Semiconductor devices - Mechanical and climatic test methods - Part 37: Board level drop test method using an accelerometer

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN IEC 60749-37:2022 sisaldab Euroopa standardi EN IEC 60749-37:2022 ingliskeelset teksti.	This Estonian standard EVS-EN IEC 60749-37:2022 consists of the English text of the European standard EN IEC 60749-37:2022.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 18.11.2022.	Date of Availability of the European standard is 18.11.2022.
Standard on kättesaadav Eesti Standardimis-ja Akrediteerimiskeskusest.	The standard is available from the Estonian Centre for Standardisation and Accreditation.

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ICS 31.080.01

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN IEC 60749-37

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Semiconductor devices - Mechanical and climatic test methods - Part 37: Board level drop test method using an accelerometer (IEC 60749-37:2022)

Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques - Partie 37: Méthode d'essai de chute au niveau de la carte avec utilisation d'un accéléromètre
(IEC 60749-37:2022)

Halbleiterbauelemente - Mechanische und klimatische Prüfverfahren - Teil 37: Prüfverfahren Fall der Leiterplatte unter Verwendung eines Beschleunigungs-Messgerätes
(IEC 60749-37:2022)

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European foreword

The text of document 47/2651/CDV, future edition 2 of IEC 60749-37, prepared by IEC/TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60749-37:2022.

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) 2023-08-16
- latest date by which the national standards conflicting with the document have to be withdrawn (dow) 2025-11-16

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In the official version, for Bibliography, the following note has to be added for the standard indicated:

IEC 60749-40 NOTE Harmonized as EN 60749-40

IEC 60749-37

Edition 2.0 2022-10

INTERNATIONAL STANDARD

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Dispositifs à semiconducteurs – Méthodes d'essais mécaniques et climatiques – Partie 37: Méthode d'essai de chute au niveau de la carte avec utilisation d'un accéléromètre

IEC 60749-37:2022-10(en-fr)

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INTERNATIONAL STANDARD

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

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FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This edition includes the following significant technical changes with respect to the previous edition:

a) correction of a previous technical error concerning test conditions;
b) updates to reflect improvements in technology.

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

Draft	Report on voting
47/2651/CDV	47/2719/RVC

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of the IEC 60749 series, under the general title *Semiconductor devices – Mechanical and climatic test methods*, can be found in 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

- reconfirmed,
- withdrawn,
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- amended.

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INTRODUCTION

Handheld electronic products fit into the consumer and portable market segments. Included in handheld electronic products are cameras, calculators, cell phones, cordless phones, pagers, palm size PCs, personal computer memory card international association (PCMCIA) cards, smart cards, personal digital assistants (PDAs) and other electronic products that can be conveniently stored in a pocket and used while held in user's hand.

These handheld electronic products are more prone to being dropped during their useful service life because of their size and weight. This dropping event can not only cause mechanical failures in the housing of the device but also create electrical failures in the printed circuit board (PCB) assemblies mounted inside the housing due to transfer of energy through PCB supports. The electrical failures sometimes result from various failure modes such as cracking of the circuit board, track cracking on the board, cracking of solder interconnections between the components and the board, and component cracks. The primary driver of these failures is excessive flexing of the circuit board due to input acceleration to the board created from dropping the handheld electronic product. This flexing of the board causes relative motion between the board and the components mounted on it, resulting in component, interconnect or board failures. The failure is a function of the combination of the board design, construction, material, thickness and surface finish; interconnect material and standoff height and component size.

Correlation between test and field conditions is not yet fully established. Consequently, the test procedure is presently more appropriate for relative component performance than for use as a pass/fail criterion. Rather, results can be used to augment existing data or establish a baseline for potential investigative efforts in package/board technologies.

The comparability between different test sites, data acquisition methods, and board manufacturers has not been fully demonstrated by existing data. As a result, if the data are to be used for direct comparison of component performance, matching studies will first be performed to prove that the data are in fact comparable across different test sites and test conditions.

This method is not intended to substitute for full characterization testing, which could incorporate substantially larger sample sizes and increased number of drops. Due to limited sample size and number of drops specified here, it is possible that enough failure data are not generated in every case to perform full statistical analysis.

SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 37: Board level drop test method using an accelerometer

1 Scope

This part of IEC 60749 provides a test method that is intended to evaluate and compare drop performance of surface mount electronic components for handheld electronic product applications in an accelerated test environment, where excessive flexure of a circuit board causes product failure. The purpose is to standardize the test board and test methodology to provide a reproducible assessment of the drop test performance of surface-mounted components while producing the same failure modes normally observed during product level test.

This document aims at prescribing a standardized test method and reporting procedure. This is not a component qualification test and is not meant to replace any system level drop test that is sometimes used to qualify a specific handheld electronic product. The standard is not meant to cover the drop test required to simulate shipping and handling-related shock of electronic components or PCB assemblies. These requirements are already addressed in test methods such as IEC 60749-10. The method is applicable to both area array and perimeter-leaded surface mounted packages.

This test method uses an accelerometer to measure the mechanical shock duration and magnitude applied which is proportional to the stress on a given component mounted on a standard board. The test method described in IEC 60749-40 uses strain gauge to measure the strain and strain rate of a board in the vicinity of a component. The customer specification states which test method is to be used.

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 60749-10:2022, *Semiconductor devices – Mechanical and climatic test methods – Part 10: Mechanical shock – Device and subassembly*

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 60749-20-1, *Semiconductor devices – Mechanical and climatic test methods – Part 20-1: Handling, packing, labelling and shipping of surface-mount devices sensitive to the combined effect of moisture and soldering heat*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses: