EUROPEAN PREFERRED PARTS LIST (EPPL)

ESCC/RP/EPPL007-50 (REP 007)

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DOCUMENTATION CHANGE NOTICE

(Refer to https://escies.org for ESCC DCR content)

DCR No.	CHANGE DESCRIPTION
1708	**New entries:** Microchip Technology, EPPL part 1 ARM Cortex-M7 Microcontroller (SAMV71RT) UMS / France, Germany, EPPL part 2 Plastic QFN packaging has been added for GH25-10 and GH15-10 GaN technologies (related Note 19) Frontgrade Technologies / USA, EPPL part 2 4Tb NAND Flash based on type UT81NDQ512G8T **Editorial:** Advanced Space Power Equipment (ASP) / Germany, EPPL part 2 Manufacturer name has been clarified: Advanced Space Power Equipment instead of ASP

Contents

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 Part 1 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 TABLE OF COMPONENTS

Components are listed within the relevant sections from the table below.

Section	Component Types
01	Capacitors
02	Connectors
03	Crystals and Oscillators
04	Diodes
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07	Inductors
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4 EPPL PART 1

4.1 01 - 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	Exxelia 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	Exxelia 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 3009/040	0805	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC40xS	Ceramic, Type I	3009/004 3009/040	1210	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC60xS	Ceramic, Type I	3009/005 3009/040	1812	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC70xS	Ceramic, Type I	3009/006 3009/040	2220	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC120xS	Ceramic, Type I	3009/022 3009/040	1206	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC140xS	Ceramic, Type I	3009/037 3009/040	0603	Exxelia Tech. / F	ESCC QPL	range in QPL
CEC190xS	Ceramic, Type I	3009/040 3009/042	0402	Exxelia 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 3009/039	0805	Exxelia Tech. / F	ESCC QPL	range in QPL
CNC40xS	Ceramic, Type II	3009/009 3009/039	1210	Exxelia Tech. / F	ESCC QPL	range in QPL
CNC60xS	Ceramic, Type II	3009/010 3009/039	1812	Exxelia Tech. / F	ESCC QPL	range in QPL
CNC70xS	Ceramic, Type II	3009/011 3009/039	2220	Exxelia Tech. / F	ESCC QPL	range in QPL
CNC120xS	Ceramic, Type II	3009/023 3009/039	1206	Exxelia Tech. / F	ESCC QPL	range in QPL
CNC140xS	Ceramic, Type II	3009/038 3009/039	0603	Exxelia Tech. / F	ESCC QPL	range in QPL

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
CEC190xS	Ceramic, Type I	3009/039 3009/043	0402	Exxelia 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
L104(X7R)	Ceramic Chip	JAXA-QTS-2040/L104E	SMD	Murata / J	JAXA QML	Range: N2040/L104(-1608X7R1E103KS 2012X7R1E104KS 3225X7R1E105KS 1608X7R1H102KS 2012X7R1H103KS 3216X7R1H104KS 2012X7R2A103KS) Notes 1,2
M105(X7R)	Ceramic, miniature, high capacity	JAXA-QTS-2040/M105C	SMD	Murata / J	JAXA QML	Range: J2040/M105(-1608X7RB105KS 1608X7RC104KS 3216X7RA226KS 3225X7RB226KS) Notes 1,2

NOTE 1:

The following documents are available at JAXA Qualified EEE parts database

https://ssl.tksc.jaxa.jp/eeepitnl/en/

- General specification : JAXA-QTS-2040F
- Detail specification : JAXA-QTS-2040/L104E, JAXA-QTS-2040/M105C
- Application data sheet : JAXA-ADS- 2040/L104B, JAXA-ADS- 2040/M105A

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.

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
TCS	Organic polymer tantalum multi-anodes	3012/006	Reel or bulk	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

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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	Exens Solutions / 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) 25uF - 850uF (8V) 20uF - 750uF (10V) 15uF - 540uF (15V) 8uF - 300uF (30 V) 5uF - 160uF (50 V) 3.5uF -110uF (75V) 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 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

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
CLR79	Voltage range: 6V to 125V Capacitance range: 1.7µF to 1200µF	MIL-PRF-39006/22	T1, T2, T3, T4	Vishay Israel / Israel	MIL QPL	Characteristic H and failure rate R shall be procured.
CLR81	Voltage range: 6V to 125V Capacitance range: 6.8µF to 2200µF	MIL-PRF-39006/25	T1, T2, T3, T4	Vishay Israel / Israel	MIL QPL	Characteristic H and failure rate R shall be procured.

NOTE 1:

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://ssl.tksc.jaxa.jp/eeepitnl/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.

4.2 02 – 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 3401/004 3401/022 3401/040 3401/072 3401/080 3401/085	Rectangular	C&K / F	ESCC QPL	range in QPL
D*M	Rectangular receptacles and plugs, solder and wire wrap contacts	3401/001 3401/022 3401/072 3401/040 3401/004	Rectangular	Souriau / F	ESCC QPL	range in QPL
D*MA	Rectangular receptacles and plugs, crimp contacts	3401/002 3401/005 3401/020 3401/021 3401/097	Rectangular	C&K / F	ESCC QPL	range in QPL
D*MA	Rectangular receptacles and plugs, crimp contacts	3401/002 3401/005 3401/020 3401/021 3401/022 3401/072	Rectangular	Souriau / F	ESCC QPL	range in QPL
DBAS	Miniature circular push-pull coupling, removable crimp contacts	3401/008 3401/009 3401/012 3401/064	Circular	TE connectivity Deutsch / F	ESCC QPL	range in QPL
MIL-C-38999, series I	Circular, bayonet coupling, scoop-proof, removable crimp contacts	3401/052 3401/058 3401/062	Circular	Souriau / F	ESCC QPL	range in QPL
MIL-C-38999, series II	Circular, bayonet coupling, removable crimp contacts	3401/044 3401/045 3401/062	Circular	Souriau / F	ESCC QPL	range in QPL

