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|------------------------------------------------------|-----------------|---------------|
| <b>TECHNICAL REPORT</b>                              | <b>EIA-933™</b> | <b>REV. D</b> |
|                                                      | Issued 2002-12  |               |
|                                                      | Revised 2026-04 |               |
| Superseding EIA-933C                                 |                 |               |
| (R) Requirements for a COTS Assembly Management Plan |                 |               |

## RATIONALE

This standard was created to define consistent commercial off-the-shelf (COTS) assembly management requirements for developing a COTS assembly management plan. This revision updates requirements to more explicitly address the elements of each requirement to include the reporting of artifacts.

## FOREWORD

This document defines the requirements for developing a commercial off-the-shelf (COTS) Assembly Management Plan (CAMP) to integrate COTS electronic assemblies into aerospace, defense, and high-performance (ADHP) electronic equipment and systems in such a manner that the performance and reliability of the ADHP equipment and systems are assured. This is accomplished by documenting and implementing the processes required in Section 3 of this document.

In this document, a COTS assembly is defined as: “An assembly developed by a supplier for multiple customers, whose design and configuration is controlled by the supplier’s or industry specification.” Therefore, the organization that integrates the COTS assembly into the ADHP equipment or system is the owner of the CAMP, hereinafter called the Plan. It is the responsibility of the Plan owner to develop and implement a Plan that satisfies the requirements of this document. The requirements of Section 3 are not intended to be levied on the COTS assembly supplier; rather they are the responsibility of the organization that integrates the COTS assembly into the ADHP equipment or system (hereinafter called the System).

This document is intended for use by ADHP equipment and system integrators, manufacturers, subcontractors, maintenance facilities, etc., to develop and implement their own Plans. It also is intended for use by regulatory and certification agencies to evaluate applications for certification of Systems containing COTS assemblies.

The Plan documents the processes that the Plan owner has available or that will be developed to address the requirements of EIA-933. For each instance of COTS assembly integration into a system, the Plan owner selects which of the documented processes will be used based on the System requirements and the application of the COTS assembly in the system.

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## 1. SCOPE

This document applies to the development of Plans for integrating and managing COTS assemblies in electronic equipment and Systems for the commercial, military, and space markets, as well as other ADHP markets that wish to use this document.

For purposes of this document, COTS assemblies are viewed as electronic assemblies such as printed wiring assemblies, disk drives, servers, printers, laptop computers, etc. There are many ways to categorize COTS assemblies<sup>1</sup>, including the following spectrum:

- a. At one end of the spectrum are COTS assemblies whose design, internal parts<sup>2</sup>, materials, configuration control, traceability, reliability, and qualification methods are at least partially controlled, or influenced, by ADHP customers (either individually or collectively) or by industry standards. An example at this end of the spectrum is a VME circuit card assembly.
- b. At the other end of the spectrum are COTS assemblies whose design, internal parts, materials, configuration control, and qualification methods are not controlled, or controllable, in any way by ADHP customers (either individually or collectively) or by industry standards. An example is a disk drive targeted for an industry other than ADHP use. It is critical for the Plan owner to: (1) review and understand the design, internal parts, materials, configuration control, reliability, and qualification methods of all “as-received” COTS assemblies and their capabilities with respect to their application in the intended System and environment; (2) identify risks; and where necessary (3) take additional action to mitigate the risks associated with the performance and reliability of the COTS assembly in the ADHP system.

## 2. REFERENCES

### 2.1 Applicable Documents

The following publications form a part of this document to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order. In the event of conflict between the text of this document and references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

#### 2.1.1 SAE International

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (U.S. and Canada only) or +1 724-776-4970 (outside U.S. and Canada), [www.sae.org](http://www.sae.org).

