

TECHNICAL SPECIFICATION

**Process management for avionics – Management plan –
Part 1: Preparation and maintenance of an electronic components management
plan**

IEC/TS 62239-1:2012

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PROCESS MANAGEMENT FOR AVIONICS –
MANAGEMENT PLAN –****Part 1: Preparation and maintenance of an
electronic components management plan**

FOREWORD

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- the required support cannot be obtained for the publication of an International Standard, despite repeated efforts, or
- the subject is still under technical development or where, for any other reason, there is the future but no immediate possibility of an agreement on an International Standard.

Technical specifications are subject to review within three years of publication to decide whether they can be transformed into International Standards.

IEC/TS 62239-1, which is a technical specification, has been prepared by IEC Technical Committee 107: Process management for avionics.

This edition cancels and replaces IEC/TS 62239 published in 2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to IEC/TS 62239:2008:

- a) Scope – Added DO-254 for clarification
- b) Normative references – Added additional references
- c) Terms, definitions and abbreviations – Clarified some definitions
- d) 4 Technical requirements – Added clarification related to managing ECMP at subcontractor
- e) 4.2 Component selection – Clarified temperature range requirements
- f) 4.3.3 De-rating and stress analysis – Added information relative to part wear out
- g) 4.3.8 Management of lead free termination finish and soldering – Added requirement
- h) 4.3.9 Counterfeit, fraudulent and recycled component avoidance – Added requirement
- i) 4.4.5 Demonstration of component qualification – Clarified documentation required
- j) 4.4.5.3.4 Equipment manufacturer validation – Added additional requirements
- k) 4.4.7 Distributor process management approval – Added additional requirements
- l) 4.5.2. On-going component quality assurance – Changed title to clarify purpose and changed STACK 0001 reference to IEC/PAS 62686-1
- m) 4.6.5 Reporting – Added requirement to periodically report status of obsolescence program to customer
- n) 4.6.7 Semiconductor reliability and wear out – Added requirement to address semiconductor wear out
- o) Annex A: Typical Qualification Requirements – Added requirement for minimum part qualification
- p) Annex B Semiconductor reliability and wear out – Added annex B to provide information about wear out

The text of this technical specification is based on the following documents:

Enquiry draft	Report on voting
107/161/DTS	107/179/RVC

Full information on the voting for the approval of this technical specification can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all the parts in the IEC/TS 62239 series under the general title *Process management for avionics – Management plan*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- transformed into an International Standard,
- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.



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INTRODUCTION

This Technical Specification provides the structure for aerospace equipment manufacturers, subcontractors, maintenance facilities, and other aerospace component users to develop their own Electronic Component Management Plans (ECMPs), hereinafter also referred to as 'plan'. This Technical Specification states objectives to be accomplished; it does not require specific tasks to be performed, specific data to be collected or reports to be issued. Those who prepare plans in compliance with this Technical Specification will document processes that are the most effective and efficient for them in accomplishing the objectives of this Technical Specification. In order to allow flexibility in implementing and updating the documented processes, plan authors are encouraged to refer to their own internal process documents instead of including detailed process documentation within their plans.

Subcontractors or test houses will be assessed by the plan owner on the relevant parts of 4.1 to 4.9 as agreed with the plan owner

This component management Technical Specification is intended for aerospace users of electronic components. This Technical Specification is not intended for use by the manufacturers of electronic components. Components selected and managed according to the requirements of a plan compliant to this Technical Specification may be approved by the concerned parties for the proposed application, and for other applications with equal or less severe requirements.

Organizations that prepare such plans may prepare a single plan, and use it for all relevant products supplied by the organization, or may prepare a separate plan for each relevant product or customer.

PROCESS MANAGEMENT FOR AVIONICS – MANAGEMENT PLAN –

Part 1: Preparation and maintenance of an electronic components management plan

1 Scope

This part of the IEC/TS 62239 series defines the requirements for developing an Electronic Components Management Plan (ECMP) to assure customers and regulatory agencies that all of the electronic components in the equipment of the plan owner are selected and applied in controlled processes compatible with the end application and that the technical requirements detailed in Clause 4 are accomplished. In general, the owners of a complete electronic components management plan are avionics equipment manufacturers. This part of the IEC/TS 62239 series provides the minimum requirements for system development assurance levels according to levels A, B and C of the DO-254 A, B and C for flight equipment.

