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# INTERNATIONAL STANDARD

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**Process management for avionics – Atmospheric radiation effects –  
Part 4: Design of high voltage aircraft electronics managing potential single  
event effects**

INTERNATIONAL  
ELECTROTECHNICAL  
COMMISSION

PRICE CODE

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**PROCESS MANAGEMENT FOR AVIONICS –  
ATMOSPHERIC RADIATION EFFECTS –****Part 4: Design of high voltage aircraft  
electronics managing potential single event effects**

## FOREWORD

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International Standard IEC 62396-4 has been prepared by IEC technical committee 107: Process management for avionics.

This International Standard is to be used in conjunction with IEC 62396-1:2012.

This first edition cancels and replaces IEC/TS 62396-4 published in 2008. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) Change to title.
- b) Clause 4 inclusion of SEGR.
- c) Inclusion of 6.5 concerning SEB due to thermal neutrons.

d) Consideration of alternative materials to silicon in 6.6.

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

FDIS	Report on voting
107/211/FDIS	107/221/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 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 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- withdrawn,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.

## INTRODUCTION

This industry-wide international standard provides guidance and requirements to design high voltage aircraft electronics for electronic equipment and avionics systems. It is intended for avionics system designers, electronic equipment manufacturers, component manufacturers and their customers to manage the single event effects produced in semiconductor devices operating at high voltage (nominally above 200 V) by atmospheric radiation. It expands on the information and guidance provided in IEC 62396-1:2012.

The internal elements of semiconductor devices operating at high applied voltage will be subject to high voltage stress. The incident radiation causes ionisation charge within the device, and the high voltage stress may cause a large increase (avalanche) in this charge, which may be destructive. Within this part of IEC 62396 two effects are considered: single event burnout (SEB), and single event gate rupture (SEGR).

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

### **Part 4: Design of high voltage aircraft electronics managing potential single event effects**

#### **1 Scope**

This part of IEC 62396 provides guidance on atmospheric radiation effects and their management on high voltage (nominally above 200 V) avionics electronics used in aircraft operating at altitudes up to 60 000 ft (18,3 km). This part of IEC 62396 defines the effects of that environment on high voltage electronics and provides design considerations for the accommodation of those effects within avionics systems.

This part of IEC 62396 provides technical data and methodology for aerospace equipment manufacturers and designers to standardise their approach to single event effects on high voltage avionics by providing guidance, leading to a standard methodology.

Details are given of the types of single event effects relevant to the operation of high voltage avionics electronics, methods of quantifying those effects, appropriate methods to provide design and methodology to demonstrate the suitability of the electronics for the application.

#### **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*