PD IEC/TR 62396-7:2017

BSI Standards Publication

Process management for avionics - Atmospheric radiation effects

Part 7: Management of SEE analysis process in avionics design

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

National foreword

This Published Document is the UK implementation of IEC/TR 62396-7:2017.

The UK participation in its preparation was entrusted to Technical Committee GEL/107, Process management for avionics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2017
Published by BSI Standards Limited 2017

ISBN 978 0 580 97751 0

ICS 49.060; 31.020; 03.100.50

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 September 2017.

Amendments/corrigenda issued since publication

Date	Text affected

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

IEC TR 62396-7

Edition 1.0 2017-07

TECHNICAL REPORT

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

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 03.100.50; 31.020; 49.060

ISBN 978-2-8322-4456-2

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

® Registered trademark of the International Electrotechnical Commission

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

CONTENTS

FOREWORD 3
1 Scope 5
2 Normative references 5
3 Terms, definitions and abbreviated terms 6
3.1 Terms and definitions 6
3.2 Abbreviated terms 6
4 Radiation analysis process 7
4.1 General 7
4.2 Determine inputs to SEE analysis 8
4.3 Assess electronic component SEE sensitivity 9
4.4 Identify and account for mitigations and electronic equipment effects 10
4.5 Calculate SEE rates and analyse risk 11
4.6 Perform radiation tests 12
4.7 Design change 12
4.8 Radiation report 13
4.9 SEE impact analysis 13
4.10 On-going component management 14
Annex A (informative) Detailed radiation analysis process 15
Annex B (informative) Radiation effects evaluation table of electronic component 16
Bibliography 18

Figure 1 – Radiation analysis process overview 8
Figure A.1 – Detailed radiation analysis process flowchart 15

Table B.1 – Template for radiation effects evaluation table of electronic component 17

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PROCESS MANAGEMENT FOR AVIONICS – ATMOSPHERIC RADIATION EFFECTS –

Part 7: Management of single event effects (SEE) analysis process in avionics design

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. However, a technical committee may propose the publication of a technical report when it has collected data of a different kind from that which is normally published as an International Standard, for example "state of the art".

IEC TR 62396-7, which is a technical report, has been prepared by IEC technical committee 107: Process management for avionics.

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

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

Enquiry draft	Report on voting
107/300/DTR	107/304/RVDTR

Full information on the voting for the approval of this technical report 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 62396 series, published under the general title *Process management for avionics – Atmospheric radiation effects*, 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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017

PROCESS MANAGEMENT FOR AVIONICS – ATMOSPHERIC RADIATION EFFECTS –

Part 7: Management of single event effects (SEE) analysis process in avionics design

1 Scope

This part of IEC 62396, which is a technical report, describes a process to account for the effects of atmospheric radiation on electronic equipment. Single event effects (SEE) due to atmospheric radiation are one class of possible failure mechanisms that are addressed in the safety and reliability analyses of electronic equipment and associated functions.

This document focuses on electronic components, electronic equipment and associated electronic functions. System level analysis is not addressed in this document.

This document is intended to describe an approach to accounting for SEE in electronic equipment design, design review, and it can provide aid in the aerospace certification process. This document establishes an example process for assessing electronic components in the atmospheric radiation environment, evaluating for mitigations/protections/utilizations, and addressing the electronic equipment impacts of the SEE. The process is intended to support an SEE analysis for electronic equipment.

It does not describe, in detail, methods used to mitigate the effects of SEE in the electronic equipment design.

NOTE 1 IEC 62396-3 provides further details for this process.

NOTE 2 IEC 62396-2 provides further details for SEE testing.

This document, by itself, is not a program requirements document, i.e. it does not contain the word “shall.” However it describes a process that can be used, for example, at the discretion and agreement of the users, to aid in the preparation and the maintenance of an electronic components management plan (see [1][1] and [7]). The output of the process described in this document provides data as an input into the product safety and reliability analyses.

Although developed for the avionics industry, this document can be used by other industrial sectors at their discretion.

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.

IEC 62396-1:2016, *Process management for avionics – Atmospheric radiation effects – Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*

[1] Numbers in square brackets refer to the Bibliography.

Documents
Document Sharing Hub

Full document details: PD IEC/TR 62396-7:2017