

Space product assurance

**ECSS Secretariat**

**ESA-ESTEC**

**Requirements & Standards Division**

**Noordwijk, The Netherlands**

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 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.

**Disclaimer**

ECSS does not provide any warranty whatsoever, whether expressed, implied, or statutory, including, but not limited to, any warranty of merchantability or fitness for a particular purpose or any warranty that the contents of the item are error-free. In no respect shall ECSS incur any liability for any damages, including, but not limited to, direct, indirect, special, or consequential damages arising out of, resulting from, or in any way connected to the use of this Standard, whether or not based upon warranty, business agreement, tort, or otherwise; whether or not injury was sustained by persons or property or otherwise; and whether or not loss was sustained from, or arose out of, the results of, the item, or any services that may be provided by ECSS.

Published by: ESA Requirements and Standards Section

ESTEC, P.O. Box 299,

2200 AG Noordwijk

The Netherlands

Copyright: 2021© by the European Space Agency for the members of ECSS

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 |  |
|  | 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. |

Table of contents

[Change log 3](#_Toc74132160)

[Introduction 7](#_Toc74132161)

[1 Scope 9](#_Toc74132162)

[2 Normative references 10](#_Toc74132163)

[3 Terms, definitions and abbreviated terms 12](#_Toc74132164)

[3.1 Terms from other standards 12](#_Toc74132165)

[3.2 Terms specific to the present standard 12](#_Toc74132166)

[3.3 Abbreviated terms 12](#_Toc74132167)

[3.4 Conventions 14](#_Toc74132168)

[3.5 Nomenclature 15](#_Toc74132169)

[4 Requirements for class 1 components 16](#_Toc74132170)

[5 Requirements for class 2 components 35](#_Toc74132171)

[6 Requirements for class 3 components 53](#_Toc74132172)

[7 Quality levels 70](#_Toc74132173)

[8 Procurement test table 71](#_Toc74132174)

[9 Pure tin lead finish – risk analysis 109](#_Toc74132175)

[Annex A (normative) Component control plan (CCP) - DRD 111](#_Toc74132176)

[Annex B (normative) Declared components list (DCL) - DRD 112](#_Toc74132177)

[Annex C (normative) Internal Supplier’s specification - DRD 113](#_Toc74132178)

[Annex D (normative) Parts approval document - DRD 115](#_Toc74132179)

[Annex E (informative) EEE documents delivery per review 116](#_Toc74132180)

[Annex F (normative) Justification document - DRD 117](#_Toc74132181)

[Annex G <<deleted>> 120](#_Toc74132182)

[Annex H (informative) Flow chart for construction analysis ~~and destructive physical analysis~~ 121](#_Toc74132183)

[Bibliography 125](#_Toc74132184)

**Figures**

[Figure 4‑1: <<deleted>> 24](#_Toc74132185)

[Figure 4‑2: <<deleted>> 28](#_Toc74132186)

[Figure 5‑1: <<deleted>> 42](#_Toc74132187)

[Figure 5‑2: <<deleted>> 47](#_Toc74132188)

[Figure 6‑1: <<deleted>>~~Lot acceptance test flow chart for Class 3 components~~ 64](#_Toc74132189)

[Figure 8‑1: <<deleted>> 71](#_Toc74132190)

[Figure 8‑2: <<deleted>> 71](#_Toc74132191)

[Figure 8‑3: <<deleted>> 71](#_Toc74132192)

[Figure 8‑4: <<deleted>> 71](#_Toc74132193)

[Figure 8‑5: <<deleted>> 72](#_Toc74132194)

[Figure 8‑6: <<deleted>> 72](#_Toc74132195)

**Tables**

[Table 4–1: <<deleted and moved as legacy test files as Table 8–9>> 24](#_Toc74132196)

[Table 4–2: <<deleted and moved as legacy test files as Table 8–10>> 27](#_Toc74132197)

[Table 4–3: <<deleted and moved as legacy test files as Table 8–11>> 28](#_Toc74132198)

[Table 4-4: Documentation for Class 1 components 34](#_Toc74132199)

