IEC 61709

Edition 3.0 2017-02

REDLINE VERSION

Electric components – Reliability – Reference conditions for failure rates and stress models for conversion

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

IEC 61709:2017-02 RLV(en)

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INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 31.020 ISBN 978-2-8322-3989-6

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CONTENTS

FOREWORD ... 9
INTRODUCTION ... 11
1 Scope ... 12
2 Normative references ... 12
3 Terms, definitions and symbols ... 13
3.1 Terms and definitions ... 13
3.2 Symbols ... 16
4 Context and conditions ... 18
4.1 Failure modes and mechanisms ... 18
4.2 Thermal modelling ... 19
4.3 ~~Operating~~ Mission profile consideration~~s~~ ... 19
4.3.1 General ... 19
4.3.2 Operating and non-operating conditions ... 19
4.3.3 Dormancy ... 20
4.3.4 Storage ~~conditions~~ ... 20
4.4 Environmental conditions ... 20
4.5 Components choice ... 22
4.6 Reliability growth during the deployment phase of new equipment ... 23
4.7 How to use this document ... 24
5 Generic reference conditions and stress models ... 25
5.1 Recommended generic reference conditions ... 25
5.2 Generic stress models ... 26
5.2.1 General ... 26
5.2.2 Stress factor for voltage dependence, π_U ... 27
5.2.3 Stress factor for current dependence, π_I ... 27
5.2.4 Stress factor for temperature dependence, π_T ... 27
5.2.5 Environmental application factor, π_E ... 29
5.2.6 Dependence on switching rate, π_S ... 30
5.2.7 Dependence on electrical stress, π_{ES} ... 30
5.2.8 Other factors of influence ... 30
6 Integrated semiconductor circuits ... 30
6.1 Specific reference conditions ... 30
6.2 Specific stress ~~factors~~ models ... 33
6.2.1 ~~Models~~ General ... 33
6.2.2 Voltage dependence, factor π_U ... 33
6.2.3 Temperature dependence, factor π_T ... 33
7 Discrete semiconductors ... 36
7.1 Specific reference conditions ... 36
7.2 Specific stress ~~factors~~ models ... 37
7.2.1 General ... 37
7.2.2 Voltage dependence for transistors, factor π_U ... 38
7.2.3 Temperature dependence, factor π_T ... 38
8 Optoelectronic components ... 40

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

8.1 Specific reference conditions 40
8.2 Specific stress ~~factors~~ models 42
8.2.1 General 42
8.2.2 Voltage dependence, factor π_U 42
8.2.3 Current dependence, factor π_I 42
8.2.4 Temperature dependence, factor π_T 43
9 Capacitors 45
9.1 Specific reference conditions 45
9.2 Specific stress ~~factors~~ models 45
9.2.1 ~~Models~~ General 45
9.2.2 Voltage dependence, factor π_U 45
9.2.3 Temperature dependence, factor π_T 47
10 Resistors and resistor networks 48
10.1 Specific reference conditions 48
10.2 Specific stress ~~factors~~ models 49
10.2.1 ~~Models~~ General 49
10.2.2 Temperature dependence, factor π_T 49
11 Inductors, transformers and coils 50
11.1 Reference conditions 50
11.2 Specific stress ~~factors~~ models 50
11.2.1 ~~Models~~ General 50
11.2.2 Temperature dependence, factor π_T 50
12 Microwave devices 51
12.1 Specific reference conditions 51
12.2 Specific stress ~~factors~~ models 52
13 Other passive components 52
13.1 Specific reference conditions 52
13.2 Specific stress ~~factors~~ models 52
14 Electrical connections 52
14.1 Specific reference conditions 52
14.2 Specific stress ~~factors~~ models 53
15 Connectors and sockets 53
15.1 Reference conditions 53
15.2 Specific stress ~~factors~~ models 53
16 Relays 53
16.1 Reference conditions 53
16.2 Specific stress ~~factors~~ models 54
16.2.1 ~~Models~~ General 54
16.2.2 Dependence on switching rate, factor π_S 54
16.2.3 Dependence on electrical stress, factor π_{ES} 55
16.2.4 Temperature dependence, factor π_T 56
17 Switches and push-buttons 56
17.1 Specific reference conditions 56
17.2 Specific stress ~~factors~~ models 57
17.2.1 ~~Models~~ General 57