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
MIL-C-38999, series III	Circular, triple-start self-locking coupling, scoop-proof, removable and non-removable crimp contacts	3401/056 3401/058 3401/062 3401/066 3401/070	Circular	Souriau / F	ESCC QPL	range in QPL
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

PCB connectors:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
HE801	PCB removable crimp contacts	3401/016 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

Coaxial connectors:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
SMA	Coaxial, solder and crimp, male, female, adaptors	3402/001 3402/002 3402/003	see spec	Radiall /F	ESCC QPL	range in QPL
SMA 2.9	Coaxial, solder and crimp, male, female, adaptors	3402/021 3402/022 3402/023	see spec	Radiall /F	ESCC QPL	range in QPL

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
Coaxial range	SMA, TNC, SMA 2.9, SMP	3402/001 3402/002 3402/003 3402/008 3402/009 3402/010 3402/021 3402/022 3402/023 3402/024 3402/025 3402/026	see spec	Rosenberger / G	ESCC QPL	range in QPL
TNC-VHP	RF coaxial TNC, RF power	3402/027 3402/028	See spec	Radiall / F	ESCC QPL	range in QPL

Micro-miniature connectors:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
MDM	Rectangular, Micro-miniature, crimp	3401/029 3401/041 3401/032 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 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 3401/082 3401/083 3401/084 3401/088	Rectangular	Souriau / F	ESCC QPL	range in QPL
MDM	Rectangular, Micro-miniature, crimp	3401/029 3401/032 3401/091	Rectangular	Axon Cable / F	ESCC QPL	range in QPL
MDSA D-CLICK	Rectangular, Micro-miniature, crimp	3401/091 3401/029 3401/032	Rectangular	Axon Cable / F	ESCC QPL	range in QPL
AXOMACH and SPACEFIBRE	Rectangular, Micro-miniature, High Data Rate	3401/089 3401/090	Rectangular	Axon Cable / F	ESCC QPL	range in QPL

JD115-*P-R***/*S-R***/*P-S***/*S-S***/*P-W***/*S-W***	Rectangular, Micro-miniature	JAXA-QTS-2060/F201	Rectangular	ITT Cannon / J	JAXA	Note 1 and 2

NOTE 1:

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

- General specification : JAXA-QTS-2060E
- Detail specifications : JAXA-QTS-2060/F201
- Application data sheet : JAXA-ADS-2060/F201

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.

4.3 03 - CRYSTALS AND PIEZO-ELECTRIC DEVICES

Crystals:

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

Oscillators:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
JAXA-2020/3001-3CBCR*	Crystal controlled oscillator (XO) 41 to 100MHz	JAXA-QTS-2020/3001	20 lead flat package	Nihon Dempa Kogyo / J	JAXA QML	Radiation Hardness Assurance: 100krad(Si) Note 1 and 2
RK135	Crystal Oscillator RK135, CLASS 2, 4MHz to 100MHz, AHCMOS compatible output, Rad-Hard	3503/001	FP1,FP2,FP3,FP4, DIL1,JL2	Rakon / France	ESCC QPL	100krad(Si)

NOTE 1:

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

- General specification : JAXA-QTS-2020
- Detail specifications : JAXA-QTS-2020/3001
- Application data sheet : JAXA-ADS-2020/3001

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.

4.4 04 - 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	5106/021	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	
STTH60400	Power rectifier	5103/032	SMD1	ST/F	ESCC QPL	
STTH40200	Power rectifier	5103/033	TO254	ST/F	ESCC QPL	
STTH60200	Power rectifier	5103/033	SMD1	ST/F	ESCC QPL	
STPS1045	Schottky barr.	5106/017	SMD0.5	ST /F	ESCC QPL	
STPS6045	Schottky barr.	5106/018	SMD1	ST /F	ESCC QPL	
STPS20100	Schottky barr.	5106/016	TO-254, SMD0.5, SMD1	ST /F	ESCC QPL	
STPS40100	Schottky barr.	5106/019	SMD1, TO-254	ST /F	ESCC QPL	
STPS40A150, STPS60A150, STPS80A150	Schottky barrier	5106/023	SMD0.5, TO-254AA	ST/F	ESCC QPL	
STPS40A45C, STPS80A45C	Schottky barrier	5106/024	SMD0.5, TO-254AA	ST/F	ESCC QPL	

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	
1N4568AU-1	Si V ref	MIL-PRF-19500/452	DO-21	Microsemi / USA	MIL QML	
1N4614UR-1 thru 1N4627UR-1	Si V regulator	MIL-PRF-19500/435	DO-213AA	Microsemi / USA	MIL QML	

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

RF/Microwave Varactor, Si diodes:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
DH252 DH256 DH267 DH292 DH294	Tuning var.	5512/016	see spec	Exens Solutions / F	ESCC QPL	range in QPL
DH76010 thru DH760150	Tuning var.	5512/023	see spec	Exens Solutions / F	ESCC QPL	range in QPL

RF/Microwave PIN, Si diodes:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
DH50151 thru DH50157	PIN Si	5513/031	M208, F27D	Exens Solutions / F	ESCC QPL	range in QPL
DH50033 thru DH50037	PIN Si	5513/032	see spec	Exens Solutions / F	ESCC QPL	range in QPL
DH50201 thru DH50209	PIN Si	5513/033	M208, F27D	Exens Solutions / F	ESCC QPL	range in QPL