[Table 5–1: <<deleted and moved as Legacy test files as Table 8–12>> 42](#_Toc74132200)

[Table 5–2: <<deleted and moved as Legacy test files as Table 8–13>> 46](#_Toc74132201)

[Table 5–3: <<deleted and moved to Legacy test files as Table 8–14>> 47](#_Toc74132202)

[Table 5–4: Documentation for Class 2 components 52](#_Toc74132203)

[Table 6–1: <<deleted>> 60](#_Toc74132204)

[Table 6–2: <<deleted>> 63](#_Toc74132205)

[Table 6–3: <<deleted and moved as Legacy test files Table 8–15>> 64](#_Toc74132206)

[Table 6–4: Documentation for Class 3 components 69](#_Toc74132207)

[Table 8–1: Procurement test table for ceramic capacitors chips 74](#_Toc74132208)

[Table 8–2: Procurement test table for solid electrolyte tantalum capacitors chips 75](#_Toc74132209)

[Table 8–3: Procurement test table for discrete parts (diodes, transistors, optocouplers) 78](#_Toc74132210)

[Table 8–4: Procurement test table for fuses 80](#_Toc74132211)

[Table 8–5: Procurement test table for magnetics 81](#_Toc74132212)

[Table 8–6: Procurement test table for microcircuits 84](#_Toc74132213)

[Table 8–7: Procurement test table for resistors 85](#_Toc74132214)

[Table 8–8: Procurement test table for Thermistors 88](#_Toc74132215)

[Table 8–9: Legacy test files - Evaluation tests for Class 1 components 90](#_Toc74132216)

[Table 8–10: Legacy test files - Screening tests for Class 1 components 93](#_Toc74132217)

[Table 8–11: Legacy test files - Lot acceptance tests for Class 1 components 95](#_Toc74132218)

[Table 8–12: Legacy test files - Evaluation tests - Class 2 components 98](#_Toc74132219)

[Table 8–13: Legacy test files - Screening tests - Class 2 components 101](#_Toc74132220)

[Table 8–14: Legacy test files - Lot acceptance tests - Class 2 components 103](#_Toc74132221)

[Table 8–15: Legacy test files - LAT tests - Class 3 components 106](#_Toc74132222)

[Table H-1 : Construction analysis sequence 122](#_Toc74132223)

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:

1. component programme management,
2. component selection, evaluation and approval,
3. procurement,
4. handling and storage,
5. component quality assurance,
6. specific components, and
7. documentation.

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

1. concurrent engineering,
2. standardization of component types,
3. characterization of components,
4. assessment of component manufacturers including declared competencies and processes,
5. testing, screening, lot acceptance and periodic testing,
6. procurement specifications,
7. control and inspection,
8. control of nonconforming materials,
9. assessment and use of existing component data,
10. application of specific control to mitigate risk for components with limited data or confidence, and
11. 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.

# 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.

1. Class 1 components are described in Clause 4
2. Class 2 components are described in Clause 5
3. 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.

# 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 |

# Terms, definitions and abbreviated terms

## 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**

## Terms specific to the present standard

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.

1. 1 The notion of "lot of EEE parts" used for the radiation and lot acceptance tests is defined by the trace code.
2. 2 Several trace codes can be part of a same delivery from the manufacturer or the distributor.
3. 3 It is possible to have several diffusion lots and wafer fabs (as per ESCC 21300) in the same trace code.

## 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 |
| **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 |
| **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 |

## Conventions

1. The term “EEE component“ is synonymous with the terms "EEE Part", "Component" or just "Part".
2. The term “for approval” means that a decision of the approval authority is necessary for continuing the process.
3. The term “for review” means that raised reviewers comments are considered and dispositioned.
4. The term “for information” means that no comments are expected about the delivered item.
5. 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)
   18. 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).