|         |                                                                                                                                                                                        |
|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| ARP4754 | Guidelines for Development of Civil Aircraft and Systems                                                                                                                               |
| ARP4761 | Guidelines for Conducting the Safety Assessment Process on Civil Aircraft, Systems, and Equipment                                                                                      |
| ARP5890 | Guidelines for Preparing Reliability Assessment Plans for Electronic Engine Controls                                                                                                   |
| ARP6379 | Processes for Application-Specific Qualification of Electrical, Electronic, and Electromechanical Parts and Sub-Assemblies for Use in Aerospace, Defense, and High Performance Systems |
| AS5553  | Counterfeit Electrical, Electronic, and Electromechanical (EEE) Parts; Avoidance, Detection, Mitigation, and Disposition                                                               |
| AS6174  | Counterfeit Material; Assuring Acquisition of Authentic and Conforming Material                                                                                                        |

<sup>1</sup> The distinction between an electronic component and an electronic assembly is not always recognized or agreed upon by the various industries involved; for example, filters, contactors, power supply modules, relays, magnetic assemblies, etc., may be considered as either components or assemblies. In each application, it is a recommended practice for the user of this document to clarify this distinction.

<sup>2</sup> Requirements for managing the electronic components within electronic assemblies may be found in MIL-STD-11991, JEC 62239-1, and EIA-STD-4899, which describe the ADHP Electronic Component Management Program (ECMP). In some cases, it may be appropriate to view the COTS assembly as a component that can be managed with ECMP processes.

|               |                                                                                          |
|---------------|------------------------------------------------------------------------------------------|
| AS9100        | Quality Management Systems - Requirements for Aviation, Space, and Defense Organizations |
| AS9120        | Quality Management Systems - Requirements for Aviation, Space, and Defense Distributors  |
| EIA-649       | Configuration Management Standard                                                        |
| EIA-STD-4899  | Requirements for an Electronic Components Management Plan                                |
| GEIA-STD-0003 | Long-Term Storage (LTS) of Electronic Devices                                            |
| GEIA-STD-0008 | Derating of Electronic Components                                                        |
| GEIA-STD-0010 | Standard Best Practices for System Safety Program Development and Execution              |
| STD-0016      | Standard for Preparing a DMSMS Management Plan                                           |

#### 2.1.2 ANSI Publications

Copies of these documents are available online at <https://webstore.ansi.org>.

ANSI/ESD S20.20 Protection of Electrical and Electronic Parts, Assemblies and Equipment (Excluding Electrically Initiated Explosive Devices)

ANSI/VITA 51.2 Physics of Failure Reliability Predictions

#### 2.1.3 ASME Publications

Available from ASME, Two Park Avenue, New York, NY 10016-5990, Tel: 800-843-2763 (U.S./Canada), 001-800-843-2763 (Mexico), 646-616-3100 (outside North America), [www.asme.org](http://www.asme.org).

NQA-1 Nuclear Quality Assurance Certification

#### 2.1.4 IEC Publications

Available from IEC Secretariat, 3 rue de Varembe, PO Box 131, CH-1211 Geneva 20, Switzerland, Tel: +41 22 919 0211, [www.iec.ch](http://www.iec.ch).

IEC 61000-4-2 Electromagnetic compatibility (EMC) - Part 4-2: Testing and measurement techniques - Electrostatic discharge immunity test

IEC 61967 Series Integrated Circuits - Measurement of electromagnetic emissions, integrated circuits

IEC 62239-1 Process Management for Avionics - Preparation of an Electronic Components Management Plan

IEC 62396 Series Process Management for Avionics - Atmospheric Radiation Effects

IEC 62402 Obsolescence management

IEC TR 62240-1 Process Management for Avionics - Electronic Components Capability in Operation - Part 1: Temperature Upgrading

#### 2.1.5 ISO Publications

Copies of these documents are available online at [www.iso.org/store](http://www.iso.org/store).

