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STN	**Polovodičové súčiastky Mechanické a klimatické skúšobné metódy Časť 22-1: Pevnosť spojenia Skúšobné metódy ťahom drôteného spoja**	**STN EN IEC 60749-22-1 35 8799**

Semiconductor devices - Mechanical and climatic test methods - Part 22-1: Bond strength - Wire bond pull test methods

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. 03/26

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English Version

Semiconductor devices - Mechanical and climatic test methods - Part 22-1: Bond strength - Wire bond pull test methods (IEC 60749-22-1:2025)

Dispositifs à semiconducteurs - Méthodes d'essais mécaniques et climatiques - Partie 22-1: Robustesse des contacts soudés - Méthodes d'essais d'arrachement par traction des contacts soudés par fil (IEC 60749-22-1:2025)

Halbleiterbauelemente - Mechanische und klimatische Prüfverfahren - Teil 22: Kontaktfestigkeit - Drahtbond-Zugprüfverfahren (IEC 60749-22-1:2025)

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

EN IEC 60749-22-1:2026 (E)

European foreword

The text of document 47/2954/FDIS, future edition 1 of IEC 60749-22-1, prepared by TC 47 "Semiconductor devices" was submitted to the IEC-CENELEC parallel vote and approved by CENELEC as EN IEC 60749-22-1:2026.

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) 2027-01-31
• latest date by which the national standards conflicting with the document have to be withdrawn	(dow) 2029-01-31

This document, together with EN IEC 60749-22-2:2026, supersedes EN 60749-22:2003.

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

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Any feedback and questions on this document should be directed to the users' national committee. A complete listing of these bodies can be found on the CENELEC website.

Endorsement notice

The text of the International Standard IEC 60749-22-1:2025 was approved by CENELEC as a European Standard without any modification.

Annex ZA
(normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 Where an International Publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Up-to-date information on the latest versions of the European Standards listed in this annex is available here: www.cencenelec.eu.

Publication	Year	Title	EN/HD	Year
IEC 60749-22-2	-	Semiconductor devices - Mechanical and climatic test methods - Part 22-2: Bond strength - Wire bond shear test methods	-	-

IEC 60749-22-1

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INTERNATIONAL STANDARD

Semiconductor devices - Mechanical and climatic test methods - Part 22-1: Bond strength - wire bond pull test methods

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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Semiconductor devices - Mechanical and climatic test methods - Part 22-1: Bond strength - Wire bond pull test methods

FOREWORD

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IEC 60749-22-1 has been prepared by IEC technical committee 47: Semiconductor devices. It is an International Standard.

This International Standard is to be used in conjunction with IEC 60749-22-2:2025.

This first edition, together with the first edition of IEC 60749-22-2:2025, cancels and replaces the first edition of IEC 60749-22 published in 2002. It is based on JEDEC document JESD22-B120. It is used with permission of the copyright holder, JEDEC Solid State Technology Association.

This edition includes the following significant technical changes with respect to the previous edition:

a) Major update, including new techniques and use of new materials (e.g. copper wire) involving a complete rewrite as two separate subparts (this document and IEC 60749-22-2).

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

Draft	Report on voting
47/2954/FDIS	47/2975/RVD

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/publications.

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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

– reconfirmed,
– withdrawn, or
– revised.

1 Scope

This part of IEC 60749 provides a means for determining the strength and failure mode of a wire bonded to, and the corresponding interconnects on, a die or package bonding surface and can be performed on unencapsulated or decapsulated devices. This test method can be performed on gold alloy, copper alloy, and silver alloy thermosonic (ball and stitch) bonds made of wire ranging in diameter from 15 µm to 76 µm (0,000 6" to 0,003"); and on gold alloy, copper alloy, and aluminium alloy ultrasonic (wedge) bonds made of wire ranging in diameter from 18 µm to 600 µm (0,000 7" to 0,024").

This wire bond pull test method is destructive. It is appropriate for use in process development, process control, or quality assurance.

This test method allows for two distinct methods of pulling wires:

a) One method incorporates the use of a hook that is placed under the wire and is then pulled.
b) One method requires that after the wire be cut, a clamp is placed on the wire connected to the bond to be tested, and this clamp is used to pull the wire.

This test method defines three pull tests. The wire pull test (WPT) is appropriate for all bonded wires. The ball pull test (BPT) and stitch pull test (SPT) are appropriate for thermosonically bonded wires.

This test method can also be used on the following four applications of thermosonic and ultrasonic bonds, though each requires special considerations when performing the test method:

a) Pulling aluminium wires and aluminium ribbons that are bonded with multiple ultrasonic bonds. See 5.3.2.2.2 for special considerations. Multiloop wires and ribbons are used in some high-power device packages.
b) Pulling wires of reverse bonds which are also known as "stitch on ball". These types of bonds can include gold stitch on gold ball, copper stitch on copper ball, and copper stitch on gold ball. See Clause A.1 in Annex A for additional information.
c) Pulling a thermosonically bonded wire that has a security bond (see 3.9) or security loop (see 3.19) placed on top of the stitch bond (see 3.3) in order to provide additional strength. See Clause A.2 for additional information.
d) Pulling thermosonic wire bonds on stacked die when wires or bonds, or both, are not accessible to allow for proper pull testing. See 5.3.2.2.4 for special considerations

This test method does not include bond strength testing using wire bond shear testing. Wire bond shear testing is described in IEC 60749-22-2.

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 60749-22-2, *Semiconductor devices - Mechanical and climatic test methods - Part 22-2: Bond strength testing - Wire bond shear test methods*