



SLOVENSKI STANDARD
SIST EN 16602-30-11:2015
01-januar-2015

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 - Derating des composants EEE

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Space product assurance - Derating - EEE components

Assurance produit des projets spatiaux - Derating des
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von EEE-Komponenten

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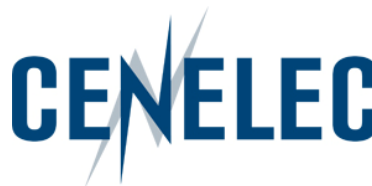
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**CEN-CENELEC Management Centre:
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Table of contents

Foreword	6
Introduction	7
1 Scope	8
2 Normative references	9
3 Terms, definitions and abbreviated terms	10
3.1 Terms from other standards.....	10
3.2 Terms specific to the present standard	10
3.3 Abbreviated terms.....	11
4 User responsibility	13
5 Derating	14
5.1 Overview	14
5.2 Principles of derating	14
5.3 Applicability and component selection	15
5.4 Derating parameters	17
5.5 Additional rules and recommendations	18
6 Tables for load ratios or limits	19
6.1 Overview	19
6.2 Capacitors: ceramic - family-group code: 01-01 and 01-02	20
6.3 Capacitors: solid tantalum - family-group code: 01-03	21
6.4 Capacitors: non-solid tantalum - family-group code: 01-04	22
6.5 Capacitors: Plastic metallized - family-group code: 01-05.....	23
6.6 Capacitors: glass and porcelain - family-group code: 01-06.....	24
6.7 Capacitors: mica and reconstituted mica - family-group code: 01-07	25
6.8 Capacitors: feedthrough - family-group code: 01-10	26
6.9 Capacitors: semiconductor technology (MOS type) - family-group code: 01-11	27
6.10 Capacitors: miscellaneous (variable capacitors) - family-group code: 01-99	28
6.11 Connectors - family-group code: 02-01, 02-02, 02-03, 02-07 and 02-09	29
6.12 Connectors RF - family-group code: 02-05	30

6.13	Piezo-electric devices: crystal resonator - family-group code: 03-01	31
6.14	Diodes - family-group code: 04-01, 04-02, 04-03, 04-04, 04-06, 04-08, 04-10 and 04-14	32
6.15	Diodes: RF/microwave - family-group code: 04-05, 04-11 to 04-13, 04-15, 04- 16 and 04-17	34
6.16	Feedthrough filters - family-group code: 05-01.....	35
6.17	Fuses: Cermet (metal film on ceramic) - family-group code: 06-01	36
6.18	Inductors and transformers - family-group code: 07-01 to 07-03 and 14-01	37
6.19	Integrated circuits: logic - family-group code: 08-10, 08-20, 08-21, 08-29 to 08- 42, and 08-80	38
6.20	Integrated circuits: non-volatile memories - family-group code: 08-22, 08-23 and 08-24	39
6.21	Integrated circuits: linear - family-group code: 08-50 to 08-60 and 08-69.....	40
6.22	Integrated circuits: linear converters - family-group code: 08-61 and 08-62	41
6.23	Integrated circuits: MMICs - family-group code: 08-95	42
6.24	Integrated circuits: miscellaneous - family-group code: 08-99.....	43
6.25	Relays and switches - family-group code: 09-01, 09-02 and 16-01	44
6.26	Resistors - family-group code: 10-01 to 10-11	47
6.27	Thermistors - family-group code: 11-01 to 11-03	50
6.28	Transistors: bipolar - family-group code: 12-01 to 12-04 and 12-09	51
6.29	Transistors: FET - family-group code: 12-05 and 12-06	52
6.30	Transistors: RF: bipolar - family-group code: 12-10 and 12-13	53
6.31	Transistors: RF: FET - family-group code: 12-12, 12-14, 12-15(FET) and 12- 16(FET)	55
6.32	Wires and cables - family-group code: 13-01 to 13-03	57
6.33	Opto-electronics - family-group code: 18-01 to 18-05	59
6.34	RF passive components: family-group code: 30-01, 30-07, 30-09, 30-10 and 30-99	60
6.35	Fibre optic components: fibre and cable: family-group-code: 27-01	61
6.36	Hybrids	62
Bibliography.....		68
Figures		
Figure 5-1: Parameter stress versus strength relationship.....		15
Tabless		
Table 6-1: Derating of parameters for capacitors family-group code 01-01 and 01-02.....		20
Table 6-2: Derating of parameters for capacitors family-group code 01-03.....		21
Table 6-3: Derating of parameters for capacitors family-group code.....		22

EN 16602-30-11:2014 (E)

