | MIL QML       |         |
| 1N4099UR-1 thru 1N4135UR-1 | Si V regulator | MIL-PRF-19500/435 | DO-213AA | Microsemi / USA | MIL QML       |         |
| 1N4464 thru 1N4496         | Si V regulator | MIL-PRF-19500/406 | axial    | Microsemi / USA | MIL QML       |         |
| 1N4954 thru 1N4992         | Si V regulator | MIL-PRF-19500/356 | axial    | Microsemi / USA | MIL QML       |         |
| 1N6309US thru 1N6319US     | Si V regulator | MIL-PRF-19500/533 | MELF     | Microsemi / USA | MIL QML       |         |
| 1N4568AUR-1                | Si V ref       | MIL-PRF-19500/452 | DO-213AA | Microsemi / USA | MIL QML       |         |
| 1N4614UR-1 thru 1N4627UR-1 | Si V regulator | MIL-PRF-19500/435 | DO-213AA | Microsemi / USA | MIL QML       |         |

EPPL Part1 RF/Microwave Schottky, Si diodes:

| Type            | Description | Specification | Package | Manufacturer | Qualification | Remarks        |
|-----------------|-------------|---------------|---------|--------------|---------------|----------------|
| BAS70 and BAS40 | MW Si       | 5512/020      | T1      | Infineon / G | ESCC QPL      | Var. 01 and 03 |

EPPL Part1 RF/Microwave Varactor, Si diodes:

| Type                                      | Description | Specification  | Package  | Manufacturer           | Qualification | Remarks      |
|---|-------------|--|----------|------------------------|---------------|--------------|
| ML43xx and ML44yy ranges                  | Tuning var. | 5512/001<br>5512/003<br>5512/004<br>5512/005<br>5512/006<br>5512/007 | see spec | api Microwave/ UK      | ESCC QPL      | range in QPL |
| DH252<br>DH256<br>DH267<br>DH292<br>DH294 | Tuning var. | 5512/016   | see spec | Cobham<br>Microwave/ F | ESCC QPL      | range in QPL |
| DH76010 thru DH760150                     | Tuning var. | 5512/023   | see spec | Cobham<br>Microwave/ F | ESCC QPL      | range in QPL |

EPPL Part1 RF/Microwave PIN, Si diodes:

| Type                     | Description | Specification | Package    | Manufacturer        | Qualification | Remarks       |
|--------------------------|-------------|---------------|------------|---------------------|---------------|---------------|
| ML4207 thru ML4209       | PIN Si      | 5513/007      | see spec   | api Microwave/ UK   | ESCC QPL      | range in QPL  |
| ML4617, 4618, 4619       | PIN Si      | 5513/009      | see spec   | api Microwave/ UK   | ESCC QPL      | range in QPL  |
| ML4611, 4612, 4614, 4615 | PIN Si      | 5513/010      | see spec   | api Microwave/ UK   | ESCC QPL      | range in QPL  |
| ML46122 to 4624          | PIN Si      | 5513/014      | see spec   | api Microwave/ UK   | ESCC QPL      | range in QPL  |
| ML4627 to 4629           | PIN Si      | 5513/015      | see spec   | api Microwave/ UK   | ESCC QPL      | range in QPL  |
| DH50151 thru DH50157     | PIN Si      | 5513/031      | M208, F27D | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50033 thru DH50037     | PIN Si      | 5513/032      | see spec   | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50201 thru DH50209     | PIN Si      | 5513/033      | M208, F27D | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50251 thru DH0256      | PIN Si      | 5513/034      | M208, F27D | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50052 thru DH50057     | PIN Si      | 5513/036      | see spec   | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50071 thru DH50077     | PIN Si      | 5513/037      | see spec   | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| DH50101 thru DH50107     | PIN Si      | 5513/038      | see spec   | Cobham Microwave/ F | ESCC QPL      | range in QPL  |
| BXY42-MESA               | PIN Si      | 5513/017      | T, T1      | Infineon / G        | ESCC QPL      | Var 01 and 02 |
| BXY43 and BXY44          | PIN Si      | 5513/030      | see spec   | Infineon / G        | ESCC QPL      | Var 1,2, 5,6  |

3.5 EPPL PART1 FILTERS

Feed-through, Electromagnetic interference suppression filters:

| Type    | Description                    | Specification | Package | Manufacturer      | Qualification | Remarks              |
|---------|--------------------------------|---------------|---------|-------------------|---------------|----------------------|
| SFC 060 | C-filter, Hermetic glass fill  | 3008/026      | axial   | Exxelie Tech. / F | ESCC QPL      | Range in QPL, Note 1 |
| SFC 100 | C-filter, Hermetic glass fill  | 3008/027      | axial   | Exxelie Tech. / F | ESCC QPL      |                      |
| SFP 060 | Pi-filter, Hermetic glass fill | 3008/021      | axial   | Exxelie Tech. / F | ESCC QPL      |                      |
| SFP 100 | Pi-filter, Hermetic glass fill | 3008/028      | axial   | Exxelie Tech. / F | ESCC QPL      |                      |
| SFL 100 | L-filter, Hermetic glass fill  | 3008/029      | axial   | Exxelie Tech. / F | ESCC QPL      |                      |

(continued) EPPL Part 1 Feed-through, Electromagnetic interference suppression filters:

| Type     | Description                        | Specification | Package | Manufacturer      | Qualification | Remarks                 |
|----------|------------------------------------|---------------|---------|-------------------|---------------|-------------------------|
| SFC 035  | C-filter, non-hermetic resin fill  | 3008/031      | axial   | Exxelìa Tech. / F | ESCC QPL      | Range in QPL,<br>Note 1 |
| SFC 040  | C-filter, non-hermetic resin fill  | 3008/032      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |
| SFC 060  | C-filter, non-hermetic resin fill  | 3008/033      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |
| SFP 035  | Pi-filter, non-hermetic resin fill | 3008/025      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |
| SFP 040  | Pi-filter, non-hermetic resin fill | 3008/014      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |
| SFP 060  | Pi-filter, non-hermetic resin fill | 3008/030      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |
| SFC 030V | C-filter, mixed fill for soldering | 3008/020      | axial   | Exxelìa Tech. / F | ESCC QPL      |                         |

Note 1: SFC filters rated 200V are not qualified since ESCC QPL released in May 2018

EPPL Part 1 Surface Acoustic Wave (SAW) filters:

| Type | Description   | Specification | Package       | Manufacturer           | Qualification | Remarks |
|------|---|---------------|---------------|------------------------|---------------|---------|
|      | SAW filters (transversal band pass / resonator / notch/ low loss impedance element) Hermetically sealed, 10MHz-4GHz | 3502/002      | Surface mount | Kongsberg Norspace / N | ESCC QML      |         |

### 3.6 EPPL PART1 FUSES

| Type               | Description | Specification      | Package | Manufacturer        | Qualification | Remarks        |
|--------------------|-------------|--------------------|---------|---------------------|---------------|----------------|
| MGA-S 0.14 to 3.5A | Thin film   | 4008/001           | SMD     | Schurter / CH       | ESCC QPL      | Var 1 to 12    |
| HCSF 5A, 7.5A, 10A | Thin film   | 4008/001           | SMD     | Schurter / CH       | ESCC QPL      | Var 24, 26, 28 |
| JAXA 2210/101      | see spec    | JAXA-QTS-2210/101B | axial   | Tateyama Kagaku / J | JAXA QPL      | Note 1 and 2   |
| JAXA 2210/102      | see spec    | JAXA-QTS-2210/102  | SMD     | Tateyama Kagaku / J | JAXA QPL      | Note 1 and 2   |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eeepitnl.tksc.jaxa.jp/en/>

- General specification : JAXA-QTS-22210
- Detail specifications : JAXA-QTS-2210/101B, JAXA-QTS-2210/102
- Application data sheet : JAXA-ADS- 2210/101B, AXA-ADS- 2210/102

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use.

### 3.7 EPPL PART1 INDUCTORS

| Type                        | Description       | Specification | Package | Manufacturer  | Qualification | Remarks      |
|-----------------------------|-------------------|---------------|---------|---------------|---------------|--------------|
| MSCI 10000, 12000 and 20000 | RF coils          | 3201/008      | SMD     | Microspire /F | ESCC QPL      | range in QPL |
| SESI                        | Power inductors   | 3201/009      | SMD     | Microspire /F | ESCC QPL      | range in QPL |
| CMC15, 18, 22               | Common mode choke | 3201/010      | SMD     | Microspire /F | ESCC QPL      | range in QPL |

### 3.8 EPPL PART1 MICROCIRCUITS

#### Microprocessor/controller:

| Type     | Description                                       | Specification | Package         | Manufacturer  | Qualification | Remarks                        |
|----------|---|---------------|-----------------|---------------|---------------|--------------------------------|
| AT697F   | 32-bit SPARC V8 Processor, Leon2FT                | 9512/004      | MQFP256 MCGA349 | Microchip / F | ESCC QML      | Also available with 5962-07224 |
| TSC695F  | Low voltage 32-bit SPARC Embed. Proc.             | 5962-00540    | MQFP256         | Microchip / F | MIL QML       | Also available with 9512/003   |
| TSC695FL | Low voltage 32-bit SPARC Embed. Proc.             | 5962-03246    | MQFP256         | Microchip / F | MIL QML       |                                |
| AT7913E  | SpW RT controller with Leon2FT embedded processor | 5962-10A03    | LGA349          | Microchip / F | MIL QML       |                                |

#### Memory SRAM:

| Type      | Description          | Specification | Package | Manufacturer  | Qualification | Remarks  |
|-----------|----------------------|---------------|---------|---------------|---------------|--|
| AT60142H  | 512Kx8 3.3V          | 5962-05208    | FP36    | Microchip / F | MIL QML       | Single Event Effects (SEE) sensitivity shall be verified where necessary |
| AT60142HT | 512Kx8 5V-tolerant   | 5962-05208    | FP36    | Microchip / F | MIL QML       |  |
| AT68166H  | 16Mbit 3.3V MCM      | 5962-06229    | MQFP68  | Microchip / F | MIL QML       |  |
| AT68166HT | 16Mbit 5V-toler. MCM | 5962-06229    | MQFP68  | Microchip / F | MIL QML       |  |
| 65609EV   | 128Kx8 3.3V          | 5962-02501    | FP32    | Microchip / F | MIL QML       | Note 1   |

Note 1: In addition to SEUs, this device has exhibited Multiple Bit Upset (MBU) sensitivity in the form of double upset in the same 8bit word. Refer to the manufacturer for details. Error-correction codes may need to be implemented accordingly.