## Nomenclature

The following nomenclature applies throughout this document:

1. The word “shall” is used in this Standard to express requirements. All the requirements are expressed with the word “shall”.
2. The word “should” is used in this Standard to express recommendations. All the recommendations are expressed with the word “should”.
   1. It is expected that, during tailoring, recommendations in this document are either converted into requirements or tailored out.
3. 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”.
4. 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.
   1. In ECSS “may” and “can” have completely different meanings: “may” is normative (permission), and “can” is descriptive.
5. The present and past tenses are used in this Standard to express statements of fact, and therefore they imply descriptive text.

# 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 the CN / CR process~~ and submitted to the customer for approval, before mounting.  ~~NOTE For JD generation, see 4.2.4.d.~~ | Applicable | |
| 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.   1. 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.~~   1. ~~1 It is important to ensure that the test conditions remain as close as possible to application.~~ 2. ~~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.~~   1. ~~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  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 | Applicable | |
| 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.~~   1. ~~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.~~  ~~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~~. | Applicable | |
| 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   1. 1 The mitigation plan can include one or a combination of the following solutions:  * Tin whisker sensitivity evaluation * Retinning of terminations with complementary evaluation.  1. 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.   1. 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.~~   1. ~~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.~~ 2. ~~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 | 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.   1. 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.   1. 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.   1. ~~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 ‑: <<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~~ |
|  | 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:  additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA),  used outside the specified limits,  specific tests are required during procurement as per Table 7-1,  pure tin is used inside or outside the part. | | Not applicable |
|  | Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer’s approval. | | Not applicable |
|  | 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 |
|  | <<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.   1. 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.   1. 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.   1. 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.   1. 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.~~:  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  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 applied normative systems, ~~in Figure 4‑2 and Table 4‑3~~ 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 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.~~  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  Table 8–8 for thermistors | New |

Figure ‑: <<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:  For any part: the minimum inspections required in ESCC 21004.  For the non-space qualified parts, when the final customer source inspection has not been performed, the following additional items shall be done:  External visual inspection by sampling (AQL 0,65% level II or 20 parts min)  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~~.   1. ~~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.   1. 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.~~   1. ~~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.   1. 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.   1. 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.   * 1. 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 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 |
| 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 -: 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) | - |

# 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.~~   * 1. ~~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.   1. ~~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.   1. 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.~~   1. ~~1 It is important to ensure that the test conditions remain as close as possible to application.~~ 2. ~~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.~~   1. ~~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.~~   1. ~~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.~~  ~~7. Through RFD submit the mitigation plan and results for the customer approval.~~ | Applicable ~~New~~ |
| 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.   1. 1 The mitigation plan can include one or a combination of the following solutions:  * Tin whisker sensitivity evaluation * Retinning of terminations with complementary evaluation.  1. 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.   1. 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 |
| **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.~~   1. ~~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.~~ 2. ~~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~~ |
| 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.   1. 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.   1. 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.   1. ~~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 ‑: <<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~~ |
| 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:  additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA),  used outside the specified limits,  specific tests are required during procurement as per Table 7-1,  pure tin is used inside or outside the part. | Not applicable |
| Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer’s approval. | Not applicable |
| 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~~ |
| <<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.   * 1. 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.   1. 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.   1. 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.   1. 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:  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  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.~~   1. ~~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.~~  ~~(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.~~ | Deleted ~~New~~ |
| ~~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.~~  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  Table 8–8 for thermistors | New |

Figure ‑: <<deleted>>

Table –: <<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:  For any part: the minimum inspections required in ESCC 21004.  ~~Marking control,~~  ~~Quantity verification,~~  ~~Packing checking,~~  ~~Review of the manufacturer delivered documentation,~~  ~~Additional tests based on the type of component, criticality and heritage with the manufacturer (e.g. solderability tests, electrical tests),~~  ~~In case of not golden termination, check the lead finish as per ESCC 25500 basic specification.~~  For the non-space qualified parts, when the final customer source inspection has not been performed, the following additional items shall be done:  External visual inspection by sampling (AQL 0,65% level II or 20 parts min)  Electrical measurements at room temperature on 20 parts or 100 % (if lot size < 20 parts), or a datapackage review. | Applicable |
| 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)~~.   1. ~~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.   1. 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.~~   1. ~~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.   1. 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  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 |
| **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 –: 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) | - |

