CCS V 25

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 41270.7-2022

Process management for avionics - Atmospheric radiation effects - Part 7: Management of single event effects (SEE) analysis process in avionics design

Issued on: March 9, 2022 **Implemented on: October 1, 2022**

Issued by: State Administration for Market Regulation, China National Standardization Administration

Table of Contents

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 7 of GB/T 41270 "Avionics Process Management of Atmospheric Radiation Effects". GB/T 41270 has been released

the following parts.

--- Part 7.Process management of single event effects analysis in avionics product design;

--- Part 9.Avionics equipment single event effect failure rate calculation procedures and methods.

This document is modified to adopt IEC /T R62396-7.2017 "Avionics Process Management Airborne Radiation Effects Part 7.Avionics

Process Management of Single Event Effects Analysis in Product Design. The file type is adjusted from IEC technical report to my country's national standard.

Compared with IEC /T R62396-7.2017, this document has made the following structural adjustments.

--- Adjust Appendix A to Appendix B;

--- Adjust Appendix B to Appendix C.

Compared with IEC /T R62396-7.2017, this document has many technical differences.

Marked with a vertical single line (?). See Appendix A 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

Avionics equipment working in the atmosphere, its key devices will produce a variety of single-event effects under the radiation of atmospheric neutrons, which are transmitted to the atmosphere.

Avionics, which can produce single event effect soft and/or hard faults, can affect the safety of the aircraft. Considering that only device-level SEE

Only the failure rate participates in the safety analysis process at the system level and the aircraft level. Therefore, it is necessary to provide equipment-level information in the process of aircraft safety assessment.

The SEE failure rate and its calculation method and program provide basic data for the safety analysis of avionics equipment.

GB/T 34955-2017 "Guidelines for Single Event Effects Tests of Atmospheric Radiation Affecting Avionics Systems" and GB/T 34956-2017

"Design Guidelines for Single Event Effect Protection of Avionics Equipment Impacted by Atmospheric Radiation" together constitute the single event effect design of avionics products

Basic technical standards with analysis.

GB/T 41270 specifies methods and procedures for the analysis, testing and evaluation of atmospheric neutron single event effects, and is intended to consist of two parts.

--- Part 7.Process management of single event effects analysis in avionics product design. The purpose is to specify avionics product design

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

--- Part 9.Avionics equipment single event effect failure rate calculation procedures and methods. The purpose is to specify the avionics list

Particle effect failure rate general, total failure rate, soft failure rate, hard failure rate calculation method and calculation program.

Avionics Process Management Atmospheric Radiation Effects

Part 7.Avionics in Design

Single Event Effects Analysis Process Management

1 Scope

This document specifies methods and procedures for single event effects analysis of electronic components in avionics product design.

This document is applicable to the formulation of electronic component management plans based on single event effect analysis of avionics products, in order to improve avionics production

Provide mitigation and protection measures against the impact of single event effects.

2 Normative references

The contents of the following documents constitute essential provisions of this document through normative references in the text. Among them, dated citations

documents, only the version corresponding to that date applies to this document; for undated references, the latest edition (including all amendments) applies to

this document.

GB/T 34956-2017 Design guidelines for protection against single event effects of avionics due to atmospheric radiation (IEC 62396-1.

2016, IDT)

3.1 Terms and Definitions

Terms and definitions defined in GB/T 34956-2017 apply to this document.

3.2 Abbreviations

The following abbreviations apply to this document.

BIT. self-test (built-intest)

BOM. Bill of Materials (bilofmaterial)

FOM. figure of merit (figureofmerit)

I/O. input/output (input/output)

L1/L2.L1 cache/L2 cache (microprocessor cache, L1 generally refers to on-chip/L2 generally refers to off-chip)

MCU. Multiple Cell Upset (multiplecelupset)

RAM. random access memory (randomaccessmemory)

SEB. single event burnout