Table 6-4: Derating of parameters for capacitors family-group code 01-05.....	23
Table 6-5: Derating of parameters for capacitors family-group code 01-06.....	24
Table 6-6: Derating of parameters for capacitors family-group code 01-07.....	25
Table 6-7: Derating of parameters for capacitors family-group code 01-10.....	26
Table 6-8: Derating of parameters for capacitors family-group code 01-11.....	27
Table 6-9: Derating of parameters for capacitors family-group code 01-99.....	28
Table 6-10: Derating of parameters for connectors family-group code 02-01, 02-02, 02-03, 02-07 and 02-09.....	29
Table 6-11: Derating of parameters for connectors RF family-group code 02-05.....	30
Table 6-12: Derating of parameters for piezo-electric devices family-group code 03-01.....	31
Table 6-13: Derating of parameters for Diode (signal/switching, rectifier including Schottky, pin).....	32
Table 6-14: Derating of parameters for Diode (Zener, reference, transient suppression).....	32
Table 6-15: Derating of parameters for Diodes family-group code 04-05, 04-11 to 04-13, 04-15, 04-16 and 04-17.....	34
Table 6-16: Derating of parameters for Feedthrough filters family-group code 05-01.....	35
Table 6-17: Derating of parameters for Fuses family-group code 06-01.....	36
Table 6-18: Derating of parameters for Inductors and transformers family-group code 07-01 to 07-03 and 14-01.....	37
Table 6-19: Derating of parameters for Integrated circuits family-group code: 08-10, 08-20, 08-21, 08-29 to 08-42, and 08-80.....	38
Table 6-20: Derating of parameters for Integrated circuits family-group code: 08-22, 08-23 and 08-24.....	39
Table 6-21: Derating of parameters for Integrated circuits family-group code 08-50 to 08-60 and 08-69.....	40
Table 6-22: Derating of parameters for Integrated circuits family-group code 08-61 and 08-62.....	41
Table 6-23: Derating of parameters for Relays and switches family-group code 09-01, 09-02 and 16-01.....	45
Table 6-24: Derating of parameters for Metal film precision resistor (type RNC, except RNC 90).....	47
Table 6-25: Derating of parameters for Metal film semi-precision resistor (type RLR).....	47
Table 6-26: Derating of parameters for Foil resistor (type RNC 90).....	48
Table 6-27: Derating of parameters Wire-wound high precision resistor (type RBR 56).....	48
Table 6-28: Derating of parameters for Wire-wound power resistor (type RWR, RER).....	48
Table 6-29: Derating of parameters for Chip resistor (RM), network resistor.....	49
Table 6-30: Derating of parameters for Carbon composition resistor.....	49
Table 6-31: Derating of parameters for Heaters.....	49
Table 6-32: Derating of parameters for Thermistors family-group code 11-01 to 11-03.....	50
Table 6-33: Derating of parameters for Transistors family-group code 12-01 to 12-04 and 12-09.....	51

Table 6-34: Derating of parameters for Transistors family-group code 12-05 and 12-06.....	52
Table 6-35: Derating of parameters for Transistors family-group code 12-10 and 12-13.....	54
Table 6-36: Derating of parameters for Transistors family-group code 12-12, 12-14, 12-15(FET) and 12-16(FET).....	55
Table 6-37: Derating of parameters for Wires and cables family-group code 13-01 to 13-03.....	57
Table 6-38: Bundle factor K for calculation of the derated current for each individual wire in bundles of N wires	58
Table 6-39: Derating of parameters for Opto-electronics family-group code 18-01 to 18-05.....	59
Table 6-40: Derating of parameters for RF passive components from family-group code 30-01, 30-07, 30-09, 30-10 and 30-99 - Low power < 5 W	60
Table 6-41: Derating of parameters for RF passive components from family-group code 30-01, 30-07, 30-09, 30-10 and 30-99 - Low power ≥ 5 W	60
Table 6-42: Derating of parameters for Fibre optic components	61

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Foreword

This document (EN 16602-30-11:2014) has been prepared by Technical Committee CEN/CLC/TC 5 "Space", the secretariat of which is held by DIN.

This standard (EN 16602-30-11:2014) originates from ECSS-Q-ST-30-11C Rev 1.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2015, and conflicting national standards shall be withdrawn at the latest by March 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

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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2

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

Terms, definitions and abbreviated terms

3.1 Terms from other standards

For the purpose of this Standard, the terms and definitions from ECSS-ST-00-01 apply.

3.2 Terms specific to the present standard

3.2.1 ambient temperature

temperature surrounding a component

3.2.2 case temperature

temperature on the component package surface

3.2.3 derating

process of designing a product such that its components operate at a significantly reduced level of stress to increase reliability and to insure useful life and design margins.

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

3.2.7 operating conditions

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

3.2.8 term "performance" deleted**3.2.9 RadPack**

package designed to provide some form of radiation protection

3.2.10 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.

3.2.11 surge

strong rush or sweep

[Collins dictionary and thesaurus]

3.2.12 transient

brief change in the state of a system

[Collins dictionary and thesaurus]

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3.3 Abbreviated terms (standards.iteh.ai)

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
GaAs	gallium arsenide
ISO	International Organization for Standardization
InP	indium phosphide
LED	light emitting diode
MOS	metal on silicon

EN 16602-30-11:2014 (E)

Abbreviation	Meaning
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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4**User responsibility**

- a. The user of this Standard shall verify that the ordered assurance level of procured components is compatible with the intended application.

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