ECSS-Q-ST-60-13C Rev.1 DIR1
17 May 2021

Space product assurance

Commercial electrical, electronic and electromechanical (EEE) components

This draft is distributed to the ECSS Community for Public Review.

NOTE: Only the modified parts of this document are subject for review.
Requirement numbers marked with YELLOW highlight mark requirements that are changed in the ECSS-Q-ST-60-13 and as well in ECSS-Q-ST-60 Standard. Changes can be "Modifiction", "Deletion" and "Addition".
Text of formerly applicable requirements that are now marked as "N/A" has been added in red font with strikethrough.
(duration 8 weeks)

Start of the Public Review: 10 June 2021

End of the Public Review: 31 August 2021

NOTE: Parallel to this Public Review is distributed ECSS-Q-ST-60C Rev.3 DIR1 where the review is limited to the common changes of both documents.

DISCLAIMER (for drafts)

This document is an ECSS Draft Standard. It is subject to change without any notice and may not be referred to as an ECSS Standard until published as such.

Foreword

This Standard is one of the series of ECSS Standards intended to be applied together for the management, engineering, product assurance and sustainability in space projects and applications. ECSS is a cooperative effort of the European Space Agency, national space agencies and European industry associations for the purpose of developing and maintaining common standards. Requirements in this Standard are defined in terms of what shall be accomplished, rather than in terms of how to organize and perform the necessary work. This allows existing organizational structures and methods to be applied where they are effective, and for the structures and methods to evolve as necessary without rewriting the standards.

This Standard has been prepared by the ECSS-Q-ST-60-13C Working Group, under the auspice of the ESCC Space Components Steering Board, reviewed by the ECSS Executive Secretariat and jointly approved by the ESCC SCSB and the ECSS Technical Authority.

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Published by: ESA Requirements and Standards Section
ESTEC, P.O. Box 299,
2200 AG Noordwijk
The Netherlands

Change log

	Change log for Draft development
ECSS-Q-ST-60-13D 02 december 2020 15 january 2021 04 february 2021	Issue to be submitted to public review Yellow highlight : requirements modified in Q-ST-60 and Q-ST-60-13 Implementation of changes from Q-ST-60-13 in Q-ST-60 finished. Comments from the 02/02/2021 meeting incorporated
ECSS-Q-ST-60-13C Rev.1 DRAFT1 KE 6 May 2021	Published Draft updated by ES with complete Revision Tracking based on WG Draft received 4 Feb 2021. Comments from Klaus Ehrlich marked on front page also marked in the document for resolution by PSWG.
DFR	Draft for Review (DFR) submitted to ES
DFR	DFR in preparation by ES for parallel Assessment
ECSS-Q-ST-60-13C Rev.1 DFR1 17 May 2021	Parallel Assessment 17 May – 25 May 2021 Yellow highlight : requirements modified in Q-ST-60 and Q-ST-60-13 Implementation of changes from Q-ST-60-13 in Q-ST-60 finished. Comments from the 02/02/2021 PSWG meeting incorporated.
CURRENT STEP	
ECSS-Q-ST-60-13C Rev.1 DIR1 17 May 2021	Public Review 10 June – 31 August 2021 Yellow highlight : requirements modified in Q-ST-60 and Q-ST-60-13 The text of formerly applicable requirements that are now marked as "N/A" has been added in red font with strikethrough.
Next Steps	
DIR + impl. DRRs	Draft with implemented DRRs
DIR + impl. DRRs	DRR Feedback
DIA	TA Vote for publication
DIA	Preparation of document for publication (including DOORS transfer for Standards)
	Publication
	Change log for published Standard (to be updated by ES before publication)
ECSS-Q-ST-60-13C 21 October 2013	First issue.
ECSS-Q-ST-60-13C Rev.1 DIR1 17 May 2021	First issue, Revision 1 Change log will be completed before publication of this document.

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Introduction

This standard is based on and complementary to ECSS-Q-ST-60C (with upward revisions). This standard can only be used in conjunction with ECSS-Q-ST-60C in its current revision. This standard applies only to commercial components - as defined in its scope - which meet defined technical parameters that are on the system application level demonstrated to be unachievable with existing space components or only achievable with qualitative and quantitative penalties. The standard requires that qualitative and quantitative penalties are specified, as applicable, as a minimum in terms of quantifiable parameters such as: functional capability, parts count, power dissipation, frequency of operation, data/signal processing efficiency, interconnect complexity, mass, volume, …

For traceability to ECSS-Q-ST-60, the modifications or additions are marked in blue. Text in black colour is unmodified text.

The objective of the EEE component selection, control, procurement and use requirements is to ensure that EEE components used in a space project enables the project to meet its mission requirements.

Important elements of EEE component requirements include:

a. component programme management,
b. component selection, evaluation and approval,
c. procurement,
d. handling and storage,
e. component quality assurance,
f. specific components, and
g. documentation.

The main tools which can be used to reach the objective are:

a. concurrent engineering,
b. standardization of component types,
c. characterization of components,
d. assessment of component manufacturers including declared competencies and processes,
e. testing, screening, lot acceptance and periodic testing,
f. procurement specifications,
g. control and inspection,
h. control of nonconforming materials,
i. assessment and use of existing component data,
j. application of specific control to mitigate risk for components with limited data or confidence, and
k. information management.

The basic approach is as follows:

- The customer of a given space project defines the EEE component requirements within the boundaries of this standard. They appear in the appropriate clauses of the project requirements as defined in ECSS-M-ST-10.

- The supplier defines a component control plan to implement those requirements into a system which enables, for instance, to control the selection, approval, procurement, handling in a schedule compatible with his requirements, and in a cost-efficient way.
- The supplier ensures that the applicable parts requirements are passed down to lower level suppliers and ensure that they are compliant to these parts requirements.

1 Scope

This standard defines the requirements for selection, control, procurement and usage of EEE commercial components for space projects.

This standard is applicable to commercial parts from the following families:

- Ceramic capacitors chips
- Solid electrolyte tantalum capacitors chips
- Discretes parts (transistors, diodes, optocouplers)
- Fuses
- Magnetic parts
- Microcircuits
- Resistors
- Thermistors

Other families of EEE components are not addressed by the present ECSS standard doesn't mean that they are forbidden in commercial grade.

In line with ECSS-Q-ST-60, this standard differentiates between three classes of components through three different sets of standardization requirements (clauses) to be met.

The three classes provide for three levels of trade-off between assurance and risk. The highest assurance and lowest risk is provided by class 1 and the lowest assurance and highest risk by class 3. Procurement costs are typically highest for class 1 and lowest for class 3. Mitigation and other engineering measures can decrease the total cost of ownership differences between the three classes. The project objectives, definition and constraints determine which class or classes of components are appropriate to be utilised within the system and subsystems.

a. Class 1 components are described in Clause 4

b. Class 2 components are described in Clause 5

c. Class 3 components are described in Clause 6

The requirements of this document are applicable to all parties involved at all levels in the integration of EEE commercial components into space segment hardware and launchers.

For easy tailoring and implementation of the requirements into a Requirement Management Tool, and for direct traceability to ECSS-Q-ST-60, requirements in this standards have been written in the way of a ECSS Applicability Requirement Matrix (EARM), as defined in Annex A of ECSS-S-ST-00 "ECSS system – Description, implementation and general requirements".

This standard may be tailored for the specific characteristics and constrains of a space project in conformance with ECSS-S-ST-00.

2
Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS standard. For dated references, subsequent amendments to, or revision of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the more recent editions of the normative documents indicated below. For undated references, the latest edition of the publication referred to applies.

ECSS-S-ST-00-01	ECSS system - Glossary of terms
ECSS-Q-ST-60	Space product assurance - Electrical, electronic and electromechanical (EEE) components
ECSS-Q-ST-60-14	Space product assurance - Relifing procedure - EEE components
ECSS-Q-ST-60-15	Space product assurance – Radiation hardness assurance – EEE components
ESCC 21300	Terms, definitions, abbreviations, symbols and units
ESCC 24900	Minimum requirements for controlling environmental contamination of components
ESCC 25500	Methodology for the detection of pure tin in the external surface finish of case and leads of EEE components
MIL-STD-750	Test methods for semiconductor devices
MIL-STD-883	Test method standard microcircuits
JESD22-A101	Steady state temperature humidity bias life test
JESD22-A110	Highly accelerated temperature and humidity stress test
JESD22-A113	Preconditioning of plastic surface mount devices prior to reliability testing
JESD22-A121	Test Method for Measuring Whisker Growth on Tin and Tin Alloy Surface Finishes
JESD22-B106	Resistance to soldering temperature for through hole mounted devices
JESD-201	Environmental Acceptance Requirements for Tin Whisker Susceptibility of Tin and Tin Alloy Surface Finishes
J-STD-020	Moisture/Reflow sensitivity classification for nonhermetic solid state surface mount devices

J-STD-033	Handling, packing, shipping and use of moisture/ reflow sensitive surface mount devices
GEIA-STD-005-2	Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems.
ESCC 21004	GUIDELINES FOR INCOMING INSPECTION OF EEE COMPONENTS (ESCC Basic Specification No. 21004)
ESCC25100	Single Event Effects Test Method and Guidelines
ESCC22500	GUIDELINES FOR DISPLACEMENT DAMAGE IRRADIATION TESTING
ESCC20600	Preservation Packaging and Despatch of SCC Components

3
Terms, definitions and abbreviated terms

3.1 Terms from other standards

For the purpose of this standard, the terms and definitions from ECSS-S-ST-00-01 apply.

For the purpose of this standard, the following terms and definitions from ECSS-Q-ST-60 apply:

agent

characterization

commercial component

concurrent engineering

franchised distributor

parts engineer

parts procurer

qualified parts

screening

space qualified parts

3.2 Terms specific to the present standard

3.2.1 traceability information (trace code)

unique identifier used by manufacturers to label and trace a quantity of components with a common manufacturing history and thereby common characteristics.

NOTE 1 The notion of "lot of EEE parts" used for the radiation and lot acceptance tests is defined by the trace code.

NOTE 2 Several trace codes can be part of a same delivery from the manufacturer or the distributor.

NOTE 3 It is possible to have several diffusion lots and wafer fabs (as per ESCC 21300) in the same trace code.

3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

Abbreviation	Meaning
AOQ	average outgoing quality

Abbreviation	Meaning
ASIC	application specific integrated circuit
BGA	ball grid array
CA	construction analysis
CCD	charge coupled device
CCP	component control plan
CN	change notice
CoC	certificate of conformance
CDR	critical design review
CR	change request
DCL	declared components list
DPA	destructive physical analysis
DRD	document requirement definition
DSM	deep Sub-Micron
Ea	activation energy
ECSS	European Coordination for Space Standardization
EEE	electrical, electronic, electromechanical
EFR	early failure rate
ESCC	European space components coordination
GSE	ground support equipment
HAST	highly accelerated stress test
HTRB	high temperature reverse bias
JD	justification document
LAT	lot acceptance test
LED	light emitting diode
LVT	lot validation testing
MMIC	microwave monolithic integrated circuit
PAD	parts approval document
PCB	parts control board
PCN	process change notice
PDA	percent defective allowable
PED	plastic encapsulated device
PIND	particle impact noise detection
QBSD	full quadrant back scatter electron detector
QCI	quality conformance inspection
RFD	request for deviation
RH	relative humidity
RoHs	restriction of the use of certain hazardous substances

Abbreviation	Meaning
RVT	radiation verification testing
SCSB	Space Components Steering Board
SAM	scanning accoustic microscopy
SEM	scanning electron microscope
SMD	surface mount device
TCI	technology conformance inspection
Tg	glassivation temperature
THB	temperature humidity bias
Tj	junction temperature
T/C	thermal cycling

3.4 Conventions

a. The term “EEE component“ is synonymous with the terms "EEE Part", "Component" or just "Part".

b. The term “for approval” means that a decision of the approval authority is necessary for continuing the process.

c. The term “for review” means that raised reviewers comments are considered and dispositioned.

d. The term “for information” means that no comments are expected about the delivered item.

e. For the purpose of clear understanding of this document, hereunder is a listing of component categories which are covered by the term EEE component, encapsulated or non-encapsulated, irrespective of the quality level:

1. Capacitors
2. Connectors
3. Crystals
4. Discrete semiconductors (including diodes, transistors)
5. Filters
6. Fuses
7. Magnetic components (e.g. inductors, transformers, including in-house products)
8. Monolithic Microcircuits (including MMICs)
9. Hybrid circuits
10. Relays
11. Resistors, heaters
12. Surface acoustic wave devices

13. Switches (including mechanical, thermal)
14. Thermistors
15. Wires and Cables
16. Optoelectronic Devices (including opto-couplers, LED, CCDs, displays, sensors)
17. Passive Microwave Devices (including, for instance, mixers, couplers, isolators and switches)

NOTE Microwave switches consisting of multiple EEE components are considered as equipment. The requirements of this standard are applicable to the EEE parts they incorporate and to microwave switches having a simple design (single EEE part).

3.5 Nomenclature

The following nomenclature applies throughout this document:

a. The word "shall" is used in this Standard to express requirements. All the requirements are expressed with the word "shall".

b. The word "should" is used in this Standard to express recommendations. All the recommendations are expressed with the word "should".

NOTE It is expected that, during tailoring, recommendations in this document are either converted into requirements or tailored out.

c. The words "may" and "need not" are used in this Standard to express positive and negative permissions, respectively. All the positive permissions are expressed with the word "may". All the negative permissions are expressed with the words "need not".

d. The word "can" is used in this Standard to express capabilities or possibilities, and therefore, if not accompanied by one of the previous words, it implies descriptive text.

NOTE In ECSS "may" and "can" have completely different meanings: "may" is normative (permission), and "can" is descriptive.

e. The present and past tenses are used in this Standard to express statements of fact, and therefore they imply descriptive text.

4 Requirements for class 1 components

Identifier	Requirement	Applicability
4.1 Component programme management		
4.1.1 General		
~~4.1.1a~~	~~The supplier shall establish and implement throughout the duration of the business agreement a component programme which ensures that the requirements of the project as defined by the customer and the supplier in the related business agreement are in compliance with this standard.~~	N/A
4.1.2 Components control programme		
4.1.2.1 Organization		
4.1.2.1a		Applicable
~~4.1.2.1b~~	~~The supplier's organization shall comply with all the requirements of ECSS-M-ST-10.~~	N/A
4.1.2.2 Component control plan		
4.1.2.2a		Applicable
4.1.2.2b		Applicable
4.1.2.2c		Applicable
4.1.3 Parts control board		
4.1.3a		Applicable
4.1.3b		Applicable
4.1.3c		Applicable
4.1.3d		Applicable
4.1.4 Declared component list		
4.1.4a	For each equipment, its supplier shall issue a DCL in an editable and sortable electronic format such as .xls or .xlsx or .csv.~~, as a minimum compatible with CSV, identifying all component types needed.~~ ~~NOTE CSV is a common file format that can be used to transfer data between database or spreadsheet tables (a spreadsheet program is for example Excel®)~~	Applicable
4.1.4b		Applicable
4.1.4c		Applicable
4.1.4d	After equipment CDR, all modifications affecting the PAD and JD information shall be implemented, in the "as design" DCL, ~~through~~	Applicable

	~~the CN / CR process~~ and submitted to the customer for approval, before mounting. ~~NOTE For JD generation, see 4.2.4.d.~~	
4.1.4e		Applicable
4.1.4f		Applicable
4.1.4g		Applicable
4.1.4h		Applicable
4.1.4i	The supplier shall establish and update a consolidated “as design" DCL at its level and deliver it to the customer	Applicable
	4.1.5 Electrical and mechanical GSE	
4.1.5a		Applicable
4.1.5b		Applicable
	4.1.6 EQM components	
4.1.6a	EEE components used in Engineering Qualification Model (EQM) shall be fit, form and function representative of the flight components and from the same manufacturers.	Applicable
4.1.6b	If thermal vacuum tests are performed on the EQM, the EEE parts shall be material representative of the FM parts.	Applicable
4.2 Component selection, evaluation and approval		
	4.2.1 General	
4.2.1a		Applicable
4.2.1b		Applicable
	4.2.2 Manufacturer and component selection	
	4.2.2.1 General rules	
4.2.2.1a		Applicable
4.2.2.1b		Applicable
~~4.2.2.1c~~	<<deleted and moved to 4.2.2.3d.>>~~Preference shall be given to components which necessitate the least evaluation or qualification effort.~~	N/A
~~4.2.2.1d~~	<<deleted and moved to 4.2.2.3e.>>~~Starting with the design phase of the project the supplier shall ensure maximum use of preferred (see 4.2.2.3) and qualified components to achieve an effective component reduction and standardization.~~	N/A
~~4.2.2.1e~~	<<deleted and moved to 4.2.2.3f.>>~~When selecting items, the supplier shall check the current data, applicability of the basis of qualification, problem notifications and alerts, and adequacy of specifications.~~	N/A
~~4.2.2.1f~~	<<deleted and moved to 4.2.2.3g.>>~~The supplier shall implement a type reduction activity.~~	N/A

4.2.2.1g	For the assessment of commercial components, the supplier shall collect the available data on the manufacturer and the component in the JD specified in the requirement 4.2.4d. NOTE It is important to check the exhaustiveness of the manufacturer documentation & data sheet with respect to e.g. the following items: • component marking, • mechanical description, • electrical and thermal description.	New
~~4.2.2.1h~~	<<deleted>>~~For Deep Sub Micron Technologies (<90nm), the detailed test definition shall identify the technology through the construction analysis and the application.~~ ~~NOTE 1 It is important to ensure that the test conditions remain as close as possible to application.~~ ~~NOTE 2 This requirement is important due to the specificities of Deep Sub Micron Technologies (<90nm).~~	Deleted
	4.2.2.2 Parts and material restriction	
4.2.2.2a		Applicable
4.2.2.2b		Applicable
4.2.2.2c	With respect to health and safety, beryllium oxide, lithium (except if identified in the procurement specification), cadmium, ~~lithium,~~ magnesium, mercury, zinc, radioactive material and all material which can cause safety hazard shall not be used.	Applicable
4.2.2.2d	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used: 1. <<deleted>>~~EEE components with pure tin (less than 3% Pb in case of SnPb alloy) used as a finish on the leads, terminations and external surfaces of components and packages.~~ ~~NOTE For EEE components with pure tin, see also requirements 4.2.2.2h and 4.2.2.2i.~~ 2. Hollow core resistors 3. Potentiometers (except for mechanism position monitoring) 4. Non-metallurgically bonded diodes 5. Semiconductor dice with unglassivated active area 6. Wet slug tantalum capacitors other than capacitor construction using double seals and a tantalum case	Applicable