ISO 9001 Quality Management Systems - Requirements

### 2.1.6 JEDEC Publications

Available from JEDEC, [www.jedec.org](http://www.jedec.org).

|        |                                                                                                                     |
|--------|---------------------------------------------------------------------------------------------------------------------|
| JEP122 | Failure Mechanisms and Models for Semiconductor Devices                                                             |
| JEP149 | Application Thermal Derating Methodologies                                                                          |
| JESD74 | Early Life Failure Rate Calculation Procedure for Semiconductor Components                                          |
| JESD89 | Measurement and Reporting of Alpha Particle and Terrestrial Cosmic Ray-Induced Soft Errors in Semiconductor Devices |

### 2.1.7 RTCA Publications

Available from RTCA, Inc., 1150 18th Street NW, Suite 910, Washington, DC 20036, Tel: 202-833-9339, [www.rtca.org](http://www.rtca.org).

|             |                                                                     |
|-------------|---------------------------------------------------------------------|
| RTCA DO-160 | Environmental Conditions and Test Procedures for Airborne Equipment |
| RTCA DO-254 | Design Assurance Guidance for Airborne Electronic Hardware          |

### 2.1.8 U.S. Government Publications

Copies of these documents are available online at <https://quicksearch.dla.mil>.

|               |                                                                                                                                            |
|---------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| MIL-HDBK-217  | Reliability Prediction of Electronic Equipment                                                                                             |
| MIL-HDBK-338  | Electronic Reliability Design Handbook                                                                                                     |
| MIL-STD-882   | Standard Practice System Safety                                                                                                            |
| MIL-STD-11991 | General Standard for Parts, Materials and Processes                                                                                        |
| SD-22         | Diminishing Manufacturing Sources and Material Shortages: A Guidebook of Best Practices for Implementing a Robust DMSMS Management Program |

## 2.2 Definitions and Acronyms

ADHP: Aerospace, defense, and high performance.

ARTIFACTS: Objective evidence such as documentation in the form of hard copy, digital, video, or other media that demonstrates compliance with the requirements.

AS-RECEIVED COTS ASSEMBLY: The physical COTS assembly that is received by the Plan owner for integration into the System.

COTS: Commercial off-the-shelf.

COTS ASSEMBLY: An assembly developed by a supplier for multiple customers, whose design and configuration is controlled by the supplier's or industry specification.

COTS ASSEMBLY INTEGRATOR: The organization that integrates the COTS assembly into the ADHP system; the owner of the COTS Assembly Management Plan.

COTS ASSEMBLY MANAGEMENT PLAN (CAMP): A Plan, compliant to this document, prepared by the COTS assembly integrator.

**COTS ASSEMBLY MANAGEMENT PLAN OWNER:** The organization that is responsible for preparing and implementing the COTS Assembly Management Plan.

**COTS ASSEMBLY MANUFACTURER:** The organization that produces the COTS assembly and controls its design and configuration.

**COTS ASSEMBLY SUPPLIER:** The organization responsible for supplying the COTS assembly. May be a reseller, distributor, or the same as COTS Assembly Manufacturer.

**DIMINISHING MANUFACTURING SOURCES AND MATERIALS SHORTAGES (DMSMS):** The loss or impending loss of manufacturer of items or suppliers of items or raw materials or software. Often used interchangeably with obsolescence.

**EEE PART (ELECTRICAL, ELECTRONIC, OR ELECTROMECHANICAL PART):** Electrical, electronic, or electromechanical devices that are not subject to disassembly without destruction or impairment of design use. They are sometimes called electronic components or piece parts. Examples are resistors, capacitors, diodes, integrated circuits, hybrids, application-specific integrated circuits, wound components, and relays.

**EMC:** Electromagnetic compatibility.

**EQUIPMENT:** Intermediate- or lower-level item into which the COTS assembly is integrated by the Plan Owner; may in turn be integrated into higher-level assemblies or a system.

**FUNCTIONALITY:** The ability to provide a certain capability to a system; operational features or characteristics to include electrical parameters, mechanical strength, size, weight, and other similar requirements.

**GEIA:** Government Electronic Industries Association. Former organization whose standards are now published by SAE.

**IEC:** International Electrotechnical Commission.

**ISO:** International Organization for Standardization.

**INFORMATION TECHNOLOGY (IT) PRODUCT:** Hardware used to store, study, retrieve, transmit, and manipulate data or information. Examples include servers, routers, workstations, and telecommunications equipment.