EPPL Part 1 ASIC Technologies Digital:

| Type       | Description   | Specification | Package | Manufacturer  | Qualification | Remarks                      |
|------------|---|---------------|---------|---------------|---------------|------------------------------|
| ATC18RHA   | 0.18 $\mu$ CMOS ASIC standard cell                          | 9202/080      | MQFP    | Microchip / F | ESCC QML      | Also available to 5962-06B02 |
| ATMX150RHA | 0.150 $\mu$ SOI CMOS ASIC standard cell – DIGITAL LIBRARIES | 9202/083      | MQFP    | Microchip / F | ESCC QML      | Note 1                       |

Note 1. ESCC QML QUALIFICATION in accordance with ESCC 2549000 is effective for the domain which includes up to 7 million gates, 3.3 and 2.5V I/Os, memory cells compiled (SRAM, DPRA, register file memory cells)

EPPL Part 1 Linear Operational Amplifier

| Type        | Description        | Specification | Package | Manufacturer | Qualification | Remarks |
|-------------|--------------------|---------------|---------|--------------|---------------|---------|
| RHF200K-01V | Fully differential | 5962-17210    | FP-16   | ST / F       | MIL QML       |         |
| RHF330K-01V | Current feedback   | 5962-07231    | FP-8    | ST / F       | MIL QML       |         |
| RHF310K-01V | Current feedback   | 5962-07233    | FP-8    | ST / F       | MIL QML       |         |
| LM124AW     | Low power Bipolar  | 5962-99504    | FP-14   | T.I. / USA   | MIL QML       | Note 1  |

Note 1: part is R level (100 krad(Si)) tolerant, Var. 02 is "not sensitive to low dose rate"; it is recommended to procure 5962R9950402VDA (no lower TID levels)



(continued) EPPL Part 1 Linear Operational Amplifier:

| Type        | Description      | Specification | Package     | Manufacturer         | Qualification | Remarks |
|-------------|------------------|---------------|-------------|----------------------|---------------|---------|
| OP27A       | Ultra low-noise  | 5962-94680    | FP10        | Analog Devices / USA | MIL QML       |         |
| OP470A      | Very low noise   | 5962-88565    | FP24        | Analog Devices / USA | MIL QML       |         |
| RHF484K-01V | Precision quad   | 5962-08222    | FP-14       | ST / F               | MIL QML       |         |
| RHR61K01V   | Precision        | 5962-16204    | FP-8        | ST / F               | MIL QML       |         |
| RHR64K01V   | Precision Quad   | 5962-16205    | FP-14       | ST / F               | MIL QML       |         |
| RHF43B      | Single           | 5962-06237    | FP-8        | ST / F               | MIL QML       |         |
| RHF350K-01V | 550MHz low noise | 5962-07232    | FP-8        | ST / F               | MIL QML       |         |
| OP77        | Ultralow offset  | 5962-87738    | LCC20, FP10 | Analog Devices / USA | MIL QML       |         |
| AD8001      | Current-feedback | 5962-94593    | FP-10       | Analog Devices / USA | MIL QML       |         |

EPPL Part 1 Linear Voltage regulator:

| Type          | Description                | Specification | Package       | Manufacturer | Qualification | Remarks |
|---------------|----------------------------|---------------|---------------|--------------|---------------|---------|
| RH-L4913 ADJ  | Positive ADJ , low dropout | 5962-02524    | FP-16         | ST / F       | MIL QML       |         |
| RH-L4913 2.5V | Positive 2.5V, 2A          | 5962-02534    | FP-16, SMD.5  | ST / F       | MIL QML       |         |
| RH-L4913 3.3V | Positive 3.3V, 2A          | 5962-02535    | FP-16, SMD.5  | ST / F       | MIL QML       |         |
| RH-L4913 5V   | Positive 5V, 2A            | 5962-02536    | FP-16, SMD.5  | ST / F       | MIL QML       |         |
| RH-L7913 ADJ  | Positive ADJ , low dropout | 5962-02532    | FP-16         | ST / F       | MIL QML       |         |
| LM117H        | Positive ADJ, 0.5A         | 5962-07229    | TO39, cerSOIC | T.I. / USA   | MIL QML       |         |
| LM117K        | Positive ADJ, 1.5A         | 5962-99517    | To-3          | T.I. / USA   | MIL QML       |         |
| LM137H        | Negative ADJ, 0.5A         | 5962-99517    | TO-39         | T.I. / USA   | MIL QML       |         |
| TPS7A4501     | Ultra low drop-out 1.5A    | 5962-12224    | FP-10         | T.I. / USA   | MIL QML       |         |
| TPS7H1101     | Ultra low drop-out 3A      | 5962-13202    | FP-16         | T.I. / USA   | MIL QML       |         |
| TPS7H3301     | 3A Sink/Source w/Vref      | 5962-14228    | FP-16         | T.I. / USA   | MIL QML       |         |

EPPL Part 1 Linear Voltage comparator:

| Type    | Description                 | Specification | Package        | Manufacturer | Qualification | Remarks |
|---------|-----------------------------|---------------|----------------|--------------|---------------|---------|
| AD584SH | Precision pin-programmable  | 5962-38128    | 8pin metal can | A. D. / USA  | MIL QML       | Var01   |
| LM119   | Dual, high speed            | 5962-96798    | FP             | T.I. / USA   | MIL QML       | Note 1  |
| LM139AH | Quad, low power             | 5962-96738    | FP-14          | T.I. / USA   | MIL QML       |         |
| LM193AH | Dual, low power, low offset | 5962-94526    | Metal can      | T.I. / USA   | MIL QML       | Note 1  |
| LM111W  | Precision                   | 5962-00524    | FP             | T.I. / USA   | MIL QML       |         |
| RHR801  | Very high speed             | 5962-10215    | FP-8           | ST / F       | MIL QML       |         |

Note 1: this part is NOT ELDRS-free

EPPL Part 1 Linear switching regulator:

| Type     | Description          | Specification | Package | Manufacturer | Qualification | Remarks |
|----------|----------------------|---------------|---------|--------------|---------------|---------|
| ST1843FK | High Performance PWM | 9108/020      | FP-8    | ST / F       | ESCC QPL      | Note 1  |
| ST1845FK | Current mode PWM     | 9108/021      | FP-8    | ST / F       | ESCC QPL      | Note 1  |

Note 1: this part is VERY sensitive to Single Event Transients (SET)

EPPL Part 1 Linear Line driver:

| Type       | Description           | Specification | Package | Manufacturer | Qualification | Remarks |
|------------|-----------------------|---------------|---------|--------------|---------------|---------|
| RHFLVDS31A | Quad LVDS low voltage | 5962-98651    | FP-16   | ST / F       | MIL QML       |         |

EPPL Part 1 Linear Line receiver:

| Type       | Description           | Specification | Package | Manufacturer | Qualification | Remarks |
|------------|-----------------------|---------------|---------|--------------|---------------|---------|
| RHFLVDS32A | Quad LVDS low voltage | 5962-98652    | FP-16   | ST / F       | MIL QML       |         |

EPPL Part 1 Linear multiplexer / demultiplexer:

| Type        | Description                                    | Specification | Package | Manufacturer | Qualification | Remarks |
|-------------|--|---------------|---------|--------------|---------------|---------|
| RHFLVDS2281 | 8-ch 4x4 cross point switch internal fail-safe | 5962-14234    | FP-64   | ST / F       | MIL QML       |         |

EPPL Part 1 Linear Analog to Digital converter:

| Type            | Description                            | Specification | Package | Manuf.     | Qualification | Remarks |
|-----------------|--|---------------|---------|------------|---------------|---------|
| RHF1201         | 12 bit, 0.5 to 50 MHz sample           | 5962-05217    | SO-48   | ST / F     | MIL QML       |         |
| RHF1401         | 14 bit, 20 Msps                        | 5962-06260    | SO-48   | ST / F     | MIL QML       |         |
| AD574AT         | 12 bit with microprocessor IF          | 5962-85127    | FP      | A.D. / USA | MIL QML       |         |
| EV10AS180AMxx-V | 10bit 1.5Gsps 200GHz bipolar DEMux ADC | 5962-15223    | Note 1  | e2v / F    | MIL QML       | Note 2  |

Note 1: The following packages are available:

- 255 terminals, CLGA-Au pad termination
- 255 terminals, CI-CGA-Solder column interposer (SCI). A limited stock of SCI is available until Feb. 2019.
- 255 terminals CCGA-Cu spiral column

Note 2: these devices are sensitive to SEU/SET – contact the manufacturer for SEE sensitivity detailed evaluation data

EPPL Part 1 Linear Digital to Analog converter:

| Type            | Description                   | Specification | Package | Manuf.     | Qualification | Remarks |
|-----------------|-------------------------------|---------------|---------|------------|---------------|---------|
| DAC08           | 8 bit DAC                     | 5962-89932    | FP-16   | A.D. / USA | MIL QML       |         |
| RHRDAC1612K01V  | 16 bit Sigma Delta DAC        | 5962-16211    | FP-24   | ST / F     | MIL QML       |         |
| EV10DS130AMxx-V | 10bit 3Gsps with 4/2:1MUX DAC | 5962-15221    | Note 1  | e2v / F    | MIL QML       | Note 2  |
| EV12DS130AMxx-V | 12bit 3Gsps with 4/2:1MUX DAC | 5962-15222    | Note 1  | e2v / F    | MIL QML       | Note 2  |

Note 1: The following packages are available:

- 255 terminals, CLGA-Au pad termination
- 255 terminals, CI-CGA-Solder column interposer (SCI). A limited stock of SCI is available until Feb. 2019.
- 255 terminals CCGA-Cu spiral column

Note 2: these devices are sensitive to SEU/SET – contact the manufacturer for SEE sensitivity detailed evaluation data

EPPL Part 1 Linear Other functions:

| Type          | Description                                  | Specification | Package     | Manufacturer | Qualification | Remarks |
|---------------|--|---------------|-------------|--------------|---------------|---------|
| RHFLVDSR2D2   | Dual LVDS transceiver                        | 5962-06202    | FP-18       | ST / F       | MIL QML       |         |
| RHF100        | Precision shunt 1.2 Vref                     | 5962-14225    | FP-10       | ST / F       | MIL QML       |         |
| AD590M        | Temp. transducer                             | 5962-87571    | FP          | A.D. / USA   | MIL QML       |         |
| UC1707        | High speed power driver                      | 5962-87619    | DIL16 LCC20 | T. I. / USA  | MIL QML       | Note 1  |
| RHF1009A      | Adjustable 2.5/5.5V Vref                     | 5962-14222    | FP-10       | ST / F       | MIL QML       |         |
| RHFLVDS217    | Rad-hard LVDS serializer                     | 5962-01534    | FP-48       | ST / F       | MIL QML       |         |
| RHFLVDS218    | Rad-hard LVDS de-serializer                  | 5962-01535    | FP-48       | ST / F       | MIL QML       |         |
| TPS50601-SP   | Rad-hard 6.3V, 6A synch. Step-down converter | 5962-10221    | FP-20       | T.I. / USA   | MIL QML       | Note 2  |
| RHRPM4423K01V | Dual inverting MOSFET driver                 | 5962-99511    | FP-16       | ST / F       | MIL QML       |         |
| RHRPM4424K01V | Dual non-inverting MOSFET driver             | 5962-99560    | FP-16       | ST / F       | MIL QML       |         |

Note 1: this part is NOT ELDRS-free

Note 2: Users of these parts are encouraged to follow these recommendations in their designs:

- a. Limit Vin to  $\leq +5.5V$
- b. Limit the output (load) current of TPS50601 to  $< 4.5A$
- c. Add input filtering components such that the POL is compliant with the VI bus (ripple, impedance etc)
- d. Add if needed, Over-voltage protection by external means
- e. Add if needed, an external LCL protection for the intermediate bus (@ ca 5V)

EPPL1 Logic families:

| Type   | Description  | Specification | Package | Manufacturer | Qualification | Remarks |
|--------|--|---------------|---------|--------------|---------------|---------|
| 4001B  | QUAD 2-INPUT NOR GATE  | 9201/041      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4002B  | DUAL 4-INPUT NOR GATE  | 9201/042      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4008B  | 4-BIT FULL ADDER   | 9202/039      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40103B | PRESETTABLE 8-BIT SYNCHRONOUS DOWN-COUNTER                             | 9204/036      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40106B | HEX SCHMITT TRIGGER  | 9409/005      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40107B | DUAL 2-INPUT NAND BUFFER / DRIVER                                      | 9401/013      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40109B | QUAD LOW-TO-HIGH 3-STATE VOLTAGE LEVEL SHIFTER                         | 9407/003      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4011B  | QUAD 2 INPUT NAND GATE   | 9201/043      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4013B  | DUAL D-TYPE FLIP-FLOP  | 9203/023      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4014B  | 8-STAGE SYNCHRONOUS STATIC SHIFT REGISTER                              | 9306/014      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4015B  | DUAL 4-STAGE STATIC SHIFT REGISTER WITH SERIAL INPUT / PARALLEL OUTPUT | 9306/015      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40161B | PROGRAMMABLE 4-BIT BINARY COUNTER WITH ASYNCHRONOUS CLEAR              | 9204/054      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40174B | HEX D-TYPE FLIP-FLOP   | 9203/038      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4017B  | DECADE COUNTER / DIVIDER   | 9204/020      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4018B  | PRESETTABLE DIVIDE-BY-N COUNTER  | 9204/021      | FP, DIL | ST / F       | ESCC QPL      |         |
| 40193B | PRESETTABLE BINARY UP/DOWN COUNTER (DUAL CLOCK WITH RESET)             | 9204/041      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4019B  | QUAD AND/OR SELECT GATE  | 9202/051      | FP, DIL | ST / F       | ESCC QPL      |         |
| 4020B  | 14-STAGE RIPPLE CARRY BINARY COUNTER / DIVIDER                         | 9204/022      | FP, DIL | ST / F       | ESCC QPL      |         |

