
Semiconductor devices - Mechanical and climatic test methods - Part 12:
Vibrations, variable frequency (IEC 60749-12:2002)

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EUROPEAN STANDARD

EN 60749-12

NORME EUROPÉENNE

EUROPÄISCHE NORM

August 2002

ICS 31.080.01

Partly supersedes EN 60749:1999 + A1:2000 + A2:2001

English version

**Semiconductor devices -
Mechanical and climatic test methods
Part 12: Vibration, variable frequency
(IEC 60749-12:2002)**

Dispositifs à semiconducteurs -
Méthodes d'essais mécaniques
et climatiques
Partie 12: Vibrations, fréquences variables
(CEI 60749-12:2002)

Halbleiterbauelemente -
Mechanische und klimatische
Prüfverfahren
Teil 12: Schwingen, variable Frequenz
(IEC 60749-12:2002)

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This European Standard was approved by CENELEC on 2002-07-02. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

CENELEC

European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of document 47/1606/FDIS, future edition 1 of IEC 60749-12, prepared by IEC TC 47, Semiconductor devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60749-12 on 2002-07-02.

This mechanical and climatic test method, as it relates to variable frequency vibration, is a complete rewrite of the test contained in clause 3, chapter 2 of EN 60749:1999.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2003-04-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2005-07-01

Annexes designated "normative" are part of the body of the standard.
In this standard, annex ZA is normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60749-12:2002 was approved by CENELEC as a European Standard without any modification.

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SIST EN 60749-12:2004

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Annex ZA (normative)

Normative references to international publications with their corresponding European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-2-6	1995	Environmental testing		
+ corr. March	1995	Part 2: Tests - Test Fc: Vibration (sinusoidal)	EN 60068-2-6	1995

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**Dispositifs à semiconducteurs –
Méthodes d'essais mécaniques et climatiques –**

**Partie 12:
Vibrations, fréquences variables**

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**Part 12:
Vibration, variable frequency**

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Commission Electrotechnique Internationale
International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**SEMICONDUCTOR DEVICES –
MECHANICAL AND CLIMATIC TEST METHODS –**

Part 12: Vibration, variable frequency

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the 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, the IEC publishes International Standards. 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. The IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of the IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
- 3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.
- 6) Attention is drawn to the possibility that some of the elements of this International Standard may be the subject of patent rights. The IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60749-12 has been prepared by IEC technical committee 47: Semiconductor devices.

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

FDIS	Report on voting
47/1606/FDIS	47/1622/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.

This mechanical and climatic test method, as it relates to variable frequency vibration, is a complete rewrite of the test contained in clause 3, chapter 2 of IEC 60749.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 3.

The committee has decided that the contents of this publication will remain unchanged until 2007. At this date, the publication will be

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

The contents of the corrigendum of August 2003 have been included in this copy.

SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 12: Vibration, variable frequency

1 Scope

This part of IEC 60749 describes a test to determine the effect of variable frequency vibration, within the specified frequency range, on internal structural elements. This is a destructive test. It is normally applicable to cavity-type packages.

In general, this variable frequency vibration test is in conformity with IEC 60068-2-6 but, due to specific requirements of semiconductors, the clauses of this standard apply.

2 Normative references

The following referenced documents are indispensable for the application 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 60068-2-6:1995, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

3 Test apparatus

Apparatus for this test shall include equipment capable of providing the required variable frequency vibration at the specified levels, and the necessary optical and electrical equipment for post-test measurements.

4 Procedure

The device shall be rigidly fastened on the vibration platform and the leads or cables adequately secured to avoid excessive lead resonance. The device shall be vibrated with simple harmonic motion having an amplitude of either 1,5 mm double amplitude (maximum total excursion) or a peak acceleration of 200 m/s², whichever is less. The vibration frequency shall be varied from between 20 Hz and 2 000 Hz. The entire frequency range of 20 Hz to 2 000 Hz and return to 20 Hz shall be traversed in not less than 4 min. This cycle shall be performed four times in each of the orientations X, Y, and Z (total of 12 times).

4.1 Test measurements

Hermeticity tests for hermetic devices, visual examination, and electrical measurements that consist of parametric and functional testing, shall be specified in the applicable procurement document.