	7. Any component whose internal construction uses metallurgic bonding with a melting temperature not compatible with the end-application mounting conditions 8. <<deleted>>~~Wire link fuses < 5A~~ 9. TO5 relays without double welding of the mechanism to the header or with any type of integrated diodes inside 10. Aluminium liquid electrolytic capacitors 11. Tin coated wires and cables 12. PVC insulated wires and cables 13. Electromechanical parts in commercial grade 14. Feedthrough filter in commercial grade	
4.2.2.2e	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used for new designs: 1. RNC90 > 100 kOhm~~kΩ~~, 2. TO3 and DO4/DO5 packages. 3. Wire link fuses	Applicable
4.2.2.2f		Applicable
4.2.2.2g		Applicable
4.2.2.2h	The use of pure tin (inside or outside the part) shall be declared in the PAD or in the JD.	Applicable
4.2.2.2i	The customer shall specify either requirement 4.2.2.2j or requirements 4.2.2.2k and 4.2.2.2l to handle risks linked with pur-tin terminations.~~To assess Pb-free with tin finish whisker risk, the following actions shall be performed by the supplier:~~ ~~1. In order to verify information from manufacturer (included in the JD), as part of the incoming inspection, check the lead finish of all procured lots as per ESCC 25500 basic specification.~~ ~~2. When confirmed during incoming, assess individually each use of pure tin termination through a RFD.~~ ~~3. Submit each lot confirmed with pure tin terminations to solder dip with an SnPb solder.~~ ~~NOTE Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation it is required that the termination is coated over its entire length, right up to the package surface (no stand off).~~ ~~4. Perform the retinning operation before screening and before the lot acceptance test.~~	Applicable

	~~5. Before retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval.~~ ~~6. Perform the evaluation of retinned components in conformance with Figure 8-1 from the requirement 8.1a.~~ ~~7. Perform the lot acceptance of retinned components in conformance with Figure 8-2 from the requirement 8.1a.~~	
4.2.2.2.j	The following actions shall be performed by the supplier to control the pure-tin risk: 1. Collect and synthesize all information participating to the risk analysis in conformance with Clause 8, 2. Based on the risk analysis, elaborate a mitigation plan. 3. Include in the JD the risk analysis and mitigation plan for customer approval. 4. In case of retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval. 5. Perform evaluation tests, lot acceptance tests and screening tests of retinned components after the retinning process NOTE 1 The mitigation plan can include one or a combination of the following solutions: • Tin whisker sensitivity evaluation • Retinning of terminations with complementary evaluation. NOTE 2 Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation, the termination is coated over its entire length, right up to the package surface (no stand off). This process is critical and needs to be evaluated and well controlled. • Conformal coating. • Design modification.	Applicable
4.2.2.2k	All the following conditions shall be fulfilled to use Parts with matte pure tin finish, >97% tin: 1. they pass the JESD-201 class 2 requirements or meet the GEIA-STD-0005-2/Class 2B requirements, 2. they are not used in power function, Voltage>15V and Current>2A. 3. they are not mechanically torqued on board or equipment.	Applicable

4.2.2.2l	If one of the three conditions specified in requirement 4.2.2.2.k is not met, a mitigation plan shall be submitted to the customer for approval, through the JD approval process. NOTE This mitigation plan can include, as an example, one of the following solutions: • Conformal coating • Design analysis and risk assessment versus a possible short circuit	Applicable
	4.2.2.3 Preferred sources	
4.2.2.3a		Not applicable
4.2.2.3b		Not applicable
4.2.2.3c		Applicable
4.2.2.3d	Preference shall be given to components which necessitate the least evaluation or qualification effort.	Not applicable
4.2.2.3e	Starting with the design phase of the project the supplier shall ensure maximum use of preferred and qualified components to achieve component reduction and standardization.	Applicable
4.2.2.3f	When selecting items, the supplier shall check the current data, applicability of the basis of qualification, problem notifications and alerts, and adequacy of specifications.	Applicable
4.2.2.3g	The supplier shall implement a type reduction activity.	Applicable
	4.2.2.4 Radiation hardness	
4.2.2.4a		Applicable
4.2.2.4b		Applicable
4.2.2.4c		Applicable
4.2.2.4d		Applicable
4.2.2.4e		Applicable
4.2.2.4f		Applicable
4.2.2.4g		Applicable
4.2.2.4h		Applicable
4.2.2.4i		Applicable
	4.2.2.5 Derating	
4.2.2.5a		Applicable
~~4.2.2.5b~~	~~For wire link fuses, the current derating factor shall be 50 % with an additional derating of 0,2 %/°C for an increase in the temperature of fuse body above 25 °C.~~	N/A
	4.2.2.6 Temperature range	
4.2.2.6a	Commercial parts shall be selected in the highest available temperature range.	New

4.2.2.6b	A minimum 10 °C margin shall be used between the maximum manufacturer temperature range and the application temperature range (including worst cases).	New
~~4.2.2.6c~~	<<deleted>>~~In case |(manufacturer max temperature range – used max temp)| < 10 °C, an electrical characterisation shall be performed at used temperature with an additional margin of 10 °C during the evaluation step.~~ ~~NOTE 1 Example: for a manufacturer -40°C/+85°C temperature range with an application up to +80°C, then an electrical characterisation is performed at +90°C.~~ ~~NOTE 2 Example for a manufacturer -40°C/+85°C temperature range with an application down to -35°C, then an electrical characterisation is performed at -45°C.~~	Deleted ~~New~~
4.2.2.6d	Operating temperature range of all commercial parts shall be greater or equal to (-40 / 85) °C.	New
4.2.2.6e	Temperature range of commercial ceramic capacitors shall be greater or equal to (-40 / 125) °C	New
	4.2.3 Component evaluation	
	4.2.3.1 General	
4.2.3.1a		Applicable
~~4.2.3.1b~~	~~The supplier shall plan and carry out the evaluation.~~	N/A
4.2.3.1c		Applicable
4.2.3.1d		Applicable
4.2.3.1e	In the definition of the evaluation programme any information including pertinent reliability, analysis and test data from the manufacturer of the component and previous use in comparable applications shall be considered and their relevance justified.	Applicable
4.2.3.1f		Applicable
4.2.3.1g		Applicable
4.2.3.1h		Applicable
4.2.3.1i	The supplier shall review the evaluation results to determine their impact on the content of the screening and lot acceptance tests.	Modified
4.2.3.1j		Applicable
4.2.3.1k	The supplier shall prepare a preliminary internal supplier's specification for electrical testing during evaluation tests. NOTE This specificaton can be part of the Test Plan.	New

4.2.3.1l	The supplier specification specified in 4.2.3.1k shall as minimum include tested parameters, test conditions, acceptance criteria, drift limits.	New
4.2.3.1m	The supplier shall update the internal supplier's specification used for screening and lot acceptance in accordance with the results of evaluation testing.	New
4.2.3.1n	The preliminary and the final internal supplier's specification as specificed in Annex C shall be submitted to the customer for approval.	New
4.2.3.2 Component manufacturer assessment		
4.2.3.2.1		Not applicable See 4.2.2.1.g
4.2.3.2.2a		Not applicable See 4.2.2.1.g
4.2.3.2.2b		Not applicable See 4.2.2.1.g
4.2.3.3. Construction analysis		
4.2.3.3a		Applicable
4.2.3.3b	The Construction analysis shall be documented by a procedure to be submitted on request~~sent~~ to the customer for approval. NOTE Annex H provides guidelines for microcircuits, diodes, transistors and optocouplers~~such procedure~~.	Modified
4.2.3.3c		Applicable
4.2.3.4 Evaluation testing		
4.2.3.4a		Applicable
4.2.3.4b		Applicable
4.2.3.4c	Evaluation tests shall be performed as specified in ~~Figure 4-1 and Table 4-1.~~: 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4 Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	New

4.2.3.4d	Omission of any of the elements of tests specified in Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8~~Figure 4-1 and Table 4-1~~, or the introduction of alternative activities, shall be justified in the JD. ~~NOTE For mounting process (including baking for PED), see ECSS-Q-ST-70-38 and ECSS-Q-ST-70-08.~~	New
~~4.2.3.4e~~	<<deleted>>~~Evaluation of retinned components shall be performed as specified in Figure 8-1 from the requirement 8.1a.~~	Deleted

Figure 4-1: <<deleted>>

Table 4–1: <<deleted and moved as legacy test files as Table 8–9>>

4.2.4 Parts approval		
4.2.4a	All components shall be reviewed and approved by the customer through the PCB.~~The supplier shall document the procedure for approval of each component type intended for use in flight products.~~	Applicable
~~4.2.4b~~	~~The approval of components shall be based on consideration of all pertinent data including both the electrical and environmental performance as well as the established quality and the dependability assurance requirements.~~	N/A
4.2.4c		Applicable
4.2.4d	The approval process by the customer depends on the part qualification status and shall be organized as follows:~~Prior to procurement of components (or before equipment CDR, at the latest), the approval process by the customer shall be organized as follows:~~	Applicable ~~Modified~~
	1. Space qualified parts : Space qualified parts listed in the DCL are approved through the DCL review except in the following cases where a PAD in conformance with ECSS-Q-ST-60 Annex D is delivered for customer's approval: (a) additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA), (b) used outside the specified limits, (c) specific tests are required during procurement as per Table 7-1, (d) pure tin is used inside or outside the part.	Not applicable
	2. Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer's approval.	Not applicable
	3. Commercial parts: A Justification Document ~~is required~~ in accordance with ECSS-Q-ST-60-13 Annex F is delivered to customer for customer's approval.	Applicable
	4. <<deleted>>~~For any commercial part, a Justification Document, as per ECSS-Q-ST-60-13 (clause 4.2.4), is required, instead of a PAD.~~	Deleted
4.2.4e	In case the evaluation results are changing the testing conditions documented in the JD, a new revision of JD shall be submitted to the customer for approval.	Modified
4.2.4f	The parts approval process, including PAD and JD approval, shall be completed prior to CDR, or MRR for recurring units if there is no CDR.	Applicable
4.3 Component procurement		
4.3.1 General		
4.3.1a		Applicable

4.3.1b		Not applicable
4.3.1c		Not applicable
4.3.1d		Applicable
4.3.1e	The supplier shall ensure the compatibility of the change with its application and update all the related documentation. NOTE e.g RFD, PAD, JD, evaluation.	Applicable
4.3.1f	The change shall be submitted to the customer for approval. ~~For non-qualified parts, a change of products as defined in 4.3.1d shall be reflected in an updated PAD or JD.~~	Applicable
4.3.1g		Applicable
4.3.1h		Applicable
4.3.1i	Each procured EEE part shall be traceable to a manufacturer assigned trace code. NOTE The procurement of a single trace code per delivery lot should be preferred and encouraged.	New
4.3.1j	Each trace code shall be maintained as is through the entire supply chain including distributor. NOTE As far as possible, commercial parts should be ordered in the manufacturer's standard packing quantities or multiples thereof to avoid distributor re-packing and handling and to preserve the traceability information usually included on the original manufacturer packaging.	New
4.3.1k	The supplier shall ensure that the elements of the JD in accordance with Annex F, including any action plan, are applicable to flight parts.	New
4.3.2. Procurement specification		
4.3.2a	The supplier shall procure EEE components according to controlled specifications. NOTE It can be procurer's in-house specification, a manufacturer's drawing or a datasheet as a minimum.	Modified
4.3.2b		Not applicable
4.3.2c		Not applicable
4.3.2d		Not applicable
4.3.2e		Applicable
4.3.2f		Applicable
4.3.2g		Applicable

4.3.2h	If additional requirements to the manufacturer are identified by the supplier, they shall be specified in the procurement specification, in conformance with DRD from Annex C.	New
4.3.3. Screening requirements		
4.3.3a		Applicable
4.3.3b		Applicable
4.3.3c		Applicable
4.3.3d	For commercial parts, screening tests shall be performed in accordance with ~~Table 4-2.~~: 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	Modified
~~4.3.3e~~	~~For active parts (transistors, diodes) packaged in TO3, DO4 or DO5, the PIND test method shall be submitted to the customer's approval.~~	N/A
4.3.3f		Applicable
4.3.3g	~~In case a component is not available in a qualified version according to quality level specified in Table 7-1, the screening of the component shall meet the screening flow defined by the generic specifications listed in Table 7-1.~~	N/A ~~Applicable~~
4.3.3h	In case of X-rays or CT scan inspection, the total dose deposited and exposure time shall not deteriorate part performance or reliability~~shall be less than 1/10 of the product acceptable dose~~.	Applicable

Table 4–2: <<deleted and moved as legacy test files as Table 8–10>>

4.3.4 Initial customer source inspection (precap)		
4.3.4a		Not applicable
4.3.4b		Not applicable
4.3.4c		Not applicable
4.3.5 Lot acceptance		
4.3.5a	The supplier shall ensure that any lot/date ~~each trace code~~ of EEE parts is submitted to a lot acceptance procedure specified, in line with	Applicable ~~Modified~~

	applied normative systems, ~~in Figure 4-2 and Table 4-3~~ according to the following rules:	
	1.	Not applicable
	2.	Not applicable
	3. Commercial components: (a) The content of the lot acceptance is defined according to information provided by the justification document according to ECSS-Q-ST-60-13 Annex F~~Each trace code is submitted to lot acceptance as specified in Table 4-3~~. (b) The proposed lot acceptance is approved through the approval process in accordance with the clause 4.2.4. ~~(c) Omission of any of these elements, or the introduction of alternative tests, is justified in the JD.~~ ~~(d) If evaluation test is performed directly on flight lot (and if in conformance with lot acceptance and screening requirements), evaluation data can be used as lot acceptance.~~ ~~(e) The lot acceptance report is sent to the customer, on request, for information.~~	Applicable ~~Modified~~
4.3.5b		Not applicable
4.3.5c	Lot acceptance tests~~of retinned components~~ shall be performed in accordance with:~~as specified in Figure 8-2, from the requirement 8.1a.~~ 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	New

Figure 4-2: <<deleted>>

Table 4–3: <<deleted and moved as legacy test files as Table 8–11>>

4.3.6 Final customer source inspection (buy-off)		
4.3.6a		Not applicable

4.3.6b		Not applicable
4.3.6c	For commercial parts, the buy off shall be replaced by an incoming inspection at the procurement entity's facility reported in the JD in accordance with clause 4.3.7.	Modified
4.3.6d		Not applicable
4.3.7 Incoming inspection		
4.3.7a		Applicable
4.3.7b	The incoming inspection shall include the following items: 1. For any part: the minimum inspections required in ESCC 21004. 2. For the non-space qualified parts, when the final customer source inspection has not been performed, the following additional items shall be done: (a) External visual inspection by sampling (AQL 0,65% level II or 20 parts min) (b) Electrical measurements at room temperature on 20 parts or 100 % (if lot size < 20 parts), or a datapackage review.	Applicable
4.3.7c		Applicable
4.3.7d		Not applicable
4.3.7e		Applicable
4.3.8 Radiation verification testing		
4.3.8a		Applicable
4.3.8b	RVT shall be performed in accordance with internationally recognized standards, such as ESCC Basic Specifications No. 22900, 25100 and 22500.	Applicable
4.3.8c		Not applicable
4.3.8d		Applicable
4.3.8e		Applicable
4.3.8f	Parts submitted to ~~RVT~~ total dose test shall be first screened as specified in the clause 4.3.3 to be fully representative of flight parts.	New
4.3.9 Destructive physical analysis		
4.3.9a	The DPA shall be performed according to the procurement Tables Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8 of Clause 8~~on 3 samples per lot of commercial parts during evaluation after lifetest as specified in the clause 4.2.3.4 and after relifing as specified in the clause 4.3.10~~. ~~NOTE Annex H provides guidelines for the construction analysis and descrtictive physical analysis.~~	Modified

4.3.9b		Not applicable
4.3.9c		Not applicable
4.3.9d		Not applicable
4.3.9e	The DPA process shall be documented by a procedure to be submitted~~sent~~, on request, to the customer for review. NOTE For guidance refer to the basic specificaton ESSC 20600 and for active parts ECSS-Q-ST-60-13 Annex H~~provides guidelines for the construction analysis and destructive physical analysis~~.	Applicable
4.3.9f		Applicable
~~4.3.9g~~	~~Independent laboratories may perform DPA when approved by the customer.~~	N/A
4.3.9h		Not applicable
4.3.9i		Applicable
4.3.9j		Applicable
~~4.3.9k~~	<<deleted>>~~A DPA shall be conducted during relifing in accordance with clause 4.3.10.~~	Deleted ~~New~~
4.3.10 Relifing		
4.3.10a		Applicable
4.3.10b	For components meeting the criteria specified in the requirement 4.3.10a, and which have a lot / date code exceeding the period defined in ECSS-Q-ST-60-14 clause 5~~7 years~~, the relifing procedure ECSS-Q-ST-60-14 shall apply to the lot.	Applicable ~~Modified~~
~~4.3.10c~~	<<deleted>>~~Humidity test and lifetest shall be performed in accordance with the clause 4.3.5 in case these tests have not been performed on the lot during the evaluation or the procurement phase.~~ ~~NOTE Humidity test includes HAST or THB.~~	Deleted ~~New~~
~~4.3.10d~~	<<deleted>>~~As part of the relifing process, a DPA on 3 pieces shall be performed on each lot in accordance with the clause 4.3.9.~~	Deleted ~~New~~
4.3.11 Manufacturer's data documentation deliveries		
4.3.11a	The manufacturer's or the franchised distributor's CoC shall be delivered to the parts procurer.	Modified
4.3.11b	Any other data, defined in the procurement documents, shall be delivered to the parts' procurer in line with the purchase order.	Modified
4.3.11c	For non qualified parts, the parts procurer shall store the documentation for a minimum of 15~~10~~ years after receiption of the components.	Applicable ~~Modified~~
4.4 Handling and storage		

4.4a	The supplier shall establish and implement procedures for handling and storage of components in order to prevent possible degradation. NOTE For guidance, refer to the basic specification ESCC 20600.	Applicable
4.4b		Applicable
4.4c		Applicable
4.4d		Applicable
4.4e	Plastic encapsulated devices shall be stored in one of the following conditions: 1. Dry Nitrogen 2. Dry and ionised air, with RH in a range of 15% to 20% 3. Dry packs as specified in J-STD-033 for dry pack inspection and control	New
4.5 Components quality assurance		
4.5.1 General		
4.5.1a		Applicable
4.5.2 Nonconformances or failures		
4.5.2a		Applicable
4.5.2b		Applicable
4.5.2c		Applicable
4.5.2d		Applicable
4.5.3 Alerts		
4.5.3a	The supplier shall take into account all received alerts, errata sheets, from international alert systems, from manufacturers or sent by the customer and shall validate that there are no alerts related to the intended application and the recommendations of alerts have been taken into account~~on the proposed parts with respect to the batch information (including date code)~~.	Applicable
4.5.3b		Applicable
4.5.3c		Applicable
4.5.4 Traceability		
~~4.5.4a~~	~~The traceability of individual components during manufacturing and testing shall be maintained as required by the procurement specifications.~~	N/A ~~Applicable~~
4.5.4b	The traceability shall be maintained through incoming, storage, and installation at the procurer and user of the component ~~in accordance with programme PA requirements~~.	Applicable
4.5.4c		Applicable

