# IEC TR 62240-1

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# REDLINE VERSION

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## Process management for avionics – Electronic components capability in operation –
## Part 1: Temperature uprating

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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# PROCESS MANAGEMENT FOR AVIONICS – ELECTRONIC COMPONENTS CAPABILITY IN OPERATION –

## Part 1: Temperature uprating

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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 62240-1, which is a Technical Report, has been prepared by IEC technical committee 107: Process management for avionics.

This second edition cancels and replaces the first edition published in 2013. This edition constitutes a technical revision. This edition includes the following significant technical changes with respect to the previous edition:

a) Revised the wording in 4.1 and the corresponding Figure 1 to reflect current industry practices.

The text of this Technical Report is based on the following documents:

| CDTR | Report on voting |
|---|---|
| 107/313/DTR | 107/322/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 parts in the IEC 62240 series, published under the general title *Process management for avionics – Electronic components capability in operation*, 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

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# INTRODUCTION

Traditionally, industries that produced electronic equipment for ADHP (aerospace, defence and high performance) applications have relied on the military specification system for semiconductor device standards and upon manufacturers of military-specified devices as device sources. This assured the availability of semiconductor devices specified to operate over the temperature ranges required for electronic equipment in ADHP applications. In the past, several device manufacturers have exited the military market, resulting in the decreased availability of devices specified to operate over wide temperature ranges. Following are some typical ambient temperature ranges at which devices are marketed:

| | |
|---|---|
| Military: | –55 °C to + 125 °C |
| Automotive: | –40 °C to + 125 °C |
| Industrial: | –40 °C to + 85 °C |
| Commercial: | 0 °C to + 70 °C |

If there are no reasonable or practical alternatives, then a potential response is for electronic equipment manufacturers to use devices at temperature ranges that are wider than those specified by the device manufacturer.

This document provides information on selecting semiconductor devices, assessing their capability to operate, and assuring their intended quality in the wider temperature ranges. It also reports the need for documentation of such usage.

This can be supported by exchanging technical information with the original device manufacturer.

Operation of the device beyond the manufacturer's limits ~~may~~ can result normally in loss of warranty by the device manufacturer.

# PROCESS MANAGEMENT FOR AVIONICS – ELECTRONIC COMPONENTS CAPABILITY IN OPERATION –

## Part 1: Temperature uprating

## 1 Scope

This part of IEC 62240, which is a technical report, provides information when using semiconductor devices in wider temperature ranges than those specified by the device manufacturer. The uprating solutions described herein are considered exceptions, when no reasonable alternatives are available; otherwise devices are utilized within the manufacturers' specifications.

The terms "uprating" and "thermal uprating" are being used increasingly in avionics industry discussions and meetings, and clear definitions are included in Clause 3. They were coined as shorthand references to a special case of methods commonly used in selecting electronic components for circuit design.

This document describes the methods and processes for implementing this special case of thermal uprating. All of the elements of these methods and processes employ existing, commonly used best engineering practices. No new or unique engineering knowledge is needed to follow these processes, only a rigorous application of the overall approach.

Even though the device is used at wider temperatures, the wider temperatures usage will be limited to those that do not compromise applications performance and reliability, particularly for devices with narrow feature size geometries (for example, 90 nm and less). This document does not imply that applications use the device to function beyond the absolute maximum rating limits ~~of the device~~ specified by the original device manufacturer and assumes that:

– device usage outside the original device manufacturers' specified temperature ranges is done only when no reasonable alternative approach is available and is performed with appropriate justification;

– if it is necessary to use devices outside the original device manufacturers' specified temperature ranges, it is done with documented and controlled processes that assure integrity of the electronic equipment.

## 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 TS 62239-1, *Process management for avionics – Management plan – Part 1: Preparation and maintenance of an electronic components management plan*

# IEC TR 62240-1

Edition 2.0 2018-03

# TECHNICAL REPORT

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## Process management for avionics – Electronic components capability in operation – Part 1: Temperature uprating



IEC TR 62240-1:2018-03(en)

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