(continued) EPPL1 Logic families:

|        |   |          |         |        |          |  |
|--------|---|----------|---------|--------|----------|--|
| 4021B  | 8-STAGE STATIC SHIFT REGISTER                               | 9306/016 | FP, DIL | ST / F | ESCC QPL |  |
| 4022B  | OCTAL COUNTER/DIVIDER                                       | 9204/023 | FP, DIL | ST / F | ESCC QPL |  |
| 4024B  | 7-STAGE RIPPLE CARRY BINARY COUNTER / DIVIDER               | 9204/024 | FP, DIL | ST / F | ESCC QPL |  |
| 4027B  | DUAL J-K MASTER-SLAVE FLIP-FLOP                             | 9203/022 | FP, DIL | ST / F | ESCC QPL |  |
| 4028B  | BCD-TO-DECIMAL OR BINARY-TO-OCTAL DECODER                   | 9205/010 | FP, DIL | ST / F | ESCC QPL |  |
| 4029B  | PRESETTABLE UP/DOWN COUNTER BINARY OR BCD DECADE            | 9204/025 | FP, DIL | ST / F | ESCC QPL |  |
| 4030B  | QUAD 2-INPUT EXCLUSIVE OR GATE                              | 9201/047 | FP, DIL | ST / F | ESCC QPL |  |
| 4040B  | 12-STAGE RIPPLE CARRY BINARY COUNTER / DIVIDER              | 9204/026 | FP, DIL | ST / F | ESCC QPL |  |
| 4041UB | QUAD TRUE/COMPLEMENT BUFFER WITH UNBUFFERED OUTPUTS         | 9202/040 | FP, DIL | ST / F | ESCC QPL |  |
| 4043B  | QUAD NOR 3-STATE R/S LATCHES                                | 9202/042 | FP, DIL | ST / F | ESCC QPL |  |
| 4044B  | QUAD NAND 3-STATE R/S LATCH                                 | 9202/043 | FP, DIL | ST / F | ESCC QPL |  |
| 4046B  | MICROPOWER PHASE-LOCKED LOOP                                | 9202/044 | FP, DIL | ST / F | ESCC QPL |  |
| 4047B  | LOW POWER MONOSTABLE / ASTABLE MULTIVIBRATOR                | 9207/003 | FP, DIL | ST / F | ESCC QPL |  |
|        |   |          |         |        |          |  |
| 4049UB | HEX BUFFER-CONVERTER (INVERTING TYPE)                       | 9202/045 | FP, DIL | ST / F | ESCC QPL |  |
| 4050B  | HEX BUFFER-CONVERTER (NON-INVERTING TYPE)                   | 9202/046 | FP, DIL | ST / F | ESCC QPL |  |
| 4051B  | ANALOGUE MULTIPLEXER / DEMULTIPLEXER                        | 9202/047 | FP, DIL | ST / F | ESCC QPL |  |
| 4052B  | ANALOGUE MULTIPLEXER/DEMUTIPLEXER                           | 9202/048 | FP, DIL | ST / F | ESCC QPL |  |
| 4053B  | TRIPLE 2-CHANNEL ANALOGUE MULTIPLEXER/DEMUTIPLEXER          | 9202/049 | FP, DIL | ST / F | ESCC QPL |  |
| 4060B  | 14-STAGE RIPPLE-CARRY BINARY COUNTER/DIVIDER AND OSCILLATOR | 9204/052 | FP, DIL | ST / F | ESCC QPL |  |
| 4063B  | 4-BIT MAGNITUDE COMPARATOR                                  | 9209/001 | FP, DIL | ST / F | ESCC QPL |  |
| 4066B  | QUAD BILATERAL SWITCH                                       | 9408/005 | FP, DIL | ST / F | ESCC QPL |  |
| 4067B  | ANALOGUE MULTIPLEXER/DEMUTIPLEXER                           | 9408/009 | FP, DIL | ST / F | ESCC QPL |  |
| 4068B  | 8-INPUT NAND GATE   | 9201/061 | FP, DIL | ST / F | ESCC QPL |  |

(continued) EPPL1 Logic families:

| Type    | Description  | Specification  | Package | Manufacturer | Qualification | Remarks |
|---------|--|----------------|---------|--------------|---------------|---------|
| 4069UB  | HEX INVERTER   | 9401/010       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4071B   | QUAD 2-INPUT OR GATE   | 9201/063       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4072B   | DUAL 4-INPUT OR GATE   | 9201/082       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4073B   | TRIPLE 3-INPUT AND GATE  | 9201/064       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4075B   | TRIPLE 3-INPUT OR GATE   | 9201/065       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4076B   | 4-BIT D TYPE REGISTER WITH 3-STATE OUTPUT  | 9306/022       | FP      | ST / F       | ESCC QPL      |         |
| 4077B   | QUAD EXCLUSIVE NOR GATE  | 9201/055       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4081B   | 8 INPUT OR-NOR GATE  | 9201/052       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4093B   | QUAD 2 INPUT NAND GATE WITH SCHMITT TRIGGER INPUT  | 9409/002       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4094B   | 8-STAGE SHIFT AND STORE BUS REGISTER WITH SYNCHRONOUS SERIAL OUTPUTS AND 3-STATE PARALLEL OUTPUT | 9306/026       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4098B   | DUAL MONOSTABLE MULTIVIBRATOR  | 9206/003       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4503B   | HEX NON-INVERTING BUFFER WITH 3-STATE OUTPUT   | 9401/030       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4512B   | 8-CHANNEL MULTIPLEXER WITH 3-STATE OUTPUT  | 9408/006       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4514B   | 4-BIT LATCH/4-TO-16 DECODER  | 9408/012       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4515B   | 4-BIT LATCH/4-TO-16 LINE DECODER   | 9205/011       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4516B   | SYNCHRONOUS QUAD PRESETTABLE UP/DOWN BINARY COUNTER  | 9204/045       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4520B   | DUAL BINARY UP COUNTER   | 9204/028       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4532B   | 8-BIT PRIORITY ENCODER   | 9202/065       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4538B   | DUAL MONOSTABLE MULTIVIBRATOR WITH RESET   | 9207/007       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4555B   | DUAL 1-OF-4 DECODER / DEMULTIPLEXER  | 9408/011       | FP, DIL | ST / F       | ESCC QPL      |         |
| 4556B   | DUAL 1-OF-4 DECODER/DEMULTIPLEXER (OUTPUT LOW ON SELECT)   | 9408/025       | FP, DIL | ST / F       | ESCC QPL      |         |
| 54AC00  | Quad 2-Input NAND Gate   | 5962-87549     | FP      | ST / F       | MIL QML       |         |
| 54AC02  | Quad 2-Input NOR Gate  | 5962-87612     | FP      | ST / F       | MIL QML       |         |
| 54AC04  | Hex Inverter   | 5962-87609     | FP      | ST / F       | MIL QML       |         |
| 54AC08  | Quad 2-Input AND Gate  | 5962-87615     | FP      | ST / F       | MIL QML       |         |
| 54AC10  | Triple 3-Input NAND Gate   | 5962-87610     | FP      | ST / F       | MIL QML       |         |
| 54AC11  | Triple 3-Input AND Gate  | 5962-87611     | FP      | ST / F       | MIL QML       |         |
| 54AC138 | Decoder/Demultiplexer, 3-to-8 line   | 5962-87622     | FP      | ST / F       | MIL QML       |         |
| 54AC139 | Dual 2 To 4 Line Decoder/Demultiplexer, with Inverted Outputs                                    | 5962-87623     | FP      | ST / F       | MIL QML       |         |
| 54AC14  | Hex Schmitt Trigger Inverter   | 5962-87624     | FP      | ST / F       | MIL QML       |         |
| 54AC157 | Quad 2-Input Multiplexer   | SMD 5962-89539 | FP      | ST / F       | MIL QML       |         |

(continued) EPPL1 Logic families:

| Type      | Description  | Specification | Package | Manufacturer | Qualification | Remarks |
|-----------|--|---------------|---------|--------------|---------------|---------|
| 54AC161   | Synchronous 4-Bit Binary Counter   | 5962-89561    | FP      | ST / F       | MIL QML       |         |
| 54AC16244 | 16 bit Buffer/Driver with three-state outputs  | 5962-04210    | FP      | ST / F       | MIL QML       |         |
| 54AC240   | Octal Bus Buffer with Inverted 3-State Outputs   | 5962-87550    | FP      | ST / F       | MIL QML       |         |
| 54AC244   | Octal Buffer/Line Driver with 3-State Outputs  | 5962-87552    | FP      | ST / F       | MIL QML       |         |
| 54AC245   | Bus Transceiver, 8-Bit, Bidirectional, with 3-State Inputs/Outputs                       | 5962-87758    | FP      | ST / F       | MIL QML       |         |
| 54AC273   | Octal D-Type Flip-Flop with Clear  | 5962-87756    | FP      | ST / F       | MIL QML       |         |
| 54AC32    | Quad 2-Input OR Gate   | 5962-87614    | FP      | ST / F       | MIL QML       |         |
| 54AC373   | Octal D-Type Transparent Latches with 3-State Outputs                                    | 5962-87555    | FP      | ST / F       | MIL QML       |         |
| 54AC374   | Octal D-Type Flip-Flop with 3-State Outputs  | 5962-87694    | FP      | ST / F       | MIL QML       |         |
| 54AC541   | Octal Bus Buffer with 3-State Outputs  | 5962-88706    | FP      | ST / F       | MIL QML       |         |
| 54AC74    | Octal D-Type Flip-Flop with 3-State Outputs  | 5962-88520    | FP      | ST / F       | MIL QML       |         |
| 54AC86    | Quad 2-Input Exclusive OR Gate   | 5962-89550    | FP      | ST / F       | MIL QML       |         |
| 54ACT00   | Quad 2-Input NAND Gate, with TTL Compatible Inputs                                       | 5962-87699    | FP      | ST / F       | MIL QML       |         |
| 54ACT240  | Octal Bus Buffer with Inverted 3-State Outputs, TTL Compatible Inputs                    | 5962-87759    | FP      | ST / F       | MIL QML       |         |
| 54ACT244  | Octal Buffer/Line Driver with 3-State Outputs, TTL Compatible Inputs                     | 5962-87760    | FP      | ST / F       | MIL QML       |         |
| 54ACT245  | Octal Bidirectional Transceiver with 3-State Outputs, TTL Compatible Inputs              | 5962-87663    | FP      | ST / F       | MIL QML       |         |
| 54ACT574  | Octal D-Type Flip-Flop with 3-State Outputs, TTL Compatible Inputs                       | 5962-89601    | FP      | ST / F       | MIL QML       |         |
| 54ACT86   | Quad 2-Input Exclusive OR Gate, TTL Compatible Inputs                                    | 5962-90687    | FP      | ST / F       | MIL QML       |         |
| 54HC00    | Quad 2-Input NAND Gate   | 9201/105      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC02    | Quad 2-Input NOR Gate  | 9201/113      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC03    | Quad 2-Input Nand Gate with Open Drain Output  | 9201/114      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC04    | Hex Inverter   | 9401/033      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC08    | Quad 2-Input Positive AND Gate   | 9201/106      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC10    | Triple 3-Input NAND Gate   | 9201/107      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC109   | Dual J-K Positive Edge Triggered Flip-Flop with Preset and Clear                         | 9306/048      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC11    | Triple 3-Input AND Gate  | 9201/117      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC123   | Dual positive or negative edge Schmitt-retriggerable monostable multivibrator with clear | 9207/006      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC125   | Quad Bus Buffers with 3 State Outputs  | 9401/039      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC132   | Quad 2-Input NAND Gate with Schmitt-trigger Inputs                                       | 9201/120      | FP, DIL | ST / F       | ESCC QPL      |         |