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
DH50251 thru DH0256	PIN Si	5513/034	M208, F27D	Exens Solutions / F	ESCC QPL	range in QPL
DH50052 thru DH50057	PIN Si	5513/036	see spec	Exens Solutions / F	ESCC QPL	range in QPL
DH50071 thru DH50077	PIN Si	5513/037	see spec	Exens Solutions / F	ESCC QPL	range in QPL
DH50101 thru DH50107	PIN Si	5513/038	see spec	Exens Solutions / 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

4.5 05 - FILTERS

Feed-through, Electromagnetic interference suppression filters:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
SFC 060	C-filter, Hermetic glass fill	3008/026	axial	Exxelia Tech. / F	ESCC QPL	Range in QPL, Note 1
SFC 100	C-filter, Hermetic glass fill	3008/027	axial	Exxelia Tech. / F	ESCC QPL	
SFP 060	Pi-filter, Hermetic glass fill	3008/021	axial	Exxelia Tech. / F	ESCC QPL	
SFP 100	Pi-filter, Hermetic glass fill	3008/028	axial	Exxelia Tech. / F	ESCC QPL	
SFL 100	L-filter, Hermetic glass fill	3008/029	axial	Exxelia Tech. / F	ESCC QPL	
SFC 035	C-filter, non-hermetic resin fill	3008/031	axial	Exxelia Tech. / F	ESCC QPL	Range in QPL, Note 1
SFC 040	C-filter, non-hermetic resin fill	3008/032	axial	Exxelia Tech. / F	ESCC QPL	
SFC 060	C-filter, non-hermetic resin fill	3008/033	axial	Exxelia Tech. / F	ESCC QPL	
SFP 035	Pi-filter, non-hermetic resin fill	3008/025	axial	Exxelia Tech. / F	ESCC QPL	
SFP 040	Pi-filter, non-hermetic resin fill	3008/014	axial	Exxelia Tech. / F	ESCC QPL	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
SFP 060	Pi-filter, non-hermetic resin fill	3008/030	axial	Exxelia Tech. / F	ESCC QPL	
SFC 030V	C-filter, mixed fill for soldering	3008/020	axial	Exxelia Tech. / F	ESCC QPL	

NOTE 1:

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

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	

4.6 06 – 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	4008/002	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://ssl.tksc.jaxa.jp/eeepitnl/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.

4.7 07 - INDUCTORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
MSCI 10000, 12000 and 20000	RF coils	3201/008	SMD	Exxelia SAS/F	ESCC QPL	range in QPL
SESI	Power inductors	3201/009	SMD	Exxelia SAS /F	ESCC QPL	range in QPL
CMC15, 18, 22	Common mode chocke	3201/010	SMD	Exxelia SAS /F	ESCC QPL	range in QPL
Custom magnetics	Inductors, Chokes	3201/013	See spec	Flux A/S / Denmark	ESCC QML	Range in QML

4.8 08 – 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	
SAMRH71	32-BIT ARM CORTEX-M7 Microcontroller	9512/006	CQFP-256	Microchip / F	ESCC QPL	R [100krad(Si)]
SAMV71RT	32-BIT ARM CORTEX-M7 Microcontroller	9512/007	CQFP-144	Microchip / F	ESCC QPL	E [20krad(Si)]
ATmegaS64M1-KH-SV ATmegaS128M1-KH-SV	8-BIT AVR Low Power Microcontrollers, based on types ATmegaS64M1 and ATmegaS128	9521/003 9521/004	CQFP-32 CQFP-64	Microchip / F	-	
GR740	Quad Core LEON4 SPARC V8 Microprocessor	5962-21204	CCGA625 CLGA625	Cobham Gaisler / S	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.

Memory EEPROM:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
5962-38267(16-17-18-19)VMC	128k x 8 Bit (1 Mbit) EEPROM (120 ns to 200 ns)	5962-38267	Rad Tolerant (RT) Flat Package (letter M)	Data Device Corporation / USA	MIL QMLV	Note 1

NOTE 1:

Rad-Pak (RP) package available for additional shielding depending on the mission profile.

ASIC Technologies Digital:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
ATC18RHA	0.18µ CMOS ASIC standard cell	9202/080	MQFP	Microchip / F	ESCC QML	Also available to 5962-06B02
ATMX150RHA	0.150µ SOI CMOS ASIC standard cell – DIGITAL LIBRARIES	9202/083	MQFP	Microchip / F	ESCC QML	Note 1
AT991	SPARC V8 GNSS Controller	9512/005	CQFP-352	Microchip / F	ESCC QML	
C65Space	65nm ASIC Platform, based on type C65Space	9202/086	CQFP-352 CLGA-625	STM / F	ESCC QML	

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)

Field Programmable Gate Array

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
NX1H35AS	FPGA, 3M gates with 2856Mb of independent RAM (NG-Medium)	9304/010 9202/086	CQFP-352 CLGA-625	NanoXplore / F	ESCC QPL	Based on STM ESCC qualified C65SPACE ASIC platform technology.
ATF280F	FPGA 280K gates	9304/009	MQFP-T352 MCGA-472 MQFP-T256	Microchip / F	ESCC QML	100 kRAD(Si)

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
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	
RHF350AK01V	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	
LMH5401-SP	6.5GHz Ultra-Wideband, Fully Differential	5962-17214	LCCC-14	T.I. / USA	MIL QML	

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)

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	
RHFL6000A	Positive ADJ, 2A, low dropout	5962-15216	FLAT 16 AlN	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	
TPS7H1101A-SP	1.5-V to 7-V Input, 3-A Low-Dropout (LDO)	5962-13202	CFP-16	T.I. / USA	MIL QML	

