IEC TS 62239-2

Edition 1.0 2017-02

TECHNICAL SPECIFICATION

Process management for avionics – Management plan –
Part 2: Preparation and maintenance of an electronic COTS assembly management plan

IEC TS 62239-2:2017-02(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 03.100.50; 31.020; 49.060

ISBN 978-2-8322-3905-6

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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PROCESS MANAGEMENT FOR AVIONICS – MANAGEMENT PLAN –

Part 2: Preparation and maintenance of an electronic COTS assembly management plan

FOREWORD

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- 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 62239-2, which is a technical specification, has been prepared by IEC Technical Committee 107: Process management for avionics.

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

Enquiry draft	Report on voting
107/288/DTS	107/293/RVDTS

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

A list of all parts in the IEC 62239 series, published 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 document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

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

INTRODUCTION

The purpose of this document is to define the requirements for developing an electronic commercial off the shelf (COTS) assembly management plan (CAMP), hereinafter also called the plan, to assure customers that all of the electronic COTS assemblies in the equipment of the plan owner are selected and applied in controlled processes, and that the technical requirements detailed in this document are accomplished. In general the owners of an electronic COTS assembly management plan are original (electronic) equipment manufacturers (OEMs) and system integrators for the aerospace, defence and high performance (ADHP) electronics industry.

The objective is to define and document, as necessary, processes to assure the adequacy of electronic COTS assemblies selected for use in electronic systems. This document states objectives to be accomplished; it does not specify how tasks are performed, specific data collected or reports issued. Those who prepare plans in compliance with this document are encouraged to document processes that are the most effective and efficient for them in accomplishing the objectives of this document. 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.

Organizations that prepare such plans are called the plan owners and 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 2: Preparation and maintenance of an electronic COTS assembly management plan

1 Scope

This part of IEC 62239, which is a technical specification, applies to the development of COTS assembly management plans (CAMPs) for the integration and management of electronic COTS assemblies (see 3.1.13 and 3.1.20) in electronic systems used in the ADHP markets where reliability is generally critical.

NOTE 1 Best practices for managing the electronic components within the electronic assemblies are described in IEC TS 62239-1 and SAE EIA-STD-4899 which describe the electronic component management program (ECMP). In cases where the electronic components can be identified and managed at the component level, ECMP can be considered as an option to manage the components.

NOTE 2 The distinction between an electronic component and an electronic assembly is provided by the definitions in Clause 3. This distinction between an electronic component and an electronic assembly is not always recognized by industry: for example, filters, contactors, power supply modules, relays, magnetic assemblies, etc., can be considered as either components or assemblies. In each application it is considered a best practice for the user of this document to clarify this distinction.

Depending on program or product line requirements and/or the technical characteristics of the electronic COTS assemblies and in agreement with the customer, the electronic COTS assembly management plans (CAMPs) could consider tailoring the requirements of this document. See Annex A.

Although developed for the avionics industry, this document can be applied by other high performance and high reliability industries at their discretion.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1 Terms and definitions

3.1.1
analysis
utilization of data, reference materials, actions, or test results previously obtained that can be utilized for comparison to verify that a requirement, a characteristic, a parameter or a criteria has been met

Note 1 to entry: Test results and associated data can be part of the analysis.

3.1.2
assembly characterization
process of testing and/or analysis of assembly capability when configuration control of the assembly's internal details is inadequate to support traditional qualification

Note 1 to entry MIL-STD-1521 provides information on qualification purposes.

3.1.3
assembly manufacturer
organization responsible for the assembly specification and its production

3.1.4
assembly obsolescence management
range of management and engineering actions taken to avoid or resolve the effects of assemblies not being procurable due to the manufacturer(s) ceasing production

3.1.5
assembly qualification
process used to demonstrate that the assembly is capable of meeting specified requirements for all required conditions and environments

Note 1 to entry: This may include qualification beyond the assembly manufacturer's limits for the assembly.

3.1.6
assembly quality assurance
all activities and processes providing adequate confidence that each individual assembly meets specified requirements

3.1.7
assurance
result of planned and systematic actions necessary to provide adequate confidence and evidence that a product or process satisfies given requirements

3.1.8
component
piece part
electrical, optical, electro/optical-mechanical or electronic device that is not subject to disassembly without destruction or impairment of design use

Note 1 to entry: Resistors, capacitors, diodes, integrated circuits, hybrids, busbars, circuit cards/modules, printers, laptop computers, disk drives, application specific integrated circuits, wound components and relays, etc. are examples of component.

