Irish Standard
I.S. EN 60749-43:2017

Semiconductor devices - Mechanical and climatic test methods - Part 43: Guidelines for IC reliability qualification plans

I.S. EN 60749-43:2017

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National Foreword

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EUROPEAN STANDARD

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September 2017

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English Version

Semiconductor devices - Mechanical and climatic test methods - Part 43: Guidelines for IC reliability qualification plans (IEC 60749-43:2017)

Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques - Partie 43: Lignes directrices concernant les plans de qualification de la fiabilité des CI (IEC 60749-43:2017)

Halbleiterbauelemente - Mechanische und klimatische Prüfverfahren - Teil 43: Leitfaden Pläne zur Zuverlässigkeitsqualifikation von integrierten Schaltungen (IEC 60749-43:2017)

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European foreword

The text of document 47/2389/FDIS, future edition 1 of IEC 60749-43, prepared by IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN 60749-43:2017.

The following dates are fixed:

• latest date by which the document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2018-04-20
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IEC 60068-2-1	NOTE	Harmonized as EN 60068-2-1.
IEC 60068-2-30	NOTE	Harmonized as EN 60068-2-30.
IEC 60749-11	NOTE	Harmonized as EN 60749-11.

Annexe ZA
(normative)
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Les documents suivants, en tout ou en partie, sont référencés normativement dans le présent document et sont indispensables pour son application. Pour les références datées, seule l'édition citée s'applique. Pour les références non-datées, la dernière édition du document référencé (y compris les amendements) s'applique.

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Publication	Année	Titre	EN/HD	Année
IEC 60749-5	-	Semiconductor devices - Mechanical and climatic test methods - Part 5: Steady-state temperature humidity bias life test	EN 60749-5	-
IEC 60749-6	-	Semiconductor devices - Mechanical and climatic test methods - Part 6: Storage at high temperature	EN 60749-6	-
IEC 60749-15	-	Dispositifs a semiconducteurs - Méthodes d¿essais mécaniques et climatiques -- Partie 15: Résistance à la température de soudage pour dispositifs par trous traversants	EN 60749-15	-
IEC 60749-20	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 20: Résistance des CMS à boîtiers plastique à l'effet combiné de l'humidité et de la chaleur de brasage	EN 60749-20	-
IEC 60749-21	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 21: Brasabilité	EN 60749-21	-
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IEC 60749-25	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 25: Cycles de température	EN 60749-25	-
IEC 60749-26	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 26: Essai de sensibilité aux décharges électrostatiques (DES) - Modèle du corps humain (HBM)	EN 60749-26	-
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IEC 60749-29	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 29: Essai de verrouillage	EN 60749-29	-
IEC 60749-42	-	Semiconductor devices - Mechanical and climatic test methods -- Part 42: Temperature humidity storage	EN 60749-42	-

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IEC 60749-43

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Semiconductor devices – Mechanical and climatic test methods – Part 43: Guidelines for IC reliability qualification plans

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 43: Lignes directrices concernant les plans de qualification de la fiabilité des CI

IEC 60749-43:2017-06(en-fr)

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Semiconductor devices – Mechanical and climatic test methods – Part 43: Guidelines for IC reliability qualification plans

Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 43: Lignes directrices concernant les plans de qualification de la fiabilité des CI

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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CONTENTS

FOREWORD 4
INTRODUCTION 6
1 Scope 7
2 Normative references 7
3 Terms and definitions 8
4 Product categories and applications 8
5 Failure 9
5.1 Failure distribution 9
5.2 Early failure 10
5.2.1 Description 10
5.2.2 Early failure rate 11
5.2.3 Screening 14
5.3 Random failure 17
5.3.1 Description 17
5.3.2 Mean failure rate 17
5.4 Wear-out failure 20
5.4.1 Description 20
5.4.2 Wear-out failure rate 20
6 Reliability test 23
6.1 Reliability test description 23
6.2 Reliability test plan 23
6.2.1 Procedures for creating a reliability test plan 23
6.2.2 Estimation of the test time required to confirm the TDDB from the number of test samples 26
6.2.3 Estimation of the number of samples required to confirm the TDDB from the test time 27
6.3 Reliability test methods 28
6.4 Acceleration models for reliability tests 31
6.4.1 Arrhenius model 31
6.4.2 V-model: 32
6.4.3 Absolute water vapor pressure model 32
6.4.4 Coffin-Manson model 32
7 Stress test methods 32
8 Supplementary tests 33
9 Summary table of assumptions 34
10 Summary 36
Bibliography 37

Figure 1 – Bathtub curve 10
Figure 2 – Failure process of IC manufacturing lots during the early failure period 11
Figure 3 – Weibull conceptual diagram of the early failure rate 12
Figure 4 – Example of a failure ratio: α (in hundreds) and the number of failures for CL of 60 % 14
Figure 5 – Screening and estimated early fail rate in Weibull diagram 15
Figure 6 – Bathtub curve setting the point immediately after production as the origin 16