Linear Voltage comparator:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
AD584SH	Precision pin-progammable	5962-38128	8pin metal can	A. D. / USA	MIL QML	Var01
LM119	Dual, high speed	5962-96798	FP	T.I. / USA	MIL QML	
LM139AH	Quad, low power	5962-96738	FP-14	T.I. / USA	MIL QML	
LM193	Dual, low power, low offset	5962-94526	Metal can	T.I. / USA	MIL QML	
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

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
TPS50601A-SP	3-V to 7-V Input, 6-A Synchronous Buck Converter	5962-10221	CFP-20	T.I. / USA	MIL QML	
UC1843B-SP	Current-mode PWM controller	5962-86704	CFP-10	T.I. / USA	MIL QML	

NOTE 1:
This part is VERY sensitive to Single Event Transients (SET)

Linear Line driver:

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

Linear Line receiver:

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

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	

Linear Analog to Digital converter:

Type	Description	Specification	Package	Manufacturer	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	5962-15223	Note 1	e2v / F	MIL QML	Note 2

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	bipolar DEMux ADC					
EV12AD550B	Dual channel 12 bit 1.6 Gsps ADC with LVDS DEMUX	5962-19205	CCGA-Cu spiral column	e2v / F	MIL QML	Note 3
ADC12DJ3200QML-SP	12-bit, dual 3.2-GSPS or single 6.4-GSPS	5962-18209	FCLGA, CCGA	TI / USA	MIL QML	
EV12AQ600AMGH-Y	Quad 12-bit 1.6 GSps ADC with embedded cross-point switch, Digitizing up to 6.4 GSps	5962-21214	Ceramic Ball Grid Array (Pb90Sn10)	e2v / F	MIL QML	Note 2 Note 4

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/SEFI – contact the manufacturer for SEE sensitivity detailed evaluation data

NOTE 3:

SEL and SEFI immune up to a LET of 80MeV.cm2/mg (No tilt).

NOTE 4:

SEL immune up to a LET of 67 MeV.cm2/mg (No tilt).

Linear Digital to Analog converter:

Type	Description	Specification	Package	Manufacturer	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

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	
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	
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	
RHRPMICL1A	Linear integrated current limiter	5962-17211	FLAT 20	ST / F	MIL QML	
CDCLVP111-SP	High-speed clock buffer with selectable input clock driver	5962-16207	CFP-36	T.I / USA	MIL QML	Note 2
TMP461	Temperature Sensor with I^2C Interface	5962-17218	FP-10	T.I / USA	MIL QML	
LMX2615	40-MHz to 15-GHz Synthesizer	5962-17236	CFP-64	T.I / USA	MIL QML	
TPS7H2201	7-V, 6-A Load Switch	5962-17220	FP-16	T.I / USA	MIL QML	
TL1431	Precision adjustable shunt voltage reference	5962-99620	FP-10, DIL-8	T.I / USA	MIL QML	Note 3
INA901-SP	–15-V to 65-V Common Mode, Unidirectional Current-Shunt Monitor	5962-18210	CFP-8	T.I / USA	MIL QML	
LMK04832-SP	Ultra low-Noise JESD204B compliant clock jitter cleaner	5962-17237	CFP-64	T.I / USA	MIL QML	

NOTE 1:

This part is NOT ELDRS-free

NOTE 2:

This part is not radiation guaranteed. It is the responsibility of the users to test if the part can withstand the radiation requirements for its application.

NOTE 3:

It is the responsibility of the users to test if the part can withstand the radiation requirements for its application (SEE and SET testing were not performed).

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	9204/022	FP, DIL	ST / F	ESCC QPL	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	BINARY COUNTER / DIVIDER					
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	
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/DEMULTIPLEXER	9202/048	FP, DIL	ST / F	ESCC QPL	
4053B	TRIPLE 2-CHANNEL ANALOGUE MULTIPLEXER/DEMULTIPLEXER	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	9408/009	FP, DIL	ST / F	ESCC QPL	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	ULTIPLEXER/DEMULTIPLEXER					
4068B	8-INPUT NAND GATE	9201/061	FP, DIL	ST / F	ESCC QPL	
4069UB	HEX INVERTER	9401/010	FP, DIL	ST / F	ESCC QPL	
4070B	Quad exclusive OR gate	9201/048	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	SYNCHONOUS 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 (OUPUT LOW ON SELECT)	9408/025	FP, DIL	ST / F	ESCC QPL	
54AC00	Quad 2-Input NAND Gate	5962-87549	FP	ST / F	MIL QML	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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	
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	5962-87760	FP	ST / F	MIL QML	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	Inputs					
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	
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	9205/023	FP, DIL	ST / F	ESCC QPL	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	with Inverted Output					
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	Synchrorous 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	
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	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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	9201/110	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	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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	
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	

Microwave Monolithic Integrated Circuits (MMIC):

Type	Description	Specification	Manufacturer	Qualification	Remarks
4GH50-20	0.5 µm Power bar GaN HEMT technology (AlGaN/GaN on SiC substrate) for Power amplifier up to C band. It is recommended to be used within the space de-rated conditions. Maximum rating for space after derating: T=160°C, Vds=45V and maximum allowed operating output power level Pout(PAEmax).	5614/009	UMS / F,G	ESCC QML	Note 1 Note 2

NOTE 1:

The transistor layout topology evaluated is the design variant V1 with a gate to gate pitch spacing of 70 µm. Hermetic package shall be used.

NOTE 2:

Total Ionisation Dose (TID) have been assessed successfully under Co60 up to 274 krad and Displacement Damaged (DD) at a fluence of 10^{12}p/cm2.

Users are required to perform SEE testing to confirm suitability for the intended application.