4.5.4d	The traceability of EEE parts during installation in equipment, shall be ensured by the supplier through maintaining the traceability to the manufacturer's trace code number of the EEE parts actually mounted.	Modified
4.5.4e	If the as built DCL has not yet been delivered, the supplier shall be able to provide this information (part type actually installed with its relevant trace code number) within one week.	Modified
	4.5.5 Lot homogeneity for sampling test	
4.5.5a	If tests are performed by sampling, the sampled parts shall be selected so that they are representative of the trace code distribution.	Modified
4.5.5b		Applicable
	4.6 Specific components	
	4.6.1 General	
4.6.1a	<<deleted>>	Deleted
	4.6.2 ASICs	
4.6.2a		Applicable
	4.6.3 Hybrids	
4.6.3a		Not applicable
4.6.3b		Not applicable
4.6.3c		Not applicable
	4.6.4 One time programmable devices	
4.6.4a		Applicable
4.6.4b	The JD shall allow traceability to the information related to the procurement of blank parts, the programming process and the acceptance of the programmed parts. NOTE The programming process and the acceptance of the programmed parts may be part of PCB, for customer approval, if not indicated in the JD.	Modified
4.6.4c	<<deleted>>	Deleted
4.6.4d		Applicable
4.6.4e	For One-time programmable FPGA and PROM ~~types~~ without a clear and defined heritage, a post-programming burn-in shall be applied, in conformance with ESCC9000 subclause 8.16 ~~8.21~~, for a minimum duration of 160 h. NOTE FPGA and PROM ~~types~~ with defined heritage are documented in these reports: ESCC REP 010 and ESCC REP011, available on https://escies.org.	Applicable
4.6.4f	The supplier shall prepare a post-programming procedure for customer's approval, depending on part types, including post and port burin-in electrical tests, burn-in conditions ~~including when~~	Applicable

	~~necessary electrical tests, programming conditions and equipment, programming software version qualified by the supplier, burn in conditions, additional screening tests and specific marking after programming) as applicable per 4.6.4d~~. NOTE: This includes, when necessary: - electrical test conditions, - programming conditions and equipment, -programming software version qualified by the supplier, - burn-in conditions, - additional screening tests, and - specific marking after programming	
4.6.4g		Applicable
4.6.4h		Applicable
4.6.5 Microwave monolithic integrated circuits		
4.6.5a		Not applicable
4.6.6 Connectors		
4.6.6a	For connectors with removable contacts, contacts shall be procured from the same manufacturer as the connector in which they are mounted.	Applicable
4.7 Documentation		
4.7a	Any result from inspection or control shall be documented (including lot acceptance, incoming, relifing and complementary tests).	Modified

Table 4-4: Documentation for Class 1 components

Document	Clause	Customer	Comments
~~New : RFD~~	~~4.2.2.2~~	~~Approval~~	~~For pure tin termination~~
New *:* Procedure for hot solder dip process	4.2.2.2j.	Approval	For retinning operation
New *:* Internal supplier's specification	4.2.3.1k.~~i~~	Approval	Applicable to the preliminary and final internal supplier's specification
PAD : not applicable	4.2.4	-	-
New *:* Justification Document	4.2.4	Approval	-
Procedure for customer precap : not applicable	4.3.4	-	-
New *:* Procedure for construction analysis	4.2.3.3	~~Approval~~ Information (on request)	-
New *:* ~~Lot acceptance report~~ Evaluation and LAT report	~~4.3.5~~ 4.2.4d.	Information (on request)	-

5
Requirements for class 2 components

5.1 Components programme management		
	5.1.1. General	
~~5.1.1a~~	The supplier shall establish and implement throughout the duration of the business agreement a component programme which ensures that the requirements of the project as defined by the customer and the supplier in the related business agreement are in compliance with this standard.	N/A ~~Applicable~~
	5.1.2 Components control programme	
	5.1.2.1 Organization	
5.1.2.1a		Applicable
	5.1.2.2 Component control plan	
5.1.2.2a		Applicable
5.1.2.2b		Applicable
	5.1.3 Parts control board	
5.1.3a		Applicable
5.1.3b		Applicable
5.1.3c		Applicable
5.1.3d		Applicable
	5.1.4. Declared component list	
5.1.4a	For each equipment, its supplier shall issue a DCL in an editable and sortable electronic format such as .xls or .xlsx or .csv.~~, as a minimum compatible with CSV, identifying all component types needed.~~ ~~NOTE CSV is a common file format that can be used to transfer data between database or spreadsheet tables (a spreadsheet program is for example Excel®)~~	Applicable
5.1.4b		Applicable
5.1.4c		Applicable
5.1.4d	After equipment CDR, all modifications affecting the PAD and JD information shall be implemented, in the "as design" DCL~~, through the CN / CR process~~ and submitted to the customer for approval. ~~NOTE For JD generation, see 5.2.4.d.~~	Applicable ~~Modified~~

5.1.4e		Applicable
5.1.4f		Applicable
5.1.4g		Applicable
5.1.4h		Applicable
5.1.4i	The supplier shall establish and update a consolidated "as design" DCL at its level and deliver it to the customer.	Applicable
5.1.5. Electrical and mechanical GSE		
5.1.5a		Applicable
5.1.5b		Applicable
5.1.6 EQM components		
5.1.6a	EEE components used in Engineering Qualification Model (EQM) shall be fit, form and function representative of the flight components and from the same manufacturers.	Applicable
5.1.6b	If thermal vacuum tests are performed on the EQM, the EEE parts shall be material representative of the FM parts.	Applicable
5.2 Component selection, evaluation and approval		
5.2.1 General		
5.2.1a		Applicable
5.2.1b		Applicable
5.2.2. Manufacturer and component selection		
5.2.2.1 General rules		
5.2.2.1a		Applicable
5.2.2.1b		Applicable
~~5.2.2.1c~~	<<deleted and moved to 5.2.2.5b>>~~Preference shall be given to components which necessitate the least evaluation or qualification effort.~~	N/A ~~Applicable~~
~~5.2.2.1d~~	<<deleted and moved to 5.2.2.5c>>~~When selecting items, the supplier shall check the current data, applicability of the basis of qualification, problem notifications and alerts, and adequacy of specifications.~~	N/A ~~Applicable~~
5.2.2.1e	For the assessment of commercial components, the supplier shall collect the available data on the manufacturer and the component in the JD. Specified in the requirement 5.2.4.d. NOTE It is important to check the exhaustiveness of the manufacturer documentation & data sheet with respect to the following items: • component marking, • mechanical description, • electrical and thermal description	New

~~5.2.2.1f~~	<<deleted>>~~For Deep Sub Micron Technologies (<90nm), the detailed test definition shall identify the technology through the construction analysis and the application.~~ ~~NOTE 1 It is important to ensure that the test conditions remain as close as possible to application.~~ NOTE ~~2~~ ~~This requirement is important due to the specificities of Deep Sub Micron Technologies (<90nm).~~	Deleted ~~New~~
5.2.2.2. Parts and material restriction		
5.2.2.2a		Applicable
5.2.2.2b		Applicable
5.2.2.2c	With respect to health and safety, beryllium oxide, , lithium ~~cadmium, lithium~~ (except if identified in the procurement specification), cadmium, magnesium, mercury, zinc, radioactive material and all material which can cause safety hazard shall not be used.	Applicable
5.2.2.2d	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used:	Applicable ~~Modified~~
	1. <<deleted>>~~EEE components with pure tin (less than 3% Pb in case of SnPb alloy) used as a finish on the leads, terminations and external surfaces of components and packages.~~ ~~NOTE For EEE components with pure tin, see also requirements 5.2.2.2h and 5.2.2.2i.~~ 2. Hollow core resistors 3. Potentiometers (except for mechanism position monitoring) 4. Non-metallurgically bonded diodes 5. Semiconductor dice with unglassivated active area 6. Wet slug tantalum capacitors other than capacitor construction using double seals and a tantalum case 7. Aluminium liquid electrolytic capacitors 8. Any component whose internal construction uses metallurgic bonding with a melting temperature not compatible with the end-application mounting conditions 9. <<deleted>>~~Wire link fuses < 5A~~ 10. TO5 relays without double welding of the mechanism to the header or with any type of integrated diodes inside 11. Tin coated wires and cables 12. PVC insulated wires and cables 13. Electromechanical parts in commercial grade 14. Feedthrough filter in commercial grade	Applicable ~~Modified~~

5.2.2.2e	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used for new designs: 1. RNC90 > 100 kOhm~~kΩ~~, 2. TO3 and DO4/DO5 packages. 3. Wire link fuses	Applicable
5.2.2.2f		Applicable
5.2.2.2g		Applicable
5.2.2.2h	The use of pure tin (inside or outside the part) shall be declared in the PAD or in the JD.	Applicable ~~Modified~~
5.2.2.2i	The customer shall specify either requirement 5.2.2.2j or requirements 5.2.2.2k and 5.2.2.2l to handle risks linked with purt-tin terminations.~~To assess Pb free with tin finish whisker risk, the following actions shall be performed by the supplier:~~ ~~1. In order to verify information from manufacturer (included in the JD), as part of the incoming inspection, check the lead finish of all procured lots as per ESCC 25500 basic specification.~~ ~~2. When confirmed during incoming, access individually each use of pure tin termination through a RFD.~~ ~~3. Collect and synthesize all information participating to the risk analysis in conformance with the Clause 9.~~ ~~4. Based on the risk analysis, elaborate a mitigation plan, submitted to the customer for approval.~~ ~~5. Include into the mitigation plan one or a combination of the following solutions (not limited to):~~ ~~(a) Retinning of terminations with complementary evaluation in conformance with Figure 8-3 from the requirement 8.1a, and lot acceptance test in conformance with Figure 8-4 from the requirement 8.1a.~~ ~~NOTE Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation, it is required that the termination is coated over its entire length, right up to the package surface (no stand off).~~ ~~(b) In case of both retinning and screening, perform the screening on retinned components.~~ ~~(c) Tin whisker sensitivity evaluation.~~ ~~(d) Conformal coating.~~ ~~(e) Design modification.~~	Applicable ~~New~~

	~~6. In case of retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval.~~ ~~7. Through RFD submit the mitigation plan and results for the customer approval.~~	
5.2.2.2.j	The following actions shall be performed by the supplier to control the pure-tin risk: 1. Collect and synthesize all information participating to the risk analysis in conformance with Clause 8, 2. Based on the risk analysis, elaborate a mitigation plan. 3. Include in the JD the risk analysis and mitigation plan for customer approval. 4. In case of retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval. 5. Perform evaluation tests, lot acceptance tests and screening tests of retinned components after the retinning process. NOTE 1 The mitigation plan can include one or a combination of the following solutions: • Tin whisker sensitivity evaluation • Retinning of terminations with complementary evaluation. NOTE 2 Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation, the termination is coated over its entire length, right up to the package surface (no stand off). This process is critical and needs to be evaluated and well controlled. • Conformal coating. • Design modification.	Applicable
5.2.2.2k	All the following conditions shall be fulfilled to use Parts with matte pure tin finish, >97% tin: 1. they pass the JESD-201 class 2 requirements or meet the GEIA-STD-0005-2/Class 2B requirements, 2. they are not used in power function, Voltage>15V and Current>2A. 3. they are not mechanically torqued on board or equipment.	Applicable
5.2.2.2l	If one of the three conditions specified in requirement 5.2.2.2.k is not met, a mitigation plan shall be submitted to the customer for approval, through the JD approval process. NOTE This mitigation plan can include, as an example, one of the following solutions:	Applicable

	• Conformal coating • Design analysis and risk assessment versus a possible short circuit	
	5.2.2.3 Radiation hardness	
5.2.2.3a		Applicable
5.2.2.3b		Applicable
5.2.2.3c		Applicable
5.2.2.3d		Applicable
5.2.2.3e		Applicable
5.2.2.3f		Applicable
5.2.2.3g		Applicable
5.2.2.3h		Applicable
5.2.2.3i		Applicable
	5.2.2.4 Derating	
5.2.2.4a		Applicable
~~5.2.2.4b~~	~~For wire link fuses, the current derating factor shall be 50 % with an additional derating of 0,2 %/°C for an increase in the temperature of fuse body above 25 °C.~~	N/A ~~Applicable~~
	5.2.2.5 Preferred sources	
5.2.2.5a		Applicable
5.2.2.5b	Preference shall be given to components which necessitate the least evaluation or qualification effort.	Applicable
5.2.2.5c	When selecting items, the supplier shall check the current data, applicability of the basis of qualification, problem notifications and alerts, and adequacy of specifications.	Applicable
	5.2.2.6 Temperature range	
5.2.2.6a	Commercial parts shall be selected in the highest available temperature range.	New
5.2.2.6b	A minimum 10°C margin shall be used between the maximum manufacturer temperature range and the application temperature range (including worst cases).	New
~~5.2.2.6c~~	<<deleted>>~~In case |(manufacturer max temperature range – used max temp)|< 10°C, an electrical characterisation shall be performed at used temperature with an additional margin of 10°C during the evaluation step.~~ ~~NOTE 1 Example: for a manufacturer -40°C/+85°C temperature range with an application up to +80°C, then an electrical characterisation is performed at +90°C.~~ NOTE ~~2~~ ~~Example for a manufacturer -40°C/+85°C temperature range with an application down~~	Deleted ~~New~~

	~~to -35°C, then an electrical characterisation is performed at +45°C.~~	
5.2.2.6d	Operating temperature range of all commercial parts shall be greater or equal to (-40 / 85) °C.	New
5.2.2.6e	Temperature range of commercial ceramic capacitors shall be greater or equal to (-40 / 125) °C	New
	5.2.3 Component evaluation	
	5.2.3.1 General	
5.2.3.1a		Applicable
~~5.2.3.1b~~	~~The supplier shall plan and carry out the evaluation.~~	N/A ~~Applicable~~
5.2.3.1c		Applicable
5.2.3.1d		Applicable
5.2.3.1e	In the definition of the evaluation programme any information including pertinent reliability, analysis and test data from the manufacturer of the component and previous use in comparable applications shall be considered and their relevance justified.	Applicable
5.2.3.1f		Applicable
5.2.3.1g		Applicable
5.2.3.1h		Applicable
5.2.3.1i	The supplier shall review the evaluation results to determine their impact on the content of the screening and lot acceptance tests.	Modified
5.2.3.1j		Applicable
5.2.3.1k	The supplier shall prepare a preliminary internal supplier's specification for electrical testing during evaluation tests. NOTE This specificaton can be part of the Test Plan.	New
5.2.3.1l	The supplier specification specified in 5.2.3.1k shall as minimum include test parameters, test conditions, acceptance criteria, drift limits.	New
5.2.3.1m	The supplier shall update the internal supplier's specification used for screening and lot acceptance in accordance with the results of evaluation testing.	New
5.2.3.1n	The preliminary and the final internal supplier's specification as specified in Annex C shall be submitted to the customer for approval.	New
	5.2.3.2 Component manufacturer assessment	
5.2.3.2a		Not applicable See 5.2.2.1.e.
	5.2.3.3. Construction analysis	
5.2.3.3a		Applicable

5.2.3.3b	The Construction analysis shall be documented by a procedure to be submitted on request~~sent~~ to the customer for approval. NOTE Annex H provides guidelines for microcircuits, diodes, transistors and optocouplers~~such procedure~~.	Modified
5.2.3.3c		Applicable
5.2.3.4. Evaluation testing		
5.2.3.4a		Applicable
5.2.3.4b		Applicable
5.2.3.4c	Evaluation tests shall be performed as specified in ~~Figure 5-1 and Table 5-1.~~ : 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4 Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	New
5.2.3.4d	Omission of any of the elements of tests specified in Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8~~Figure 5-1 and Table 5-1~~, or the introduction of alternative activities, shall be justified in the JD. ~~NOTE For mounting process (including baking for PED), see ECSS-Q-ST-70-38 and ECSS-Q-ST-70-08.~~	New
~~5.2.3.4e~~	<<deleted>>~~Evaluation of retinned components shall be performed as specified in Figure 8-3 from the requirement 8.1a.~~	Deleted~~New~~

Figure 5-1: <<deleted>>

Table 5–1: <<deleted and moved as Legacy test files as Table 8–12>>

5.2.4 Parts approval		
5.2.4a	All components shall be reviewed and approved by the customer through the PCB.~~The supplier shall document the procedure for approval of each component type intended for use in flight products.~~	Applicable

~~5.2.4b~~	~~The approval of components shall be based on consideration of all pertinent data including both the electrical and environmental performance as well as the established quality and the dependability assurance requirements.~~	N/A ~~Applicable~~
5.2.4c		Applicable
5.2.4d	The approval process by the customer depends on the part qualification status and shall be organized as follows:~~Prior to procurement of components (or before equipment CDR, at the latest), the approval process by the customer shall be organized as follows:~~	Applicable ~~Modified~~
	1. Space qualified parts : Space qualified parts listed in the DCL are approved through the DCL review except in the following cases where a PAD in conformance with ECSS-Q-ST-60 Annex D is delivered for customer's approval: (a) additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA), (b) used outside the specified limits, (c) specific tests are required during procurement as per Table 7-1, (d) pure tin is used inside or outside the part.	Not applicable
	2. Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer's approval.	Not applicable
	3. Commercial parts: A Justification Document in accordance with ECSS-Q-ST-60-13 Annex F is delivered to customer for customer's approval.	Applicable ~~Not applicable~~
	4. <<deleted>>~~A Justification Document is required in accordance with annex F.~~	Deleted ~~Modified~~
5.2.4e	In case the evaluation results are changing the testing conditions documented in the JD, a new revision of JD shall be submitted to the customer for approval.	Modified
5.2.4f	The parts approval process, including PAD and JD approval, shall be completed prior to CDR, or MRR for recurring units if there is no CDR.	Applicable

5.3 Component procurement

5.3.1 General

5.3.1a		Applicable
5.3.1b		Not applicable
5.3.1c		Not applicable
5.3.1d		Applicable