Although developed for the avionics industry, this process may be applied by other industrial sectors.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 61340-5-1, *Electrostatics – Part 5-1: Protection of electronic devices from electrostatic phenomena – General requirements*

IEC/TR 61340-5-2, *Electrostatics – Part 5-2: Protection of electronic devices from electrostatic phenomena – User guide*

IEC/TR 62240, *Process management for avionics – Use of semiconductor devices outside manufacturers' specified temperature range*

IEC 62396-1, *Process management for avionics – Atmospheric radiation effects – Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*

IEC/TS 62396-2, *Process management for avionics – Atmospheric radiation effects – Part 2: Guidelines for single event effects testing for avionics systems*

IEC/TS 62396-3, *Process management for avionics – Atmospheric radiation effects – Part 3: Optimising system design to accommodate the single event effects (SEE) of atmospheric radiation*

IEC/TS 62396-4, *Process management for avionics – Atmospheric radiation effects – Part 4: Guidelines for designing with high voltage aircraft electronics and potential single event effects*

IEC/TS 62396-5, *Process management for avionics – Atmospheric radiation effects – Part 5: Guidelines for assessing thermal neutron fluxes and effects in avionics systems*

IEC 62402, *Obsolescence management – Application guide*

IEC/TS 62564-1, *Process management for avionics Aerospace qualified electronic components (AQEC) – Part 1: Integrated circuits and discrete semiconductors*

IEC/PAS 62647-1, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 1: Lead-free management*

IEC/TS 62647-11, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 1: Preparation for a lead-free control plan*

IEC/PAS 62647-2, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 2: Mitigation of the deleterious effects of tin*

IEC/TS 62647-22, *Process management for avionics – Aerospace and defence electronic systems containing lead-free solder – Part 2: Mitigation of the deleterious effects of tin*

IEC/TS 62668-1, *Process management for avionics – Counterfeit prevention – Part 1: Avoiding the use of counterfeit, fraudulent and recycled electronic components*

IEC/PAS 62686-1, *Process management for avionics – Aerospace qualified electronic components (AQEC) – Part 1: General requirements for high reliability integrated circuits and discrete semiconductors*

IEC/TS 62686-13, *Process management for avionics – Aerospace qualified electronic components (AQEC) – Part 1: General requirements for high reliability integrated circuits and discrete semiconductors*

ISO 9000:2005, *Quality management systems – Fundamentals and vocabulary*

JEP 149:2004, JEDEC Standard, *Application Thermal Derating Methodologies*

JESD 47, JEDEC Standard, *Stress – Test-driven qualification of integrated circuits*

JESD 94.01, JEDEC Standard, *Application Specific Qualification Using Knowledge Based Test Methodology*

MIL-HDBK-263, Revision B, *Electrostatic Discharge Control Handbook*

AEC-Q100, *Failure Mechanism based Stress Test Qualification for Integrated Circuits*

AEC-Q101, *Stress Test Qualification for Automotive Grade Discrete Semiconductors*

AEC-Q200, *Stress Test Qualification for Passive components*

SAE AS5553, *Counterfeit Electronic Parts, Avoidance, Detection, Mitigation, and Disposition*

ANSI/GEIA-STD-0002-1, *Aerospace Qualified Electronic Component (AQEC) Volume 1 – Integrated Circuits and Semiconductors*

1 To be published. This will supersede the PAS document.

2 To be published. This will supersede the PAS document.

3 To be published. This will supersede the PAS document.

ANSI/GEIA-STD-0005-1, *Performance Standard for Aerospace and Military Electronic Systems Containing Lead-Free Solder*

ANSI/GEIA-STD-0005-2, *Standard for Mitigating the Effects of Tin Whiskers in Aerospace and High Performance Electronic Systems*

GIFAS/5052/2008, *Guide for managing electronic component sourcing through non franchised distributors. Preventing fraud and counterfeiting*

AS/EN/JISQ 9100 *Quality Management Systems-Requirements for Aviation Space and Defense Organizations*

IPC/JEDEC J-STD-20, *Moisture/Reflow Sensitivity Classifications*

3 Terms, definitions and abbreviations

For the purposes of this document, the following terms, definitions and abbreviations apply.

In their plan, plan owners may use alternative definitions consistent with convention in their company.

3.1 Terms and definitions

3.1.1 environment

applicable environmental conditions (as described per the equipment specification) that the equipment is able to withstand without loss or degradation in equipment performance throughout its manufacturing cycle and maintenance life (the length of which is defined by the equipment manufacturer in conjunction with customers)

3.1.2 purchased

bought outside the plan owner organization, from an independent supplier

Note 1 to entry: This indicates that the plan owner does not manufacture this in-house

3.1.3 capable

capacity of a component to be used successfully in the intended application

3.1.4 certified

assessed and compliant to an applicable 3rd party

3.1.5 characterization

process of testing a sample of components to determine the key electrical parameter values that can be expected of all produced components of the type tested

3.1.6 component application

domain of use where the component meets the design requirements

3.1.7 component manufacturer

organization responsible for the component specification and its production

3.1.8**component obsolescence**

absence of availability of a component which is not procurable due to the manufacturer(s) ceasing production

Note 1 to entry: Component obsolescence management is considered as an element of component dependability

3.1.9**component qualification**

process used to demonstrate that the component is capable of meeting its specification for all the required conditions and environments

3.1.10**component quality assurance**

activities and processes to provide adequate confidence that each individual component meets the performance and environmental requirements

3.1.11**component selection**

process of choosing a specific component for a specific application

3.1.12**component standardization**

process of developing and agreeing by consensus on uniform engineering criteria for products and methods for achieving compatibility, interoperability, interchangeability, or commonality of material

Note 1 to entry: Standardization is used to reduce proliferation of parts into inventory.