(continued) EPPL1 Logic families:

| Type    | Description  | Specification | Package | Manufacturer | Qualification | Remarks |
|---------|--|---------------|---------|--------------|---------------|---------|
| 54HC137 | 3-to-8 line decoder/demultiplexer with address latch and inverted output | 9205/013      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC138 | 3-to-8 Line Decoders/Demultiplexers with Inverted Outputs                | 9408/046      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC139 | Dual 2-to-4-line Decoders/Demultiplexers with Inverted Outputs           | 9205/017      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC14  | Hex Schmitt Trigger Inverter   | 9409/007      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC148 | 8-line to -3line priority encoder  | 9410/017      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC151 | 8-line to 1-line Data Selectors/Multiplexer                              | 9408/054      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC153 | Dual 4-line to 1-line data selectors/multiplexer                         | 9408/038      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC154 | 4-to-6 Line Decoder/Demultiplexer with Inverted Output                   | 9205/023      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC157 | Quad 2-line to 1-line Data Selectors/Multiplexers                        | 9408/057      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC158 | Quad 2-to-1-Line Data Selectors/Multiplexers with Inverted Outputs       | 9408/059      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC160 | Synchronous presettable 4-bit decade counter with direct clear           | 9204/062      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC161 | Asynchronous 4-Bit Binary Counter  | 9204/059      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC164 | 8-bit Sipo Shift Register  | 9306/041      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC165 | 8-bit Sipo Shift Register  | 9306/042      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC166 | 8-bit Piso Shift Register  | 9306/043      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC174 | Hex D-Type Edge-triggered Flip-Flop with Clear                           | 9306/052      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC175 | Quad D-Type Edge-triggered Flip-Flop with Clear                          | 9203/052      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC191 | Synchronous 4-Bit Up/Down Binary Counter                                 | 9204/066      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC193 | Synchronous 4-Bit Up/Down Binary Counter (Dual Clock with Clear)         | 9204/065      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC194 | 4-bit PIPO shift register  | 9306/047      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC20  | Dual 4-Input NAND Gate   | 9201/118      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC21  | Dual 4-Input AND Gate  | 9201/108      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC237 | 3-to-8-Line Decoder/Demultiplexer with Address Latch                     | 9205/021      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC240 | Octal Bus Buffer with Inverted 3-State Outputs                           | 9401/034      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC244 | Octal Bus Buffer with 3-State Outputs                                    | 9401/048      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC245 | Octal Bus Transceiver with 3-State Outputs                               | 9405/013      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC251 | 1-to-8 data selector/multiplexer with 3-state output                     | 9408/048      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC257 | Quad 2-to-1-Line Data Selector/Multiplexer with 3-State Outputs          | 9408/047      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC259 | 8-bit addressable latch  | 9203/073      | FP, DIL | ST / F       | ESCC QPL      |         |



(continued) EPPL1 Logic families:

| Type     | Description   | Specification | Package | Manufacturer | Qualification | Remarks |
|----------|---|---------------|---------|--------------|---------------|---------|
| 54HC27   | Triple 3-Input NOR Gate   | 9201/109      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC273  | Octal D-Type Edge-triggered Flip-Flop with Clear                          | 9203/053      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC280  | 9-bit odd/even parity generator/checker                                   | 9208/003      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC283  | 4-Bit Binary Full Adders with Fast Carry                                  | 9202/075      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC30   | 8-input NAND gate   | 9201/111      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC32   | Quad 2-Input OR Gate  | 9201/111      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC367  | Hex bus buffer with 3-state output  | 9401/044      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC373  | Octal D-Type Transparent Latches with 3-State Outputs                     | 9203/059      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC374  | Octal D-Type Edge-triggered Flip-Flop with 3-State Outputs                | 9203/060      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC393  | Dual 4-bit negative edge-triggered binary counter                         | 9204/074      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4020 | Asynchronous negative-edge-triggered 14-bit binary counter                | 9204/070      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4040 | Asynchronous Negative Edge-triggered 12-Bit Binary Counters               | 9204/069      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4049 | Hex Buffer Converter with Inverted Outputs                                | 9401/037      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4050 | Hex Buffer Converter  | 9401/038      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4051 | Analogue multiplexer/demultiplexer  | 9408/064      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4053 | Analogue multiplexer/demultiplexer (triple 2-channel)                     | 9408/065      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4060 | Asynchronous negative-edge-triggered 14-bit binary counter and oscillator | 9204/076      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4066 | Quad bilateral switch   | 9408/052      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4078 | 8-input OR/NOR gate   | 9201/123      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4094 | 8-bit SIPO shift latch register with 3-state output                       | 9306/050      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC4514 | 4-to-16 line decoder/latch  | 9205/019      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC540  | Octal Bus Buffer with Inverted 3-State Outputs                            | 9401/049      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC541  | Octal bus buffer with 3-state output                                      | 9401/047      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC573  | Octal D-type transparent latch with 3-state output                        | 9202/072      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC574  | Octal D-type edge-triggered flip-flop with 3-state output                 | 9203/054      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC590  | 8-Bit Binary Counter with 3-State Output Registers                        | 9204/071      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC595  | 8-Bit Shift Registers with 3-State Output Registers                       | 9306/051      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC597  | 8-Bit PISO Shift Register   | 9306/054      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC688  | 8-bit identify comparator   | 9209/005      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC74   | Dual Negative Edge Triggered D-Type Flip-Flop with Clear                  | 9203/050      | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HC85   | 4-Bit Magnitude Comparator  | 9209/004      | FP      | ST / F       | ESCC QPL      |         |
| 54HC86   | Quad 2-Input Exclusive OR Gate  | 9201/119      | FP, DIL | ST / F       | ESCC QPL      |         |

(continued) EPPL1 Logic families:

| Type          | Description   | Specification  | Package | Manufacturer | Qualification | Remarks |
|---------------|---|----------------|---------|--------------|---------------|---------|
| 54HCT244      | Octal Bus Buffer with 3-State Outputs   | 9402/009       | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HCT245      | Octal Bus Transceiver with 3-State Outputs  | 9405/014       | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HCT373      | Octal D-Type Transparent Latch with 3-State Outputs   | 9203/064       | FP, DIL | ST / F       | ESCC QPL      |         |
| 54HCT74       | Dual D-Type Flip-Flop with Preset and Clear   | 9203/070       | FP, DIL | ST / F       | ESCC QPL      |         |
| 54VCXH162244  | Low Voltage CMOS 16-bit Bus Buffer with Bus hold, series Output Resistors and three-state Outputs                 | 5962-05210     | FP-48   | ST / F       | MIL QML       |         |
| 54VCXH162373  | Low Voltage CMOS 16-bit D-type Latch with Bus hold, series Output Resistors and three-state Outputs               | 5962-05211     | FP-48   | ST / F       | MIL QML       |         |
| 54VCXH162374  | Low Voltage CMOS 16-bit D-type Flip-Flop with Bus hold, series Output Resistors and three-state Outputs           | SMD 5962-05212 | FP-48   | ST / F       | MIL QML       |         |
| 54VCXHR162245 | Rad-Hard low voltage CMOS, 16-bit bus transceiver with bus hold, Series Output Resistors, and Three-State Outputs | 5962-05213     | FP-48   | ST / F       | MIL QML       |         |
| AC16245       | AC16245 is an advanced CMOS 16-bit bus transceiver with three-state outputs.                                      | 5962-04211     | Flat 48 | ST / F       | MIL QML       |         |
| AC164245      | 16-channel bidirectional multi-purpose transceiver  | SMD 5962-98580 | Flat 48 | ST / F       | MIL QML       |         |

EPPL1 Other functions:

| Type    | Description                         | Specification | Package | Manufacturer | Qualification | Remarks |
|---------|-------------------------------------|---------------|---------|--------------|---------------|---------|
| RHF1009 | Adjustable 2.5V/5.5V precision Vref | 5962-14222    | FP10    | ST / F       | MIL QML       |         |

EPPL1 Miscellaneous:

| Type    | Description  | Specification | Package | Manufacturer | Qualification | Remarks |
|---------|--|---------------|---------|--------------|---------------|---------|
| AT7910E | SpW-10X router: it includes 8 bi-directional SpaceWire serial ports and 2 bidirectional parallel external interfaces | 5962-09A03    | MQFP196 | ATM / F      | MIL QML       |         |

### 3.9 EPPL PART1 RELAYS

| Type  | Description  | Specification | Package | Manufacturer | Qualification | Remarks |
|-------|--------------|---------------|---------|--------------|---------------|---------|
| T     | Non-latching | 3601/002      | TO5     | STPI / F     | ESCC QPL      |         |
| M300  | Non-latching | 3601/007      | Can     | Leach / F    | ESCC QPL      |         |
| E215  | Non-latching | 3601/007      | Can     | STPI / F     | ESCC QPL      |         |
| TL    | Latching     | 3602/002      | Can     | STPI / F     | ESCC QPL      |         |
| EL415 | Latching     | 3602/004      | Can     | STPI / F     | ESCC QPL      |         |
| M402  | Latching     | 3602/004      | Can     | Leach / F    | ESCC QPL      |         |
| EL215 | Latching     | 3602/009      | Can     | STPI / F     | ESCC QPL      |         |
| M302  | Latching     | 3602/009      | Can     | Leach / F    | ESCC QPL      |         |

### 3.10 EPPL PART1 RESISTORS

| Type            | Description                                    | Specification | Package | Manufacturer | Qualification | Remarks         |
|-----------------|--|---------------|---------|--------------|---------------|-----------------|
| SMP/SMS/SMT     | Shunts   | 4001/027      | SMD     | ISA / G      | ESCC QPL      | Range as in QPL |
| TNPS            | Thin film                                      | 4001/029      | SMD     | Vishay / G   | ESCC QPL      | Range as in QPL |
| MS1             | Fixed film                                     | 4001/022      | SMD     | Vishay / G   | ESCC QPL      | Range as in QPL |
| P HR            | Thin film 0402, 0603, 0805, 1206, 2010         | 4001/023      | SMD     | Vishay / F   | ESCC QPL      | Range as in QPL |
| PFRR            | Thin film 0402, 0603, 0805, 1206, 2010 with ER | 4001/023      | SMD     | Vishay / F   | ESCC QML      | Range as in QPL |
| PRA Hr & CNW HR | Thin film arrays                               | 4001/025      | SMD     | Vishay / F   | ESCC QML      | Range as in QPL |

(continued) EPPL Part 1 Resistors:

| Type           | Description                                      | Specification          | Package  | Manufacturer      | Qualification | Remarks            |
|----------------|--|------------------------|----------|-------------------|---------------|--------------------|
| CHP            | Thick film<br>0603, 0805,<br>1206, 2010,<br>2512 | 4001/026               | SMD      | Vishay / F        | ESCC QML      | Range as<br>in QPL |
| JAXA 2050/J401 | 1005, 1608,<br>2012, 3216,<br>3225               | JAXA-QTS-<br>2050/J401 | SMD      | SANADA KOA<br>/ J | JAXA QPL      | Note 1 and<br>2    |
| SMV            | Shunts   | 4001/028               | SMD      | ISA / G           | ESCC QPL      | Range as<br>in QPL |
| Heater         | Flexible,<br>single and<br>double layer          | 4009/002               | See spec | IRCA / I          | ESCC QPL      | Range as<br>in QPL |
| Heater         | Flexible,<br>single and<br>double layer          | 4009/004               | See spec | IRCA / I          | ESCC QPL      | Range as<br>in QPL |
| Heater         | Flexible,<br>single and<br>double layer          | 4009/003               | See spec | MINCO / F         | ESCC QPL      | Range as<br>in QPL |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eeepitnl.tksc.jaxa.jp/en/>

- General specification : JAXA-QTS-2050 (and App. J)
- Detail specification : JAXA-QTS-2050/J401
- Application data sheet : JAXA-ADS-2050/J401

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use.