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

17.2.2 Dependence on electrical stress, factor π_{ES} 57
18 Signal and pilot lamps 58
18.1 Specific reference conditions 58
18.2 Specific stress ~~factors~~ models 58
18.2.1 ~~Models~~ General 58
18.2.2 Voltage dependence, factor π_U 59
19 Printed circuit boards (PCB) 59
20 Hybrid circuits 59
Annex A (normative) Failure modes of components 60
Annex B (informative) Thermal model for semiconductors 63
B.1 Thermal model 63
B.2 Junction temperature calculation 64
B.3 Thermal resistance evaluation 65
B.4 Power dissipation of an integrated circuit P 66
Annex C (informative) Failure rate prediction 69
C.1 General 69
C.2 Failure rate prediction for assemblies 69
C.2.1 General 69
C.2.2 Assumptions and limitations 70
C.2.3 Process for failure rate prediction 70
C.2.4 Prediction models 71
~~C.2.5 Consideration of operating profiles .....~~
C.2.5 Other methods of reliability prediction 75
C.2.6 Validity considerations of reliability models and predictions 76
C.3 Component considerations 76
C.3.1 Component model 76
C.3.2 Components classification 76
C.4 General consideration about failure rate 77
C.4.1 General 77
C.4.2 General behaviour of the failure rate of components 77
C.4.3 Expected values of failure rate 78
C.4.4 Sources of variation in failure rates 79
Annex D (informative) Considerations on mission profile 80
D.1 General 80
D.2 Dormancy 80
D.3 Mission profile 81
D.4 Example of mission profile 82
Annex E (informative) Useful life models 83
E.1 General 83
E.2 Power transistors 83
E.3 Optocouplers 83
E.3.1 Useful life L 83
E.3.2 Factor L_0 84
E.3.3 Factor κ_0 84
E.3.4 Factor κ_1 85
E.3.5 Factor κ_2 85
E.3.6 Factor κ_3 85

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

E.4 LED and LED modules ... 86
E.4.1 Useful life L ... 86
E.4.2 Factor L_0 ... 86
E.4.3 Factor κ_0 ... 87
E.4.4 Factor κ_1 ... 87
E.4.5 Factor κ_2 ... 88
E.4.6 Factor κ_3 ... 88
E.5 Aluminium, non-solid electrolyte capacitors ... 88
E.6 Relays ... 89
E.7 Switches and keyboards ... 89
E.8 Connectors ... 89
Annex F (informative) Physics of failure ... 90
F.1 General ... 90
F.2 Failure mechanisms of integrated circuits ... 91
Annex G (informative) Considerations for the design of a data base on failure rates ... 92
G.1 General ... 92
G.2 Data collection acquisition – collection process ... 92
G.3 Which data to collect and how to collect it ... 92
G.4 Calculation and decision making ... 93
G.5 Data descriptions ... 93
G.6 Identification of components ... 94
G.6.1 General ... 94
G.6.2 Component identification ... 94
G.6.3 Component technology ... 94
G.7 Specification of components ... 94
G.7.1 General ... 94
G.7.2 Electrical specification of components ... 94
G.7.3 Environmental specification of components ... 95
G.8 Field related issues data ... 95
G.8.1 General ... 95
G.8.2 Actual field conditions ... 95
G.8.3 Data on field failures ... 95
G.9 Test related issues data ... 96
G.9.1 General ... 96
G.9.2 Actual test conditions ... 96
G.9.3 Data on test failures ... 96
G.10 Failure rate database attributes ... 97
Annex H (informative) Potential sources of failure rate data and methods of selection ... 99
H.1 General ... 99
H.2 Data source selection ... 99
H.3 User data ... 100
H.4 Manufacturer's data ... 100
H.5 Handbook reliability data ... 101
H.5.1 General ... 101
H.5.2 Using handbook data with this document ... 101
H.5.3 List of available handbooks ... 102
Annex I (informative) Overview of component classification ... 105
I.1 General ... 105

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

I.2 The IEC 61360 system ... 105
I.3 Other systems ... 113
I.3.1 General ... 113
I.3.2 NATO stock numbers ... 113
I.3.3 UNSPSC codes ... 113
I.3.4 STEP/EXPRESS ... 113
I.3.5 IECQ ... 113
I.3.6 ECALS ... 114
I.3.7 ISO 13584 ... 114
I.3.8 MIL specifications ... 114
Annex J (informative) Presentation of component reliability data ... 115
J.1 General ... 115
J.2 Identification of components ... 115
J.2.1 General ... 115
J.2.2 Component identification ... 116
J.2.3 Component technology ... 116
J.3 Specification of components ... 116
J.3.1 General ... 116
J.3.2 Electrical specification of components ... 116
J.3.3 Environmental specification of components ... 116
J.4 Test related issues data ... 116
J.4.1 General ... 116
J.4.2 Actual test conditions ... 117
J.5 Data on test failures ... 117
Annex K (informative) Examples ... 119
K.1 Integrated circuit ... 119
K.2 Transistor ... 119
K.3 Capacitor ... 119
K.4 Relay ... 120
Bibliography ... 121

