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# INTERNATIONAL STANDARD



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## Process management for avionics – Atmospheric radiation effects – Part 2: Guidelines for single event effects testing for avionics systems

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

### **PROCESS MANAGEMENT FOR AVIONICS – ATMOSPHERIC RADIATION EFFECTS –**

#### **Part 2: Guidelines for single event effects testing for avionics systems**

#### FOREWORD

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International Standard IEC 62396-2 has been prepared by IEC technical committee 107: Process management for avionics.

This standard cancels and replaces IEC/TS 62396-2 published in 2008. This first edition constitutes a technical revision.

This first edition includes the following significant technical changes with respect to the technical specification IEC/TS 62396-2.

- a) Clause 5 information expanded including additional information in sections on heavy ion data, neutron and proton data and thermal neutron data.
- b) The neutron sources Clause 6 has been updated, Figure 1 now contains data on additional radiation simulators, and Figure 2 contains more recent data with results for feature sizes below 100 nm. A new Figure 3 contains data on low energy neutron (< 10 MeV) SEU percentage fraction.

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- c) The sources of existing data (radiation SEE data) table has been split in to two tables: one for post 2000 sources and the other for pre 2000 sources which is now in Annex A.
- d) The Anita spallation neutron source has been added to Clause 7.
- e) A new subclause, 7.4.5, has been added on whole system and equipment testing.
- f) A new subclause, 8.4, provides a comparison between accelerator based neutron sources.
- g) A new subclause, 8.5, compares the influence of upper neutron energy for neutron sources.

The text of this standard is based on the following documents:

FDIS	Report on voting
107/186/FDIS	107/192/RVD

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all 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 publication will remain unchanged until the stability date indicated on the IEC web site under "<http://webstore.iec.ch>" in the data related to the specific publication. At this date, the publication will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual edition of this document may be issued at a later date.

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## INTRODUCTION

This industry-wide international standard provides additional guidance to avionics systems designers, electronic equipment component manufacturers and their customers to determine the susceptibility of microelectronic devices to single event effects. It expands on the information and guidance provided in IEC 62396-1.

Guidance is provided on the use of existing single event effects (SEE) data, sources of data and the types of accelerated radiation sources used. Where SEE data is not available considerations for testing are introduced including suitable radiation sources for providing avionics SEE data. The conversion of data obtained from differing radiation sources into avionics SEE rates is detailed.

## **PROCESS MANAGEMENT FOR AVIONICS – ATMOSPHERIC RADIATION EFFECTS –**

### **Part 2: Guidelines for single event effects testing for avionics systems**

#### **1 Scope**

This part of IEC 62396 aims to provide guidance related to the testing of microelectronic devices for purposes of measuring their susceptibility to single event effects (SEE) induced by atmospheric neutrons. Since the testing can be performed in a number of different ways, using different kinds of radiation sources, it also shows how the test data can be used to estimate the SEE rate of devices and boards due to atmospheric neutrons at aircraft altitudes.

Although developed for the avionics industry, this process may be applied by other industrial sectors.

#### **2 Normative references**

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 62396-1:2012, *Process management for avionics – Atmospheric radiation effects – Part 1: Accommodation of atmospheric radiation effects via single event effects within avionics electronic equipment*

IEC/TS 62396-3, *Process management for avionics – Atmospheric radiation effects – Part 3: Optimising system design to accommodate the single event effects (SEE) of atmospheric radiation*

IEC/TS 62396-4, *Process management for avionics – Atmospheric radiation effects – Part 4: Guidelines for designing with high voltage aircraft electronics and potential single event effects*

IEC/TS 62396-5, *Process management for avionics – Atmospheric radiation effects – Part 5: Guidelines for assessing thermal neutron fluxes and effects in avionics systems*