



# TECHNICAL SPECIFICATION

---

**Process management for avionics – Electronic components for aerospace,  
defence and high performance (ADHP) applications –  
Part 2: General requirements for passive components**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

---

ICS 03.100.50; 31.020; 49.060

ISBN 978-2-8322-6247-4

**Warning! Make sure that you obtained this publication from an authorized distributor.**

## CONTENTS

FOREWORD.....	5
INTRODUCTION.....	7
1 Scope.....	8
2 Normative references .....	8
3 Terms, definitions and abbreviated terms .....	8
3.1 Terms and definitions.....	8
3.2 Abbreviated terms.....	11
4 Technical requirements .....	12
4.1 General.....	12
4.1.1 Overview .....	12
4.1.2 Equivalent methods .....	13
4.2 Procedures .....	13
4.2.1 General .....	13
4.2.2 Product discontinuance .....	14
4.2.3 ESD protection during manufacture .....	14
4.2.4 Traceability.....	14
4.3 Shipment controls.....	14
4.3.1 General .....	14
4.3.2 Unit pack container .....	14
4.3.3 Intermediate packing .....	14
4.3.4 Date codes .....	15
4.3.5 Moisture sensitivity level (MSL) .....	15
4.3.6 Lead-free marking .....	15
4.3.7 Labels .....	15
4.3.8 Electrostatic discharge (ESD).....	16
4.4 Product or process change notification (PCN).....	16
4.4.1 General .....	16
4.4.2 Notification .....	17
4.4.3 Notification details .....	17
4.5 Electrical.....	17
4.5.1 General .....	17
4.5.2 Electrical test.....	17
4.6 Mechanical .....	17
4.6.1 General .....	17
4.6.2 Device marking.....	18
4.6.3 Lead-free components .....	18
4.6.4 Moisture sensitivity .....	18
4.6.5 Termination finishes .....	18
4.6.6 Termination finish notification of change .....	19
4.7 Audit capability .....	19
4.7.1 General .....	19
4.7.2 Internal quality audits .....	19
4.7.3 Subcontract manufacturing .....	19
4.8 Quality assurance .....	19
4.8.1 General .....	19
4.8.2 Quality system.....	20
4.8.3 Sampling plans .....	20

4.8.4	Failure analysis support.....	20
4.8.5	Outgoing quality .....	20
4.9	Qualification.....	20
4.9.1	General .....	20
4.9.2	Methodology.....	21
4.9.3	Test samples .....	24
4.9.4	Qualification categories .....	24
4.9.5	Maintenance of qualification standard.....	24
4.9.6	In-process test results .....	25
4.9.7	Test references .....	25
4.9.8	Qualification report .....	25
4.9.9	Archiving .....	25
4.9.10	Qualification of device changes .....	25
4.9.11	Similarity assessment.....	25
4.10	Product monitoring in the production line .....	26
4.10.1	General .....	26
4.10.2	Monitoring programme.....	26
4.10.3	Problem notification.....	26
4.10.4	Data reporting.....	26
4.11	Environmental health and safety (EHS).....	26
4.11.1	General .....	26
4.11.2	General EHS compliance.....	27
4.11.3	Device handling.....	27
4.11.4	Device materials and substances.....	27
Annex A (informative)	Test code (TC) information for guidance.....	28
A.1	General.....	28
A.2	TC1 – Electrical test.....	28
A.3	TC2 – External visual.....	28
A.4	TC3 – Package dimensions.....	29
A.5	TC4 – High temperature exposure (storage) .....	30
A.6	TC5 – Temperature cycling .....	30
A.7	TC6 – Moisture resistance .....	30
A.8	TC7 – Biased humidity.....	30
A.9	TC8 – High temperature operating life.....	30
A.10	TC9 – Terminal strength (lead).....	31
A.11	TC10-Resistance to solvents .....	31
A.12	TC11 – Mechanical shock .....	31
A.13	TC12 – Vibration.....	31
A.14	TC13 – Resistance to heat.....	31
A.15	TC14 – Thermal shock .....	32
A.16	TC15 – Board flex (SMD).....	32
A.17	TC16 – Beam load .....	32
A.18	TC17 – Solderability .....	32
A.19	TC18 – Electrostatic discharge .....	32
A.20	TC19 – Flammability .....	32
A.21	TC20 – Terminal strength (SMD).....	32
A.22	TC21 – Surge voltage .....	32
A.23	TC22 – Hermeticity .....	33
A.24	TC23 – Tin whisker.....	33