Other functions:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
RHF1009	Adjustable 2.5V/5.5V precision Vref	5962-14222	FP10	ST / F	MIL QML	
SPPL12420RH	2A Synchronous rectified Step-Down Converter	9102/014	FP16	SpaceIC /G	ESCC QPL	Note 1

NOTE 1:

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

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	
VSC8541RT	Single port gigabit Ethernet copper PHY with GMII/RGMII/MII/RMII interfaces	9405/020	CQFP068	ATM / F	-	Variant 01

4.9 09 - RELAYS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
T	Non-latching	3601/002	TO5	STPI / 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	
GP250	Latching	3602/010	Can	Leach / F	ESCC QPL	
GP2	Latching	3602/003	Can	Leach / F	ESCC QPL	

4.10 10 - RESISTORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
SMP/SMS/SMT	Shunts	4001/027	SMD	c	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

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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
CHP	Thick film 0603, 0805, 1206, 2010, 2512	4001/026	SMD	Vishay / F	ESCC QML	Range as in QPL
JAXA 2050/J401	1005, 1608, 2012, 3216, 3225	JAXA-QTS-2050/J401	SMD	SANADA KOA / J	JAXA QPL	Note 1 and 2
JAXA WCR32-50-64	Chip Fixed film	JAXA-QTS-2050/E302	SMD	Hokuriku Electric / Japan	JAXA QML	Case sizes: 3216, 5025, 6432 Note 1 and 2
JAXA SCR-16-20-32-35-50	Chip Fixed film	JAXA-QTS-2050/E301	SMD	Hokuriku Electric / Japan	JAXA QML	Case sizes: 1608, 2012 3216, 3225, 5025 Note 1 and 2
SMV	Shunts	4001/028	SMD	ISA / G	ESCC QPL	Range as in QPL
Heater	Flexible, single and double layer	4009/002	See spec	IRCA / I	ESCC QPL	Range as in QPL
Heater	Flexible, single and double layer	4009/004	See spec	IRCA / I	ESCC QPL	Range as in QPL
JAXA CRK 2-4-8-10-16 H	Metal Glaze Thick Film Resistor (1Ω to 10 MΩ)	JAXA-QTS-2050/E201H	Chip	Tateyama Kagaku / J	JAXA QML	Case sizes: 2010, 1210, 1206, 0805, 0603 Note 1, 2

NOTE 1:

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

- General specification : JAXA-QTS-2050
- Detail specification : JAXA-QTS-2050/J401, JAXA-QTS-2050/E301, JAXA-QTS-2050/E302, JAXA-QTS-2050/E201H
- Application data sheet : JAXA-ADS-2050/J401, JAXA-QTS-2050/E301, JAXA-QTS-2050/E302, JAXA-QTS-2050/E201F

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.

4.11 11 - THERMISTOR SENSORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
G15K and G10K	NTC 2K to 100K, -40 + 160C	4006/014	See spec	MEAS / I	ESCC QPL	Var. 08, 09, 12, 13
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 Sensor Technology / Switzerland	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://ssl.tksc.jaxa.jp/eeepitnl/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

4.12 12 - TRANSISTORS

Bipolar transistors:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
2N5666, 2N5667	Low power NPN	MIL-PRF-19500-455	TO205	MIC / U	MIL QML	
2N3501	Low power NPN	MIL-PRF-19500-366	TO205	MIC / U	MIL QML	
2N2484	Low power NPN	5201/001	LCC3	ST / F	ESCC QPL	Range in QPL 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	
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, 2N3868S	Low power PNP	MIL-PRF-19500-350	TO205	MIC / U	MIL QML	
2ST3360	Complementary NPN/PNP	5207/009	FP8	ST / F	ESCC QPL	Range in QPL Note 1
ST15300	Low Power NPN	5201/020	SMD.5	ST / F	ESCC QPL	Variant 1
2N5401	Low power PNP	5202/014	LCC3, LCCC3+1	ST / F	ESCC QPL	Range in QPL Note 1
2N2907	Low power	5202/001	LCC3,	ST / F	ESCC QPL	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
	PNP		LCCC3+1			
2N5154	High power NPN	5203/010	TO-257, SMD .5	ST / F	ESCC QPL	
2N5153	High power PNP	5204/002		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.

MOSFET Transistors:

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
STRH100N10FSY3	N-channel	5205/021	TO254AA	ST / F	ESCC QPL	Variants 01 and 02
STRH100N6	N-channel	5205/022	TO254AA	ST / F	ESCC QPL	Variants 01 and 02
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
BUY06CS	N-channel	5205/032	See spec	INF / G	ESCC QPL	Var. 01 thru 08
BUY65CS08J-01	N-channel	5205/033	SMD0.5	INF / G	ESCC QPL	Variant 01
BUY65CS28A-01	N-channel	5205/033	SMD2	INF / G	ESCC QPL	Variant 02
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
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

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
STRH12P10	P-channel	5205/029	TO254AA, TO257AA	ST / F	ESCC QPL	Variants 1 and 2
2N7389	P-channel	MIL-PRF-19500-630	TO205AF, LCC	I.R. / USA	MIL QML	

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

4.13 13 - 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 Fileca/F	ESCC QPL	Range in QPL
FA-3901-2	Polymide	3901/002	N/A	Draka Fileca/F	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	Bizlink Special Cables / G	ESCC QPL	Range in QPL

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
-	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	Axon / F	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
SPL	Polymide	3901/019	N/A	W.L. Gore / G	ESCC QPL	Range in QPL
-	Polym/fluorth.	3901/018	N/A	Bizlink Special Cables/ G	ESCC QPL	Range in QPL
-	Polymide	3901/001	N/A	Axon / F	ESCC QPL	Range in QPL
-	Polymide	3901/021	N/A	Bizlink Special Cables / 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
LEW	Fluoropolymer, 600V	3901/026	N/A	W.L. Gore / G	ESCC QPL	Range in QPL