5.3.1e	The supplier shall ensure the compatibility of the change with its application and update all the realated documentation. NOTE e.g RFD, PAD, JD, evaluation.	Applicable
5.3.1f	The change shall be submitted to the customer for approval. ~~For non-qualified parts, a change of products as defined in 4.3.1d shall be reflected in an updated PAD or DJD~~	Applicable
5.3.1g		Applicable
5.3.1h		Applicable
5.3.1i	Each procured EEE part shall be traceable to a manufacturer assigned trace code. NOTE The procurement of a single trace code per delivery lot should be preferred and encouraged.	New
5.3.1j	Each trace code shall be maintained as is through the entire supply chain including distributor. NOTE As far as possible, commercial parts should be ordered in the manufacturer's standard packing quantities or multiples thereof to avoid distributor re-packing and handling and to preserve the traceability information usually included on the original manufacturer packaging.	New
5.3.1k	The supplier shall ensure that the elements of the JD in accordance with Annex F, including any action plan, are applicable to flight parts.	New
5.3.2 Procurement specification		
5.3.2a	The supplier shall procure EEE components according to controlled specifications. NOTE It can be procurer's in-house specification, a manufacturer's drawing or a datasheet as a minimum.	Modified
5.3.2b		Not applicable
5.3.2c		Not applicable
5.3.2d		Not applicable
5.3.2e		Applicable
5.3.2f		Applicable
5.3.2g		Applicable
5.3.2h	If aditional requirements to the manufacturer are identified, they shall be specified in the procurement specification.	New
5.3.3 Screening requirements		
5.3.3a		Applicable

5.3.3b		Applicable
5.3.3c		Applicable
5.3.3d	For commercial parts, screening tests shall be performed in accordance with: 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	Modified
~~5.3.3e~~	~~For active parts (transistors, diodes) packaged in TO3, DO4 or DO5, the PIND test method shall be submitted to the customer's approval.~~	N/A ~~Applicable~~
5.3.3f		Applicable
5.3.3g	~~In case a component is not available in a qualified version according to quality level specified in Table 7-3, the screening of the component shall meet the screening flow defined by the generic specifications listed in Table 7-3.~~	Not Applicable ~~Applicable~~
5.3.3h	In case of X-rays or CT scan inspection, the total dose deposited and exposure time shall not deteriorate part performance or reliability~~shall be less than 1/10 of the product acceptable dose~~.	Applicable
~~5.3.3.i~~	<<deleted>>~~Based on data from the evaluation tests in conformance with the requirement 5.2.3.4 and data collected in the JD, the supplier may propose a modification of the screening flow of table 5-2, to be submitted to customer for approval.~~ NOTE ~~Data collected in the JD includes EFR, life test, thermal cycling.~~	Deleted ~~New~~
~~5.3.3.j~~	<<deleted>>~~If modification of 5.3.3f is proposed to the customer, it shall meet the following similarity criteria:~~ ~~1. For EFR, either:~~ ~~(a) the data are as the same die revision, wafer fab, process and package.~~ ~~(b) the data are not provided, but in this case the data on the same part type is not older than two years w.r.t date code.~~ ~~2. For lifetest, either:~~ ~~(a) the data are as the same die revision, wafer fab, process and pacakge.~~	Deleted ~~New~~

	~~(b) the data are not provided, but in this case the data on the same part type is not older thant two years w.r.t date code.~~ ~~3. For thermal cycles the data are on same package.~~	
~~5.3.3.k~~	<<deleted>>~~100% Pind test and 100% hermeticity test (when applicable) shall not be tailored out of the screening flow.~~	Deleted ~~New~~
~~5.3.3.l~~	<<deleted>>~~100% external visual inspection shall be performed in case of any test done during screening or in case of retinning.~~	Deleted ~~New~~

Table 5–2: <<deleted and moved as Legacy test files as Table 8–13>>

5.3.4 Initial customer source inspection (precap)		
5.3.4a		Not applicable
5.3.4b		Not applicable
5.3.5 Lot acceptance		
5.3.5a	The supplier shall ensure that any lot/date~~each trace~~ code of EEE parts is submitted to a lot acceptance procedure specified, in line with applied normative system, ~~in Figure 5-2 and Table 5-3~~ according to the following rules:	Applicable ~~Modified~~
	1.	Not applicable
	2.	Not applicable
	3. Commercial components: (a) The content of the lot acceptance is defined according to information provided by the justification document according to ECSS-Q-ST-60-13 Annex F~~Each trace code is submitted to lot acceptance as defined in Table 5-3~~. (b) The proposed lot acceptance is approved through the approval process in accordance with the clause 5.2.4. ~~(c) Omission of any of these elements, or the introduction of alternative tests, is justified.~~ ~~(d) If evaluation test is performed directly on flight lot (and if in conformance with lot acceptance and screening requirements), evaluation data can be used as lot acceptance.~~ ~~(d) The lot acceptance report is sent to the customer, on request, for information.~~	Modified
5.3.5b		Not applicable
5.3.5c	Lot acceptance tests~~of retinned components~~ shall be performed in accordance with:~~as specified in Figure 8-4 from requirement 8.1a.~~ 1. Table 8–1 for ceramic capacitors chips,	New

	2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	

Figure 5-2: <<deleted>>

Table 5–3: <<deleted and moved to Legacy test files as Table 8–14>>

5.3.6 Final customer source inspection (buy-off)		
5.3.6a		Not applicable
5.3.6b		Not applicable
5.3.6c	For commercial parts, the buy off shall be replaced by an incoming inspection at the procurement entity's facility reported in the JD in accordance with clause 5.3.7.	Modified
5.3.6d		Not applicable
5.3.7 Incoming inspection		
5.3.7a		Applicable
5.3.7b	The incoming inspection shall include the following items: 1. For any part: the minimum inspections required in ESCC 21004. ~~(a) Marking control,~~ ~~(b) Quantity verification,~~ ~~(c) Packing checking,~~ ~~(d) Review of the manufacturer delivered documentation,~~ ~~(e) Additional tests based on the type of component, criticality and heritage with the manufacturer (e.g. solderability tests, electrical tests),~~ ~~(f) In case of not golden termination, check the lead finish as per ESCC 25500 basic specification.~~	Applicable

	2. For the non-space qualified parts, when the final customer source inspection has not been performed, the following additional items shall be done: (a) External visual inspection by sampling (AQL 0,65% level II or 20 parts min) (b) Electrical measurements at room temperature on 20 parts or 100 % (if lot size < 20 parts), or a datapackage review.	
5.3.7c		Applicable
5.3.7d		Not Applicable
5.3.7e		Applicable
5.3.8 Radiation verification testing		
5.3.8a		Applicable
5.3.8b	RVT shall be performed in accordance with internationally recognized standards, such as ESCC Basic Specifications No. 22900, 25100 and 22500.	Applicable
5.3.8c		Not applicable
5.3.8d		Applicable
5.3.8e		Applicable
5.3.8f	Parts submitted to RVT shall be screened as specified in clause 5.3.3 to be fully representative of flight parts.	New
5.3.9 Destructive physical analysis		
5.3.9a	The DPA shall be performed according to the procurement Tables Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8 of Clause 8~~on 3 samples per lot of commercial parts (during evaluation after lifetest as specified in clause 5.2.3.4 and after relifing as specified by clause 5.3.10)~~. ~~NOTE Annex H provides guidelines for the construction analysis and destructive physical analysis.~~	Modified
5.3.9b		Not applicable
5.3.9c		Not applicable
5.3.9d	The DPA process shall be documented by a procedure to be sent, on request, to the customer for review. NOTE For guidance refer to the basic specificaton ESSC 20600 and for active parts ECSS-Q-ST-60-13 Annex H.	Modified
5.3.9e		Applicable

~~5.3.9f~~	~~Independent laboratories may perform DPA when approved by the customer.~~	N/A ~~Applicable~~
5.3.9g		Not applicable
5.3.9h		Applicable
5.3.9i		Applicable
~~5.3.9j~~	<<deleted>>~~A DPA shall be conducted during relifing in accordance with clause 5.3.10.~~	Deleted ~~New~~
5.3.10 Relifing		
5.3.10a		Applicable
5.3.10b	For components meeting the criteria specified in requirement 5.3.10a, and which have a lot / date code exceeding the period defined in ECSS-Q-ST-60-14 clause5~~7 years~~, the relifing procedure ECSS-Q-ST-60-14 shall apply to the lot.	Applicable ~~Modified~~
~~5.3.10c~~	<<deleted>>~~Humidity test and lifetest shall be performed in accordance with the clause 5.3.5 in case these tests have not been performed on the lot during the evaluation or the procurement phase.~~ ~~NOTE Humidity test include HAST or THB.~~	Deleted ~~New~~
~~5.3.10d~~	<<deleted>>~~As part of the relifing process, a DPA on 3 pieces shall be performed on each lot in accordance with the clause 5.3.9.~~	Deleted ~~New~~
5.3.11 Manufacturer's data documentation deliveries		
5.3.11a	The manufacturer's or the franchised distributor's CoC shall be delivered to the parts procurer.	Modified
5.3.11b	Any other data, defined in the procurement documents, shall be delivered to the parts' procurer in line with the purchase order.	Modified
5.3.11c	For non qualified parts, the parts procurer shall store the documentation minimum 15~~10~~ years after receiption of the components.	Applicable ~~Modified~~
5.4 Handling and storage		
5.4a	The supplier shall establish and implement procedures for handling and storage of components in order to prevent possible degradation. NOTE For guidance, refer to the basic specification ESCC 20600.	Applicable
5.4b		Applicable
5.4c		Applicable
5.4d		Applicable
5.4e	Plastic encapsulated devices shall be stored in one of the following conditions: 1. Dry Nitrogen	New

	2. Dry and ionised air with RH in a range of 15% to 20% 3. Dry packs as specified in J-STD-033 for dry pack inspection and control	
5.5 Components quality assurance		
	5.5.1 General	
5.5.1a		Applicable
	5.5.2 Nonconformances or failures	
5.5.2a		Applicable
5.5.2b		Applicable
5.5.2c		Applicable
5.5.2d		Applicable
	5.5.3 Alerts	
5.5.3a	The supplier shall take into account all received alerts, errata sheets, from international alert systems, from manufacturers or sent by the customer and shall validate that there are no alerts related to the intended application and the recommendations of alerts have been taken into account ~~on the proposed parts with respect to the batch information (including date-code)~~.	Applicable
5.5.3b		Applicable
	5.5.4 Traceability	
~~5.5.4a~~	~~The traceability of individual components during manufacturing and testing shall be maintained as required by the procurement specifications.~~	N/A ~~Applicable~~
5.5.4b	The traceability shall be maintained through incoming, storage, and installation at the procurer and user of the component ~~in accordance with programme PA requirements~~.	Applicable
5.5.4c		Applicable
5.5.4d	The traceability of EEE parts during installation in equipment, shall be ensured by the supplier through maintaining the traceability to the manufacturer's trace code number of the EEE parts actually mounted.	Modified
5.5.4e	If the as built DCL has not yet been delivered, the supplier shall be able to provide this information (part type actually installed with its relevant trace code number) within one week.	Modified
	5.5.5 Lot homogeneity for sampling test	
5.5.5a		Applicable
5.6 Specific components		
	5.6.1 General	
5.6.1a	<<deleted>>	Deleted

	5.6.2 ASICs	
5.6.2a		Applicable
	5.6.3 Hybrids	
5.6.3a		Not applicable
5.6.3b		Not applicable
5.6.3c		Not applicable
	5.6.4 One time programmable devices	
5.6.4a		Applicable
5.6.4b	The JD shall allow traceability to the information related to the procurement of blank parts, the programming process and the acceptance of the programmed parts.	Modified
5.6.4c	The programming process and the acceptance of the programmed parts may be part of PCB, for customer approval, if not indicated in the JD.	Modified
5.6.4d		Applicable
5.6.4e	For one-time programmable FPGA and PROM ~~types~~ without a clear and defined heritage, a post-programming burn-in shall be applied, in conformance with ESCC9000 subclause 8.16 ~~8.21~~, for a minimum duration of 160 h. NOTE: FPGA and PROM ~~types~~ with defined heritage are documented in these reports: ESCC REP 010 and ESCC REP011, available on https://escies.org.	Applicable
5.6.4f	The supplier shall prepare a post-programming procedure for customer's approval, depending on part types, including post and port burin-in electrical tests, burn-in conditions ~~including when necessary electrical tests, programming conditions and equipment, programming software version qualified by the supplier, burn in conditions, additional screening tests and specific marking after programming) as applicable per 4.6.4d~~. NOTE: This includes, when necessary: - electrical test conditions, - programming conditions and equipment, -programming software version qualified by the supplier, - burn-in conditions, - additional screening tests, and - specific marking after programming	Applicable
5.6.4g		Applicable
5.6.4h		Applicable
	5.6.5 Microwave monolithic integrated circuits	

5.6.5a		Not applicable
	5.6.6 Connectors	
5.6.6a	For connectors with removable contacts, contacts shall be procured from the same manufacturer as the connector in which they are mounted.	Applicable
5.7 Documentation		
5.7a	Any result from inspection or control shall be documented (including lot acceptance, incoming, relifing and complementary tests).	Modified

Table 5–4: Documentation for Class 2 components

Document	Clause	Customer	Comments
New : Procedure for hot solder dip process	5.2.2.2j	Approval	For retinning operation
New : Internal supplier's specification	5.2.3.1k	Approval	Applicable to the preliminary and final internal supplier's specification
PAD : not applicable	4.2.4	-	-
New : Justification Document	5.2.4d	Approval	-
Procedure for customer precap : not applicable	4.3.4	-	-
New : Procedure for construction analysis	5.2.3.3	Information (on request)	-
New : Evaluation, screening and LAT report	5.2.4d	Information (on request)	-

6
Requirements for class 3 components

6.1 Component programme management		
	6.1.1. General	
~~6.1.1a~~	~~The supplier shall establish and implement throughout the duration of the business agreement a component programme which ensures that the requirements of the project as defined by the customer and the supplier in the related business agreement are in compliance with this standard.~~	N/A ~~Applicable~~
	6.1.2 Components control programme	
	6.1.2.1 Organization	
6.1.2.1a		Applicable
	6.1.2.2 Component control plan	
6.1.2.2a		Applicable
6.1.2.2b		Applicable
6.1.3 Parts control **board**		
6.1.3a		Applicable
	6.1.4 Declared component list	
6.1.4a	For each equipment, its supplier shall issue a DCL in an editable and sortable electronic format such as .xls or .xlsx or .csv.~~, as a minimum compatible with CSV, identifying all component types needed.~~ ~~NOTE CSV is a common file format that can be used to transfer data between database or spreadsheet tables (a spreadsheet program is for example Excel®)~~	Applicable
6.1.4b		Applicable
6.1.4c		Applicable
6.1.4d	After equipment CDR, all modifications affecting the PAD and JD information shall be implemented, in the "as design" DCL~~, through the CN / CR process~~ and submitted to the customer for approval. ~~NOTE For JD generation, see requirement 6.2.4.d.~~	Modified
6.1.4e		Applicable
6.1.4f		Applicable
6.1.4g		Applicable

6.1.4h	The supplier shall establish and update a consolidated “as design" DCL at its level and deliver it to the customer.	Applicable
	6.1.5 Electrical and mechanical GSE	
6.1.5a		Applicable
6.1.5b		Applicable
	6.1.6 EQM components	
6.1.6a	EEE components used in Engineering Qualification Model (EQM) shall be fit, form and function representative of the flight components and from the same manufacturers.	Applicable
6.1.6b	If thermal vacuum tests are performed on the EQM, the EEE parts shall be material representative of the FM parts.	Applicable
	6.2 Component selection, evaluation and approval	
	6.2.1 General	
6.2.1a		Applicable
6.2.1b		Applicable
	6.2.2 Manufacturer and component selection	
	6.2.2.1 General rules	
6.2.2.1a		Applicable
6.2.2.1b		Applicable
~~6.2.2.1c~~	<<deleted and moved to 6.2.2.3b>>	N/A ~~Applicable~~
~~6.2.2.1d~~	<<deleted and moved to 6.2.2.3c>>	N/A ~~Applicable~~
6.2.2.1e	For the assessment of commercial components, the supplier shall collect the available data on the manufacturer and the component in the JD specified in the requirement 6.2.4.d. NOTE It is important to check the exhaustiveness of the manufacturer documentation & data sheet with respect to the following items: • component marking, • mechanical description, • electrical and thermal description	New
~~6.2.2.1f~~	<<deleted>>~~For Deep Sub Micron Technologies (<90nm) the detailed test definition shall identify the technology through the construction analysis and the application.~~ ~~NOTE 1 It is important to ensure that the test conditions remain as close as possible to application.~~	Deleted ~~New~~

	~~NOTE 2 This requirement is important due to the specificities of Deep Sub Micron Technologies (<90nm).~~	
6.2.2.2 Parts and material restriction		
6.2.2.2a		Applicable
6.2.2.2b		Applicable
6.2.2.2c	With respect to health and safety, beryllium oxide, lithium (except if identified in the procurement specification), cadmium, ~~lithium,~~ magnesium, mercury, zinc, radioactive material and all material which can cause safety hazard shall not be used.	Applicable
6.2.2.2d	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used: 1. <<deleted>>~~EEE components with pure tin (less than 3% Pb in case of SnPb alloy) used as a finish on the leads, terminations and external surfaces of components and packages.~~ ~~NOTE For EEE components with pure tin, see also requirements 6.2.2.2h and 6.2.2.2i.~~ 2. Hollow core resistors 3. Potentiometers (except for mechanism position monitoring) 4. Non-metallurgically bonded diodes 5. Semiconductor dice with unglassivated active area 6. Wet slug tantalum capacitors other than capacitor construction using double seals and a tantalum case 7. Aluminium liquid electrolytic capacitors 8. Any component whose internal construction uses metallurgic bonding with a melting temperature not compatible with the end-application mounting conditions 9. <<deleted>>~~Wire link fuses < 5A~~ 10. TO5 relays without double welding of the mechanism to the header or with any type of integrated diodes inside. 11. Tin coated wires and cables 12. PVC insulated wires and cables 13. Electromechanical parts in commercial grade 14. Feedthrough filter in commercial grade	Applicable ~~Modified~~
6.2.2.2e	For limited life duration, known instability, safety hazards or reliability risk reasons, EEE components listed below shall not be used for new designs: 1. RNC90 > 100 kOhm~~kΩ~~,	Applicable