Figure 1 – Comparison of the temperature dependence of π_T for CMOS IC ... 25
Figure 2 – Selection of stress regions in accordance with current and voltage-operating conditions ... 55
Figure 3 – Selection of stress regions in accordance with current and voltage-operating conditions ... 57
~~Figure B.1 – Stress profile ...~~
Figure B.1 – Temperatures inside equipment ... 64
~~Figure B.2 – Averaging failure rates ...~~
Figure B.2 – Thermal resistance model ... 65
Figure D.1 – Mission profile ... 82

Table 1 – Basic environments ... 21
Table 2 – Values of environmental parameters for basic environments ... 22
Table 3 – Recommended reference conditions for environmental and mechanical stresses ... 26
Table 4 – Environmental application factor, π_E ... 29

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

Table 5 – Memory ... 31
Table 6 – Microprocessors and peripherals, microcontrollers and signal processors ... 31
Table 7 – Digital logic families and bus interfaces, bus driver and receiver circuits ... 31
Table 8 – Analog ICs ... 32
Table 9 – Application-specific ICs (ASICs) ... 32
Table 10 – Constants for voltage dependence ... 33
Table 11 – Factor π_U for digital CMOS-family ICs ... 33
Table 12 – Factor π_U for bipolar analog ICs ... 33
Table 13 – Constants for temperature dependence ... 33
Table 14 – Factor π_T for ICs (without EPROM; FLASH-EPROM; OTPROM; EEPROM; EAROM) ... 35
Table 15 – Factor π_T for EPROM; FLASH-EPROM; OTPROM; EEPROM; EAROM ... 35
Table 16 – Transistors common, low frequency ... 36
Table 17 – Transistors, microwave, (e.g. RF > 800 MHz) ... 36
Table 18 – Diodes ... 37
Table 19 – Power semiconductors ... 37
Table 20 – Constants for voltage dependence of transistors ... 38
Table 21 – Factor π_U for transistors ... 38
Table 22 – Constants for temperature dependence of discrete semiconductors ... 38
Table 23 – Factor π_T for transistors, reference and microwave diodes ... 39
Table 24 – Factor π_T for diodes (without reference and microwave diodes) and power semiconductors ... 39
Table 25 – Optoelectronic semiconductor signal receivers ... 40
Table 26 – LEDs, IREDs, laser diodes and transmitter components ... 40
Table 27 – Optocouplers and light barriers ... 41
Table 28 – Passive optical components ... 41
Table 29 – Transceiver, transponder and optical sub-equipment ... 41
Table 30 – Constants for voltage dependence of phototransistors ... 42
Table 31 – Factor π_U for phototransistors ... 42
Table 32 – Constants for current dependence of LEDs and IREDs ... 43
Table 33 – Factor π_I for LEDs and IREDs ... 43
Table 34 – Constants for temperature dependence of optoelectronic components ... 43
Table 35 – Factor π_T for optical components ... 44
Table 36 – Capacitors ... 45
Table 37 – Constants for voltage dependence of capacitors ... 46
Table 38 – Factor π_U for capacitors ... 46
Table 39 – Constants for temperature dependence of capacitors ... 47
Table 40 – Factor π_T for capacitors ... 48
Table 41 – Resistors and resistor networks ... 49
Table 42 – Constants for temperature dependence of resistors ... 49
Table 43 – Factor π_T for resistors ... 50

