



SLOVENSKI STANDARD
oSIST prEN 16602-30-11:2021
01-april-2021

Zagotavljanje varnih proizvodov v vesoljski tehniki - Zmanjšanje števila komponent EEE

Space product assurance - Derating - EEE components

Raumfahrtproduktsicherung - Herabsetzen/Unterlastung von EEE-Komponenten

Assurance produit des projets spatiaux - Détarage des composants EEE

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Space product assurance - Derating - EEE components

Assurance produit des projets spatiaux - Détarage des
composants EEE

Raumfahrtproduktsicherung -
Herabsetzen/Unterlastung von EEE-Komponenten

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/CLC/JTC 5.

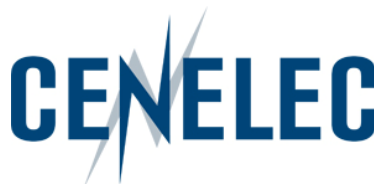
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European Foreword

This document (prEN 16602-30-11:2021) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN (Germany).

This document (prEN16602-30-11:2021) originates from ECSS-Q-ST-30-11C Rev.2 DIR1.

This document is currently submitted to the Enquiry.

This document will supersede EN 16602-30-11:2014. [if applicable].

The main changes with respect to EN 16602-30-11:2014 are listed below:

- Implementation of Change Requests,
- ...

NOTE: CHANGE LOG WILL BE COMPLETED BEFORE PUBLICATION

This document has been developed to cover specifically space systems and will therefore have precedence over any EN covering the same scope but with a wider domain of applicability (e.g. : aerospace).

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Introduction

This Standard specifies derating requirements applicable to electronic, electrical and electromechanical components.

Derating is a long standing practice applied to components used on spacecrafts. Benefits of this practice are now proven, but for competitiveness reasons, it becomes necessary to find an optimized reliability. Too high a derating can lead to over-design, over-cost and over-sizing of components, the direct consequence being excess volume and weight. The aim is to obtain reliable and high performance equipment without over-sizing of the components. For this reason and if possible, this Standard provides derating requirements depending on mission duration and mean temperature, taking into account demonstrated limits of component capabilities.

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1 Scope

This Standard applies to all parties involved at all levels in the realization of space segment hardware and its interfaces.

The objective of this Standard is to provide customers with a guaranteed performance and reliability up to the equipment end-of-life. To this end, the following are specified:

- Load ratios or limits to reduce stress applied to components;
- Application rules and recommendations.

This standard may be tailored for the specific characteristics and constraints of a space project, in accordance with ECSS-S-ST-00.

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Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this ECSS Standard. For dated references, subsequent amendments to, or revisions of any of these publications do not apply. However, parties to agreements based on this ECSS Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references the latest edition of the publication referred to applies.

| EN reference | Reference in text | Title |
|----------------|-------------------|---|
| EN 16601-00-01 | ECSS-S-ST-00-01 | ECSS system - Glossary of terms |
| EN 16602-60 | ECSS-Q-ST-60 | Space product assurance - Electrical, electronic and electromechanical (EEE) components |
| | ESCC 2269010 | Evaluation test programme for monolithic microwave integrated circuits (MMICS) |
| | ESCC 2265010 | Evaluation Test Programme for Discrete Microwave Semiconductors |

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Terms, definitions and abbreviated terms

3.1 Terms from other standards

- a. For the purpose of this Standard, the terms and definitions from ECSS-ST-00-01 apply.
 1. component
 2. derating
 3. performance

3.2 Terms specific to the present standard

3.2.1 ambient temperature

temperature surrounding a component

3.2.2 bundle

set of two or more wires arranged in parallel, tied or laced together.

3.2.3 case temperature

temperature on the component package surface

3.2.4 hot spot temperature

highest measured or predicted temperature within any component

3.2.5 junction temperature

highest measured or predicted temperature at the junction within a semiconductor or micro-electronic device

NOTE Predicted temperature can be taken as $T_{\text{case}} +$ thermal resistance between junction and case times actual power (Watt) of the device.

3.2.6 load ratio

permissible operating level after derating has been applied; given as a percentage of a parameter rating

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3.2.7 operating conditions

parameter stress and environment (temperature, vibration, shock and radiation) in which components are expected to operate

3.2.8 RadPack

package designed to provide some form of radiation protection

3.2.9 rating

maximum parameter value specified and guaranteed by the component manufacturer and component procurement specification

NOTE Rating is considered as a limit not to be exceeded during operation and constitutes in most cases the reference for derating.

3.2.10 surge

strong rush or sweep

[Collins dictionary and thesaurus]

3.2.11 transient

brief change in the state of a system

[Collins dictionary and thesaurus]

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3.3 Abbreviated terms

For the purpose of this Standard, the abbreviated terms from ECSS-S-ST-00-01 and the following apply:

| Abbreviation | Meaning |
|---------------------|---|
| A/D | analog to digital |
| ASIC | application specific integrated circuit |
| C | capacitance |
| DRAM | dynamic random access memory |
| EEPROM | electrical erasable programmable read only memory |
| EPROM | erasable programmable read only memory |
| ESCC | European Space Component Coordination |
| ESR | equivalent series resistance |
| f | frequency |
| FET | field effect transistor |

| Abbreviation | Meaning |
|-------------------|--|
| GaAs | gallium arsenide |
| ISO | International Organization for Standardization |
| InP | indium phosphide |
| LED | light emitting diode |
| MOS | metal on silicon |
| MIL (spec) | specification of the US Department of Defense |
| MMIC | monolithic microwave integrated circuit |
| NASA | National Aeronautics and Space Administration |
| P | power |
| PROM | programmable read only memory |
| RadHard | radiation hardened |
| Ri | insulation resistance |
| RF | radio-frequency |
| SEBO | single event burn-out |
| SEGR | single event gate rupture |
| Si, SiGe | silicon, silicon germanium |
| SOA | safe operating area |
| SRAM | static random access memory |
| T _j | junction temperature |
| T _{jmax} | absolute maximum rated junction temperature |
| T _{op} | operating temperature |
| V _{CE} | collector-emitter voltage |

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