	2. TO3 and DO4/DO5 packages. 3. Wire link fuses	
6.2.2.2f		Applicable
6.2.2.2g		Applicable
6.2.2.2h	The use of pure tin (inside or outside the part) shall be declared in the PAD and in the JD.	Applicable ~~Modified~~
6.2.2.2i	The customer shall specify either requirement 6.2.2.2j or requirements 6.2.2.2k and 6.2.2.2l to handle risks linked with pur-tin terminations.~~To assess Pb free with tin finish whisker risk, the following actions shall be performed by the supplier:~~ ~~1. In order to verify information from manufacturer (included in the JD), as part of the incoming inspection, check the lead finish of all procured lots as per ESCC 25500 basic specification.~~ ~~2. When confirmed during incoming, access individually each use of pure tin termination through a RFD.~~ ~~3. Collect and synthesize all information participating to the risk analysis in conformance with the Clause 9.~~ ~~4. Based on the risk analysis, elaborate a mitigation plan, submitted to the customer for approval.~~ ~~5. Include into the mitigation plan one or a combination of the following solutions (not limited to):~~ ~~(a) Retinning of terminations with complementary evaluation in conformance with Figure 8-5 from the requirement 8.1a, and lot acceptance test in conformance with Figure 8-6 from the requirement 8.1a.~~ ~~NOTE Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation, it is required that the termination is coated over its entire length, right up to the package surface (no stand off).~~ ~~(b) In case of both retinning and screening, perform the screening on retinned components.~~ ~~(c) Tin whisker sensitivity evaluation.~~ ~~(d) Conformal coating.~~ ~~(e) Design modification.~~ ~~6. In case of retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval.~~	Applicable ~~New~~

	~~7. Through RFD submit the mitigation plan and results for the customer approval.~~	
6.2.2.2.j	The following actions shall be performed by the supplier to control the pure-tin risk: 1. Collect and synthesize all information participating to the risk analysis in conformance with Clause 8, 2. Based on the risk analysis, elaborate a mitigation plan. 3. Include in the JD the risk analysis and mitigation plan for customer approval. 4. In case of retinning of flight parts, document the hot solder dip process by a procedure to be submitted to customer for approval. 5. Perform evaluation tests, lot acceptance tests and screening tests of retinned components after the retinning process. NOTE 1 The mitigation plan can include one or a combination of the following solutions: • Tin whisker sensitivity evaluation • Retinning of terminations with complementary evaluation. NOTE 2 Solder dip for tin whisker mitigation differs from solder dip for solderability in that for tin whisker mitigation, the termination is coated over its entire length, right up to the package surface (no stand off). This process is critical and needs to be evaluated and well controlled. • Conformal coating. • Design modification.	Applicable
6.2.2.2k	All the following conditions shall be fulfilled to use Parts with matte pure tin finish, >97% tin: 1. they pass the JESD-201 class 2 requirements or meet the GEIA-STD-0005-2/Class 2B requirements, 2. they are not used in power function, Voltage>15V and Current>2A. 3. they are not mechanically torqued on board or equipment.	Applicable
6.2.2.2l	If one of the three conditions specified in requirement 6.2.2.2.k is not met, a mitigation plan shall be submitted to the customer for approval, through the JD approval process. NOTE This mitigation plan can include, as an example, one of the following solutions: • Conformal coating	Applicable

	• Design analysis and risk assessment versus a possible short circuit	
6.2.2.3 Preferred sources		
6.2.2.3a		Applicable
6.2.2.3b	Preference shall be given to components which necessitate the least evaluation or qualification effort.	Applicable
6.2.2.3c	When selecting items, the supplier shall check the current data, applicability of the basis of qualification, problem notifications and alerts, and adequacy of specifications.	Applicable
6.2.2.4 Radiation hardness		
6.2.2.4a		Applicable
6.2.2.4b		Applicable
6.2.2.4c		Applicable
6.2.2.4d		Applicable
6.2.2.4e		Applicable
6.2.2.4f		Applicable
6.2.2.4g		Applicable
6.2.2.4h		Applicable
6.2.2.4i		Applicable
6.2.2.5 Derating		
6.2.2.5a		Applicable
~~6.2.2.5b~~	~~or wire link fuses, the current derating factor shall be 50 % with an additional derating of 0,2 %/°C for an increase in the temperature of fuse body above 25 °C.~~	N/A ~~Applicable~~
6.2.2.6 Temperature range		
6.2.2.6a	Commercial parts shall be selected in the highest available temperature range.	New
6.2.2.6b	A minimum 10°C margin shall be used between the maximum manufacturer temperature range and the application temperature range (including worst cases).	New
~~6.2.2.6c~~	<<deleted>>~~In case |(manufacturer max temperature range – used max temp)|< 10°C, an electrical characterisation shall be performed at used temperature with an additional margin of 10°C during the evaluation step.~~ ~~NOTE 1 Example: for a manufacturer -40°C/+85°C temperature range with an application up to +80°C, then an electrical characterisation is performed at +90°C.~~ ~~NOTE 2 Example for a manufacturer -40°C/+85°C temperature range with an application~~	Deleted ~~New~~

	~~down to 35°C, then an electrical characterisation is performed at 45°C.~~	
6.2.2.6d	Operating temperature range of all commercial parts shall be greater or equal to (-40 / 85) °C.	New
6.2.2.6e	Temperature range of commercial ceramic capacitors shall be greater or equal to (-40 / 125) °C	New
	6.2.3 Component evaluation	
	6.2.3.1 General	
6.2.3.1a	~~For class 3 components, the evaluation shall be limited to construction analysis and radiation tests.~~	N/A ~~Modified~~
~~6.2.3.1b~~	~~The supplier shall plan and carry out the evaluation.~~	N/A ~~Applicable~~
6.2.3.1c		Not applicable
6.2.3.1d	An evaluation plan shall be sent to the customer for approval, and include the following elements:	Modified
	1. Construction Analysis	Applicable
	2. Evaluation testing	Not applicable
	3. Radiation Hardness	Applicable
6.2.3.1e	In the definition of the evaluation programme any information including pertinent reliability, analysis and test data from the manufacturer of the component and previous use in comparable applications shall be considered and their relevance justified.	Applicable
6.2.3.1f		Applicable
6.2.3.1g		Applicable
6.2.3.1h		Applicable
6.2.3.1i	The supplier shall review the evaluation results to determine their impact on the content of the lot acceptance tests.	Modified
6.2.3.1j		Applicable
	6.2.3.2 Component manufacturer assessment	
6.2.3.2a		Not applicable See 6.2.2.1e
	6.2.3.3. Construction analysis	
6.2.3.3a		Applicable
6.2.3.3b	The Construction analysis shall be documented by a procedure to be submitted on request~~sent~~ to the customer for approval. NOTE Annex H provides guidelines for microcircuits, diodes, transistors and optocouplers~~such procedure~~.	Modified
6.2.3.3c		Applicable

6.2.3.4 Evaluation testing		
6.2.3.4a		Not applicable
6.2.3.4b		Not applicable
6.2.3.4c	Evaluation tests shall be performed as specified in ~~Table 6-1.~~: 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4 Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	New
6.2.3.4d	Omission of any of the elements of tests specified in Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8~~Table 6-1~~, or the introduction of alternative activities, shall be justified in the JD. ~~NOTE For mounting process (including baking for PED), see ECSS-Q-ST-70-38 and ECSS-Q-ST-70-08.~~	New
~~6.2.3.4e~~	<<deleted>>~~Evaluation of retinned components shall be performed in accordance with Figure 8-5 from the requirement 8.1a.~~	Deleted New

Table 6–1: <<deleted>>

6.2.4 Parts approval		
6.2.4a	All components shall be reviewed and approved by the customer through the PCB.~~The supplier shall document the procedure for approval of each component type intended for use in flight products.~~	Applicable
~~6.2.4b~~	~~The approval of components shall be based on consideration of all pertinent data including both the electrical and environmental performance as well as the established quality and the dependability assurance requirements.~~	N/A Applicable
6.2.4c		Applicable
6.2.4d	The approval process by the customer depends on the part qualification status and shall be organized as follows:~~Prior to procurement of components (or before equipment CDR, at the latest), the approval process by the customer shall be organized as follows:~~	Modified

	1. Space qualified parts : Space qualified parts listed in the DCL are approved through the DCL review except in the following cases where a PAD in conformance with ECSS-Q-ST-60 Annex D is delivered for customer's approval: (a) additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA), (b) used outside the specified limits, (c) specific tests are required during procurement as per Table 7-1, (d) pure tin is used inside or outside the part.	Not applicable
	2. Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer's approval.	Not applicable
	3. Commercial parts: A Justification Document ~~is required~~ in accordance with ECSS-Q-ST-60-13 Annex F is delivered to customer for customer's approval.	Applicable ~~Modified~~
6.2.4e	In case the evaluation results are changing the testing conditions documented in the JD, a new revision of JD shall be submitted to the customer for approval.	Modified
6.2.4f	The parts approval process, including PAD and JD approval, shall be completed prior to CDR, or MRR for recurring units if there is no CDR.	Applicable

6.3 Component procurement

6.3.1 General

6.3.1a		Applicable
6.3.1b		Not applicable
6.3.1c		Not applicable
6.3.1d		Applicable
6.3.1e		Applicable
6.3.1f	Each procured EEE part shall be traceable to a manufacturer assigned trace code. NOTE The procurement of a single trace code per delivery lot should be preferred and encouraged.	New
6.3.1g	Each trace code shall be maintained as is through the entire supply chain including distributor. NOTE As far as possible, commercial parts should be ordered in the manufacturer's standard packing quantities or multiples thereof to avoid distributor re-packing and handling and to preserve the traceability information	New

	usually included on the original manufacturer packaging.	
6.3.1h	The supplier shall ensure that the elements of the JD in accordance with Annex F, including any action plan, are applicable to flight parts.	New
6.3.2 Procurement specification		
6.3.2a	The supplier shall procure EEE components according to controlled specifications. NOTE It can be procurer's in-house specification, a manufacturer's drawing or a datasheet as a minimum.	Modified
6.3.2b		Not applicable
6.3.2c		Not applicable
6.3.2d		Not applicable
6.3.2e		Applicable
6.3.2f		Applicable
6.3.2g		Applicable
6.3.2h	If additional requirements are specified to the manufacturer, they shall be identified in a procurement specification.	New
6.3.3 Screening requirements		
6.3.3a		Applicable
6.3.3b		Applicable
6.3.3c		Applicable
6.3.3d	For commercial parts, screening tests shall be performed in accordance with: ~~Table 6-2.~~ 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers) 4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	Modified
~~6.3.3e~~	~~For active parts (transistors, diodes) packaged in TO3, DO4 or DO5, the PIND test method shall be submitted to the customer's approval.~~	N/A ~~Applicable~~
6.3.3f		Applicable
~~6.3.3g~~	~~In case a component is not available in a qualified version according to quality level specified in Table 7-3, the screening of the component~~	N/A ~~Applicable~~

	~~shall meet the screening flow defined by the generic specifications listed in Table 7-3.~~	
6.3.3h	In case of X-rays or CT scan inspection, the total dose deposited and exposure time shall not deteriorate part performance or reliability~~shall be less than 1/10 of the product acceptable dose~~.	Applicable

Table 6–2: <<deleted>>

6.3.4 Initial customer source inspection (precap)		
6.3.4a		Applicable
6.3.5 Lot acceptance		
6.3.5a	The supplier shall ensure that any lot/date~~each trace code~~ of EEE parts is submitted to a lot acceptance procedure specified, in line with applied normative system, ~~in Figure 6-1 and Table 6-3~~ according to the following rules:	Applicable ~~Modified~~
	1.	Not applicable
	2.	Not applicable
	3. Commercial components: (a) The content of the lot acceptance is defined according to information provided by the JD. (b) <<deleted>>~~Without any representative data, the tests specified in Table 6-3 are performed.~~ (c) The proposed lot acceptance is approved through the approval process as specified in the clause 6.2.4. ~~(d) The Construction Analysis is documented by a procedure approved by the customer.~~ ~~NOTE Annex H provides guidelines for such procedure.~~ ~~(e) If evaluation test is performed directly on flight lot (and if in conformance with lot acceptance and screening requirements), evaluation data can be used as lot acceptance.~~ ~~(f) The lot acceptance report is sent to the customer, on request, for information.~~	Modified
6.3.5b		Not applicable
6.3.5c	Lot acceptance tests~~of retinned components~~ shall be performed as specified in: ~~Figure 8-6 from the requirement 8.1a.~~ 1. Table 8–1 for ceramic capacitors chips, 2. Table 8–2 for solid electrolyte tantalum capacitors chips 3. Table 8–3 for discrete parts (diodes, transistors, optocouplers)	New

	4. Table 8–4 for fuses 5. Table 8–5 for magnetic parts 6. Table 8–6 for microcircuits 7. Table 8–7 for resistors 8. Table 8–8 for thermistors	

Figure 6-1: <<deleted>>~~Lot acceptance test flow chart for Class 3 components~~

Table 6–3: <<deleted and moved as Legacy test files Table 8–15>>

6.3.6 Final customer inspection (buy-off)		
6.3.6a		Applicable
6.3.7 Incoming inspection		
6.3.7a		Applicable
6.3.7b	The incoming inspection shall include the following items: For any part: the minimum inspections required in ESCC 21004. ~~1. Marking control,~~ ~~2. Quantity verification,~~ ~~3. Packing checking,~~ ~~4. Review of the manufacturer delivered documentation,~~ ~~5. Additional tests based on the type of component, criticality and heritage with the manufacturer (e.g. solderability tests, electrical tests),~~ ~~6. In case of not golden termination finish, check the lead finish as per ESCC 25500 basic specification.~~	Applicable
6.3.7c		Applicable
6.3.7d		Not applicable
6.3.7e		Applicable
6.3.8 Radiation verification testing		
6.3.8a		Applicable
6.3.8b	RVT shall be performed in accordance with internationally recognized standards, such as ESCC Basic Specifications No. 22900, 25100 and 22500.	Applicable
6.3.8c		Not applicable
6.3.8d		Applicable

6.3.8e		Applicable
6.3.8f	Parts submitted to RVT shall be screened as specified in clause 5.3.3 to be fully representative of flight parts.	New
	6.3.9 Destructive physical analysis	
6.3.9a	The DPA shall be performed according to the procurement Tables Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8 of Clause 8~~on 3 samples per lot of commercial parts after relifing as specified in clause 6.3.10.~~ ~~NOTE Annex H provides guidelines for construction analysis and destructive physical analysis.~~	Modified
6.3.9b		Not applicable
6.3.9c		Not applicable
6.3.9d	The DPA process shall be documented by a procedure to be submittedsent, on request, to the customer for review. NOTE For guidance refer to the basic specificaton ESSC 20600 and for active parts ECSS-Q-ST-60-13 Annex H~~ provides guidelines for the construction analysis and destructive physical analysi~~	Applicable ~~Modified~~
6.3.9e		Applicable
6.3.9f	~~Independent laboratories may perform DPA when approved by the customer.~~	N/A ~~Applicable~~
6.3.9g		Not applicable
6.3.9h		Applicable
6.3.9i		Applicable
~~6.3.9j~~	<<deleted>>~~A DPA shall be conducted during relifing in accordance with the clause 6.3.10.~~	Deleted ~~New~~
	6.3.10 Relifing	
6.3.10a		Applicable
6.3.10b	For components meeting the criteria specified in requirement 6.3.10a, and which have a lot / date code exceeding the period defined in ECSS-Q-ST-60-14 clause 5~~7 years~~, the relifing procedure ECSS-Q-ST-60-14 shall apply to the lot.	Applicable ~~Modified~~
~~6.3.10c~~	<<deleted>>~~Humidity test and lifetest shall be performed in accordance with the clause 6.3.5 in case if these tests have not been performed on the lot during the evaluation or the procurement phase.~~ ~~NOTE Humidity test includes HAST or THB.~~	Deleted New

~~6.3.10d~~	<<deleted>>~~As part of the relifing process, a DPA on 3 pieces shall be performed on each lot in conformance with the clause 6.3.9.~~	Deleted New
6.3.11 Manufacturer's data documentation deliveries		
6.3.11a	The manufacturer's or the franchised distributor's CoC shall be delivered to the parts procurer.	Modified
6.3.11b	Any other data, defined in the applicable procurement documents, shall be delivered to the parts' procurer in line with the purchase order.	Modified
6.3.11c	For non qualified parts, the parts procurer shall store the documentation minimum 15~~10~~ years after receiption of the components.	Applicable ~~Modified~~
6.4 Handling and storage		
6.4a	The supplier shall establish and implement procedures for handling and storage of components in order to prevent possible degradation. NOTE For guidance, refer to the basic specification ESCC 20600.	Applicable
6.4b		Applicable
6.4c		Applicable
6.4d		Applicable
6.4e	Plastic encapsulated devices shall be stored in one of the following conditions: 1. Dry Nitrogen 2. Dry and ionised air with RH in a range of 15% to 20% 3. Dry packs as specified in J-STD-033 for dry pack inspection and control	New
6.5 Components quality assurance		
6.5.1. General		
6.5.1a		Applicable
6.5.2 Nonconformances or failures		
6.5.2a		Applicable
6.5.2b		Applicable
6.5.2c		Applicable
6.5.2d		Applicable
6.5.3 Alerts		
6.5.3a	The supplier shall take into account all received alerts, errata sheets, from international alert systems, from manufacturers or sent by the customer and shall validate that there are no alerts	Applicable

	related to the intended application and the recommendations of alerts have been taken into account ~~on the proposed parts with respect to the batch information (including date code)~~.	
6.5.3b		Applicable
	6.5.4 Traceability	
~~6.5.4a~~	~~The traceability of individual components during manufacturing and testing shall be maintained as required by the procurement specifications.~~	N/A ~~Applicable~~
6.5.4b	The traceability shall be maintained through incoming, storage, and installation at the procurer and user of the component ~~in accordance with programme PA requirements~~.	Applicable
6.5.4c		Applicable
6.5.4d	The traceability of EEE parts during installation in equipment, shall be ensured by the supplier through maintaining the traceability to the manufacturer's trace code number of the EEE parts actually mounted.	Modified
6.5.4e	The supplier shall be able to provide these information (part type actually installed with its relevant trace code number) within one working day (when the flight system is on launch pad) or within one week (in the other cases).	Modified
	6.5.5 Lot homogeneity for sampling test	
6.5.5a		Applicable
	6.6 Specific components	
	6.6.1 General	
6.6.1a	<<deleted>>	Deleted
	6.6.2 ASICs	
6.6.2a		Applicable
	6.6.3 Hybrids	
6.6.3a		Not applicable
6.6.3b		Not applicable
6.6.3c		Not applicable
	6.6.4 One time programmable devices	
6.6.4a		Applicable
6.6.4b	The JD shall allow traceability to the information related to the procurement of blank parts, the programming process and the acceptance of the programmed parts.	Modified
6.6.4c	The programming process and the acceptance of the programmed parts may be part of PCB, for customer approval, if not indicated in the JD.	Modified

