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SIST-TP CEN/TR 17602-30-01:2022

01-februar-2022

Zagotavljanje kakovosti proizvodov v vesoljski tehniki - Analiza najslabšega primera

Space product assurance - Worst case analysis

RaumfahrtProduktsicherung - Worst-Case-Analysis

Assurance produit des projets spatiaux - Analyse pire cas

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Ta slovenski standard je istoveten z: **CEN/TR 17602-30-01:2021**

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ICS:		
03.120.99	Drugi standardi v zvezi s kakovostjo	Other standards related to quality
49.140	Vesoljski sistemi in operacije	Space systems and operations

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2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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TECHNICAL REPORT

RAPPORT TECHNIQUE

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CEN/TR 17602-30-01

December 2021

ICS 49.140

English version

Space product assurance - Worst case analysis

Assurance produit des projets spatiaux - Analyse pire cas

RaumfahrtProduktsicherung - Worst-Case-Analysis

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CEN-CENELEC Management Centre:
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European Foreword

This document (CEN/TR 17602-30-01:2021) has been prepared by Technical Committee CEN/CLC/JTC 5 “Space”, the secretariat of which is held by DIN.

It is highlighted that this technical report does not contain any requirement but only collection of data or descriptions and guidelines about how to organize and perform the work in support of EN 16602-30.

This Technical report (CEN/TR 17602-30-01:2021) originates from ECSS-Q-HB-30-01A.

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 TR covering the same scope but with a wider domain of applicability (e.g.: aerospace).

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1 Scope

This handbook provides guidelines to perform the worst case analysis. It applies to all electrical and electronic equipment. This worst case analysis (WCA) method can also be applied at subsystem level to justify electrical interface specifications and design margins for equipment. It applies to all project phases where electrical interface requirements are established and circuit design is carried out.

The worst case analysis is generally carried out when designing the circuit. For selected circuitry, worst case analysis (WCA) can be used to validate a conceptual design approach.

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2 References

EN Reference	Reference in text	Title
EN 16601-00-01	ECSS-ST-00-01	ECSS system - Glossary of terms
EN 16603-10-02	ECSS-E-ST-10-02	Space engineering -Verification
EN 16602-30	ECSS-Q-ST-30	Space product assurance - Dependability
EN 16602-30-11	ECSS-Q-ST-30-11	Space product assurance - Derating - EEE components
-	ECSS-Q-TM-30-12	Space product assurance – End-of-life parameters drifts - EEE components
EN 16602-30-02	ECSS-Q-ST-30-02	Space product assurance - Failure modes, effects and criticality analysis
EN 16602-40-02	ECSS-Q-ST-40-02	Space product assurance - Hazard analysis
-	ECSS-Q-TM-40-04	Space product assurance - Sneak analysis
EN 16602-40-12	ECSS-Q-ST-40-12	Space product assurance - Fault tree analysis – Adoption notice ECSS / IEC61025
	CRTAWCCA	Worst Case Circuit Analysis Application Guidelines, 1993 Reliability Analysis Center, Rome NY, U.S.A
	JPL D-5703	Jet Propulsion Laboratory Reliability Analyses Handbook

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3 Terms, definitions and abbreviated terms

3.1 Terms from other documents

For the purpose of this document, the terms and definitions from ECSS-S-ST-00-01 apply and the terms specific to the present document.

3.2 Terms specific to the present document

3.2.1 ambient temperature

temperature of a medium surrounding the component

3.2.2 biased variation value

value with a deterministic direction or sign whose amplitude and direction of variation are known

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3.2.3 component parameters

electrical performance parameters of EEE parts

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3.2.4 component specification

specification of the EEE part used for procurement of the EEE part

3.2.5 design lifetime

duration for which the circuit is designed to work within a particular mission

3.2.6 effective ageing data

ageing data extrapolated from the lifetime assumed in database to the design lifetime

3.2.7 lifetime assumed in database

lifetime for which the parameter variation due to ageing and environmental effects is valid

3.2.8 radiation

phenomenon by which energy, in form of waves or particles, emanates from a source into space

Example Trapped electrons, trapped protons and solar protons.

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3.2.9 random variation value

value with no preferred direction or sign whose amplitude alone is known

3.2.10 reference condition

relative condition where the parameter variation is assumed to be zero

3.2.11 temperature assumed in database

temperature for which the parameter variation is given in the database

3.2.12 variation factors

factors which affect component parameters over its lifetime

NOTE For details see subclause 5.1.1.

3.2.13 worst case

highest or lowest boundary value of a given control parameter established in a validation or qualification exercise

NOTE Failures or single event effects are not covered by the worst case.

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3.2.14 worst case analysis (WCA)

performance prediction of the circuit in the worst case condition

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3.2.15 functional block

within a circuit, set of components which perform a specific function

3.3 Abbreviated terms

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

Abbreviation	Meaning
CDR	critical design review
EEE	electrical, electronic, electromechanical
EMC	electromagnetic compatibility
EOL	end-of-life
EVA	extreme value analysis
E_A	activation energy

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k	Boltzmann constant
MCA	Monte-Carlo analysis
PCB	printed circuit board
PDF	probability density function
PDR	preliminary design review
RF	radio frequency
RSS	root-sum-square
SEE	single event effect
T_j	junction temperature
WCA	worst case analysis

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