3.1.13**counterfeit**

practice of producing products which are imitations or are fake goods or services and, therefore, infringes the intellectual property rights of the original manufacturer.

Note 1 to entry: Counterfeiting is illegal and generally relates to wilful trade mark infringement

3.1.14**fraudulent**

produced or distributed in violation of the law

EXAMPLE Fraudulent parts include but are not limited to:

- a) parts which do not contain the proper internal construction (die, manufacturer, wire bonding etc.),
- b) parts which have been used refurbished or reclaimed but represented as new product,
- c) parts which have different package style or surface plating/finish than the ordered parts,
- d) parts which have not successfully completed the original component manufacturer's full production and test flow but are represented as the completed product,
- e) parts sold as upscreened parts which have not successfully completed upscreening,
- f) parts sold with modified labelling or markings intended to misrepresent the part's form, fit, function or grade,
- g) parts which have been refinished, upscreened or uprated and have been identified as such, and are submitted as compliant parts, are not considered fraudulent (SAE AS5553, IEC/TS 62668-1:2012, definition),
- h) pieces rejected at manufacturing level which meet the definition of a counterfeit part.

Note 1 to entry: This includes stolen electronic components, components scrapped by the original component manufacturer or by any user, disassembled components salvaged and resold as new components, counterfeit components, copies, imitations, full or partial substitutes of brands, designs, models, patents, software or copyright for example: components whose production and distribution are not controlled by the original manufacturer, unlicensed copies of a design, disguised components (re-marking of the original manufacturer name, reference date/code or other identifiers etc.) components without chips or chips other than of the original manufacturers' chips.

**3.1.15
dependability**

capability of a product enabling it to achieve the specified functional performance at the appropriate time and for the planned duration, without damage to itself or its environment

Note 1 to entry: Dependability is generally characterised by the following four parameters: reliability, maintainability, availability, safety.

**3.1.16
franchised distributor**

individual or organization that is legally independent from the franchiser (in this case the electronic component manufacturer or OCM) and who agrees under contract to distribute products under the franchiser's name and sales network

**3.1.17
Electronic Components Management Plan
ECMP**

equipment manufacturer's document that defines the processes and practices for applying components to an equipment or range of equipment and which generally addresses all relevant aspects of controlling components during system design, development, production, and post-production support

**3.1.18
electronic components**

electronic parts
piece parts
electrical or electronic devices that are not subject to disassembly without destruction or impairment of design use.

EXAMPLE Resistors, capacitors, diodes, integrated circuits, hybrids, application specific integrated circuits, wound components and relays.

**3.1.19
electronic equipment**

functioning electronic device produced by the plan owner, which incorporates electronic components

EXAMPLE End items, sub-assemblies, line replaceable units and shop-replaceable units.

**3.1.20
flight equipment**

equipment used for the active flying of the aircraft (UAV etc.) and associated with active flying of the aircraft such as flight recorders, etc.

Note 1 to entry: This excludes equipment fitted to the aircraft not actively involved with the flying of the aircraft, such as in-flight entertainment, galley equipment, etc.

**3.1.21
may**

indicates a course of action which is permissible within the limits of this Technical Specification

**3.1.22
obsolete component**

component which is no longer manufactured, and may or may not still be available

**3.1.23
package type**

generic package family describing the physical outline and lead style

EXAMPLE Plastic quad flat-package, ball grid array, chip scale package, SOIC package, SOT23, etc.

3.1.24**plan owner**

original design authority responsible for all aspects of the design, functionality and reliability of the delivered equipment in the intended application and is responsible for writing and maintaining their specific ECMP

3.1.25**risk**

measure of the potential inability to achieve overall program objectives within defined cost, schedule, and technical constraints

3.1.26**risk management**

act or practice of dealing with risk that includes planning for risk, assessing (identifying and analysing) risk areas, developing risk handling options, monitoring risks to determine how risks have changed, and documenting the overall risk management program

3.1.27**shall**

indicates a requirement

3.1.28**should**

indicates that, among several possibilities, one is recommended as particularly suitable, without mentioning or excluding others; or that a certain course of action is preferred but not necessarily required; or that (in the negative form) a certain course of action is discouraged but not prohibited

3.1.29**single event effect**

response of a component caused by the impact of galactic cosmic rays, solar enhanced particles and/or energetic neutrons and protons

Note 1 to entry: The range of responses can include both non-destructive (for example upset) and destructive (for example latch-up or gate rupture) phenomena.

3.1.30**subcontractor assembly facilities**

location where subcontractor conducts assembly processes and uses approved test equipment to the plan owners drawings and bills of material and test specifications without owning the intellectual property rights to the equipment

3.1.31**subcontractor**

person or entity to whom the holder of obligations under a contract has delegated part or all of such obligations

3.1.32**substitute component**

component used as a replacement in equipment after the equipment design has been approved

Note 1 to entry: In some contexts, the term "alternate component" is used to describe a substitute component that is equal to or better than the original component.

3.1.33**validation**

method of qualifying components at the equipment manufacturer, when no in service data from prior use is available and there is no manufacturer's qualification data to analyse