**JEDEC:** Joint Electron Device Engineering Council (JEDEC Solid State Technology Association).

**PLAN OWNER:** The organization that prepares and implements the COTS Assembly Management Plan; the organization that integrates the COTS assembly into the next higher assembly or system.

**QUALIFICATION:** The process used to demonstrate that the COTS assembly is capable of satisfying the intended application specifications for all the required conditions and environments.

**SHALL:** Indicates a mandatory requirement.

**SHOULD:** Offers a guideline or recommendation that might be used or might be helpful to assure compliance to this document.

**SYSTEM:** Higher-level item into which the COTS assembly is integrated by the Plan owner; may be a higher-level assembly, electronics equipment, or an entire ADHP end item.

### 3. TECHNICAL REQUIREMENTS

The Plan Owner shall develop a COTS Assembly Management Plan to include documented processes and evidentiary artifacts to meet each of the requirements in 3.1 through 3.18.

The Plan shall include the completion and documentation of a COTS assembly and supplier analysis utilizing the format in Appendix D (or equivalent) for each COTS assembly and for each System application.

The requirements in this section can be satisfied only by the Plan owner and are not intended to be flowed down to organizations not responsible for the integration of the COTS assembly into the System.

Appendix A provides an example format to document specific COTS assembly validation for a specific application. Not all the requirements listed below will be applicable for all programs. See the note in Appendix A for further information.

For examples of mitigation methods, see Appendix B.

#### 3.1 Functionality

The documented processes shall assure that the COTS assembly performs the form, fit, function(s), interfaces, and requirements allocated to it by the System design. These documented processes shall:

- a. Address questions 6, 16, 18 through 24, and 50 in Appendix D.
- b. Identify functionality risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

Allocated functions include, but are not limited to, inputs and outputs for electrical, mechanical, optical, hydraulic and pneumatic signals, and duty cycle.

(Refer to RTCA DO-254 and ARP4754 for guidance on design and development of aerospace electronic Systems, including allocation of System requirements.)

#### 3.2 Operating, Storage, and Transportation Environmental Stresses

The documented processes shall assure that the COTS assembly meets the system requirement(s) allocated to it by the System design with respect to each of the System operating, storage, and transportation stresses listed in Table 1. These documented processes shall:

- a. Address questions 26, 43, 45, 46, 47, and 50 through 53 in Appendix D.
- b. Identify risks including, but not limited to, those identified in (a) with respect to Table 1.
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

**Table 1**

|        | <b>Stress</b>                 | <b>Application Consideration</b>                                                                                                                  | <b>Applicable Standards</b>                    |
|--------|-------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------|
| 3.2.1  | Temperature limits            | Damage can occur when specified maximum or minimum temperature limits are exceeded during operation, storage, or transport.                       | IEC TR 62240-1<br>GEIA-STD-0003<br>RTCA DO-160 |
| 3.2.2  | Temperature variations        | Temperature cycling over long periods of time can cause damage due to mismatches of coefficients of thermal expansion of COTS assembly materials. |                                                |
| 3.2.3  | Heat dissipation and cooling  | Proper heat dissipation and cooling methods may be required to prevent damage to COTS assemblies.                                                 |                                                |
| 3.2.4  | Mechanical shock              | Mechanical stress limits may be exceeded when COTS assemblies are exposed to mechanical shock.                                                    |                                                |
| 3.2.5  | Mechanical vibration          | Damage can occur due to long-term exposure to certain mechanical vibration profiles.                                                              |                                                |
| 3.2.6  | Natural radiation             | Radiation due to cosmic rays, neutrons, heavy ions, etc., may cause single event effects (SEE).                                                   | IEC 62396 series<br>JESD89A                    |
| 3.2.7  | Induced radiation             | Damage can result from exposure to nuclear radiation.                                                                                             |                                                |
| 3.2.8  | Moisture and corrosion        | Damage can result from exposure to moist and/or corrosive environments.                                                                           |                                                |
| 3.2.9  | Electromagnetic capability    | Assemblies can produce electromagnetic noise through electrical transitions, and assemblies can be susceptible to electromagnetic interference.   | IEC 61967 series                               |
| 3.2.10 | Electrostatic Discharge (ESD) | Damage can result from exposure to electrostatic discharge during storage and handling.                                                           | ANSI/ESD S20.20<br>IEC 61000-4-2               |
| 3.2.11 | Other relevant stresses       |                                                                                                                                                   |                                                |