6.6.4d		Applicable
6.6.4e	For One-time programmable FPGA and PROM types without a clear and defined heritage, a post-programming burn-in shall be applied, in conformance with ESCC9000 subclause 8.16 ~~8.21~~, for a minimum duration of 160 h. NOTE FPGA and PROM with defined heritage are documented in these reports: ESCC REP 010 and ESCC REP011 SCSB Decisions Regarding OTP FPGA PPBI, available on https://escies.org.	Applicable
6.6.4f	The supplier shall prepare a post-programming procedure for customer's approval, depending on part types, including post and port burin-in electrical tests, burn-in conditions ~~(including when necessary electrical tests, programming conditions and equipment, programming software version qualified by the supplier, burn in conditions, additional screening tests and specific marking after programming) as applicable per 6.6.4d~~. NOTE: This includes, when necessary: - electrical test conditions, - programming conditions and equipment, -programming software version qualified by the supplier, - burn-in conditions, - additional screening tests, and - specific marking after programming	Applicable
6.6.4g		Applicable
6.6.4h		Applicable
6.6.5 Microwave monolithic integrated circuits		
6.6.5a		Not Applicable
6.6.6 Connectors		
6.6.6a	For connectors with removable contacts, contacts shall be procured from the same manufacturer as the connector in which they are mounted.	Applicable
6.7 Documentation		
6.7a	Any result from inspection or control shall be documented (including lot acceptance, incoming, relifing and complementary tests).	Modified

Table 6–4: Documentation for Class 3 components

Document	Clause	Customer	Comments
New : Procedure for hot solder dip process	6.2.2.2j	Approval	For retinning operation
PAD : not applicable	4.2.4	-	-
New : Justification Document	6.2.4	Approval	-
Procedure for customer precap : not applicable	4.3.4	-	-
New : Procedure for construction analysis	6.2.3.3	Information (on request)	-
New : Evaluation, screening and LAT report	6.2.4	Information (on request)	-

7
Quality levels

Not applicable

8
Procurement test table

8.1 General		
	Clause 8.2 defines the evaluation, screening and lot acceptance tests applicable to several commercial parts families. These tests are requested in the previous requirements clause 4 to clause 6. Clause 8.3 defines legacy test files which are called in Clause 8.2, for active parts. It ensures the consistency between the various issues of the ECSS-Q-ST-60-13.	New
~~8.1a~~	<<deleted>>~~In case of retinning of components with pure tin terminations, an evaluation and lot acceptance for these retinned parts for each class of components shall be performed as specified in the flow charts from Figure 8-1 to Figure 8-6.~~	Deleted ~~New~~

Figure 8-1: <<deleted>>

Figure 8-2: <<deleted>>

Figure 8-3: <<deleted>>

Figure 8-4: <<deleted>>

Figure 8-5: <<deleted>>

Figure 8-6: <<deleted>>

8.2 Applicable Procurement test tables

8.2a	The Test Tables Table 8–1, Table 8–2, Table 8–3, Table 8–4, Table 8–5, Table 8–6, Table 8–7, Table 8–8 shall be used for evaluation, screening and LAT of commercial parts.	New
8.2b	Based on the review of representative data, as per 8.1f, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process. NOTE: This permission is referenced in the Procurement Test Tables as "Note (a)"	New
8.2c	Based on representative data, as per 8.1f, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process. NOTE: This permission is referenced in the Procurement Test Tables as "Note (b)"	New
8.2d	The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on: 1. representative data, as per 8.1f, on parts not older than 2 years, or 2. concurring data showing that the manufacturer production drifts are controlled. NOTE: This permission is referenced in the Procurement Test Tables as "Note (c)"	New
8.2e	Outgassing test shall only be applied if all the three following conditions are met: 1. part package is based on organic material, AND 2. weight of one part > 100mg, AND 3. test required by the user program or critical applications. NOTE: This permission is referenced in the Procurement Test Tables as "Note (d)"	
8.2f	Representativity data in requirement 8.2b, 8.2c and 8.2d shall comply with the following criteria:	New

	1. Ceramic capacitors chip : same serie; same ceramic type; same range of voltage, capacitance and packages; same manufacturing plant. 2. Solid electrolyte Tantalum capacitor chips: same serie; same electrolyte; same range of voltage, capacitance and package range; same manufacturing plant 3. Resistors: same serie; same range of voltage, resistance and packages; same manufacturing plant 4. Magnetics : same serie; same rating and package range, same manufacturing plant 5. Thermistor: same serie; same rating and package range, same manufacturing plant 6. Discretes: Same manufacturing plant, same die revision for life test, same package for environmental and mechanical tests 7. Microcircuits: Same manufacturing plant, same die revision for life test, same package for environmental and mechanical tests	

Table 8–1: Procurement test table for ceramic capacitors chips

Ceramic capacitors chips									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC21001		
AEC-Q grd 0/1	X	X	X	Evaluation	Temperature characterization	5	ESCC3009 8.10		Note (a)
AEC-Q grd 0/1	X			Evaluation	Life Test 2000h	40	ESCC3009 8.6 + 8.9	2000 hours - 2 Un	Note (a)
AEC-Q grd 0/1	X			Screening	Complete screening	100%	ESCC3009 chart F3		Note (b)
AEC-Q grd 0/1	X	X	X	LAT	DPA	3	ESCC21001		
AEC-Q grd 0/1	X	X		LAT	Life Test 1000h	20	ESCC3009 8.6 + 8.9	1000 hours - 2 Un	Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC21001		
No	X	X	X	Evaluation	Temperature characterization	5	ESCC 3009 8.10		Note (a)
No	X	X		Evaluation	Complete evaluation	72	ESCC 3009 chart F4	Life Test : 2000h - 40 parts	Note (a)
No			X	Evaluation	Life Test 1000h	40	ESCC3009 8.6 + 8.9	1000 hours - 2 Un	Note (a)
No	X	X	X	Screening	Complete screening	100%	ESCC3009 chart F3		The sample size for the test electrical test @ hot/cold temperature (ESCC3009- 8.3.3) shall be 20 parts Note (b) for class 2 and 3
No	X	X	X	LAT	DPA	3	ESCC21001		

Ceramic capacitors chips									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
No	X			LAT	Complete LAT	52	ESCC 3009 chart F4	Life Test : 1000h - 20 parts	
No		X	X	LAT	Life Test 1000h	20	ESCC3009 8.6 + 8.9	1000 hours - 2 Un	Note (c) for class 3

Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process.

Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process.

Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on:

1. representative data, as per 8.1f, on parts not older than 2 years, or
2. concurring data showing that the manufacturer production drifts are controlled.

Table 8–2: Procurement test table for solid electrolyte tantalum capacitors chips

Solid electrolyte tantalum capacitors chips									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC21001		
AEC-Q grd 0/1	X			Evaluation	Life Test 2000h	60	ESCC 3012 chart IV endurance subgroup	36 parts, 85°C @Ur, 2000h 24 parts, 125°C @Uc , 2000h	Note (a)

Solid electrolyte tantalum capacitors chips									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	x	X	X	Screening	Surge current	100%	Surge current test	MIL-PRF-55365 cond. B or ESCC 3012 ie 9.3.1 + 9.20	-
AEC-Q grd 0/1	X	-	-	Screening	Complete screening	100%	ESCC 3012 chart III	-	Note (b)
AEC-Q grd 0/1	X	X	X	LAT	DPA	3	ESCC21001	-	-
AEC-Q grd 0/1	X	X	-	LAT	Life Test 1000h	16	ESCC 3012 chart V - Endurance subgroup	16 parts, 85°C @Ur, 1000h	Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC21001	-	-
No	X	X	-	Evaluation	Complete evaluation	108	ESCC 3012 chart IV	-	Note (a)
No	-	-	X	Evaluation	Life Test 1000h	16	ESCC 3012 chart V - Endurance subgroup	16 parts, 85°C @Ur	Note (a)
No	X	X	X	Screening	Surge current	100%	Surge current test	MIL-PRF-55365 cond. B or ESCC 3012 ie 9.3.1 + 9.20	-
No	X	-	-	Screening	Complete screening	100%	ESCC 3012 chart III	-	-
No	-	X	X	Screening	burn-in	100%	MIL-PRF-55365 4.7.5	40h; vrated, 85°C	Note (b)
No	X	X	X	LAT	DPA	3	ESCC21001	-	-
No	X	-	-	LAT	Complete LAT	34	ESCC 3012 chart V LAT level 1	-	-

Solid electrolyte tantalum capacitors chips									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
No		X	X	LAT	LAT	16	ESCC 3012 chart V - Endurance subgroup	16 parts, 85°C @Ur	Note (c) in class 3

Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process.

Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process..

Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on:

1. representative data, as per 8.1f, on parts not older than 2 years, or
2. concurring data showing that the manufacturer production drifts are controlled.

Table 8–3: Procurement test table for discrete parts (diodes, transistors, optocouplers)

Discrete parts (diodes, transistors, optocouplers)									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q	X	X	X	Evaluation	Radiation evaluation		i.a.w. ECSS-Q-ST-60-15		
AEC-Q	X	X	X	Evaluation	Construction Analysis	5	i.a.w. Annex H + outgassing		Note (d)
AEC-Q	X			Evaluation	Life Test 2000h	15	test methods i.a.w. table 8-2-1	Life test duration 2000h	Note (a)
AEC-Q	X	X	X	Screening	Hermiticity	all	test methods i.a.w. table 8-2-2		for hermetic parts
AEC-Q	X	X	X	Screening	Pind test	all	test methods i.a.w. table 8-2-2		for parts with cavity
AEC-Q	X			Screening	Complete screening	all	test methods i.a.w. table 8-2-2	burn-in duration 240h	Note (b)
AEC-Q	X	X	X	LAT	RVT		i.a.w. ECSS-Q-ST-60-15		
AEC-Q	X	X	X	LAT	Construction Analysis	5	i.a.w. Annex H		
AEC-Q	X	X		LAT	Life test	15	test methods i.a.w. table 8-2-3 and 8-2-6	Life test duration 1000h	Note (c)
No	X	X	X	Evaluation	Radiation evaluation		i.a.w. ECSS-Q-ST-60-15		
No	X	X	X	Evaluation	Construction Analysis	5	i.a.w. Annex H + outgassing		Note (d)
No	X	X		Evaluation	Complete Evaluation	55	test methods i.a.w. table 8-2-1 and 8-2-4		Nnote (a)

Discrete parts (diodes, transistors, optocouplers)									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
No	X	X	X	Screening	Hermiticity	all	test methods i.a.w. table 8-2-2	-	for hermetic parts
No	X	X	X	Screening	Pind test	all	test methods i.a.w. table 8-2-2	-	for parts with cavity
No	X	X	-	Screening	Complete screening	all	test methods i.a.w. table 8-2-2 and 8-2-5	240/168h duration in class 1/2	Note (b) in class 2
No	X	X	X	LAT	RVT	-	i.a.w. ECSS-Q-ST-60-15	-	-
No	X	X	X	LAT	Construction Analysis	5	i.a.w. Annex H	-	-
No	X	X	x	LAT	LAT i.a.w. ECSS-Q-ST-60-13 Rev C	45	test methods i.a.w. tables 8-2-3, 8-2-6 and 8-2-7	Life test duration 1000h	Note (c) in class3

Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process.

Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process..

Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on:

1. representative data, as per 8.1f, on parts not older than 2 years, or
2. concurring data showing that the manufacturer production drifts are controlled.

Table 8–4: Procurement test table for fuses

Fuses									
Automotive grade	**Class 1**	**Class 2**	**Class 3**	**Category**	**Test type**	**Sample size**	**Test Procedure**	**Specific Test condition**	**Note**
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001		
AEC-Q grd 0/1	X	X	X	Evaluation	Fusion characterization	20	ESCC 4008 test 8.5		
AEC-Q grd 0/1	X			Evaluation	Life Test 2000h	20	ESCC 4008 chart F4 endurance subgroup	2000h	Note (a)
AEC-Q grd 0/1	X			Screening	Complete screening	all	ESCC 4008 chart F3	168h burn-in	Note (b)
AEC-Q grd 0/1	X	X	X	LAT	DPA	3	ESCC 21001		
AEC-Q grd 0/1	X	X		LAT	Life test 1000h	20	ESCC 4008 chart F4 endurance subgroup	1000h	Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001		
No	X	X	X	Evaluation	Fusion characterization	20	ESCC 4008 test 8.5		
No	X	X		Evaluation	Complete Evaluation	66	ESCC 4008 chart F4		Note (a)
No			X	Evaluation	Life test 1000h	20	ESCC 4008 chart F4 endurance subgroup	1000h	Note (a)
No	X	X	X	Screening	Complete screening	all	ESCC 4008 chart F3	168h burn-in class 1 96h burn-in class 2&3	Note (b) in class 2 & 3
No	X	X	X	LAT	DPA	3	ESCC 21001		
No	X			LAT	Complete LAT	66	ESCC 4008 chart F4		
No		X	X	LAT	Life Test 1000h	20	ESCC 4008 chart F4 endurance subgroup	1000h	Note (c) in class 3

Fuses									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process. Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process.. Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on: 1. representative data, as per 8.1f, on parts not older than 2 years, or 2. concurring data showing that the manufacturer production drifts are controlled.									

Table 8–5: Procurement test table for magnetics

Magnetic parts									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001 + outgassing test	-	Note (d)
AEC-Q grd 0/1	X		-	Evaluation	Life Test 2000h	20	ESCC 3201 chart F4 endurance subgroup	2000h LT	Note (a) and Shock and vibration level tolerance shall be compared to the application constraint to

Magnetic parts									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
									adapt the evaluation tests
AEC-Q grd 0/1	X	X	X	Evaluation	Temperature Rise test		ESCC 3201 Para 8.7		Note (a)
AEC-Q grd 0/1	X			Screening	Complete screening	all	ESCC 3201 chart F3	168h burn-in	Note (b)
AEC-Q grd 0/1	X	X	X	LAT	DPA	3	ESCC 21001		
AEC-Q grd 0/1	X	X		LAT	Life test 1000h	20	ESCC 3201 chart F4 endurance subgroup		Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001 + outgassing test		Note (d)
No	X	X		Evaluation	Complete Evaluation	43	ESCC 3201 chart F4	2000h LT	Note (a)
No			X	Evaluation	Life test 1000h	20	ESCC 3201 chart F4 endurance subgroup	1000h LT	Note (a)
No			x	Evaluation	Temperature Rise test + thermal shocks	10	ESCC 3201 Para 8.7 + 8,2	100 cycles	Note (a)
No	X	X			Complete screening	all	ESCC 3201 chart F3	168/96h burn-in class 1/2 25 cycles	Note (b) in class 2
No			X	Screening	Thermal Shocks	all	ESCC 3201 para 8,2	25 cycles	Note (b)
No	X	X	X	LAT	DPA	3	ESCC 21001		
No	X			LAT	Complete LAT	43	ESCC 3201 chart F4	1000 h LT	Note (c)
No		X	x	LAT	Life Test 1000h	20	ESCC 3201 chart F4 endurance subgroup	1000 h LT	Note (c) in class 3

Magnetic parts									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process. Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process.. Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on: 1. representative data, as per 8.1f, on parts not older than 2 years, or 2. concurring data showing that the manufacturer production drifts are controlled.									

Table 8–6: Procurement test table for microcircuits

Microcircuits									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Radiation evaluation		i.a.w. ECSS-Q-ST-60-15		
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	i.a.w. Annex H + outgassing		Note (d)
AEC-Q grd 0/1	X			Evaluation	Life Test 2000h	15	test methods i.a.w. table 8-2-1	2000h LT	Note (a)
AEC-Q grd 0/1	X	X	X	Screening	Hermiticity	all	test methods i.a.w. table 8-2-2		for hermetic parts
AEC-Q grd 0/1	X	X	X	Screening	Pind test	all	test methods i.a.w. table 8-2-2		for parts with cavity
AEC-Q grd 0/1	X			Screening	Complete screening	all	test methods i.a.w. table 8-2-2	240h burn-in	Note (b)
AEC-Q grd 0/1	X	X	X	LAT	RVT		i.a.w. ECSS-Q-ST-60-15		
AEC-Q grd 0/1	X	X	X	LAT	Construction Analysis	5	i.a.w. Annex H		
AEC-Q grd 0/1	X	X		LAT	Life test 1000h	15	test methods i.a.w. table 8-2-3 and 8-2-6	1000h LT	Note (c)
No	X	X	X	Evaluation	Radiataion evaluation		i.a.w. ECSS-Q-ST-60-15		
No	X	X	X	Evaluation	Construction Analysis	5	i.a.w. Annex H + outgassing		Note (d)
No	X	X		Evaluation	Complete Evaluation	55	test methods i.a.w. table 8-2-1 and 8-2-4		Note (a)
No	X	X	X	Screening	Hermiticity	all	test methods i.a.w. table 8-2-2		for hermetic parts
No	X	X	X	Screening	Pind test	all	test methods i.a.w. table 8-2-2		for parts with cavity
No	X	X		Screening	Complete screening	all	test methods i.a.w. table 8-2-2 and 8-2-5	240/168h duration in class 1/2	Note (b) in class 2
No	X	X	X	LAT	RVT		i.a.w. ECSS-Q-ST-60-15		

Microcircuits									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
No	X	X	X	LAT	Construction Analysis	5	i.a.w. Annex H		
No	X	X	X	LAT	LAT i.a.w. ECSS-Q-ST-60-13 Rev C	45	test methods i.a.w. tables 8-2-3, 8-2-6 and 8-2-7	Life test duration 1000h	Note (c) in class 3

Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process.

Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process..

Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on:

1. representative data, as per 8.1f, on parts not older than 2 years, or
2. concurring data showing that the manufacturer production drifts are controlled.