IEC 61709 Ed. 3.0 RLV - Preview only Copy via ILNAS e-Shop

Table 44 – Inductors, transformers and coils 50
Table 45 – Constants for temperature dependence of inductors, transformers and coils 50
Table 46 – Factor π_T for inductors, transformers and coils 51
Table 47 – Microwave devices 51
Table 48 – Other passive components 52
Table 49 – Electrical connections 53
Table 50 – Connectors and sockets 53
Table 51 – Relays 54
Table 52 – Factor π_{ES} for low current relays 55
Table 53 – Factor π_{ES} for general purpose relays 55
Table 54 – Factor π_{ES} for automotive relays 56
Table 55 – Constants for temperature dependence of relays 56
Table 56 – Factor π_T for relays 56
Table 57 – Switches and push-buttons 57
Table 58 – Factor π_{ES} for switches and push-buttons for low electrical stress 58
Table 59 – Factor π_{ES} for switches and push-buttons for higher electrical stress 58
Table 60 – Signal and pilot lamps 58
Table 61 – Factor π_U for signal and pilot lamps 59
Table A.1 – Failure modes: ICs (digital) 60
Table A.2 – Failure modes: transistors, diodes, optocouplers 61
Table A.3 – Failure modes: LEDs 61
Table A.4 – Failure modes: laser diodes and modules 61
Table A.5 – Failure modes: photodiodes and receiver modules 61
Table A.6 – Failure modes: capacitors 62
Table A.7 – Failure modes: Resistors, inductive devices, relays 62
Table B.1 – Thermal resistance as a function of package type, pin number and airflow factor 66
Table B.2 – Typical values of v are K 66
Table B.3 – Values of P_{DC} and P_f 67
Table E.1 – Useful life limitations for switches and keyboards 89
Table F.1 – Failure mechanism for Integrated circuits 91
Table G.1 – Reliability prediction database attributes 98
Table H.1 – Result of calculation for transistors common, low frequency 102
Table H.2 – Sources of reliability data (in alphabetical order) 102
Table I.1 – Classification tree (IEC 61360-4) 106

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ELECTRIC COMPONENTS – RELIABILITY – REFERENCE CONDITIONS FOR FAILURE RATES AND STRESS MODELS FOR CONVERSION

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International Standard IEC 61709 has been prepared by IEC technical committee 56: Dependability.

This third edition cancels and replaces the second edition, published in 2011. This edition constitutes a technical revision. This third edition is a merger of IEC 61709:2011 and IEC TR 62380:2004.

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

a) addition of 4.5 Components choice, 4.6 Reliability growth during the deployment phase of new equipment, 4.7 How to use this document, and of Clause 19 Printed circuit boards (PCB) and Clause 20 Hybrid circuits with respect to IEC TR 62380;
b) addition of failure modes of components in Annex A;
c) modification of Annex B, Thermal model for semiconductors, adopted and revised from IEC TR 62380;
d) modification of Annex D, Considerations on mission profile;
e) modification of Annex E, Useful life models, adopted and revised from IEC TR 62380;
f) revision of Annex F (former B.2.6.4), Physics of failure;
g) addition of Annex G (former Annex C), Considerations for the design of a data base on failure rates, complemented with parts of IEC 60319;
h) addition of Annex H, Potential sources of failure rate data and methods of selection;
i) addition of Annex J, Presentation of component reliability data, based on IEC 60319.

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

FDIS	Report on voting
56/1714/FDIS	56/1721/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.

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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

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- withdrawn,
- replaced by a revised edition, or
- amended.

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INTRODUCTION

This document is intended for the reliability prediction of electric components as used in equipment and is aimed at organizations that have their own data and describes how to state and use that data in order to perform reliability predictions.

It can also be used to allow an organization to set up a failure rate database and describes the reference conditions for which field failure rates should be stated. The reference conditions adopted in this document are typical of the majority of applications of components in equipment however when components operate under other conditions the users may consider stating these conditions as their reference conditions.

Using the presented stress models allows extrapolation of failure rates from reference conditions to other operating conditions which in turn permits the prediction of failure rates at assembly level. This allows estimation of the effect of design changes or changes in the environmental conditions on component reliability. Reliability prediction is most useful in the early design phase of ~~electrical~~ equipment. It can be used, for example, to identify potential reliability problems, the planning of logistic support strategies and the evaluation of designs.

The stress models contained herein are generic and are as simple as possible while still being comparable with more complex equations contained in other models. The predictions generated using this document have a wide range of prediction accuracy.

This document does not contain failure rates, but it describes how they can be stated and used. This approach allows a user to select the most relevant and up to date failure rates for the prediction from a source that they select. This document also contains information on how to select the data that can be used in the presented models.

The failure rates considered in this document are assumed to be constant, either for an unlimited period of operation (general case) or for limited periods. The limitation of life is called useful life and applies only for some few component families, reaching the wear-out failure period (during which the failure rate is increasing) within the normal period of use. It is hence assumed that during useful life, the failure rate can be considered constant for any practical use.

For the purposes of this document the term electric component includes the commonly used terms “electronic component”, “electrical component” and “electro-mechanical component”.

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