### 3.11 EPPL PART1 THERMISTORS

| Type          | Description                      | Specification | Package  | Manufacturer | Qualification | Remarks                |
|---------------|----------------------------------|---------------|----------|--------------|---------------|------------------------|
| G15K and G10K | NTC 2K to<br>100K, -40 +<br>160C | 4006/014      | See spec | MEAS / I     | ESCC QPL      | Var. 08, 09,<br>12, 13 |
| Pt sensors    | PTC 100 ohm<br>to 2 Kohm         | 4006/015      | See spec | IST / CH     | ESCC QPL      | All variants           |

(continued) EPPL Part 1 Thermistors:

| Type                    | Description                | Specification       | Package        | Manufacturer                               | Qualification | Remarks         |
|-------------------------|----------------------------|---------------------|----------------|--|---------------|-----------------|
| JAXA 2160/A101-2012B*** | NTC                        | JAXA-QTS-2160/A101B | Chip           | Tateyama Kagaku / J                        | JAXA QPL      | Note 1 and 2    |
| JAXA 2160/B101 series   | NTC, 2.2 to 10K, -55/+150C | JAXA-QTS-2160/B101  | Radial (leads) | Tateyama Kagaku / J                        | JAXA QPL      | Note 1 and 2    |
| K3A35                   | NTC 1K to 100K, -55 + 115C | 4006/013            | See spec       | MEAS / I                                   | ESCC QPL      | Range as in QPL |
| PxKx.232.7W             | PTC Pt sensors             | 4006/015            | See spec       | Innovative Technology Switzerland / Sensor | ESCC QPL      | Range as in QPL |
| N1043/301               | Pt sensor                  | JAXA-QTS-2180/103   | See spec       | Mitsubishi Heavy Industries / J            | JAXA QPL      | Note 1 and 2    |
| N1043/501               | Pt sensor                  | JAXA-QTS-2180/105   | See spec       | Mitsubishi Heavy Industries / J            | JAXA QPL      | Note 1 and 2    |
| N1043/401               | Pt sensor                  | JAXA-QTS-2180/104   | See spec       | Mitsubishi Heavy Industries / J            | JAXA QPL      | Note 1 and 2    |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eepitnl.tksc.jaxa.jp/en/>  
 - General specifications : JAXA-QTS-2160 (and App. A and B), JAXA-QTS-2180  
 - Detail specifications : JAXA-QTS-2160/A101B, JAXA-QTS-2180/103, 104 and /105, JAXA-QTS-2160/B101A  
 - Application data sheet : JAXA-ADS-2160/A101A, JAXA-ADS-2180/103-105, JAXA-ADS-2160/B101

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use

### 3.12 EPPL PART1 TRANSISTORS

Bipolar transistors:

| Type           | Description   | Specification     | Package | Manuf.  | Qualification | Remarks                |
|----------------|---------------|-------------------|---------|---------|---------------|------------------------|
| 2N5666, 2N5667 | Low power NPN | MIL-PRF-19500/455 | TO205   | MIC / U | MIL QML       |                        |
| 2N3501         | Low power NPN | MIL-PRF-          | TO205   | MIC / U | MIL QML       |                        |
| 2N2484         | Low power NPN | 5201/001          | LCC3    | ST / F  | ESCC QPL      | Range in QPL<br>Note 1 |
| 2N2222A        | Low power NPN | 5201/002          |         | ST / F  | ESCC QPL      |                        |
| 2N3700         | Low power NPN | 5201/004          | LCC3+1  | ST / F  | ESCC QPL      |                        |
| 2N5551         | Low power NPN | 5201/019          | LCC3+1  | ST / F  | ESCC QPL      |                        |

(continued) EPPL Part 1 Bipolar Transistors:

| Type                | Description      | Specification     | Package          | Manuf.  | Qualification | Remarks                |
|---------------------|------------------|-------------------|------------------|---------|---------------|------------------------|
| 2N5415              | Low power PNP    | MIL-PRF-19500/485 | TO39             | MIC / U | MIL QML       |                        |
| 2N3637              | Low power PNP    | MIL-PRF-19500/357 | TO205            | MIC / U | MIL QML       |                        |
| 2N3867S,<br>2N3868S | Low power PNP    | MIL-PRF-19500/350 | TO205            | MIC / U | MIL QML       |                        |
| 2N5401              | Low power PNP    | 5202/014          | LCC3,<br>LCCC3+1 | ST / F  | ESCC QPL      | Range in QPL<br>Note 1 |
| 2N2907A             | Low power PNP    | 5202/001          | LCC3,<br>LCCC3+1 | ST / F  | ESCC QPL      |                        |
| 2N5154              | High power NPN   | 5203/010          | TO-257,          | ST / F  | ESCC QPL      |                        |
| 2N5153              | High power PNP   | 5204/002          | SMD .5           | ST / F  | ESCC QPL      |                        |
| BUX77               | High power NPN   | 5203/016          | TO-257           | ST / F  | ESCC QPL      |                        |
| BUX78               | High power PNP   | 5204/006          | TO-257           | ST / F  | ESCC QPL      |                        |
| 2N2920A             | Matched dual NPN | 5207/002          | LCC6             | ST / F  | ESCC QPL      |                        |
| 2N3810              | Matched dual PNP | 5207/005          | LCC6, FP8        | ST / F  | ESCC QPL      |                        |

Note 1: TO-18, TO-39, TO-77, TO-78 packaged variants are affected by product termination with a last time buy offer, hence these parts are affected by obsolescence and are not eligible for listing in EPPL in accordance with ESCC 12300.

EPPL Part 1 MOSFET Transistors:

| Type                        | Description | Specification         | Package             | Manuf.   | Qualification | Remarks          |
|-----------------------------|-------------|-----------------------|---------------------|----------|---------------|------------------|
| STRH100N10FSY3              | N-channel   | 5205/021              | TO254AA             | ST / F   | ESCC QPL      | Variants 1 and 2 |
| STRH100N6                   | N-channel   | 5205/022              | TO254AA             | ST / F   | ESCC QPL      | Variants 1 and 2 |
| STRH8N10                    | N-channel   | 5205/023              | SMD .5              | ST / F   | ESCC QPL      | Variant 01       |
| STRH40N6                    | N-channel   | 5205/024              | SMD .5              | ST / F   | ESCC QPL      | Variant 01       |
| BUY15CSXXXX01               | N-channel   | 5205/031              | See spec            | INF/G    | ESCC QPL      | Var. 01 thru 04  |
| BUY25CS12J-01               | N-channel   | 5205/026              | SMD0.5              | INF / G  | ESCC QPL      | Variant 01       |
| BUY25CS54A-01               | N-channel   | 5205/027              | SMD2                | INF / G  | ESCC QPL      | Variant 01       |
| BUY10CS12J-01               | N-channel   | 5205/028              | SMD0.5              | INF / G  | ESCC QPL      | Variant 01       |
| BUY25CS12K-01               | N-channel   | 5205/030              | TO257AA             | INF / G  | ESCC QPL      | Variant 01       |
| STRH40P10                   | P-channel   | 5205/025              | TO254AA             | ST / F   | ESCC QPL      | Variants 1 and 2 |
| STRH12P10                   | P-channel   | 5205/029              | TO254AA,<br>TO257AA | ST / F   | ESCC QPL      | Variants 1 and 2 |
| JAXA R 2SK4048<br>thru 4056 | N-channel   | JAXA-QTS-<br>2030/101 | See spec            | Fuji / J | JAXA QPL      | Note 1 and 2     |

EPPL Part 1 MOSFET Transistors (continued):

| Type  | Description | Specification          | Package         | Manuf.        | Qualification | Remarks         |
|---|-------------|------------------------|-----------------|---------------|---------------|-----------------|
| JAXA R 2SK4214<br>thru 4216                                 | N-channel   | JAXA-QTS-<br>2030/101  | See spec        | Fuji / J      | JAXA QPL      | Note 1 and 2    |
| JAXA R 2SK4152<br>thru 4160                                 | N-channel   | JAXA-QTS-<br>2030/102  | See spec        | Fuji / J      | JAXA QPL      | Note 1 and 2    |
| JAXA R 2SK4217<br>thru 4219                                 | N-channel   | JAXA-QTS-<br>2030/102  | See spec        | Fuji / J      | JAXA QPL      | Note 1 and 2    |
| JAXA R 2SK4185<br>thru 4190                                 | N-channel   | JAXA-QTS-<br>2030/103  | See spec        | Fuji / J      | JAXA QPL      | Note 1 and 2    |
| JAXA R FRME60N25S<br>JAXA R FRMF30N25S<br>JAXA R FRMG13N25S | N-channel   | JAXA-QTS-<br>2030/108A | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R<br>FRMM42N25S  | N-channel   | JAXA-QTS-<br>2030/108A | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R<br>FRMN20N25S  | N-channel   | JAXA-QTS-<br>2030/108A | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R FRME34N60S<br>JAXA R FRMG06N60S                      | N-channel   | JAXA-QTS-<br>2030/109  | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R<br>FRMM34N60S  | N-channel   | JAXA-QTS-<br>2030/109  | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R<br>FRMN05N60S  | N-channel   | JAXA-QTS-<br>2030/109  | See spec        | Fuji / J      | JAXA QPL      | Note 1, 2 and 3 |
| JAXA R 2SJ1A01<br>thru 1A12                                 | P-channel   | JAXA-QTS-<br>2030/104  | See spec        | Fuji / J      | JAXA QPL      | Note 1 and 2    |
| 2N7389  | P-channel   | MIL-PRF-<br>19500/630  | TO205AF,<br>LCC | I.R. /<br>USA | MIL QML       |                 |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eepitnl.tksc.jaxa.jp/en/>

- General specification : JAXA-QTS-2030
- Detail specifications : JAXA-QTS-2030/101, 102, 103, 104, 108A, 109
- Application data sheets : JAXA-ADS-2030/101, 102, 103, 104, 108A, 109

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use

Note 3: These devices have been evaluated with SEE tests, see ADS documentation. Use only within Safe Operating Area as defined in QTS specification as applicable.