Table 8–7: Procurement test table for resistors

Resistors									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001		
AEC-Q grd 0/1	X			Evaluation	Life Test 2000h	54	ESCC 4001 - Chart F4 Enfurance subgroup	Life Test 2000h	Note (a)
AEC-Q grd 0/1	X			Screening	Complete screening	all	ESCC 4001 - chart F3		Note (b)
AEC-Q grd 0/1	X	X	X	LAT	DPA	3	ESCC 21001		

Resistors									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	-	LAT	Life test 1000h	15	ESCC 4001 - Chart F4 Enfurance subgroup	Life test 1000H	Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001	-	
No	X	X	X	Evaluation	Humidity test	15	IEC Publication No. 60068-2	40°C/95%, 100V or Vmax	Note (a) and For NiCr resistors only
No	X	X	-	Evaluation	Complete Evaluation	96	ESCC 4001 - chart F4 "Environmental + endurance"	-	Note (a)
No	-	-	X	Evaluation	Life test 1000h	54	ESCC 4001 - Chart F4 Enfurance subgroup	Life Test 1000h	Note (a)
No	X	-	-	Screening	Complete screening	all	ESCC 4001 - chart F3	168h	-
No	-	X	X	Screening	Burn-in	all	ESCC 4001 8.4+ 8.3.2 + 8.3.4	96h	Note (b)
No	X	X	X	LAT	DPA	3	ESCC 21001	-	-
No	X	-	-	LAT	Complete LAT	57	ESCC 4001 - chart F4 Environmental + endurance	-	-
No	-	X	X	LAT	Life Test 1000h	15	ESCC 4001 - Chart F4 Enfurance subgroup	Life test 1000H	Note (c) in class 3

Resistors									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process. Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process.. Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on: 1. representative data, as per 8.1f, on parts not older than 2 years, or 2. concurring data showing that the manufacturer production drifts are controlled.									

Table 8–8: Procurement test table for Thermistors

Thermistors									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
AEC-Q grd 0/1	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001		
AEC-Q grd 0/1	X			Evaluation	Endurance 2000h	40	ESCC 4006 - Chart F4 - Endurance subgroup	2000h	Note (a)
AEC-Q grd 0/1	X	X	X	Evaluation	Resistance versus Temperature	10	ESCC 4006 Para 8.3.3 and 8.3.4		Note (a)
AEC-Q grd 0/1	X			Screening	Complete screening	all	ESCC 4006 - Chart F3		Note (b)
AEC-Q grd 0/1	X	X	X	LAT	Construction Analysis	3	ESCC 21001		
AEC-Q grd 0/1	X	X		LAT	Endurance 1000h	40	ESCC 4006 - Chart F4 - Endurance subgroup	1000h	Note (c)
No	X	X	X	Evaluation	Construction Analysis	5	ESCC 21001		
No	X	X		Evaluation	Complete Evaluation	76	ESCC4006 - chart F4	Thermal shock 100 cycles	Note (a)
No			X	Evaluation	Endurance 1000h	40	ESCC 4006 - Chart F4 - Endurance subgroup	1000h	Note (a)
No			x	Evaluation	Resistance versus Temperature	10	ESCC 4006 Para 8.3.3 and 8.3.4		Note (a)
No	X			Screening	Complete screening	all	ESCC 4006 - Chart F3	168h	
No		X	X	Screening	Burn-in	all	ESCC 4006 - 8.4 + 8.3.3 + 8.3.4	96h	Note (b)
No	X	X	X	LAT	DPA	3	ESCC 21001		

Thermistors									
Automotive grade	Class 1	Class 2	Class 3	Category	Test type	Sample size	Test Procedure	Specific Test condition	Note
No	X	-	-	LAT	Complete LAT	76	ESCC4006 - chart F4	Thermal shock 100 cycles	-
No	-	X	-	LAT	Endurance 1000h	40	ESCC 4006 - Chart F4 - Endurance subgroup	1000h	-
No	-	-	X	LAT	Life Test 1000h	20	ESCC 4006 - Chart F4 - Life test file from Endurance subgroup	1000h	Note (c)

Note (a): See 8.2b: Based on the review of representative data, as per 8.1g, the supplier may propose an adaptation and a minimization of these evaluation tests, to be submitted to customer for approval through the JD's approval process.

Note (b): See 8.2c: Based on representative data, as per 8.1g, collected in evaluation tests and in the JD, the supplier may propose an adaptation and a minimization of these screening tests to be submitted to customer for approval through the JD's approval process.

Note (c): See 8.2d: The supplier may propose an adaptation and a minimization of these LAT tests, to be submitted to customer for approval through the JD's approval process, based on:

1. representative data, as per 8.1f, on parts not older than 2 years, or
2. concurring data showing that the manufacturer production drifts are controlled.

8.3 Legacy test files

8.3.a	The test methods and test files in Table 8–9, Table 8–10, Table 8–11, Table 8–12, Table 8–13. Table 8–14, Table 8–15 shall be used for the procurement of discrete and microcircuits, when they are requested in theTable 8–3 and Table 8–6. NOTE These test tables are inherited from the ECSS-Q-ST-60-13C with small corrections. They are used to ensure consistency between the various ECSS-Q-ST-60-13 issues.	New

Table 8–9: Legacy test files - Evaluation tests for Class 1 components

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
1	Construction analysis	5 parts	As per clause 4.2.2.3 See Annex H	-
2	Electrical characterization	10 parts min 0 defect accepted	Electrical test under 3 T° (min, typ, max) or at using range +10 °C (whichever is higher as per 4.2.2.6).	Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
3	External visual inspection	10 parts min	ESCC 2055000 ESCC 2059000	
4	Mechanical shocks	10 parts min	MIL STD 883 TM 2002 condition B - 50 pulses (per orientation) instead of 5 pulses (per orientation). MIL-STD-750 TM 2016, 1500g, 0,5ms duration - 50 shocks instead of 5 shocks, planes X1, Y1 and Z1.	Applicable to cavity package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
	Vibrations		MIL-STD-883, TM 2007 condition A - 120 times (total) instead of 12 times (total) MIL-STD-750, TM 2056, 20g, 10-2000Hz, cross over at 50Hz - 120 times (total) instead of 12 times (total).	
	Constant acceleration		MIL-STD-883, TM 2001 condition E (resultant centrifugal acceleration to be in the Y1 axis only).	

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
			For components which have a package weight of 5 grammes or more, or whose inner seal or cavity perimeter is more than 5 cm, Condition D shall be used MIL-STD-750, TM 2006, 20000g, planes X1, Y1 and Y2.	
5	Preconditioning + 96h HAST (or 1000h THB 85/85)	10 parts min	HAST 96h-130°C-85% RH (JESD22-A110 with continuous bias) or THB (JESD22-A101) Initial and final electrical test at 25°C (parameter & functional) Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Applicable to plastic package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
6	C-SAM	10 parts min	JEDEC J-STD-020	To be done on the 10 parts of step 7 after the electrical test at 25°C and before preconditioning. C-SAM test only applicable to plastic package.
7	Preconditioning + Thermal Cycling	10 parts min	500 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less) MIL-STD-750. method 1051 cond.B MIL-STD-883 method 1010 cond.B Initial, intermediate (100 T/C) and final electrical tests at 25°C (parameter & functional). Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Preconditioning applicable to plastic package only. Read & record for electrical tests as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
8	Seal test	10 parts min	MIL-STD-883 TM 1014 condition A or B (fine leak) and condition C (gross leak). MIL-STD-750 TM 1071 condition H1 or H2 (fine leak) and condition C or K (gross leak with cavity) or condition E (gross leak without cavity).	Applicable to hermetic & cavity package.
9	Lifetest 2000h-125°C minimum	10 parts min	MIL-STD-750 method 1026 & 1042 MIL-STD-883 method 1005 cond.D	The lifetest duration shall be 2000h at minimum 125°C.

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
			Initial, intermediate (1000h) and final electrical tests at 3 T° (min, typ, max) (parameter & functional).	In case of a temperature lower than 125°C, the lifetest duration is extended i.a.w. MIL-STD-883 method 1005. Read & record for electrical tests. as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
10	DPA	3 parts	As per clause 4.3.9 see Annex H.	To be done on 3 parts after lifetest (as per above step 4).
11	Radiation evaluation	i.a.w. ECSS-Q-ST-60-15	See ECSS-Q-ST-60-15	-

Table 8–10: Legacy test files - Screening tests for Class 1 components

	TEST	SAMPLING	METHOD	COMMENTS
1	X-rays	100%	MIL-STD-750 method 2076 MIL-STD-883 method 2012.	Deposited total dose shall be< 1/10 of product acceptable dose.
2	Serialization	100%	Defined by the supplier.	-
3	Temperature cycling	100%	10 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less). MIL-STD-750 method 1051 MIL-STD-883 method 1010	-
4	PIND test	100%	MIL-STD-750 method 2052 cond.A MIL-STD-883 method 2020 cond.A	Applicable to cavity package only.
5	Initial electrical test	100%	Electrical test (para-metrical and functional) at 25°C as per the internal supplier's specification.	Read & record on selected parameters as per the internal supplier's specification (see 4.2.3.1.k).
6	Burn-in	100%	MIL-STD-750 method 1038 & 1039 MIL-STd-883 method 1015 cond.B 240h – 125°C or 445h – 105°C or 885h – 85°C	Temperature shall be < Tjmax-10°C and Tg-10°C whichever is lower. In absence of Tj or Tg knowledge, 105°C max is required. Ea = 0,4eV for equivalence calculation unless a different value has been demonstrated for the product. Termination oxidation risk shall be controlled after burn-in. For discrete, HTRB and power burn-in depend on product family.
7	Final electrical test	100%	Electrical test (para-metrical and functional) at 3 temp. as per the internal supplier's specification.	Read & record on selected parameters as per the internal supplier's specification (see 4.2.3.1k).

	TEST	SAMPLING	METHOD	COMMENTS
8	PDA	-	On steps 5 and 7. Max acceptable PDA: 5%	PDA calculation applies to room temperature measurement only.
9	Seal test	100%	MIL-STD-750 method 1071 cond H1 or H2 and C or K. MIL-STD-883 method 1014 cond A or B and C.	Applicable to hermetic & cavity package only.
10	External visual inspection	100%	MIL-STD-750 method 2071 MIL-STD-883 method 2009	The MIL specs are not adapted to visual inspection of plastic encapsulated components, but can be used as reference (mainly for connection corrosion and marking acceptance). In addition, for plastic packages, inspect for the following defects: Package deformation/ Foreign inclusions in the package, voids and cracks in the plastic/ deformed leads.

Table 8–11: Legacy test files - Lot acceptance tests for Class 1 components

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
1	Construction analysis	5 parts	As per clause 4.2.3.3 see Annex H.	-
2	Mechanical shocks	10 parts min (0 defect accepted)	MIL STD 883 TM 2002 condition B - 5 pulses (per orientation) MIL-STD-750 TM 2016, 1500g, 0,5ms duration - 5 shocks, planes X1, Y1 and Z1.	Applicable to cavity package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
	Vibrations		MIL-STD-883, TM 2007 condition A - 12 times (total). MIL-STD-750, TM 2056, 20g, 10-2000Hz, cross over at 50Hz - 12 times (total).	
	Constant acceleration		MIL-STD-883, TM 2001 condition E (resultant centrifugal acceleration to be in the Y1 axis only). For components which have a package weight of 5 grammes or more, or whose inner seal or cavity perimeter is more than 5 cm, Condition D shall be used. MIL-STD-750, TM 2006, 20000g, planes X1, Y1 and Y2.	
3	Preconditioning + 96h HAST (or 1000h THB 85/85)	10 parts 0 defect accepted	HAST 96h-130°C-85%RH (JESD22-A110 with continuous bias) or THB (JESD22-A101). Electrical test (para-metrical and functional) at 25°C as per the internal supplier's specification. Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Applicable to plastic package. Internal supplier's specification (see 4.2.3.1k)
4	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after the electrical test at 25°C and before preconditioning. C-SAM test only applicable to plastic package.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
5	Preconditioning + Thermal Cycling [1]	10 parts 0 defect accepted	100 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less) MIL-STD-750 method 1051 cond.B MIL-STD-883 method 1010 cond.B Electrical test (para-metrical and functional) at 25°C as per the internal supplier's specification. Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Preconditioning applicable to plastic package only. Internal supplier's specification (see 4.2.3.1k)
6	Seal test	10 parts min (0 defect accepted)	MIL-STD-883 TM 1014 condition A or B (fine leak) and condition C (gross leak). MIL-STD-750 TM 1071 condition H1 or H2 (fine leak) and condition C or K (gross leak with cavity) or condition E (gross leak without cavity).	Applicable to hermetic & cavity package.
7	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after thermal cycling and the electrical test at 25°C. C-SAM test only applicable to plastic package.
8	Lifetest [1]	15 parts 0 defect accepted	2000h – 125°C minimum MIL-STD-750 method 1026 or 1042 MIL-STD-883 method 1005 cond.D Initial, intermediate (1000h) and final electrical test (para-metrical and functional) at 25°C	The lifetest duration shall be 2000h at minimum 125°C. In case of a temperature lower than 125°C, the lifetest duration is extended i.a.w. MIL-STD-883 method 1005. Can be reduced to 1000h if data 2000h are available (DC less than 2 years) and no technology change occurred.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
				Read & record and drift calculation on selected parameters as per the internal supplier's specification (see 4.2.3.1k).
9	External visual inspection	10 parts min	ESCC 2055000 ESCC 2059000	
10	Radiation Verification Test [1]	i.a.w. ECSS-Q-ST-60-15	See ECSS-Q-ST-60-15	-
[1] : Lifetest, thermal cycling and radiation verification test are performed on screened parts (see 4.3.3).				

Table 8–12: Legacy test files - Evaluation tests - Class 2 components

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
1	Construction analysis	5 parts	As per clause 4.2.2.3 See Annex H	-
2	Electrical characterization	10 parts min 0 defect accepted	Electrical test under 3 T° (min, typ, max) or at using range +10 °C (whichever is higher as per 4.2.2.6).	Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
3	External visual inspection	10 parts min	ESCC 2055000 ESCC 2059000	
4	Mechanical shocks	10 parts min 0 defect accepted	MIL STD 883 TM 2002 condition B - 50 pulses (per orientation) instead of 5 pulses (per orientation). MIL-STD-750 TM 2016, 1500g, 0,5ms duration - 50 shocks instead of 5 shocks, planes X1, Y1 and Z1.	Applicable to cavity package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
	Vibrations		MIL-STD-883, TM 2007 condition A - 120 times (total) instead of 12 times (total). MIL-STD-750, TM 2056, 20g, 10-2000Hz, cross over at 50Hz - 120 times (total) instead of 12 times (total).	
	Constant acceleration		MIL-STD-883, TM 2001 condition E (resultant centrifugal acceleration to be in the Y1 axis only). For components which have a package weight of 5 grammes or more, or whose inner seal or cavity perimeter is more than 5 cm, Condition D shall be used. MIL-STD-750, TM 2006, 20000g, planes X1, Y1 and Y2.	

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
5	Preconditioning + 96h HAST (or 1000h THB 85/85)	10 parts min	HAST 96h-130°C-85%RH (JESD22-A110 with continuous bias) or THB (JESD22-A101) Initial and final electrical test at 25°C (parameter & functional) Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Applicable to plastic package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
6	C-SAM	10 parts min	JEDEC J-STD-020	To be done on the 10 parts of step 7 after the electrical test at 25°C and before preconditioning. C-SAM test only applicable to plastic package.
7	Preconditioning + Thermal Cycling	10 parts min 0 defect accepted	500 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less) MIL-STD-750. method 1051 cond.B MIL-STD-883 method 1010 cond.B Initial, intermediate (100 T/C) and final electrical tests at 25°C (parameter & functional). Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Preconditioning applicable to plastic package only. Read & record for electrical tests as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
8	Seal test	10 parts min 0 defect accepted	MIL-STD-883 TM 1014 condition A or B (fine leak) and condition C (gross leak). MIL-STD-750 TM 1071 condition H1 or H2 (fine leak) and condition C or K (gross leak with cavity) or condition E (gross leak without cavity).	Applicable to hermetic & cavity package.
9	Lifetest 2000h-125°C minimum	10 parts min 0 defect accepted	MIL-STD-750 method 1026 & 1042. MIL-STD-883 method 1005 cond.D Initial, intermediate (1000h) and final electrical tests at 3 T° (min, typ, max) (parameter & functional).	The lifetest duration shall be 2000h at minimum 125°C. In case of a temperature lower than 125°C, the lifetest duration is extended i.a.w. MIL-STD-883 method 1005.

	TEST	SAMPLING	METHOD / CRITERIA	COMMENTS
				Read & record for electrical tests. as per the preliminary issue of the internal supplier's specification (see 4.2.3.1.k).
10	DPA	3 parts	As per clause 4.3.9 see Annex H.	To be done on 3 parts after lifetest (as per above step 4).
11	Radiation evaluation	i.a.w. ECSS-Q-ST-60-15	See ECSS-Q-ST-60-15	-

Table 8–13: Legacy test files - Screening tests - Class 2 components

	TEST	SAMPLING	METHOD	COMMENTS
1	Serialization	100%	Defined by the supplier.	-
2	Temperature cycling	100%	10 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less). MIL-STD-750 method 1051 MIL-STD-883 method 1010	-
3	PIND test	100%	MIL-STD-750 method 2052 cond.A MIL-STD-883 method 2020 cond.A	Applicable to cavity package only.
4	Initial electrical test	100%	Electrical test (parametrical and functional) at 25°C as per the internal supplier's specification.	Read & record on selected parameters as per the internal supplier's specification (see 5.2.3.1k).
5	Burn-in	100%	MIL-STD-750 method 1038 & 1039 MIL-STD-883 method 1015 cond.B 160h – 125°C or 300h – 105°C or 590h – 85°C	Temperature shall be < Tjmax-10°C and Tg-10°C whichever is lower. In absence of Tj or Tg knowledge, 105°C max is required. Ea = 0,4eV for equivalence calculation unless a different value has been demonstrated for the product. Termination oxidation risk shall be controlled after burn-in. For discrete, HTRB and power burn-in depend on product family.
6	Final electrical test	100%	Electrical test (para-metrical and functional) at 3 temp.as per the internal supplier's specification.	Read & record on selected parameters as per the internal supplier's specification (see 5.2.3.1k).

	TEST	SAMPLING	METHOD	COMMENTS
7	PDA	-	On steps 4 and 6. Max acceptable PDA: 5%	PDA calculation applies to room temperature measurement only.
8	Seal test	100%	MIL-STD-750 method 1071 cond H1 or H2 and C or K. MIL-STD-883 method 1014 cond A or B and C.	Applicable to hermetic & cavity package only.
9	External visual inspection	100%	MIL-STD-750 method 2071 MIL-STD-883 method 2009	The MIL specs are not adapted to visual inspection of plastic encapsulated components, but can be used as reference (mainly for connection corrosion and marking acceptance). In addition, for plastic packages, inspect for the following defects: Package deformation/ Foreign inclusions in the package, voids and cracks in the plastic/ deformed leads.