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, GTX, GSC, GBL	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 /D101	Differential transmission cable (1 pair)	JAXA-QTS-2120-D101	N/A	Junkosha / J	JAXA QPL	Note 1 and 2
JAXA2120 /D101	Differentia; transmission cable (4 pairs)	JAXA-QTS-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://ssl.tksc.jaxa.jp/eeepitnl/en/

- General specification : JAXA-QTS-2120 and its Appendix D
- Detail specifications : JAXA-QTS-2120/D101, 102, Application DS: 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

4.14 14 TRANSFORMERS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
Linear CCM	Molded SMD Custom Magnetics	3201/011	See spec	Exxelia SAS / France	ESCC QML	Range in QML
Toroidal TO	Molded SMD Custom Magnetics	3201/012	See spec	Exxelia SAS / France	ESCC QML	Range in QML
Custom magnetics	Transformers	3201/013	See spec	Flux A/S / Denmark	ESCC QML	Range in QML

4.15 20 THERMOSTATS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
TH47	SPST 4A 30V	3702/001	See spec	COMEPA / F	ESCC QPL	Range in QPL
TH473	SPST 4A 30V	3702/002	See spec	COMEPA / F	ESCC QPL	Range in QPL

4.16 30 - 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	3403/006	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

4.17 40 – HYBRIDS AND MODULES

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
JAXA2020/01011DB CR06	POL 1.5V/3A	JAXA-QTS-2020-0101	FP26	Avio Fukushima /J	JAXA QPL	Notes 1, 2
JAXA2020/01011DB CR09	POL 3.3V/2A		FP26	Avio Fukushima /J		Notes 1,2
A0015227-QAR-00 CA5-B FP AR	1553 BUS COUPLER	ARIA6HYB6SPEC6DA0031443	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://ssl.tksc.jaxa.jp/eeepitnl/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.

4.18 50 - CABLE ASSEMBLIES

Type	Description	Specification	Package	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	
RF Cable Assembly type Axowave SL34SQ	DC to 45 Ghz	3408/003	-	Axon'Cable / F	ESCC QPL	
RF Cable Assembly type 8S-SMA	DC to 22 Ghz	3408/002	-	WL Gore / UK	ESCC QPL	
RF Cable Assembly type Axowave 44SLQ	DC to 32 GHz	3408/004		Axon'Cable / F	ESCC QPL	
HDR Cable assembly with connectors based on Types Axomach and Spacefibre	High Data Rate Cable assembly	3409/001		Axon'Cable / F	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.

5 EPPL PART 2

5.1 01 – 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
TCF479S to TCF485S, TCK479S to TCK485S	Ceramic, High Voltage 200V to 5kV, class 1 N2200	3001/039	SMD	Exxelia SAS / F	Not qualified	
C480PS to C485PS, C480PLS to C485PLS, C480LS to C485LS, C480RS to C485RS	Ceramic, High Voltage 200V to 5kV, class 1 N2200	3001/040	SMD	Exxelia SAS / F	Not qualified	
C479S to C483S	Ceramic, High Voltage 200V to 5kV, class 1 N2200	3009/044	SMD	Exxelia SAS / F	Not qualified	
G311P829**********	Ceramic chip multilayer	S-311-P-829	SMD	Presidio Comp. Inc / USA	GSFC QPLD	Custom made to GSFC spec. Note 4
T541 HRA series	Multiple Anode Polymer Tantalum Chip	DLA DWG 04052	SMD	Kemet / USA	Not qualified	Surge current option B.

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

5.2 02 - CONNECTORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
TNC	Coaxial	3402/008 3402/009 3402/010	TNC	Radiall / F	Not qualified	
SMP	Coaxial	RAD-DET-CONN-019	SMP	Radiall / F	Not qualified	
MDSA	Micro D	05039-ST-01	Rectangular	Axon'Cable / F	Not qualified	
Nano	Nano D	3401/086	Rectangular	Axon'Cable / 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
HDR PCB connectors	PCB Connectors (electrical, rectangular, microminiature, high data rate with female contacts) to be mated with 3409/002 Based on type MicroMach.	3401/095	-	Axon'Cable / F	Not qualified	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
SND and SDD connectors	SND and SDD connectors with removables contacts (without contacts)	3401/002		Positronic / F	Not Qualified	
SND and SDD connectors	SND and SDD connectors with pressfit contacts (straight or right angle)	3401/098		Positronic / F	Not Qualified	
Contacts	Removable crimped contacts	3401/005		Positronic / F	Not Qualified	
Accessories	Accessories for rectangular connectors and connector savers	3401/022		Positronic / F	Not Qualified	

5.3 03 - CRYSTALS AND PIEZO-ELECTRIC DEVICES

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

5.4 04 - 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	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
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	
SIC-HT-SBD01	SiC blocking	5106/022	SMD	Alter Tech./ 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.

