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

GB/T 41270.3-2025

**Process management for avionics - Atmospheric radiation
effects - Part 3: System design optimization to accommodate
the single event effects (SEE) of atmospheric radiation**

航空电子过程管理 大气辐射影响 第3部分：考虑大气辐射单粒子效应（SEE）的
系统设计优化

(English Translation)

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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 for standardization documents" Drafting.

This document is Part 3 of GB/T 41270. GB/T 41270 has been published in the following parts.

- Guidelines for the design of protection against single event effects of atmospheric radiation on avionics equipment (GB/T 34956-2017);
- Guide for testing single event effects of atmospheric radiation on avionics systems (GB/T 34955-2017);
- Aviation electronics process management - Atmospheric radiation effects - Part 3: System design considering atmospheric radiation single event effects (SEE)
- Aviation electronics process management atmospheric radiation effects Part 7: Single event effects analysis process management in avionics product design Management (GB/T 41270.7-2022);
- Aviation electronics process management atmospheric radiation effects Part 9: Calculation procedure for single event effect failure rate of avionics equipment Method (GB/T 41270.9-2022).

This document is equivalent to IEC 62396-3:2013 "Aviation electronics process management atmospheric radiation effects Part 3: Consideration of atmospheric radiation" System Design Optimization for Single Event Effects (SEE).

Introduction

GB/T 41270 "Influence of atmospheric radiation on avionics process management" stipulates the influence of atmospheric radiation on avionics process management in the field of avionics process management.

The management and technical requirements for the impact of electronic products are planned to consist of nine parts.

- Part 1: Guidelines for design of protection against single event effects in avionics equipment. The purpose is to provide guidance for the design of protection against single event effects in aircraft flying at a speed of less than 18.3 km.

Provide guidance for the design of atmospheric radiation effect protection for avionics equipment.

- Part 2: Guide for single event effects testing of avionics systems. The purpose is to

provide a guide for microelectronic devices to measure single particle effects of atmospheric neutrons.

Guidance on test methods for sensitive characteristics of sub-effects.

--- Part 3: System design optimization considering single event effects (SEE) of atmospheric radiation. The purpose is to specify the Technical requirements under the influence of single event effects (SEE) induced by atmospheric radiation are used to guide the design of avionics products.

--- Part 4: Design management of potential single event effects of high voltage aircraft electronic equipment. The purpose is to specify high voltage (nominal higher than 200V) Guidelines for the effects and management of atmospheric radiation on avionics equipment.

--- Part 5: Evaluation of thermal neutron flux and single event effects in avionics systems. The purpose is to describe the effects of thermal neutrons on avionics systems.

The impact of sub-product composition.

--- Part 6: Potential impacts of extreme space weather on avionics environment and electronic equipment.

Information on understanding weather events, describing the mechanisms and conditions that produce "extreme space weather" due to a large increase in activity on the solar surface.

The potential radiation environment is discussed based on records of extreme space weather.

--- Part 7: Single event effects analysis process management in avionics product design. The purpose is to specify the single event effects analysis process management in avionics product design.

Methods and procedures for single event effects analysis of electronic components.

--- Part 8: Consideration of proton, electron, muon, alpha ray and single event effects in avionics. The purpose is to specify Small particle (proton, electron, pi, and muon flux) and single event effects on aircraft flying at 60,000 feet (18,300 m) Awareness and guidance on the effects of using avionics equipment.

--- Part 9: Procedure and method for calculating single event failure rate of avionics equipment.

General calculation method for particle effect failure rate, total failure rate calculation method, soft failure rate calculation method, hard failure rate calculation method and Calculation program.

This document provides additional guidance to avionics system designers, electronic equipment and component manufacturers and their customers, using a standard approach.

The system design is optimized to adapt to the atmospheric radiation single event effect (SEE).

Based on information and guidance from a system-level approach, a number of avionics systems are considered and a basic approach to adapting to single event effects (SEEs) is provided.

Method to meet the system hardware assurance level.

Atmospheric radiation effect is a factor that may cause hard failure rate and soft failure rate of equipment.

To obtain the failure rate values, the method described in ARP4754 (which generally accommodates hard and soft failure rates) will also accommodate the effects of atmospheric radiation.

Avionics Process Management. Atmospheric Radiation Impacts Part 3: Considering single-event effects of atmospheric radiation System Design Optimization (SEE)

1 Scope

This document specifies the technical requirements for avionics products under the influence of single event effects (SEE) induced by atmospheric radiation, and is used to guide the Design of electronic products. The activities and contents described in this document are inputs to the review/certification and conformity evidence of avionics products.

Based on the system-level single event effect in GB/T 34956-2017, this paper provides a basic method for SEE protection for avionics products to meet the requirements of Meet the research and development assurance level requirements.

2 Normative references

The contents of the following documents constitute the essential clauses of this document through normative references in this document.

For referenced documents without a date, only the version corresponding to that date applies to this document; for referenced documents without a date, the latest version (including all amendments) applies to this document.

GB/T 34956-2017 Guide for design of protection against single event effects of atmospheric radiation on avionics equipment (IEC 62396-1.

2016, IDT)

Note: There is no technical difference between the referenced content of GB/T 34956-2017 and the referenced content of IEC 62396-1:2012.