EPPL Part 1 Microwave transistors:

| Type                                 | Description           | Specification | Package  | Manufacturer | Qualification | Remarks       |
|--------------------------------------|-----------------------|---------------|----------|--------------|---------------|---------------|
| BFY180 thru 183, 193, 193C, 196, 280 | Small signal, bipolar | 5611/006      | Micro-X1 | INF / G      | ESCC QPL      | Var. 01 to 08 |
| BFY450                               | Small signal, bipolar | 5611/008      | Micro-X  | INF / G      | ESCC QPL      | Var. 01 to 03 |
| BFY460                               | Small signal, bipolar | 5611/009      | Micro-X  | INF / G      | ESCC QPL      | Var. 01 to 03 |
| BFY640B, 650B                        | Small signal, bipolar | 5611/010      | Micro-X  | INF / G      | ESCC QPL      | Var. 01 to 04 |
| BFY740B                              | Small signal, bipolar | 5611/011      | Micro-X  | INF / G      | ESCC QPL      | Var. 01       |

3.13 EPPL PART1 WIRES AND CABLES

Low frequency wires and cables

| Type            | Description    | Specification | Package | Manufacturer  | Qualification | Remarks      |
|-----------------|----------------|---------------|---------|---------------|---------------|--------------|
| 1871            | Polymide       | 3901/001      | N/A     | Nexans / F    | ESCC QPL      | Range in QPL |
| 1872            | Polymide       | 3901/002      | N/A     | Nexans / F    | ESCC QPL      | Range in QPL |
| FA-3901-1       | Polymide       | 3901/001      | N/A     | Draka         | ESCC QPL      | Range in QPL |
| FA-3901-2       | Polymide       | 3901/002      | N/A     | Draka         | ESCC QPL      | Range in QPL |
| -               | PTFE/polym.    | 3901/013      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| SPC2110         | Polymide       | 3901/009      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| -               | Polymide       | 3901/019      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| -               | Polymide       | 3901/019      | N/A     | Leoni / G     | ESCC QPL      | Range in QPL |
| -               | Fluoropolymer  | 3901/012      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| SPM             | Polym/fluorth. | 3901/018      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| SPLD            | Polymide       | 3901/021      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| -               | Polymide       | 3901/021      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| -               | ETFE           | 3901/020      | N/A     | TE Conn / UK  | ESCC QPL      | Range in QPL |
| -               | ETFE           | 3901/022      | N/A     | TE Conn / UK  | ESCC QPL      | Range in QPL |
| CSWL            | Fluoropolymer  | 3901/024      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| CSWL            | Fluoropolymer  | 3901/024      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| CSC lightweight | Polym/fluorth. | 3901/025      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| SPM             | Polym/fluorth. | 3901/018      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| 55/995X         | Fluoropolymer  | 3901/012      | N/A     | TE Conn / UK  | ESCC QPL      | Range in QPL |
| MTV-BTV         | PTFE/polymide  | 3901/013      | N/A     | Nexans / F    | ESCC QPL      | Range in QPL |



EPPL Part 1 Low frequency wires and cables (continued):

| Type | Description    | Specification | Package | Manufacturer  | Qualification | Remarks      |
|------|----------------|---------------|---------|---------------|---------------|--------------|
| SPL  | Polymide       | 3901/019      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| -    | Polym/fluorth. | 3901/018      | N/A     | Leoni / G     | ESCC QPL      | Range in QPL |
| -    | Polymide       | 3901/001      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| -    | Polymide       | 3901/021      | N/A     | Leoni / G     | ESCC QPL      | Range in QPL |
| -    | Polymide       | 3901/002      | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| SPP  | Power wires    | 3901/017      | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |

EPPL Part 1 Coaxial and miscellaneous wires and cables:

| Type              | Description                                      | Specification          | Package | Manufacturer  | Qualification | Remarks      |
|-------------------|--|------------------------|---------|---------------|---------------|--------------|
| -                 | HF cable   | 3902/002               | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| GCX,<br>GSC, GBL  | GTX,<br>HF cable                                 | 3902/002               | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| 50CIS             | HF cable   | 3902/001               | N/A     | Nexans / F    | ESCC QPL      | Range in QPL |
| JAXA2120<br>/D101 | Differential<br>transmission<br>cable (1 pair)   | JAXA-QTS-<br>2120/D101 | N/A     | Junkosha / J  | JAXA QPL      | Note 1 and 2 |
| JAXA2120<br>/D101 | Differential;<br>transmission<br>cable (4 pairs) | JAXA-QTS-<br>2120/D102 | N/A     | Junkosha / J  | JAXA QPL      | Note 1 and 2 |
| -                 | Spacewire  | 3902/003               | N/A     | Axon / F      | ESCC QPL      | Range in QPL |
| -                 | Spacewire  | 3902/003               | N/A     | W.L. Gore / G | ESCC QPL      | Range in QPL |
| -                 | Spacewire  | 3902/004               | N/A     | Axon / F      | ESCC QPL      | Range in QPL |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eepitnl.tksc.jaxa.jp/en/>  
 - General specification : JAXA-QTS-2120 and its Appendix D  
 - Detail specifications : JAXA-QTS-2120/D101, 102, Application data sheets : JAXA-ADS-2120/D101-102

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use

3.14 EPPL PART1 THERMOSTAT

| Type | Description | Specification | Package  | Manufacturer | Qualification | Remarks      |
|------|-------------|---------------|----------|--------------|---------------|--------------|
| TH47 | SPST 4A 30V | 3702/001      | See spec | COMEPA / F   | ESCC QPL      | Range in QPL |

### 3.15 EPPL PART1 RF PASSIVE COMPONENTS

| Type           | Description                        | Specification | Package  | Manufacturer | Qualification | Remarks      |
|----------------|------------------------------------|---------------|----------|--------------|---------------|--------------|
| Attenuator     | Coaxial                            | 3403/005      | See spec | Radiall / F  | ESCC QPL      | Range in QPL |
| Attenuator     | Coaxial                            | 3403/008      | See spec | Radiall / F  | ESCC QPL      | Range in QPL |
| RF loads       | Coaxial                            | 3403/004      | See spec | Radiall / F  | ESCC QPL      | Range in QPL |
| RF loads       | Coaxial                            | 3403/006      | See spec | Radiall / F  | ESCC QPL      | Range in QPL |
| RF loads       | Coaxial                            | 3403/009      | See spec | Radiall / F  | ESCC QPL      | Range in QPL |
| BK1xxxx/BK3XXX | Circulators and isolators, coaxial | 3202/026      | See spec | Cobham / F   | ESCC QPL      | Var. 01, 02  |
| BE11E2/BE12E2  |                                    | 3202/022      |          |              |               | Range in QPL |
| BG11E2/BG12E2  |                                    | 3202/023      |          |              |               | Range in QPL |

### 3.16 EPPL PART1 HYBRIDS

| Type                           | Description           | Specification                    | Pack. | Manufacturer      | Qualification | Remarks    |
|--------------------------------|-----------------------|----------------------------------|-------|-------------------|---------------|------------|
| JAXA2020/01011DBCR06           | POL 1.5V/3A           | JAXA-QTS-2020/0101               | FP26  | Avio Fukushima /J | JAXA QPL      | Notes 1, 2 |
| JAXA2020/01011DBCR09           | POL 3.3V/2A           |                                  | FP26  | Avio Fukushima /J |               | Notes 1,2  |
| A0015227-QAR-00<br>CA5-B FP AR | 1553 BUS COUPLER      | ARIA6HYB6SPE<br>C6DA0031443      | FP64  | Airbus DS / F     | Ariane 5      | Note 3     |
| DTR5V                          | 1553 dual transceiver | DPN-A5-ST-0426                   | FP46  | Airbus DS / F     |               |            |
| ADT1553-5V                     | 1553 DUAL Rx and Tx   | T1553-DT5V-SPEC-DA0032383-E-ASTR | FP40  | Airbus DS / F     |               |            |

Note 1: The following documents are available at JAXA Qualified EEE parts database <https://eeepitnl.tksc.jaxa.jp/en/>  
- General spec.: JAXA-QTS-2020, Detail spec. : JAXA-QTS-2020/0101, Application data sheet : JAXA-ADS-0101

Note 2: As to Export License, Manufacturer will apply to METI (Ministry of Economy, Trade and Industry) for license in accordance with "Foreign Exchange and Foreign Trade Act (Law)" with information such as End User/End Use

Note 3: these devices are listed based on the ESA PCA certified for the Hybrid line, combined with type approval in the context of their application in Ariane 5. This is also relevant for the analysis of RHA with these hybrids. Their application in space systems other than launchers might require the repetition of radiation evaluation tests or design analyses.

3.17 EPPL PART 1 CABLE ASSEMBLIES

| Type                       | Description                  | Specification | Pack. | Manufacturer | Qualification | Remarks    |
|----------------------------|------------------------------|---------------|-------|--------------|---------------|------------|
| TNC, VHP Cable Assemblies  | DC to 8 GHz                  | 3408/001      | -     | Radiall / F  | ESCC QPL      | Notes 1, 2 |
| Mini AVIM optical fibre CA | Optical fibre Cable Assembly | 3420/001      | -     | Diamond / CH | ESCC QPL      |            |

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.

4 EPPL PART 2

4.1 EPPL PART2 CAPACITORS

| Type          | Description             | Specification | Package | Manufacturer             | Qualification | Remarks                          |
|---------------|-------------------------|---------------|---------|--------------------------|---------------|----------------------------------|
| CTC21E        | Solid Ta electrolyte    | 3012/003      | SMD     | Exxelia Tantalum /F      | Not qualified | Note 1                           |
| ST79          | Tantalum non-solid      | 3003/006      | Axial   |                          | Not qualified | Notes 2 and 3                    |
| CT79, CT79E   | Tantalum non-solid      | 3003/005      | Axial   |                          | Not qualified | Range in specification           |
| T583          | Organic polymer Ta      | 3012/005      | SMD     | Kemet / Portugal         | Not qualified |                                  |
| G311P829***** | Ceramic chip multilayer | S-311-P-829   | SMD     | Presidio Comp. Inc / USA | GSFC QPLD     | Custom made to GSFC spec. Note 4 |

Note 1. The restricted range of preferred values in 10% tolerance are: 680µF 6.3V, 330µF 6.3V, 470µF 10V, 220µF 10V, 330µF 16V, 150µF 16V, 220µF 20V, 100µF 20V, 100µF 25V, 47µF 25V, 68µF 40V, 33µF 40V, 47µF 50V, 22µF 50V, 12µF 63V, 15µF 63V, 33µF 63V

Note 2: 125V rated values shall be avoided

Note 3. The restricted range of preferred values in 10% tolerance are: 560µF 60V, 700µF 60V, 500µF 63V, 330µF 75V, 470µF 75V, 150µF 100V, 220µF 100V

Note 4. The restricted range of preferred values is: 0402 X7R 0.1uF 10V, 0603 X7R 0.22uF 10V, 0805 X7R 1uF 10V, 1206 X7R 1.8uF 10V, 1209 X7R 2.7uF 10V, 1812 X7R 4.7uF 10V, 0603 X7R 0.1uF 5V, 0508 X7R 0.12uF 10V, 0612 X7R 0.27uF 10V, 0912 X7R 0.68uF 16V

#### 4.2 EPPL PART2 CONNECTORS

| Type   | Description            | Specification     | Package        | Manufacturer | Qualification | Remarks            |
|--------|------------------------|-------------------|----------------|--------------|---------------|--------------------|
| TNC    | Coaxial                | 3402/008, /009,   | TNC            | Radiall / F  | Not qualified |                    |
| SMP    | Coaxial                | RAD-DET-CONN-     | SMP            | Radiall / F  | Not qualified |                    |
| MDSA   | Micro D                | 05039-ST-01       | Rectangular    | Axon / F     | Not qualified |                    |
| Nano   | Nano D                 | 3401/086          | Rectangular    | Axon / F     | Not qualified |                    |
| D*J    | Filtered               | CSFR 165          | Rectangular    | C & K / F    | Not qualified |                    |
| Splice | Space splice           | 3401/005+CS FR039 | Wire joint     | C & K / F    | Not qualified |                    |
| Saver  | Circular               | 3401/063          | Circular       | Glenair / UK | Not qualified | Not for Flight use |
| MDSA   | Microminiature D-CLICK | 3401/091          | Microminiature | Axon / F     | Not qualified |                    |

#### 4.3 EPPL PART2 CRYSTALS AND PIEZO-ELECTRIC DEVICES

| Type      | Description | Specification | Package  | Manufacturer | Qualification | Remarks |
|-----------|-------------|---------------|----------|--------------|---------------|---------|
| AXIOM6060 | OCXO        | AXIOM6060     | 60x60x30 | Axtal / G    | Others        |         |