5.5 06 - FUSES

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
FM12	Subminiature fuse	MIL-PRF-23419	Flying leads	AEM / USA	NPSL	Note 1
FM13	Surface mount fuse	MIL-PRF-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

5.6 07 - INDUCTORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
Custom magnetics 1217-ASP-UP-xxxxxxxx	Input filter Common Mode Choke, Filter Choke	DSP-B214-10000ASP01, Magnetic sheet	See spec	Advanced Space Power Equipment (ASP) / G	Not Qualified	

5.7 08 - MICROCIRCUITS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
3DSD4G08VS8613	4Gb SDRAM	3DPA-5020	SOP58-08	3D PLUS / F	Not qualified	Note 1
3DFN64G08VS8305	Flash NAND 8Gx8	3DPA-3420	SOP50-0.5	3D PLUS / F	Not qualified	
3DPM0168-2-SS	Latch-Up Current Limiter	3DPA-5090-5	SOP-20	3D PLUS / F	Not qualified	
SY1007S	GNSS Rx	SY1004s-Proc02	BGA36	Saphyrion/CH	Others	Notes 2, 3
SY1017CS	GNSS AD/DAC/PLL	SY1017CS-Proc08	BGA36	Saphyrion/CH	Others	Notes 2, 3
UT81NDQ512G8T	4Tb NAND Flash	UT81NDQ512G8T	BGA132	Frontgrade Technologies / USA	Others	
GR718B	SpaceWire Router	GR718B-PS	CQ256	Frontgrade Gaisler / S	Others	

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
GR712RC-MS-CQ240	Dual-core LEON3FT SPARC V8 processor space version	GR712RC-PS-1.3	CQFP240	Frontgrade Gaisler / Sweden	Not qualified	Note 5, 6
αRD124A	Low power Bipolar Linear Operational Amplifier	RDm 054	FP-14	RD ALFA Microelectronics / Latvia	Not qualified	
AQLVD01	Quad Bus Low Voltage Differential Signals (LVDS) Driver	ARQ_17501_DSP_002	FP-16	Arquimea / Spain	Not qualified	
AQLVR02	Quad Bus Low Voltage Differential Signals (LVDS) Receiver	ARQ_17501_DSP_003	FP-16	Arquimea / Spain	Not qualified	

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 5:

The latest revision of the GR712RC data sheet (GR712RC-DS_2.4) and GR712RC user's manual (GR712RC-UM_2.12) are available on-line:

https://www.gaisler.com/doc/gr712rc-datasheet.pdf

https://www.gaisler.com/doc/gr712rc-usermanual.pdf

NOTE 6:

Radiation hardness assurance control is performed on each new wafer lot for compliance to 100krad(Si) and 300 krad(Si).

The SEU onset LET for flip-flop memories are above 15 MeV-cm2/mg.

SEUs for embedded RAM memories are protected with the fault tolerant design architecture.

SEL immunity has been confirmed up to 118 MeV-cm2/mg at +125°C at maximum rated supply voltages (core and I/O).

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,G	Others	
PPH15X-10	GaAs process, 0.15µ P-HEMT. Absolute Maximum Ratings (AMR) for PPH15X-10: Drain to Source Voltage: Vds = 8V at Ids = 150mA/mm Maximum instantaneous RF Drain to Gate Voltage: Vdgmax = 14V at the maximum DC Operating point specified above (Vds = 8V and Ids = 150mA/mm) RF Compression = 7dB for Power matched 8x75m cell at Ids = 150mA/mm and Vds = 7V - Gate to Source Voltage: Vgs = -2.5V	UMS / F,G	Others	SEE testing under DC+RF was performed – report available from the manufacturer
CHA5350-99F	K-band Power Amplifier in die form. Available in accordance with ESCC 9012/002	UMS / F,G	Others	Made on PPH15X-10 process
GH15-10	0.15µm GaN HEMT MMIC process for High Power amplifiers up to 35GHz (AlGaN/GaN on SiC)	UMS / F,G	Others	Note 16 Note 17 Note 18 Note 19

Type	Description	Manufacturer	Qualification	Remarks
HP07-20	MMIC, GaAs Foundry Process, MESFET 0.7 µm for power applications up to Ku Band. Replacement of HP07 Process by HP07-20 process due to a change in the gate lithography process	UMS / F,G	Others	Do not use beyond vgdmax/2 due to sensitivity to heavy ions.
HB20M	Mixed digital/analog MMIC HBT process InGaP HBT (Application in mixed digital/analog circuits up to Ku band	UMS / F,G	Others	SEE to be considered (digital elements)
CHV1203-98S	Voltage controlled oscillator 2.75 – 3 GHz Available in accordance with ESCC 9012/003	UMS / F,G	Others	Made on HB20M process
CHV1206-98S	Voltage controlled oscillator 5.5 – 6.1 GHz Available in accordance with ESCC 9012/004	UMS / F,G	Others	
HB20PX-10	HBT InGaP (2 µm emitter width) MMIC process Applications in Power Amplifiers up to Ku Band Absolute Maximum Ratings (AMR) for HB20PX-10: - Base to Collector Voltage : Vbc = 11.0V - Collector to Emitter Voltage: Vce = 9.5V (VSWRmax = 2 and 4dBC of Compression, Jce = 33000A/cm² for single cell transistor in CW mode and Jce = 22000A/cm² for bi-cell transistor in pulsed mode) - RF Compression = 5 dB (under maximum operating conditions) - Max DC Collector Emitter Current Density: Jce	UMS / F,G	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,G	Others	
PPH25X-10	0.25 µm Power P-HEMT process Application in Power Amplifiers C to K band Absolute Maximum Ratings (AMR) for PPH25X-10: - Drain to Source Voltage: Vds = 9.5V (VSWR max of 2 and 3dBc) - Gate to Drain Voltage: Vgdmax= -11.5V - RF Compression = 7dB (Vds =8.0V and VSWR of 3)	UMS / F,G	Others	
BES	1µm Schottky diode process	UMS / F,G	Others	Note 4
GH25-10	0.25 µm GaN HEMT MMIC process for High Power amplifiers up to 20GHz (AlGaN/GaN on SiC)	UMS / F,G	Others	Note 5 Note 6 Note 7 Note 19