Table 8–14: Legacy test files - Lot acceptance tests - Class 2 components

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
1	Construction analysis	5 parts	As per clause 5.2.3.3 see Annex H.	
2	Mechanical shocks	10 parts min 0 defect accepted	MIL STD 883 TM 2002 condition B - 5 pulses (per orientation). MIL-STD-750 TM 2016, 1500g, 0,5ms duration - 5 shocks, planes X1, Y1 and Z1.	Applicable to cavity package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 5.2.3.1.k).
	Vibrations		MIL-STD-883, TM 2007 condition A - 12 times (total). MIL-STD-750, TM 2056, 20g, 10-2000Hz, cross over at 50Hz - 12 times (total).	
	Constant acceleration		MIL-STD-883, TM 2001 condition E (resultant centrifugal acceleration to be in the Y1 axis only). For components which have a package weight of 5 grammes or more, or whose inner seal or cavity perimeter is more than 5 cm, Condition D shall be used MIL-STD-750, TM 2006, 20000g, planes X1, Y1 and Y2.	
3	Preconditioning + 96h HAST (or 1000h THB 85/85)	10 parts 0 defect accepted	HAST 96h-130°C-85%RH (JESD22-A110 with continuous bias) or THB (JESD22-A101). Electrical test (para-metrical and functional) at 25°C as per the internal supplier's specification Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Only for plastic package. Internal supplier's specification (see 5.2.3.1k).
4	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after the electrical test at 25°C and before preconditioning.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
				C-SAM test only applicable to plastic package.
5	Preconditioning + Thermal Cycling [1]	10 parts 0 defect accepted	100 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less) MIL-STD-750 method 1051 cond.B MIL-STD-883 method 1010 cond.B. Electrical test (para-metrical and functional) at 25°C as per the internal supplier's specification. Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Preconditioning applicable to plastic package only. The necessity to perform this step will depend on the application. Internal supplier's specification (see 5.2.3.1k).
6	Seal test	10 parts min 0 defect accepted	MIL-STD-883 TM 1014 condition A or B (fine leak) and condition C (gross leak). MIL-STD-750 TM 1071 condition H1 or H2 (fine leak) and condition C or K (gross leak with cavity) or condition E (gross leak without cavity).	Applicable to hermetic & cavity package.
7	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after thermal cycling and the electrical test at 25°C. C-SAM test only applicable to plastic package.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
8	Lifetest [1]	15 parts 0 defect accepted	1000h – 125°C minimum MIL-STD-750 method 1026 or 1042 MIL-STD-883 method 1005 cond.D Initial, intermediate and final electrical test (para-metrical and functional) at 25°C.	The lifetest duration shall be 1000h at minimum 125°C. In case a temperature lower than 125°C, the lifetest duration is extended i.a.w. MIL-STD-883 method 1005. Read & record and drift calculation on selected parameters as per the internal supplier's specification (see 5.2.3.1k)
9	External visual inspection	10 parts min	ESCC 2055000 ESCC 2059000	
10	Radiation Verification Test [1]	i.a.w. ECSS-Q-ST-60-15	See ECSS-Q-ST-60-15	-
[1] : Lifetest, thermal cycling and radiation verification test are performed on screened parts (see 5.3.3).				

Table 8–15: Legacy test files - LAT tests - Class 3 components

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
1	Construction analysis	5 parts	As per clause 6.2.3.3 see Annex H	In case of retinning, step 1 shall include the SEM "QBSD" mode to check the 100% coverage of SnPb.
2	Mechanical shocks	10 parts min 0 defect accepted	MIL STD 883 TM 2002 condition B - 5 pulses (per orientation). MIL-STD-750 TM 2016, 1500g, 0,5ms duration - 5 shocks, planes X1, Y1 and Z1.	Applicable to cavity package. Read & record for electrical test as per the preliminary issue of the internal supplier's specification (see 5.2.3.1.k).
	Vibrations		MIL-STD-883, TM 2007 condition A - 12 times (total). MIL-STD-750, TM 2056, 20g, 10-2000Hz, cross over at 50Hz - 12 times (total).	
	Constant acceleration		MIL-STD-883, TM 2001 condition E (resultant centrifugal acceleration to be in the Y1 axis only). For components which have a package weight of 5g or more, or whose inner seal or cavity perimeter is more than 5 cm, Condition D shall be used MIL-STD-750, TM 2006, 20000g, planes X1, Y1 and Y2.	
3	Preconditioning + 96h HAST (or 1000h THB 85/85)	10 parts 0 defect accepted	HAST 96h-130°C-85%RH (JESD22-A110 with continuous bias) or THB (JESD22-A101). Electrical test (para-metrical and functional) at 25°C as per the datasheet (selected functional tests and parameters) Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Only for plastic package. To be done, except if representative data collected in the JD are available. In case of retinning, step 2 is mandatory.
4	Lifetest [1]	15 parts 0 defect accepted	1000h – 125°C minimum. MIL-STD-750 method 1026 or 1042 MIL-STD-883 method 1005 cond.D.	The lifetest duration shall be 1000h at minimum 125°C.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
			Initial and final electrical test (parametrical and functional) at 25°C as per the datasheet (selected functional tests and parameters).	In case of a temperature lower than 125°C, the lifetest duration is extended i.a.w. MIL-STD-883 method 1005. Electrical test on selected parameters. To be done, except if representative data collected in the JD are available. In case of retinning, step 3 is mandatory.
5	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after the electrical test at 25°C and before preconditioning. C-SAM test only applicable to plastic package. To be done, except if representative data collected in the JD are available.
6	Preconditioning + Thermal Cycling [1]	10 parts 0 defect accepted	100 T/C -55°/+125°C (or to the manufacturer storage temp., whichever is less) MIL-STD-750 method 1051 cond.B. MIL-STD-883 method 1010 cond.B. Electrical test (para-metrical and functional) at 25°C as per the datasheet (selected functional tests and parameters). Preconditioning: i.a.w. JESD-22-A113 for SMD JESD-22-B106 for through hole.	Preconditioning applicable to plastic package only. To be done, except if representative data collected in the JD are available. In case of retinning, step 5 is mandatory.
7	Seal test	10 parts min 0 defect accepted	MIL-STD-883 TM 1014 condition A or B (fine leak) and condition C (gross leak).	Applicable to hermetic & cavity package. To be done, except if representative data collected in the JD are available. In case of retinning, step 6 is mandatory.

	TEST	SAMPLING / CRITERIA	METHOD	COMMENTS
			MIL-STD-750 TM 1071 condition H1 or H2 (fine leak) and condition C or K (gross leak with cavity) or condition E (gross leak without cavity).	
8	C-SAM	10 parts	JEDEC J-STD-020	To be done on the 10 parts of step 5 after thermal cycling and the electrical test at 25°C. C-SAM test only applicable to plastic package. To be done, except if representative data collected in the JD are available.
9	Radiation Verification Test [1]	i.a.w. ECSS-Q-ST-60-15	See ECSS-Q-ST-60-15	-
[1] : Lifetest, thermal cycling and radiation verification test areare performed on screened parts (see 6.3.3).				

9
Pure tin lead finish – risk analysis

9.1 Overview

9.1	Pure tin finish has a propensity to generate whiskers. A tin whisker is a conductive crystalline structure of tin growing from tin rich surfaces that can induce failures as: • Electrical instantaneous or permanent short circuit • Metal vapour arc in reduced atmospheric pressure conditions and for application with high levels of current and voltage (more than 12V) • Contamination: a free floating whisker can~~may~~ interfere with the movement of mechanical parts or induce contamination of optical surfaces Many parameters can have an impact on whisker growth. The purpose of the risk analysis is to evaluate those parameters.	New

9.2 Requirements

9.2a	A pure tin lead finish risk analysis facing whiskers shall include, as a minimum, the following:	New
	1. Lead material (e.g. alloy 42, copper)	
	2. Underlayer material and thickness(e.g. Ni underlayer, silver underlayer)	
	3. Plating chemistry and thickness(e.g. matte or bright tin, tin thickness)	
	4. Heat treatment by manufacturer (e.g. 1hour at 150 °C for Cu based lead frame)	
	5. Procedure (if any) for SnPb dipping of the parts	
	6. Conformal coating presence and characteristics: material and thickness	
	7. Design criticality (shorter distances between 2 connections or between a connection and an area at another potential)	
	8. Supply voltage and current	
	9. Tin whisker sensitivity results (as per JESD-201 and JESD22- A121A)	
	10. Mission profile: storage, mission duration, thermal cycling	
	11. Previous experiences	
	12.Impact of failure at unit/system level	

	NOTE The Annex A of GEIA STD-005-02 can be used as guideline	

Annex A (normative)
Component control plan (CCP) - DRD

Annex A.1 DRD Identification		
A.1.1 Requirement identification and source document		
A.1.1		Applicable
A.1.2 Purpose and objective		
A.1.2		Applicable
A.2 Expected response		
A.2.1 Scope and content		
A.2.1a		Applicable
A.2.2 Special remarks		
A.2.2a		Applicable

Annex B (normative)
Declared components list (DCL) - DRD

Annex B.1 DRD Identification		
B.1.1 Requirement identification and source document		
B.1.1		Applicable
B.1.2 Purpose and objective		
B.1.2		Applicable
B.2 Expected response		
B.2.1 Scope and content		
B.2.1a		Applicable
B.2.2 Special remarks		
B.2.2		Applicable

Annex C (normative)
Internal Supplier's specification - DRD

Annex C.1 DRD Identification		
C.1.1 Requirement identification and source document		
C.1.1	This DRD is called up from ECSS-Q-ST-60-13 requirements 4.2.3.1.l and 5.2.3.1.l.	Modified
C.1.2 Purpose and objective		
C.1.2	The purpose of the Internal Supplier's Specification is to establish the tested parameters, test conditions, acceptance criteria, drift limits for the electrical testing during evaluation, screening and lot acceptance.	Modified
C.2 Expected response		
C.2.1 Scope and content		
C.2.1a	The internal supplier's specification shall include or refer to the following information:	Modified
	1.	Applicable
	2.	Applicable
	3.	Applicable
	4.	Not applicable
	5.	Applicable
	6.	Applicable
	7.	Not applicable
	8.	Not applicable
	9.	Applicable
	10.	Not applicable
	11.	Not applicable
	12.	Not applicable
	13.	Not applicable
	14.	Not applicable
	15.	Not applicable
	16.	Not applicable
	17.	Not applicable
C.2.2 Special remarks		

C.2.2		Applicable

Annex D (normative)
Parts approval document - DRD

Annex D.1 DRD Identification		
D.1.1 Requirement identification and source document		
D.1.1		Not applicable
D.1.2 Purpose and objective		
D.1.2		Not applicable
D.2 Expected response		
D.2.a		Not applicable

Annex E (informative)
EEE documents delivery per review

Annex E (informative)		
Annex E		Not applicable

Annex F (normative)
Justification document - DRD

Annex F.1 DRD Identification

F.1.1 Requirement identification and source document

F.1.1	This DRD is called up from requirements 4.2.4.d, 5.2.4.d and 6.2.4.d.	New

F.1.2 Purpose and objective

F.1.2	The JD is a control document the objective of which is to identify the component and to provide information about it , its evaluation and its acceptability w.r.t.: • component/ manufacturer data • approval status • evaluation tests • procurement inspections and tests • lot acceptance or lot verification tests • radiation hardness data and RVT	New

F.2 Expected response

F.2.1 Scope and content

F.2.1.1 General information

F.2.1.1a	The JD shall include:	New
	1. Family/ sub-family	
	2. Part number (commercial designation)	
	3. Ordering information (part number description)	
	4. Functional description ~~(major parameters for the application)~~	
	5. Technology (CMOS, bipolar, etc…)	
	6. Package	
	7. Manufacturer ~~(country)~~	
	8. Temperature range or AECQ grade	
	9. AEC-Q	
	10 Other qualification	
	11. Datasheets/Procurement specification (revision, date, …)	
	~~. Absolute maximum rating (Tj max, Pd max, Vcc max,…)~~	
	12. Application notes	

	13. ~~Procurement specification/ data sheet (revision, date), Application notes &~~ errata sheet	
	14. Manufacturer screening & other manufacturer test on procured lot	
	15. Manufacturer parts traceability (trace-code, date-code, assembly plant, wafer fab, diffusion lot, die revisioni and mask set, process name)	
	16. PCN (Service & for selected parts)	
	17. Obsolescence management (Yes/No)	
	~~14. Technology (CMOS, bipolar, and if available process name)~~	
	~~15. Life cycle maturity (emerging/maturity/decline)~~	
	~~16. Technologies with less than one year introduction (yes/no)~~	
	18. Moulding characteristics (Tg)	
	19. Moisture sensitivity level	
	20. ESD level	
	~~19. Internal pure tin (Yes/No)~~	
	21. Lead finish ~~(RoHs)~~	
	22. In case of pure tin finish, JESD-201 Class 2 qualified (YES/NO)	
	23. Justification of the need~~/ Trade off with Hirel and other commercial sources~~ in class 1.	
F.2.1.2 Supporting data		
F.2.1.2a	The JD shall include:	New
	1. Traceability information (e.g. assembly plant, wafer fab, die revision) for the data given below.	
	2. Construction analysis report	
	3. Mechanical shocks results (in case of sensitive parts)	
	4. Vibration results (in case of sensitive parts)	
	5. Constant acceleration results (in case of sensitive parts)	
	6. Seal tests results (in case of hermetic & cavity package)	
	7. Humidity test results such as HAST (96h – 130°C – 85% RH) or THB (1000h – 85°C – 85% RH)	
	8. Thermal cycling test results (up to 500 cycles, -55°C /+125°C)	
	9. Lifetest / HTOL results (up to 2000h - 125°C)	
	10. Other test results (if any)	

	11. Infant mortality data (EFR computation) – recommended	
	~~1. Qualification status /Hirel or automotive parts (same technology)~~	
	~~2. OQ/ EFR/ periodic tests~~	
	~~3. Qualification data~~	
	~~4. Other data / experiences (evaluation, alert, radiation, assembly,…)~~	
	~~5. Demonstration of the representativeness of reliability data~~	
	~~6. the supporting data~~	
F.2.1.2b	When applicable the JD shall contain the following supporting radiation data: 1. TID (Total Ionizing Dose) data 2. DD (Displacement Damage) data 3. SEE (Single Event Effect) data	
	F.2.1.3 Evaluation plan	
F.2.1.3a	The JD shall include:	New
	1. Evaluation plan with flow diagram	
	2. Preliminary and final internal supplier's specification	
	F.2.1.4 Additional test on flight lot	
F.2.1.4a	The JD shall include LAT /screening and RVT plan with flow diagram and test conditions and acceptance criteria (including drift calculation).	New
	F.2.1.5 Procurement data	
F.2.1.5a	The JD shall include traceability information (trace-code, date-code, assembly plant, wafer fab, diffusion lot and die revision).	New
	F.2.1.6 Approval status	
F.2.1.6a	The JD shall include the approval status.	New
	F.2.1.7 Appendix	
F.2.1.7a	The JD shall include:	New
	1. A copy of the procurement specification / data sheet	
	2. Traceability information (CoC, PCN)	
	F.2.2 Special remarks	
F.2.2	None	New

Annex G <<deleted>>

Annex H (informative) Flow chart for construction analysis ~~and destructive physical analysis~~

H.1 Overview

This annex is a guideline for Construction Analysis (CA) and Destructive Physical Analysis (DPA) sequences to be adapted on a case by case basis for specific products/ technologies as DSM, BGA packages. Construction analysis goals are specifically oriented: quality/ reliability aspects, detection of counterfeit parts, identification of lead finish (RoHs).

Destructive Physical Analysis allow evaluating impact of life test or long duration storage on the parts.

H.2 <<deleted>>

H.3 Construction analysis sequence

Table H-1: Construction analysis sequence

TEST	SN1	SN2	SN3	SN4	SN5	PROCEDURE	COMMENTS
External visual inspection	X	X	X	X	X	MIL-STD-750 method 2071 MIL-STD-883 method 2009	MIL specifications are not fitted to visual inspection of PED but can be used as reference (Note 1)
X-ray inspection	X	X	X	X	X	MIL-STD-750 method 2076 MIL-STD-883 method 2012	-
C-SAM test	X	X	X	X	X	JEDEC J-STD-020	Only applicable to plastic package
Permanence of marking	X	X	X	X	X	ESCC 24800	-
PIND test (cavity package)	X	X	X	X	X	MIL-STD-750 method 2052 MIL-STD-883 method 2020	-
Hermeticity (cavity package)			X	X	X	MIL-STD-750 method 1071 MIL-STD-883 method 1014	-
Residual gas analysis (cavity package)			X	X	X	MIL-STD-750 Method 1018 MIL-STD-883 Method 1018	5000 ppm H_2O max at 100°C
Lead finish analysis and pure tin identification	X	X				Energy Dispersive X-ray analysis (EDX), X-ray fluorescence, Microfluorescence, Differential Scanning Calorimeter (DSC)	Analysis to identify lead finish w.r.t. RoHs problematic
Solderability	X	X				MIL-STD-750 method 2026 MIL-STD-883 method 2003	-
Terminal strength	X	X				MIL-STD-750 Method 2036 MIL-STD-883 Method 2004	-
Delidding	X	X	X	X		-	-
Internal visual inspection	X	X	X	X		ESCC 2045000 ESCC 2045010 ESCC 2059000	The die revision shall be identified and recorded

SEM inspection	X	X				MIL-STD-750 method 2077 MIL-STD-883 method 2018	To verify the quality of wire bonding, glassivation integrity, die interconnect metallization
Bond strength (for wedged bonding)	X	X	X			MIL-STD-750 method 2037 MIL-STD-883 method 2011	-
Bond shear (for ball bonding)	X	X	X			JEDEC JASD22-B116	-
Glassivation integrity		X	X	X		MIL-STD-883 method 2021	Make sure that the chemical etchant is suitable for the metallization
Die shear test (cavity package)	X	X	X			MIL-STD-750 method 2017 MIL-STD-883 method 2019	-
Package level cross-sectioning					X	Micro-sectioning of leads shall be performed to assess presence and characteristics of the under-layer	Including die micro-sectioning
Visual, SEM and material analysis					X	-	-

Note 1: In addition to MIL specification criteria, inspect for any evidence of:

- Package deformation
- Foreign inclusions in the package, voids and cracks in the plastic encapsulant
- Deformed leads, peeling, blistering or corrosion of finishing
- Legibility and correctness of marking
- Homogeneity of the lot (package level)

H.4 <<deleted>>~~Destructive physical analysis sequence~~

Bibliography

ECSS-S-ST-00	ECSS system - Description, implementation and general requirements
ECSS-Q-ST-70-61	Space product assurance - High reliability assembly for surface mount and through hole connections