Annex B (informative) Typical IECQ-CECC approved components .....	34
Annex C (informative) Typical USA military specified passive components.....	36
Annex D (informative) Typical automotive components .....	37
Annex E (informative) Typical IEC specified passive components .....	39
E.1 Typical IEC passive component specifications .....	39
E.2 IEC passive component environmental test methods.....	39
Annex F (informative) Verification requirements matrix for IEC TS 62686-2 .....	46
Bibliography.....	55
Table 1 – Label requirements.....	16
Table 2 – Internal quality audit areas .....	19
Table 3 – Technology/family qualification and device qualification .....	22
Table 4 – Qualification tests for device types .....	23
Table D.1 – AEC-Q200 temperature grades .....	37
Table E.1 – IEC passive specifications' environmental test methods compared to those specified in Table 3 .....	40
Table F.1 – Verification requirements matrix for IEC TS 62686-2 .....	46

## INTERNATIONAL ELECTROTECHNICAL COMMISSION

# PROCESS MANAGEMENT FOR AVIONICS – ELECTRONIC COMPONENTS FOR AEROSPACE, DEFENCE AND HIGH PERFORMANCE (ADHP) APPLICATIONS –

## Part 2: General requirements for passive components

### FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

The main task of IEC technical committees is to prepare International Standards. In exceptional circumstances, a technical committee may propose the publication of a technical specification when

- 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 62686-2 which is a technical specification, has been prepared by IEC technical committee 107: Process management for avionics.

This first edition cancels and replaces the first edition of IEC PAS 62686-2 published in 2016. This edition constitutes a technical revision.

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

Enquiry draft	Report on voting
107/302/DTS	107/343/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 the parts in the IEC 62686 series, published under the general title *Process management for avionics – Electronic components for aerospace, defence and high performance (ADHP) applications*, 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

This part IEC 62686 includes all the requirements of the obsolete STACK Specification S/0003 issue 2 related to passive components and contains revisions for alternative qualification test methods and additional test information for the aerospace, defence and high performance (ADHP) industries. This document is typically used in conjunction with IEC TS 62239-1.

NOTE With the addition of alternative methods, it is possible for manufacturers to be audited by IECQ under the new IECQ automotive scheme or IECQ approved component scheme.

# PROCESS MANAGEMENT FOR AVIONICS – ELECTRONIC COMPONENTS FOR AEROSPACE, DEFENCE AND HIGH PERFORMANCE (ADHP) APPLICATIONS –

## Part 2: General requirements for passive components

### 1 Scope

This part of IEC 62686 defines the minimum requirements for general purpose "off-the-shelf" COTS (commercial off-the-shelf) passive components for aerospace, defence and high performance (ADHP) applications.

This document applies to all passive components that can be operated in ADHP applications within the manufacturers' publicly available data sheet limits in conjunction with IEC TS 62239-1. This document can be used by other high performance and high reliability industries, at their discretion.

ADHP application requirements are not necessarily fulfilled by this document alone. ADHP original equipment manufacturers (OEMs) could consider redesigning their products or conducting further testing to verify suitability in ADHP applications using their procedures for satisfying their electronic component management plan (ECMP) (see IEC TS 62239-1).

### 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.

JESD48, *Product discontinuance*

J-STD-609B, *Marking, symbols, and labels of leaded and lead-free terminal finished materials used in electronic assembly*