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

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 12/17

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EUROPEAN STANDARD

EN 60749-43

NORME EUROPÉENNE

EUROPÄISCHE NORM

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.

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- 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
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2020-07-20

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

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)

Références normatives à d'autres publications internationales avec les publications européennes correspondantes

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.

NOTE 1 Dans le cas où une publication internationale est modifiée par des modifications communes, indiqué par (mod), l'EN/le HD correspondant(e) s'applique.

NOTE 2 Les informations les plus récentes concernant les dernières versions des Normes Européennes listées dans la présente annexe sont disponibles à l'adresse suivante: www.cenelec.eu.

<u>Publication</u>	<u>Année</u>	<u>Titre</u>	<u>EN/HD</u>	<u>Année</u>
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 à 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	-
IEC 60749-23	-	Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques -- Partie 23: Durée de vie en fonctionnement à haute température	EN 60749-23	-
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	-
IEC 60749-28	-	Dispositifs à semiconducteurs - Méthodes d'essai mécaniques et climatiques - Partie 28: Essai de sensibilité aux décharges électrostatiques (DES) Modèle de dispositif chargé par contact direct (DC-CDM)	EN 60749-28	-
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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**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
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INTERNATIONAL STANDARD

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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**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES –
MECHANICAL AND CLIMATIC TEST METHODS –

Part 43: Guidelines for IC reliability qualification plans

FOREWORD

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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*

IEC 60749-29, *Semiconductor devices – Mechanical and climatic test methods – Part 29: Latch-up test*

IEC 60749-42, *Semiconductor devices – Mechanical and climatic test methods – Part 42: Temperature and humidity storage*

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