3.1.9
configuration
performance, functional, and physical attributes of an existing or planned product or a combination of products

Note 1 to entry: Generally each variation of a product leads to a configuration change.

3.1.10
configuration change management
configuration control
systematic process which ensures that changes to released configuration documentation are properly identified, documented, evaluated for effect, approved by an appropriate level of authority, incorporated and verified

Note 1 to entry: Generally configuration management activity concerns systematic proposal, justification, evaluation, coordination, and disposition of proposed changes, and implementation of all approved and released changes into

- applicable configurations of a product,
- associated product information, and
- supporting and interfacing products and their associated product information.

3.1.11
configuration documentation
technical information whose purpose is to identify and define a product's performance functional and physical attributes (for example specifications, drawings)

3.1.12
configuration verification
action verifying that the product has achieved its required attributes (for example performance requirements, functional constraints) and the product's design is accurately documented

3.1.13
COTS product
commercial off-the-shelf product
one or more components, assembled and developed for multiple commercial consumers, whose design and/or configuration is controlled by the manufacturer's specification or industry standard

Note 1 to entry: COTS products can include electronic components, subassemblies or assemblies, or top level assemblies. Electronic COTS subassemblies or assemblies include circuit card assemblies, power supplies, hard drives, and memory modules. Top-level COTS assemblies include a fully integrated rack of equipment such as raid arrays, file servers to individual switches, routers, personal computers, or similar equipment.

[SOURCE: IEC TS 62668-1:2016, 3.1.3]

3.1.14
COTS assembly management plan
CAMP
document that defines the processes and practices for integrating and managing assemblies in an equipment or system

Note 1 to entry: Generally, it addresses all relevant aspects of managing assemblies during system design, development, production, and post-production support.

3.1.15
COTS assembly manufacturer
organization responsible for the specification and the production of the COTS assembly

Note 1 to entry: Generally the COTS assembly manufacturer controls the design and the configuration (even if subcontracted), but it is not a rule in this market segment which is not fully dedicated to avionics, and the COTS assembly manufacturer ensures generally also the sale of the product to the commercial market.

3.1.16
dependability
measure of consistency in meeting reliability, availability and obsolescence expectations, using logistical support methods

3.1.17
derating
design method which increases the operational margins of items by imposing modified item usage limitations which are more restrictive than the usual or manufacturer's item operational ratings

3.1.18
design process
process of creating an item, equipment or system from a set of requirements

Note 1 to entry: In general, the design process follows a set of sub-processes such as requirements capture, conceptual design, detailed design, implementation and production transition. Functional and physical verification, as well as qualification, can be part of the design process which may be called in some organizations "development process".

3.1.19
durability analysis
structured analysis of the assembly's response to the stresses resulting from operation, maintenance, shipping, storage, and other activities throughout its specified life in order to estimate its expected life

3.1.20
electronic assembly
electrical or electronic device that is not subject to disassembly without destruction or impairment of design use

EXAMPLE Electronic circuit cards or modules, displays, storage devices, printers, laptop computer, electro/optical devices, etc.

3.1.21
electronic equipment

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

Note 1 to entry: End items, sub-assemblies, line-replaceable units and shop-replaceable units are examples of electronic equipment.

[SOURCE: IEC TS 62239-1:2015, 3.1.20]

3.1.22
failure
inability of an item to perform a required function within specified limits

Note 1 to entry: A failure may be produced when a fault is encountered.

3.1.23
form
shape, size, dimensions, and other physically measurable parameters that uniquely characterize a product

3.1.24
franchised distributor or agent
individual or corporate organization that is legally independent from the franchiser (in this case the electronic component manufacturer or OCM) and agrees under contract to distribute products using the franchiser's name and sales network

Note 1 to entry: Distribution activities are carried out in accordance with standards set and controlled by the franchiser. Shipments against orders placed can be despatched either direct from the OCM or the franchised distributor or agent. In other words, the franchised distributor enters into contractual agreements with one or more electronic component manufacturers to distribute and sell the said components. Distribution agreements may be stipulated according to the following criteria: geographical area, type of clientele (avionics for example), maximum manufacturing lot size. Components sourced through this route are protected by the OCM's warranty and supplied with full traceability.

[SOURCE: IEC TS 62668-1:2016, 3.1.9]

3.1.25
function
action or actions that a product is designed to perform

3.1.26
guidance
advice or counselling for complying with requirements

3.1.27
hardware
products made of material and their components (mechanical, electrical, electronic, optical, hydraulic, pneumatic)

Note 1 to entry: Computer software and technical documentation are excluded.

