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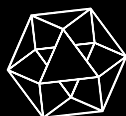

Irish Standard
I.S. EN 60749-19:2003

Semiconductor devices - Mechanical and climatic test methods -- Part 19: Die shear strength (IEC 60749-19:2003 (EQV))

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I.S. EN 60749-19:2003

Incorporating amendments/corrigenda issued since publication:

EN 60749-19:2003/AC:2003
EN 60749-19:2003/A1:2010

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I.S. xxx: Irish Standard – national specification based on the consensus of an expert panel and subject to public consultation.

S.R. xxx: Standard Recommendation - recommendation based on the consensus of an expert panel and subject to public consultation.

SWiFT xxx: A rapidly developed recommendatory document based on the consensus of the participants of an NSAI workshop.

This document replaces:	*This document is based on:* EN 60749-19:2003	*Published:* 17 April, 2003

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60749-19/A1

September 2010

ICS 31.080.01

English version

Semiconductor devices -
Mechanical and climatic test methods -
Part 19: Die shear strength
(IEC 60749-19:2003/A1:2010)

Dispositifs à semiconducteurs -
Méthodes d'essais mécaniques
et climatiques -
Partie 19: Résistance de la pastille
au cisaillement
(CEI 60749-19:2003/A1:2010)

Halbleiterbauelemente -
Mechanische und klimatische
Prüfverfahren -
Teil 19: Prüfung der Chip-Bondfestigkeit
(IEC 60749-19:2003/A1:2010)

This amendment A1 modifies the European Standard EN 60749-19:2003; it was approved by CENELEC on 2010-09-01. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this amendment 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 amendment 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, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

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

Management Centre: Avenue Marnix 17, B - 1000 Brussels

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Ref. No. EN 60749-19:2003/A1:2010 E

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Foreword

The text of document 47/2016/CDV, future amendment 1 to IEC 60749-19:2003, prepared by IEC TC 47, Semiconductor devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60749-19:2003 on 2010-09-01.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN and CENELEC shall not be held responsible for identifying any or all such patent rights.

The following dates were fixed:

– latest date by which the amendment has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2011-06-01
– latest date by which the national standards conflicting with the amendment have to be withdrawn	(dow)	2013-09-01

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Endorsement notice

The text of amendment 1:2010 to the International Standard IEC 60749-19:2003 was approved by CENELEC as an amendment to the European Standard without any modification.

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FOREWORD

This amendment has been prepared by IEC technical committee 47: Semiconductor devices.

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

CDV	Report on voting
47/2016/CDV	47/2060/RVC

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

The committee has decided that the contents of this amendment and the base 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

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

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1 Scope

Number the existing 'NOTE' as 'NOTE 1' and add the following "NOTE 2" below "NOTE 1":

"NOTE 2 In cavity packages, die shear strength is measured in order to assure the strength of the die attachment within the cavity.

In non-cavity packages, such as plastic encapsulated packages, die bonding is used to prevent die movement until the resin mould is completely cured. Normally, specification of the die shear strength and the minimum adhesion area of die bond after moulding are unnecessary, except in the following circumstances:

– when the die needs to be electrically connected to die pad;

– when heat from the die needs to be diffused through the die bond."

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 60749-19

April 2003

ICS 31.080.01

Incorporates Corrigendum June 2003

English version

Semiconductor devices – Mechanical and climatic test methods Part 19: Die shear strength
(IEC 60749-19:2003)

Dispositifs à semiconducteurs –
Méthodes d'essais mécaniques
et climatiques
Partie 19: Résistance de la pastille
au cisaillement
(CEI 60749-19:2003)

Halbleiterbauelemente –
Mechanische und klimatische
Prüfverfahren
Teil 19: Prüfung der Chip-Bondfestigkeit
(IEC 60749-19:2003)

This European Standard was approved by CENELEC on 2003-04-01. 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.

