



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 41275.3-2022

**Process management for avionics - Aerospace and defence electronic
systems containing lead-free solder - Part 3: Performance testing for
systems containing lead-free solder and finishes**

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785 and the requirements in the reliability section of JESD22-B110A.

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules of Standardization Documents" drafted.

This document is part 3 of GB/T 41275 "Avionics Process Management for Aerospace and Defense Electronic Systems Containing Lead-Free Solders".

GB/T 41275 has published the following parts.

- Part 2.Reducing the harmful effects of tin;
- Part 3.System performance test methods containing lead-free solder and lead-free pins;
- Part 21.Guidelines for the transition to lead-free electronics.

This document is modified to adopt IEC TS62647-3.2014 "Avionics Process Management Containing Lead-Free Solder Aerospace and Defense Electronics System"

System Part 3.System Performance Test Methods Containing Lead-Free Solder and Lead-Free Pins", the document type is adjusted from IEC technical specifications to my country

national standard.

Compared with IEC TS62647-3.2014, this document has made the following structural adjustments.

- Chapter 4 corresponds to 3.2 in IEC TS62647-3.2014;
- Delete the title of 6.4.1 in IEC TS62647-3.2014.

Compared with IEC TS62647-3.2014, there are many technical differences in this document.

The vertical single line (?) is marked. See Appendix D for a list of these technical differences and their reasons.

Please note that some content of this document may be patented. The issuing agency of this document assumes no responsibility for identifying patents.

Introduction

GB/T 41275 specifies the management requirements and technical requirements for the realization of lead-free in aerospace, national defense and high-performance electronic systems.

Consists of 3 parts.

--- Part 2.Reducing the harmful effects of tin. The purpose is to regulate aerospace, defense and high performance electronic systems to reduce the harmful effects of tin

The technical approach adopted in response.

--- Part 3.Test methods for system performance containing lead-free solder and lead-free pins. The purpose is to specify lead-free solder and lead-free pipes

Performance test methods and test procedures for aerospace, defense, and high-performance electronic systems for feet.

--- Part 21.Guidelines for the transition to lead-free electronics. The purpose is to specify the management or system of the aerospace and defense electronic systems program

A working guide for engineering management to manage the transition to lead-free electronics.

As one of the IEC 62647 series of standards, this document is applicable to the performance test design of printed board assemblies. The general test method is mainly aimed at

For companies that only need common test methods, the test design and practice procedures are mainly aimed at companies that have the need to develop their own test methods.

This document has not been prepared to prescribe a particular method, but is intended for avionics/defense supplier products to achieve

The reliability or performance requirements of IEC /T S62647-1 and the requirements specified in IEC /T S62647-21 provide reference.

The test method (see Chapter 5) is applicable to the routine items of electronic equipment manufacturers and maintenance organizations on the one hand, and also applicable to the

Items where test methods cannot be tailored to the product for a variety of reasons. When

there is insufficient information to qualify, implement and test electrical products containing lead-free solder

This method should be used for reliability, qualification or other test results of sub-equipment. The implementation conditions of the general method are relatively conservative, which is conducive to making aviation

Minimized risk for users of aerospace, defense and high performance (ADHP) electronic equipment.

The test procedures (see Chapter 6) are suitable for the resources available, and can be designed and implemented according to the conditions of use and application scenarios of their specific products.

Test manufacturers or repair facilities related to reliability, quality or workmanship. Users of this procedure should have the necessary knowledge, experience and data to

It can customize the relevant test methods, and can guide the design and implementation of the test according to the obtained data, and analyze the results. The key to the procedure is to make it clear what is involved

and all material properties for lead-free materials, as well as package-level and board-level properties described in 5.3.2. Studies have shown that due to lead-tin and tin-silver brazing

The creep mechanism of the material may be different, so in-depth study of such mechanism is the key to determine the main test parameters (such as temperature cycle duration).

key. This procedure provides guidance for the development of test parameters for the precise determination of the properties of new materials.

It is recommended that users use this procedure to obtain more accurate results while reducing costs. IEC /T S62647-22 provides a comprehensive overview of using

The technical elements necessary to use this procedure.

This document evaluates failure mechanisms of electronic products containing lead-free solder through performance testing. Based on failure physics and life prediction

Analysis shows that the fatigue failure of solder joints is the main failure mode in ADHP electronic products. Caused by lead-free solder from ADHP electronics

Potential failure modes are a key factor in analyzing early field failures or reliability problems, and classification of different failure modes may mislead test results

or erroneous conclusions. It is necessary to correctly distinguish various failure modes through failure analysis, so that reliability assessment and life prediction can be correctly applied.

Where practical, the methods defined in this document should be used with the procedures specified in IPC-SM-785, or at least as required by IPC-SM-

785 and the requirements in the reliability section of JESD22-B110A.

This document can be used flexibly and customized, and any clause can be used individually to guide the experimental design of lead-free components. To pass this type of test

To form the conclusions of reliability, verification or identification tests, it is necessary to solicit opinions from stakeholders and formulate corresponding normative measures for expected problems

document.

Avionics Process Management

Aerospace and Defense Electronic Systems with Lead-Free Solder

Part 3. Lead-free solder and lead-free pins

System performance test method

1 Scope

This document specifies the test methods, test procedures and instructions for the performance of systems containing lead-free solder and lead-free pins.

This document applies to products transitioning to lead-free solder for aerospace and defense electronic systems, and other high-performance, high-reliability electronic industries may

Reference use.

Note. Products transitioning to lead-free solder include.

---Have passed the design and qualification of traditional lead-tin electronic components, materials and assembly processes, but are using lead-free components for re-qualification product;

--- Products with tin-lead design converted to lead-free solder;

--- Newly designed products with lead-free solder;

---Assembly welding grade products, namely printed board assembly grade products.

2 Normative references

The contents of the following documents constitute essential provisions of this document