#### 4.4 EPPL PART2 DIODES

| Type                                  | Description          | Specification     | Package   | Manufacturer | Qualification | Remarks |
|---------------------------------------|----------------------|-------------------|-----------|--------------|---------------|---------|
| 1N5811US                              | Rectifier            | MIL-PRF-19500/477 | D-5B      | SEN / USA    | MIL QML       |         |
| 1N5806US                              | Rectifier            | MIL-PRF-19500/477 | D-5A      | SEN / USA    | MIL QML       |         |
| 1N5416US thru 1N5418US, 1N5420US      | Rectifier            | MIL-PRF-19500/411 | MELF      | SEN / USA    | MIL QML       |         |
| 1N5819UR-1                            | Rectifier            | MIL-PRF-19500/586 | DO-2123AB | MIC / USA    | MIL QML       |         |
| 1N5615, 1N5617 (A/UN), 1N5619, 1N5623 | Rectifier            | MIL-PRF-19500/429 | AXIAL     | MIC / USA    | MIL QML       |         |
| 1N5811US                              | Rectifier            | MIL-PRF-19500/477 | D-5B      | MIC / USA    | MIL QML       |         |
| 1N5811US                              | Rectifier            | MIL-PRF-19500/477 | D-5B      | SEN / USA    | MIL QML       |         |
| 1N5550, 1N5552, 1N5554                | Rectifier            | MIL-PRF-19500/420 | AXIAL     | MIC / USA    | MIL QML       |         |
| 1N6124A                               | Transient suppressor | MIL-PRF-19500/516 | AXIAL     | MIC / USA    | MIL QML       |         |
| 1N6640US                              | Switching            | MIL-PRF-19500/609 | SMD       | SEN / USA    | MIL QML       |         |
| 1N6642US                              | Switching            | MIL-PRF-19500/578 | SMD       | SEN / USA    | MIL QML       |         |

EPPL PART2 DIODES (continued):

| Type         | Description  | Specification | Package | Manufacturer          | Qualification | Remarks |
|--------------|--------------|---------------|---------|-----------------------|---------------|---------|
| SIC-HT-SBD01 | SiC blocking | 5106/022      | SMD     | Alter Tech./<br>Spain | Not qualified | Note 1  |

Note 1. The listing of this part is based on project validation data; an adequate procurement approach, possibly including procurement inspections (PRECAP, DPA) and Lot Validation Testing, should be considered upon selection.

4.5 EPPL PART 2 FUSES

| Type | Description        | Specification        | Package      | Manufacturer | Qualification | Remarks |
|------|--------------------|----------------------|--------------|--------------|---------------|---------|
| FM12 | Subminiature fuse  | MIL-PRF-<br>23419    | Flying leads | AEM / USA    | NPSL          | Note 1  |
| FM13 | Surface mount fuse | MIL-PRF-<br>23419/13 | SMD          | AEM/USA      | MIL QPL       |         |

Note 1: refer to NPSL for recommended range and important application notes at <https://nepp.nasa.gov/npsl/Fuses/23419/23419.htm>

4.6 EPPL PART2 INDUCTORS AND TRANSFORMERS

| Type     | Description                           | Specification     | Package      | Manufacturer   | Qualification | Remarks               |
|----------|---------------------------------------|-------------------|--------------|----------------|---------------|-----------------------|
| 12XXXXXX | RF filter air coil and toroidal cores | FT08690020        | Flying leads | Flux / DK      | Others        | THM, SMT optional     |
| 14XXXXXX | Power transformer                     | FT08690020        | THM, SMT     | Flux / DK      | Others        | Optional flying leads |
| 19XXXXXX | Power transformer assembly            | FT08690020        | SMT          | Flux / DK      | Others        | THM optional          |
| DBIT     | 1553 transformer                      | MSP-003           | See spec     | Microspire / F | Not qualified |                       |
| AE458RFW | Wideband transformer                  | 1501+<br>ES424N-1 | See specs    | Coilcraft /USA | Not qualified |                       |

#### 4.7 EPPL PART2 MICROCIRCUITS

| Type           | Description            | Specification             | Package  | Manufacturer          | Qualification | Remarks    |
|----------------|------------------------|---------------------------|----------|-----------------------|---------------|------------|
| 3DSD4G08VS8292 | 4Gb SDRAM              | 3DPA6140                  | SOP58-08 | 3D PLUS / F           | Not qualified | Note 1     |
| 3DEE8M08VS8190 | EEPROM<br>8Mbit 1Mx8   | 3DPA-1630-11              | G8       | 3D PLUS / F           | Not qualified |            |
| DFN64G08VS8305 | Flash NAND<br>8Gx8     | 3DPA-3420-7               | D8a      | 3D PLUS / F           | Not qualified |            |
| SY1007S        | GNSS Rx                | SY1004s-Proc02            | BGA36    | Saphyrion/CH          | Others        | Notes 2, 3 |
| SY1017CS       | GNSS<br>AD/DAC/PLL     | SY1017CS-Proc08           | BGA36    | Saphyrion/CH          | Others        | Notes 2, 3 |
| SPPL12420RH    | Step-down<br>converter | PRCS.PL12420.01<br>iss1.4 | FP-16    | Space IC / G          | Not qualified | Note 4     |
| GR718B         | SpaceWire<br>Router    | GR718B-PS                 | CQ256    | Cobham<br>Gaisler / S | Others        |            |

Note 1: SDRAMs are sensitive to ion and protons induced degradation of their memory cells. The effect is the degradation of the retention time of the memory cells and the affected bits seem to be stuck in a preferential state (therefore the name of stuck bits or weakened memory cells). Depending on the level of degradation, some cells can recover full functionality very quickly, some cells cannot. A weakened cell detected as an error by an EDAC cannot be scrubbed. Because of this, several in-flight anomalies have been observed on design using simple 1 bit/nibble error correct/2 bits/nibbles errors detect EDAC schemes. The number of anomalies observed is relatively small but not negligible. Therefore, with SDRAMs, it is recommended to use stronger EDAC schemes that have the capability to correct at least 2 bits/nibbles in a data word.

Note 2: This device has been verified by test to be immune to destructive Single Event Latch-up, as may be induced by eth space environment, up to 45.4 MeV.cm2/mg only. Contact the manufacturer for additional details.

Note 3: Potential users of this component are encouraged to implement procurement inspections as PRECAP and DPA. Refer to ESCC guidelines available in documents ESCC 21001 and ESCC 21002.

Note 4: This device is sensitive to non-destructive AND destructive SEE induced by the space radiation environment. Refer to the manufacturer for additional information on both non-destructive (SET) and destructive SEE evaluation results. Adequate derating MUST be implemented to prevent some of these effects. The issue 1.4 of the specification provides the following rules based on thresholds obtained during SEE evaluation:

- LET ≤ 60MeV.cm2/mg : VIN ≤ 13V
- LET ≤ 85MeV.cm2/mg : VIN ≤ 11V

EPPL Part 2. Microwave Monolithic Integrated Circuits (MMIC):

| Type        | Description   | Manufacturer | Qualification | Remarks  |
|-------------|---|--------------|---------------|--|
| PH25        | GaAs process, 0.25µm P-HEMT for low noise, low level applications up to 100GHz  | UMS / F      | Others        |  |
| HB20P       | HBT GaInP/GaAs Foundry Process, 0.7 µm Gate Applications in Power Amplifiers up to Ku Band  | UMS / F      | Others        |  |
| PPH15X-10   | GaAs process, 0.15µ P-HEMT. Absolute Maximum Ratings (AMR) for PPH15X-10:<br>Drain to Source Voltage: $V_{ds} = 8V$ at $I_{ds} = 150mA/mm$<br>Maximum instantaneous RF Drain to Gate Voltage: $V_{dgm} = 14V$ at the maximum DC Operating point specified above ( $V_{ds} = 8V$ and $I_{ds} = 150mA/mm$ )<br>RF Compression = 7dB for Power matched 8x75m cell at $I_{ds} = 150mA/mm$ and $V_{ds} = 7V$<br>- Gate to Source Voltage: $V_{gs} = -2.5V$ | UMS / F      | Others        | SEE testing under DC+RF was performed – report available from the manufacturer |
| CHA5350-99F | K-band Power Amplifier in die form.<br>Available in accordance with ESCC 9012/002   | UMS / F      | Others        | Made on PPH15X-10 process  |
| ED02AH      | 0.18 µm Mixed Analog/Digital 60 GHz Ft Pseudomorphic Low Noise MMIC Process   | Ommic / F    | Others        | Note 1   |
| CGY2173UH   | MMIC 6 bit phase shifter.<br>Available in accordance with ESCC 9012/007   | Ommic / F    | Others        | No Radiation test done.<br>Note 1  |
| D01MH       | 0.13 µm Low Power / Low Noise 150GHz Ft M-HEMT process.<br><b>Maximum ratings of D01MH MHEMT</b>  | Ommic / F    | Others        | Note 2<br>Note 3   |

| Parameter                          | Unit      | AMR  | SOA (derating applied) |
|------------------------------------|-----------|------|------------------------|
| $V_{gs}$ (reverse) <sup>(1)</sup>  | V         | -7   | -7                     |
| $V_{gs}$ (forward)                 | V         | +0.8 | +0.6                   |
| $V_{ds}$ (reverse) <sup>(1)</sup>  | V         | -4   | -4                     |
| $V_{ds}$ (forward)                 | V         | +0.8 | +0.6                   |
| Gate current ( $I_g$ )             | mA/finger | 1    | 0.75                   |
| Dissipater power ( $P_{diss}$ )    | W/mm      | 0.26 | 0.21                   |
| $V_{cs}$ <sup>(2)</sup>            | V         | 1.7  | 1.3                    |
| Gain compression (depends on MMIC) | dBc       | 5    | 3                      |
| Channel temperature                | °C        | 150  | 110                    |

<sup>(1)</sup> derating not applicable  
<sup>(2)</sup>  $I_{gs} = 125mA/mm$  and  $T_{ch} = 110°C$

Note 1: EDO2AH Process is sensitive to Hydrogen poisoning. A Hydrogen getter is mandatory in case of hermetic encapsulation.

Note 2: Although not experienced during ESCC evaluation, D01MH process may be sensitive to Hydrogen poisoning. A hydrogen getter is strongly recommended in case of hermetic encapsulation.

Note 3: It is the responsibility of the users to check that the process design can withstand the radiation requirements for its application.

(continued) EPPL Part 2. Microwave Monolithic Integrated Circuits (MMIC):

| Type        | Description   | Manufacturer | Qualification | Remarks  |
|-------------|---|--------------|---------------|--|
| HP07-20     | MMIC, GaAs Foundry Process, MESFET 0.7 um for power applications up to Ku Band.<br>Replacement of HP07 Process by HP07-20 process due to a change in the gate lithography process   | UMS / F      | Others        | DO NOT USE BEYOND Vgdmax/2 DUE TO SENSITIVITY TO HEAVY IONS. |
| HB20M       | Mixed digital/analog MMIC HBT process<br>InGaP HBT (Application in mixed digital/analog circuits up to Ku band)   | UMS / F      | Others        | SEE to be considered (digital elements)                      |
| CHV1203-98S | Voltage controlled oscillator 2.75 – 3 GHz<br>Available in accordance with ESCC 9012/003  | UMS / F      | Others        | Made on HB20M process  |
| CHV1206-98S | Voltage controlled oscillator 5.5 – 6.1 GHz<br>Available in accordance with ESCC 9012/004   | UMS/F        | Others        |  |
| HB20PX-10   | HBT InGaP (2 µm emitter width) MMIC process<br>Applications in Power Amplifiers up to Ku Band<br>Absolute Maximum Ratings (AMR) for HB20PX-10:<br>- Base to Collector Voltage : Vbc = 11.0V<br>- Collector to Emitter Voltage: Vce = 9.5V<br>(VSWRmax = 2 and 4dBC of Compression, Jce = 33000A/cm <sup>2</sup> for single cell transistor in CW mode and Jce = 22000A/cm <sup>2</sup> for bi-cell transistor in pulsed mode)<br>- RF Compression = 5 dB (under maximum operating conditions)<br>- Max DC Collector Emitter Current Density: Jce = 40000A/cm <sup>2</sup> per emitter area (in pulsed mode for Bi-Cell Transistor)<br>- Base to Emitter Voltage: Vbe = 2.5V | UMS / F      | Others        | Note 4   |
| PPH25       | 0.25µm Power P-HEMT (AlGaAs/InGaAs/GaAs) with double gate recess. Technology suitable for power switch / attenuator and power amplifiers up to 35GHz.   | UMS / F      | Others        |  |
| PPH25X-10   | 0.25 µm Power P-HEMT process<br>Application in Power Amplifiers C to K band<br><br>Absolute Maximum Ratings (AMR) for PPH25X-10:<br>- Drain to Source Voltage: Vds = 9.5V (VSWR max of 2 and 3dBc)<br>- Gate to Drain Voltage: Vgdmax= -11.5V<br>- RF Compression = 7dB (Vds =8.0V and VSWR of 3)<br>- Gate to Source Voltage: Vgs = -3.0V  | UMS / F      | Others        |  |
| BES         | 1µm Schottky diode process  | UMS / F      | Others        | Note 4   |