Figure 7 – Bathtub curve setting the point after screening as the origin 17
Figure 8 – Conceptual diagram of calculation method for the mean failure rate from the exponential distribution 18
Figure 9 – Conceptual diagram of calculation method for the mean failure rate as an extension of early failure 19
Figure 10 – Conceptual diagram of the wear-out failure 21
Figure 11 – Conceptual diagram describing the concept of the acceleration test 21
Figure 12 – Concept of the reliability test in a Weibull diagram (based on sample size) 25
Figure 13 – Concept of the reliability test in a Weibull diagram (based on test time) 28
Figure 14 – Difference in sampling sizes according to the m value (image) 29

Table 1 – Examples of product categories 9
Table 2 – Cumulative failure probability 0,1 % over 10 years [$\times 10^{-6}$] for the third, fifth and seventh years 25
Table 3 – Major reliability (life) test methods and purposes 30
Table 4 – Examples of the number of test samples and the test time in typical reliability (life) test methods 31
Table 5 – LTPD sampling table for acceptance number Ac = 0 33
Table 6 – Major reliability (strength) test methods and purposes 33
Table 7 – Supplementary tests 34
Table 8 – Accelerating factors, calculation formulae and numerical values[a] 35

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 43: Guidelines for IC reliability qualification plans

FOREWORD

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International Standard IEC 60749-43 has been prepared by IEC technical committee 47: Semiconductor devices.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
47/2389/FDIS	47/2406/RVD

Full information on the voting for the approval of this International Standard 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 60749 series, published under the general title *Semiconductor devices – Mechanical and climatic test methods*, 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

This document provides guidelines for semiconductor IC vendors in the preparation of detailed reliability test plans for device qualification. Such plans are intended to be prepared before commencing qualification tests and after consultation with the user of their semiconductor integrated circuit product.

The guideline gives some examples for creating reliability qualification test plans to determine appropriate reliability test conditions based on the quality standards demanded in use conditions for each application of semiconductor integrated circuits. Categories are set for automotive applications and for general applications as a target of reliability. The grade for automotive use is further classified into two grades according to applications. The guideline assumes annual operating hours, useful life, etc. for each grade, and defines the verification methods for early failure rate and wear-out failure to propose appropriate reliability tests, and at the same time, presents concepts to properly ensure the quality of semiconductor integrated circuits using screening techniques which are designed to reduce the early failure rate.

Note that the test conditions and the values of acceleration factors presented in this guideline are shown to provide examples of calculations for obtaining reliability test conditions in order to verify the required quality standards, and are not designed to define the standards to ensure reliability of semiconductor integrated circuits.

NOTE Qualification tests are tests in which the semiconductor vendor takes account of the reliability required by its product users.

SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS

Part 43: Guidelines for IC reliability qualification plans

1 Scope

This part of IEC 60749 gives guidelines for reliability qualification plans of semiconductor integrated circuit products (ICs). This document is not intended for military- and space-related applications.

NOTE 1 The manufacturer can use flexible sample sizes to reduce cost and maintain reasonable reliability by this guideline adaptation based on EDR-4708, AEC Q100, JESD47 or other relevant document can also be applicable if it is specified.

NOTE 2 The Weibull distribution method used in this document is one of several methods to calculate the appropriate sample size and test conditions of a given reliability project.

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 60749-5, *Semiconductor devices – Mechanical and climatic test methods – Part 5: Steady-state temperature humidity bias life test*

IEC 60749-6, *Semiconductor devices – Mechanical and climatic test methods – Part 6: Storage at high temperature*

IEC 60749-15, *Semiconductor devices – Mechanical and climatic test methods – Part 15: Resistance to soldering temperature for through-hole mounted devices*

IEC 60749-20, *Semiconductor devices – Mechanical and climatic test methods – Part 20: Resistance of plastic encapsulated SMDs to the combined effect of moisture and soldering heat*

IEC 60749-21, *Semiconductor devices – Mechanical and climatic test methods – Part 21: Solderability*

IEC 60749-23, *Semiconductor devices – Mechanical and climatic test methods – Part 23: High temperature operating life*

IEC 60749-25, *Semiconductor devices – Mechanical and climatic test methods – Part 25: Temperature cycling*

IEC 60749-26, *Semiconductor devices – Mechanical and climatic test methods – Part 26: Electrostatic discharge (ESD) sensitivity testing – Human body model (HBM)*

IEC 60749-28, *Semiconductor devices – Mechanical and climatic test methods – Part 28: Electrostatic discharge (ESD) sensitivity testing – Charged device model (CDM) – Device level*