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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

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Ref. No. EN 60749-19:2003 E

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Foreword

The text of document 47/1664/FDIS, future edition 1 of IEC 60749-19, prepared by IEC TC 47, Semiconductor devices, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60749-19 on 2003-04-01.

This mechanical and climatic test method, as it relates to die shear strength, is a complete rewrite of the test contained in Clause 7, 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) 2004-01-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-04-01

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

Endorsement notice

The text of the International Standard IEC 60749-19:2003 was approved by CENELEC as a European Standard without any modification.

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

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DISPOSITIFS À SEMICONDUCTEURS – MÉTHODES D'ESSAIS MÉCANIQUES ET CLIMATIQUES –

Partie 19: Résistance de la pastille au cisaillement

AVANT-PROPOS

1) La CEI (Commission Electrotechnique Internationale) est une organisation mondiale de normalisation composée de l'ensemble des comités électrotechniques nationaux (Comités nationaux de la CEI). La CEI a pour objet de favoriser la coopération internationale pour toutes les questions de normalisation dans les domaines de l'électricité et de l'électronique. A cet effet, la CEI, entre autres activités, publie des Normes internationales. Leur élaboration est confiée à des comités d'études, aux travaux desquels tout Comité national intéressé par le sujet traité peut participer. Les organisations internationales, gouvernementales et non gouvernementales, en liaison avec la CEI, participent également aux travaux. La CEI collabore étroitement avec l'Organisation Internationale de Normalisation (ISO), selon des conditions fixées par accord entre les deux organisations.
2) Les décisions ou accords officiels de la CEI concernant les questions techniques représentent, dans la mesure du possible un accord international sur les sujets étudiés, étant donné que les Comités nationaux intéressés sont représentés dans chaque comité d'études.
3) Les documents produits se présentent sous la forme de recommandations internationales. Ils sont publiés comme normes, spécifications techniques, rapports techniques ou guides et agréés comme tels par les Comités nationaux.
4) Dans le but d'encourager l'unification internationale, les Comités nationaux de la CEI s'engagent à appliquer de façon transparente, dans toute la mesure possible, les Normes internationales de la CEI dans leurs normes nationales et régionales. Toute divergence entre la norme de la CEI et la norme nationale ou régionale correspondante doit être indiquée en termes clairs dans cette dernière.
5) La CEI n'a fixé aucune procédure concernant le marquage comme indication d'approbation et sa responsabilité n'est pas engagée quand un matériel est déclaré conforme à l'une de ses normes.
6) L'attention est attirée sur le fait que certains des éléments de la présente Norme internationale peuvent faire l'objet de droits de propriété intellectuelle ou de droits analogues. La CEI ne saurait être tenue pour responsable de ne pas avoir identifié de tels droits de propriété et de ne pas avoir signalé leur existence.

La Norme internationale CEI 60749-19 a été établie par le comité d'études 47 de la CEI: Dispositifs à semiconducteurs.

Le texte de cette norme est issu des documents suivants:

FDIS	Rapport de vote
47/1664/FDIS	47/1684/RVD

Le rapport de vote indiqué dans le tableau ci-dessus donne toute information sur le vote ayant abouti à l'approbation de cette norme.

Cette publication a été rédigée selon les directives ISO/CEI, Partie 2.

Cette méthode d'essais mécaniques et climatiques, relative à l'essai de résistance de la pastille au cisaillement, est le résultat de la réécriture complète de l'essai contenu dans l'Article 7, Chapitre 2 de la CEI 60749.

Le comité a décidé que le contenu de cette publication ne sera pas modifié avant 2007. A cette date, la publication sera

- reconduite;
- supprimée;
- remplacée par une édition révisée, ou
- amendée.

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 19: Die shear strength

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 60749-19 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
47/1664/FDIS	47/1684/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 publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

This mechanical and climatic test method, as it relates to die shear strength, is a rewrite of the test method contained in Clause 7, Chapter 2 of IEC 60749.

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.