Note 4: It is the responsibility of the users to check that the process design can withstand the radiation requirements for its application. Max ratings should be in conformance with the application



(continued) EPPL Part 2. Microwave Monolithic Integrated Circuits (MMIC):

| Type    | Description   | Manufacturer | Qualification | Remarks   |
|---------|---|--------------|---------------|---|
| GH50-10 | <p>0.5 <math>\mu\text{m}</math> GaN HEMT (AlGaIn/GaN on SiC substrate) for Power amplifier up to C band.</p> <p>MAXIMUM RATING for AB class operation:<br/>           ** Vds (at Ids = 50 mA/mm): 60V (50V recommended)<br/>           ** Vgs: -7V<br/>           ** Output power at PAEmax +1dB<br/>           ** Maximum VSWR under recommended ratings: 5:1 all phases (sustained operation should stay below a recommended VSWR of 3:1 to safeguard reliability)<br/>           ** Ig (under DC bias only) &gt; -0.5mA/mm<br/>           ** Tj (under recommended conditions): 160C</p> | UMS / F      | Others        | Note 6<br>Note 7<br>Note 8<br>Note 9<br>Note 10 |

Note 5: not used

Note 6: All conditions can be fulfilled simultaneously.

Note 7: The given values must not be exceeded at the same time even momentarily for any parameter, since each parameter is independent from each other, otherwise deterioration or destruction of the device may take place

Note 8: Recommended operating output power is defined as the input power level to operate at maximum power added efficiency (PAE)

Note 9: Junction temperature is specified as the maximum peak junction temperature

Note 10: Maximum power bar size tested during evaluation was 25.6mm under pulsed conditions (CHZ180A topology), the space evaluation domain is accordingly limited to powers bars with maximum 25.6mm of total periphery. For different usage of power bars of this size (as for example continuous mode operation) and for total periphery higher than 25.6mm it is the responsibility of the users to perform relevant reliability tests.

(continued) EPPL Part 2. Microwave Monolithic Integrated Circuits (MMIC):

|         |  |         |        |                               |
|---------|--|---------|--------|-------------------------------|
| GH25-10 | 0.25 $\mu$ m GaN HEMT MMIC process for High Power amplifiers up to Ka band (AlGaIn/GaN on SiC) | UMS / F | Others | Note 11<br>Note 12<br>Note 13 |
|---------|--|---------|--------|-------------------------------|

Note 11: Maximum ratings for transistor topologies and MIM capacitors are as follows:

| <b>Transistor V1S (power applications)</b> |        |   |           |                    |                          |
|--|--------|---|-----------|--------------------|--------------------------|
| Parameter                                  | Symbol | Conditions  | Unit      | ROR                | AMR                      |
| Drain-Source Biasing Voltage               | Vds    | Idq = 150mA/mm                                    | V         | 30                 | 45                       |
| RF compression such as Pin equal to:       |        | Under power matched and ROR dc biasing conditions |           | PAE <sub>max</sub> | PAE <sub>max</sub> +2dBm |
| Gate-Source Voltage (DC+RF)                | Vgs    | Under ROR dc biasing conditions                   | V         | -20                | -25                      |
| Drain-Gate Voltage (DC+RF)                 | Vdg    |   | V         | 90                 | 120                      |
| Gate Current                               | Ig     | Forward   | mA/finger | 2                  | 5                        |
| Peak Junction Temperature                  | Tj     | Under ROR dc biasing conditions                   | °C        | 200                | 230                      |

| <b>Transistor V9S (low noise and wide band applications)</b> |        |   |           |                    |                          |
|--|--------|---|-----------|--------------------|--------------------------|
| Parameter  | Symbol | Conditions  | Unit      | ROR                | AMR                      |
| Drain-Source Voltage Bias                                    | Vds    | Idq = 150mA/mm                                    | V         | 25                 | 40                       |
| RF compression such as Pin equal to:                         |        | Under power matched and ROR DC biasing conditions |           | PAE <sub>max</sub> | PAE <sub>max</sub> +2dBm |
| Gate-Source Voltage (DC+RF)                                  | Vgs    | Under ROR dc biasing conditions                   | V         | -20                | -25                      |
| Drain-Gate Voltage (DC+RF)                                   | Vdg    |   | V         | 70                 | 100                      |
| Gate Current   | Ig     | Forward   | mA/finger | 2                  | 5                        |
| Peak Junction Temperature                                    | Tj     | Under ROR DC biasing conditions                   | °C        | 200                | 230                      |

| <b>Transistor V1C (switch applications)</b> |        |                                 |           |     |     |
|---|--------|---------------------------------|-----------|-----|-----|
| Parameter                                   | Symbol | Conditions                      | Unit      | ROR | AMR |
| Drain-Source Voltage (DC+RF)                | Vds    | Vgs = -30V                      | V         | 90  | 100 |
| RF Gate-Source/drain Voltage                | Vgs    | Vgs DC = 0V                     | V         | -60 | -80 |
| Gate Current                                | Ig     | Forward                         | mA/finger | 2   | 5   |
| Peak Junction Temperature                   | Tj     | Under ROR DC biasing conditions | °C        | 200 | 230 |

**MIM capacitors**

| Parameter       | Unit | ROR | ROR Rad hard | AMR | Note    |
|-----------------|------|-----|--------------|-----|---------|
| Voltage (DC+RF) | V    | 80  | 35           | 130 | @ 175°C |

For space applications, the Recommended Operating Rating on MIM capacitor is 35V including RF signal.

Note 12: Radiation tests have shown SEB occurrences on MIM capacitors. It is the responsibility of the users to verify their design's compatibility with mission radiation environment. UMS may provide additional information on request.

Note 13: Humidity test (85%/85C with biasing) has pointed out the necessity to mount devices in a safe environment to prevent rapid corrosion due to high voltage operation. It is therefore recommended to use circuits in hermetic package or in appropriate protective coating.

(continued) EPPL Part 2. Microwave Monolithic Integrated Circuits (MMIC):

|           |  |           |        |  |
|-----------|--|-----------|--------|--|
| D01PH     | 0.13 $\mu$ m 100 GHz ft 12V VBGD Pseudomorphic Power MMIC Process  | Ommic / F | Others | Note 14<br>Note 15                                   |
| CGY2135UH | MMIC K-band High Power Amplifier available in accordance with ESCC 9012/005  | Ommic / F | Others | Uses D01PH<br>Notes 14, 15<br>No radiation test done |
| CGY2145UH | MMIC low noise wideband amplifier available in accordance with ESCC 9012/006   |           |        |  |
| PH15      | MMIC GaAs Foundry Process, 0.15 $\mu$ m (P-HEMT for low noise, low level applications up to W Band                             | UMS / F   | Others | Note 16  |
| PH10-10   | 0.1 $\mu$ m Very low Noise P-HEMT technology (AlGaAs/InGaAs on GaAs substrate with AlTiAlNi gate)                              | UMS / F   | Others | Note 17  |
| PPH15X-20 | 0.15 $\mu$ m GaAs power PHEMT technology<br>Power and High linearity applications up to 45GHz                                  | UMS / F   | Others | Note 18  |
| SGB25RH   | SiGe 0.25 $\mu$ m BiCMOS process for Mixed-Signal applications up to Ku-band with peak fT / fMAX 75GHz / 95 GHz and BVCBO > 7V | IHP / G   | Others | Note 19  |

Note 14: D01PH Process is sensitive to Hydrogen poisoning. A Hydrogen getter is mandatory in case of hermetic encapsulation.

Note 15: D01PH tested in DC+RF up to 8dB of Gain Compression with no evidence of SEE induced by heavy ions

Note 16: Passive elements are similar to PH25 Process. No radiation tests were performed on this process. Therefore it is the responsibility of the users to check that its design can withstand the radiation requirements for its application (especially for SEE).

Note 17: TID, DD and SEE testing under DC biasing were performed. Reports are available from the manufacturer.

Note 18: TID and SEE testing under DC biasing were performed. Reports are available from the manufacturer. BCB protection layer option covered by ESCC evaluation

Note 19: it is the responsibility of the users to check that its design can withstand the radiation requirements for its application (especially for SEE).

#### 4.8 EPPL PART2 RELAYS

| Type  | Description | Specification | Package  | Manufacturer | Qualification | Remarks |
|-------|-------------|---------------|----------|--------------|---------------|---------|
| PHL50 | Latching    | 3602/014      | See spec | STPI / F     | Not qualified |         |

#### 4.9 EPPL PART 2 RESISTORS

| Type    | Description   | Specification | Package | Manufacturer     | Qualification | Remarks |
|---------|---------------|---------------|---------|------------------|---------------|---------|
| VCS1625 | Wraparound 1W | 303119        | Chip    | Vishay Precision | Not qualified |         |

#### 4.10 EPPL PART2 THERMISTORS

| Type                 | Description | Specification | Package  | Manufacturer                        | Qualification | Remarks |
|----------------------|-------------|---------------|----------|-------------------------------------|---------------|---------|
| 0805 NTC 50K @25C 1% |             | S-311-P-827   | 0805     | Quality Thermistor/ USA             | Others        |         |
| 44900 NTC            |             | S-311-P-18    | See spec | Measurement specialties (YSI) / USA | MIL QPL       |         |
| 311P18-xx            |             | S-311-P-18    | See spec | Quality Thermistor/ USA             | MIL QPL       |         |

#### 4.11 EPPL PART2 RF PASSIVE COMPONENTS

| Type     | Description                           | Specification | Package  | Manufacturer  | Qualification | Remarks |
|----------|---------------------------------------|---------------|----------|---------------|---------------|---------|
| T10      | Coax isol / circul.<br>7.9GHz to 21.5 | 60102965-069  | T10 SMA  | Cobham MW / F | Not qualified |         |
| R4042106 | RF coaxial load                       | 3403/004      | SMA conn | Radiall / F   | Not qualified |         |
| R4043706 | RF coaxial load                       | 3403/010      | TNC conn | Radiall / F   | Not qualified |         |

4.12 EPPL PART2 HYBRIDS

| Type               | Description  | Specification      | Package          | Manufacturer  | Qualification | Remarks |
|--------------------|--|--------------------|------------------|---------------|---------------|---------|
| A0000055<br>(H757) | 1553 dual<br>transceiver                             | DPN-A5-ST-<br>0426 | Metallic<br>FP64 | Airbus DS / F | Others        |         |
| MXF-02             | Double<br>balanced mixer<br>10 to 1500MHz            | TD200370-178       | FP               | Cobham MW / F | Not qualified |         |
| MXF-01             | Double<br>balanced mixer<br>0.5 to 500MHz            | TD200369-178       | FP               | Cobham MW / F | Not qualified |         |
| MXF-03             | Termination-<br>insensitive<br>mixer 1 to<br>3500MHz | TD200542-178       | FP               | Cobham MW / F | Not qualified |         |
| MXC-01             | Triple balanced<br>mixer (2 to 18<br>GHz)            | TD102144-178       | See spec         | Cobham MW / F | Not qualified |         |

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