Type	Description	Manufacturer	Qualification	Remarks
PH15	MMIC GaAs Foundry Process, 0.15 µm (P-HEMT for low noise, low level applications up to W-Band	UMS / F,G	Others	Note 10
PH10-10	0.1 µm Very low Noise P-HEMT technology (AlGaAs/InGaAs on GaAs substrate with AlTiAlNi gate) Technology suitable for very low noise applications up to W-band	UMS / F,G	Others	Note 11
PPH15X-20	0.15µm GaAs power PHEMT technology Power and High linearity applications up to 45GHz	UMS / F,G	Others	Note 12
SGB25RH	SiGe 0.25 µm BiCMOS process for Mixed-Signal applications up to Ku-band with peak fT / fMAX 75GHz / 95 GHz and BVCBO > 7V	IHP / G	Others	Note 13
ED02AH	High frequency Enhancement/Depletion 180nm PHEMT GaAs process in 3inch	MACOM / F	Others	Note 1 Note 2 Note 3
D01PHS	High frequency Depletion 130nm PHEMT GaAs process in 3inch	MACOM / F	Others	Note 1 Note 2 Note 3
D007IH	Ultra-low noise process for high-frequency application in 3-inch	MACOM / F	Others	Note 1 Note 2 Note 3 Note 8

NOTE 1:

No radiation test has been performed in the frame of this evaluation. It is the responsibility of the users to check that the process design can withstand the radiation requirements for its application.

NOTE 2:

MESC processes are considered sensitive to hydrogen poisoning. A hydrogen getter is mandatory in case of hermetic encapsulation.

NOTE 3:

For recommendations of use, users shall refer to the Maximum rating chapter of the design manual. It is the responsibility of the end user to verify their MMIC design's compatibility with mission requirements

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

NOTE 5:

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

Transistor V1S (power applications)					
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		PAEmax	PAEmax +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

Transistor V9S (low noise and wide band applications)					
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		PAEmax	PAEmax +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

Transistor V1C (switch applications)					
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	Rad hard limit for space use	AMR	Note
Voltage (DC+RF)	V	80	35	130	@175°C

NOTE 6:

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 7:

Humidity tests according to JESD22-A101-B (85°C/85%, 1000h, with bias) have been successfully performed in open package environment and with die coated with BCB protection. It is recommended that other or specific package environments be tested or evaluated taking into account the requirements defined by the mission profile.

NOTE 8:

Derated channel temperature for space applications is 110°C

NOTE 10:

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 11:

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

NOTE 12:

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

NOTE 13:

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

NOTE 16:

Maximum ratings for active devices and MIM capacitors are as follows:

Transistor for Power Amplifiers					
Parameter	Symbol	Conditions	Unit	ROR	AMR
Drain-Source Biasing Voltage	Vds	Idq = 150mA/mm	V	25	27
		Derated value for space use		20	
RF compression such as Pin equal to:		Under ROR dc biasing conditions		PAEmax +2dB	PAEmax +3dB
Gate-Source Voltage (DC+RF)	Vgs		V	-15	-20
Drain-Gate Voltage (DC+RF)	Vdg		V	65	
Gate Current	Ig	Forward	mA/finger	0	2
Peak Junction Temperature	Tj	Under ROR dc biasing conditions	°C	200	230

MIM capacitors (175pF/mm^2)					
Parameter	Symbol	ROR	Rad hard limit for space use	AMR	Note
Voltage (DC+RF)	V	80	42.5	130	@175°C

Note 17:

SEB limits on the technology have been determined through SEE testing under DC biasing. Report is available on request. It is the responsibility of the end user to verify their MMIC design's compatibility with mission radiation environment.

Note 18:

For recommendations of use, users shall refer to the Maximum rating chapter of the design manual. It is the responsibility of the end user to verify their MMIC design's compatibility with mission requirements.

Note 19:

Plastic QFN packaging platform for GaN MMICs (up to Pdiss 40W CW) has been successfully evaluated for use in space applications. Users wishing to use this platform must contact UMS to verify the compatibility of their chip with the validated domain as described in the document UMS ref. 3713520 - Version: 1 (13.12.2024)

5.8 09 - RELAYS

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

5.9 10 - RESISTORS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
VCS1625	Wraparound 1W	303119	Chip	Vishay Precision	Not qualified	
BVR-PW	Shunt resistor with SnPb finish	BVR-PW// Size 4026 (26 Sept 2023)	Chip 4026	ISA / G	Not qualified	BVR (untinned) resistors are grade 0 AEC-Q200 qualified

5.10 11 - THERMISTOR SENSORS

Type	Description	Specification	Package	Manufacturer	Qualification
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

5.11 14 - TRANSFORMERS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
DBIT	1553 transformer	MSP-003	See spec	Microspire / F	Not qualified	
Custom magnetics 1217-ASP-UP-xxxxxxxx	Signal transformer	DSP-B214-10000ASP01, Magnetic Sheet	See specs	Advanced Space Power Equipment (ASP) / G	Not qualified	
AE458RFW	Wideband transformer	1501+ ES424N-1	See specs	Coilcraft /USA	Not qualified	

5.12 30 - RF PASSIVE COMPONENTS

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
T10	Coax isol / circul. 7.9GHz to 21.5	60102965-069	T10 SMA	Exens Solutions/ F	Not qualified	
R4043706	RF coaxial load	3403/010	TNC conn	Radiall / F	Not qualified	

5.13 40 - HYBRIDS AND MODULES

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

5.14 50 - CABLE ASSEMBLIES

Type	Description	Specification	Package	Manufacturer	Qualification	Remarks
HDR cable assembly	High data rate cable assembly with microminiature rectangular connectors based on type MicroMach, SpaceWire and Low mass SpaceWire cable. Variant numbers 01, 02 and 03.	3409/002	-	Axon'Cable / F	Not qualified	