# 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.~~   * 1. ~~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.   1. ~~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.   1. 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.~~   1. ~~1 It is important to ensure that the test conditions remain as close as possible to application.~~ 2. ~~2 This requirement is important due to the specificities of Deep Sub-Micron Technologies (<90nm).~~ | | Deleted ~~New~~ |
| **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~~,  2. TO3 and DO4/DO5 packages.  3. Wire link fuses | | Applicable |
| 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.~~   1. ~~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.~~  ~~7. Through RFD submit the mitigation plan and results for the customer approval.~~ | | Applicable ~~New~~ |
| 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.   1. 1 The mitigation plan can include one or a combination of the following solutions:  * Tin whisker sensitivity evaluation * Retinning of terminations with complementary evaluation.  1. 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.   1. 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 |
| **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.~~   1. ~~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.~~ 2. ~~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~~ |
| 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.   1. 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.   1. ~~For mounting process (including baking for PED), see ECSS-Q-ST-70-38 and ECSS-Q-ST-70-08.~~ | | New |
| ~~6.2.3.4.e~~ | <<deleted>>~~Evaluation of retinned components shall be performed in accordance with Figure 8‑5 from the requirement 8.1a.~~ | | Deleted New |

Table –: <<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 |
| 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:  additional controls are required (e.g. precap, buy-off, LAT or LVT, RVT, DPA),  used outside the specified limits,  specific tests are required during procurement as per Table 7-1,  pure tin is used inside or outside the part. | Not applicable |
| Other Hirel parts : A PAD in accordance with Q-ST-60 Annex D is delivered to customer for customer’s approval. | Not applicable |
| 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.   1. 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.   1. 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 |
| 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.   1. 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.~~  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  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 shall meet the screening flow defined by the generic specifications listed in Table 7 3.~~ | N/A ~~Applicable~~ |
| 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 –: <<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.~~   1. ~~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.~~  Table 8–1 for ceramic capacitors chips,  Table 8–2 for solid electrolyte tantalum capacitors chips  Table 8–3 for discrete parts (diodes, transistors, optocouplers)  Table 8–4 for fuses  Table 8–5 for magnetic parts  Table 8–6 for microcircuits  Table 8–7 for resistors  Table 8–8 for thermistors | New |

Figure ‑: <<deleted>>~~Lot acceptance test flow chart for Class 3 components~~

Table 6–: <<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.~~   1. ~~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.   1. 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.~~   1. ~~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.   1. 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 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 |
| 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.   * 1. 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 –: 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) | - |

# Quality levels

Not applicable

# 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 ‑: <<deleted>>

Figure ‑: <<deleted>>

Figure ‑: <<deleted>>

Figure ‑: <<deleted>>

Figure ‑: <<deleted>>

Figure ‑: <<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:  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 | New |

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 |  |  |
| **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) |
| **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 |  |  |
| **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) |
| **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 |
| 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 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 |
| 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 |  |  |
| **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 |  |  |
| **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 |
| 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 |  |  |
| **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.   1. 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).  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  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.  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). |
| **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. |
| **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.  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. |
| **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.  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). |
| **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.  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. |
| **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.  Initial and final electrical test (parametrical and functional) at 25°C as per the datasheet (selected functional tests and parameters). | The lifetest duration shall be 1000h 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.  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).  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.  To be done, except if representative data collected in the JD are available.  In case of retinning, step 6 is mandatory. |
| **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). | | | | |

# 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   1. The Annex A of GEIA STD-005-02 can be used as guideline |  |

1. (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 |

1. (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 |

1. (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 |

1. (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 |

1. (informative)  
   EEE documents delivery per review

|  |  |  |
| --- | --- | --- |
| **Annex E (informative)** | | |
| Annex E |  | Not applicable |

1. (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 |

1. <<deleted>>
2. (informative)  
   Flow chart for construction analysis ~~and destructive physical analysis~~ 
   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.

* 1. <<deleted>>



* 1. Construction analysis sequence

: 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 H2O 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) | | | | | | | |

* 1. <<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 |