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DISPOSITIFS À SEMICONDUCTEURS – MÉTHODES D'ESSAIS MÉCANIQUES ET CLIMATIQUES –

Partie 19: Résistance de la pastille au cisaillement

1 Domaine d'application

La présente partie de la CEI 60749 détermine (voir note) la cohérence des matériaux et des méthodes d'essais utilisées pour fixer les pastilles à semiconducteurs aux embases de boîtiers ou autres substrats (le terme «pastille à semiconducteurs» doit être considéré comme incluant les éléments passifs pour cette méthode d'essais).

Cette méthode d'essai est généralement applicable aux seuls boîtiers à cavité ou comme moniteur de processus. Elle n'est pas applicable aux surfaces de pastilles supérieures à 10 mm^2. Elle n'est également pas applicable aux pastilles à surépaisseur ni aux substrats flexibles.

NOTE Cette détermination est fondée sur une mesure de la force appliquée à la pastille ou à l'élément et, si une défaillance apparaît, sur le type de défaillance résultant de l'application de cette force ainsi que l'aspect visuel de ce qui reste du matériau de fixation de la pastille et de la métallisation de l'embase ou du substrat.

2 Description de l'appareillage d'essai

L'appareillage utilisé pour cet essai doit comprendre un dispositif d'application de la charge opérant par un mouvement rectiligne ou à l'aide d'un dynamomètre circulaire à levier. Cet appareillage doit en outre posséder:

a) un outil de contact qui applique une charge uniforme sur le côté de la pastille, perpendiculairement au plan de montage de celle-ci sur le boîtier ou le substrat (voir Figure 3). Un matériau souple solidaire de l'outil de contact peut être utilisé pour assurer une application uniforme de la charge (voir Figure 1);
b) une précision de 5 % de la pleine échelle ou de ±0,5 N, en choisissant la plus élevée des deux tolérances;
c) un moyen d'indication de la charge appliquée;
d) une installation équipée d'une source lumineuse adaptée, permettant l'observation visuelle (par exemple avec un grossissement de 10×) de la pastille et de l'outil de contact au cours des essais;
e) une fixation possédant un dispositif capable d'opérer une rotation par rapport à l'outil de contact et à la fixation maintenant le boîtier ou le substrat pour permettre le contact de l'outil tout le long du bord de la pastille (voir Figure 2).

NOTE Beaucoup d'équipements de mesure sont gradués en kilogramme-force (kgf) (1 kgf = 9,8 N).

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SEMICONDUCTOR DEVICES – MECHANICAL AND CLIMATIC TEST METHODS –

Part 19: Die shear strength

1 Scope

This part of IEC 60749 determines (see note) the integrity of materials and procedures used to attach semiconductor die to package headers or other substrates (for the purpose of this test method, the term “semiconductor die” should be taken to include passive elements).

This test method is generally only applicable to cavity packages or as a process monitor. It is not applicable for die areas greater than 10 mm^2. It is also not applicable to flip chip technology or to flexible substrates.

NOTE This determination is based on a measure of the force applied to the die or to the element, and, if a failure occurs, the type of failure resulting from the application of force and the visual appearance of the residual die attach medium and the header/substrate metallization.

2 Description of the test apparatus

The apparatus for this test shall consist of a load applying instrument in the form of a linear motion force-applying instrument or a circular dynamometer with a lever arm. In addition it shall have the following:

a) a contact tool which applies a uniform load to the edge of the die, perpendicular to the die mounting plane of the package or substrate (see Figure 3). A compliant material on the contact tool may be used to ensure that the load is applied uniformly (see Figure 1);
b) an accuracy of 5 % of full scale or ±0,5 N, whichever is the greater tolerance;
c) a means of indicating the load applied;
d) a facility, fitted with suitable light source, to allow visual observation (e.g. at 10× magnification) of the die and contact tool during testing;
e) a fixture with rotational capability relative to the die contact tool and package/substrate holding fixture to allow line contact of the tool along the whole edge of the die from end to end (see Figure 2).

NOTE Many measuring equipments are graduated in kilogram-force (kgf) (1 kgf = 9,8 N).

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