3.1.28
implementation
action of generating a physical reality from a specification

3.1.29
integrity
state where the performance, technical characteristics, accuracy and consistency of an item are maintained and assured over its entire life cycle

Note 1 to entry: Integrity applies to item like electronic components, electronic circuit cards, equipment, systems, data, etc., and is a critical aspect to their design, implementation and usage conditions.

Note 2 to entry: Environmental conditions can affect physical, electrical and functional performances, for example electromechanical faults, electromagnetic compatibility (EMC) perturbation (for example emission, immunity), design flaws, material fatigue, corrosion, power outages, natural radiation disturbance, etc.

3.1.30
life cycle
generic period of time relating to the entire period of conception, definition, build, distribution, operation, and disposal of a product

3.1.31
open system architecture
collection of interacting assemblies that has the following attributes as required to satisfy stated needs such as:

- scalable,
- evolvable,
- robust (for example with regard to environmental constraints (thermal, vibrations, etc.)),
- controlled coupling among system elements,
- guaranteed timing and real time execution,
- graceful degradation,
- information assurance and protection,
- systems of systems interoperability,
- technology independence and obsolescence mitigation

Note 1 to entry: The interface specifications of assemblies are generally fully defined, available to the public and maintained according to group consensus.

3.1.32
plan owner
COTS assembly integrator
original design authority responsible for all aspects of the design, functionality and reliability of the delivered equipment in the intended application and responsible for writing and maintaining their specific CAMP

Note 1 to entry: The plan owner, or COTS assembly integrator, typically integrates the electronic COTS assembly into the ADHP electronic system and is the owner of the COTS assembly management plan (CAMP).

3.1.33
reliability
probability that an item will perform its intended function for a specified interval under stated conditions

3.1.34
requirements
specified essential attributes

3.1.35
risk
measure of the potential inability to achieve overall program objectives within defined cost, schedule, and technical constraints

[SOURCE: IEC TS 62239-1:2015, 3.1.28]

3.1.36
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

[SOURCE: IEC TS 62239-1:2015, 3.1.29]

3.1.37
safety
state in which risk is lower than the boundary risk

Note 1 to entry: The boundary risk is the upper limit of the acceptable risk. It is specific for a technical process or state. The risk is defined by the rate or probability or occurrence and the expected damage or injury.

3.1.38
safety analysis
disciplined approach to identifying hazards and their causes, and to assessing their risks

3.1.39
similarity analysis
structured comparison of the elements of the assembly being assessed with those of predecessor assemblies for which test or in-service reliability data are available

3.1.40
single event effect
SEE
response of a component caused by the impact of a single particle (for example galactic cosmic rays, solar energetic particles, 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.

[SOURCE: IEC 62396-1:2016, 3.53]

3.1.41
specification
document that explicitly states essential technical attributes and/or requirements for a product

Note 1 to entry: A specification can include procedures to determine that the product's performance meets its requirements or attributes.

3.1.42
subcontractor
person or entity to which the holder of obligations under a contract has delegated part or all of such obligations

[SOURCE: IEC TS 62239-1:2015, 3.1.32]

3.1.43
substitute assembly
assembly used as a replacement in equipment or system after the equipment or system design has been approved

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

3.1.44
system safety assessment
SSA
ongoing systematic, comprehensive evaluation of the proposed system to show that relevant safety requirements are satisfied

3.1.45
test
verification actions, assessment and/or trials conducted and specific data obtained, analyzed, corrected eventually to standard conditions, and compared to acceptance criteria to verify performance requirements

Note 1 to entry: Test can apply to functional or environmental (for example thermal, vibrations, etc.) verification.

Note 2 to entry: Where "test" is the designated verification method, it is understood that some degree of analysis is inherent in the verification process and need not be so identified.

3.1.46
testability
ability to test an item sufficiently to guarantee that all possible states of the item perform to its specification

Note 1 to entry: This includes the ease with which an item can be tested to provide evidence of compliance with its requirements.

3.1.47
traceability
ability to have for an electronic component its full trace back to the original component manufacturer

Note 1 to entry: This traceability means that every supplier in the supply chain is prepared to legally declare in writing that they know and can identify their source of supply, which goes back to the original manufacturer and can confirm that the electronic components are brand new and were handled with appropriate ESD and MSL handling precautions. This authenticates that the electronic components being supplied are unused, brand new components with no ESD, MSL or other damage. This ensures that the electronic components are protected by any manufacturer's warranties, have all of their useful life remaining and function according to the manufacturer's published datasheet, exhibiting the expected component life in the application for the OEM's reliability predictions and product warranty.

[SOURCE: IEC TS 62668-1:2016, 3.1.22]