### 3.3 Derating

The documented processes shall assure that the derating criteria and methods used for the COTS assembly are appropriate for the System application. These documented processes shall:

- Address questions 31 and 84 in Appendix D.
- Identify derating risks including, but not limited to, those identified in (a).
- Accept risks or apply risk mitigations as appropriate for the intended application.
- Identify the artifact(s) to be generated that document (a), (b), and (c).

(Refer to GEIA-STD-0008, JEP149, and MIL-HDBK-338 for additional guidance about derating.)

### 3.4 Component Aging and Wear-Out

The documented processes shall assure the assembly will satisfy the aging and wear-out requirements of the intended System, to include all relevant life-limiting or wear-out failure mechanisms of the COTS assembly and its internal parts, including advanced technology semiconductor devices and other parts susceptible to degradation or early wear-out. These documented processes shall:

- a. Address questions 54, 55, 56, 82, 83, and 84 in Appendix D.
- b. Identify aging and wear-out risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

(Refer to MIL-STD-11991, JEP122, JESD74, and ANSI/VITA 51.2 for information that can be used to satisfy this requirement.)

### 3.5 Reliability

The documented processes shall assure that the Plan owner understands the reliability of the as-received COTS assembly in the System based on credible data from testing or simulation of the COTS assembly or from use of similar assemblies in similar environments. The documented processes shall:

- a. Address questions 40, 50, 54, 55, 56, 82, 83, 84, and 87 in Appendix D.
- b. Identify reliability risks associated with the COTS assembly and its internal parts including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

(Refer to MIL-HDBK-338, ANSI/VITA 51.2, ARP5890, and MIL-HDBK-217 for guidance on reliability analysis.)

### 3.6 Safety

The documented processes shall assure that the COTS assembly meets the system safety requirement(s) allocated to it. These documented processes shall:

- a. Address questions 40, 50, and 84 in Appendix D.
- b. Identify safety risks, including but not limited to those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

(Refer to ARP4761, MIL-STD-882, and GEIA-STD-0010 for guidance on System safety analyses.)

### 3.7 Qualification

The documented processes shall assure that the COTS assembly is qualified for the System application, using appropriate additional qualification processes, tests, simulation, or data, as required. The documented processes shall:

- a. Address questions 12, 14, 18 through 25, 40, 49, and 78 through 81 in Appendix D.
- b. Identify qualification risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

### 3.8 Compatibility with System Assembly Processes

The documented processes shall assure that the COTS assembly is compatible with System assembly processes, including test, repair, and rework. These documented processes shall:

- a. Address questions 12, 13, 53, 54, 55, and 79 in Appendix D.
- b. Identify system assembly process risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

### 3.9 Maintainability and Testability

The documented processes shall assure that the maintainability and testability of the COTS assembly are consistent with the System requirements, using appropriate risk mitigations as required. These documented processes shall:

- a. Address questions 53, 54, 55, 57, 58, and 84 through 87 in Appendix D.
- b. Identify maintainability and testability risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).

### 3.10 Supplier Parts Selection Process

The documented processes shall assure that the COTS assembly supplier's processes for selecting the internal parts and assembly processes are consistent with ADHP industry standards such as MIL-STD-11991, IEC 62239-1, EIA-STD-4899, or equivalent. These processes shall:

- a. Address questions 4, 5, 15, 30, 42, 68, and 69 in Appendix D.
- b. Identify parts selection risks including, but not limited to, those identified in (a).
- c. Accept risks or apply risk mitigations as appropriate for the intended application.
- d. Identify the artifact(s) to be generated that document (a), (b), and (c).