



NSAI
Standards

Irish Standard
I.S. EN 60512-26-100:2008

Connectors for electronic equipment -
Tests and measurements -- Part 26
-100: Measurement setup, test and
reference arrangements and
measurements for connectors
according to IEC 60603-7 - Tests 26a to
26g (IEC 60512-26-100:2008 (EQV))

I.S. EN 60512-26-100:2008

Incorporating amendments/corrigenda issued since publication:

EN 60512-26-100:2008/A1:2011

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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.

| | | |
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English version

**Connectors for electronic equipment -
Tests and measurements -
Part 26-100: Measurement setup, test and reference arrangements and
measurements for connectors according to IEC 60603-7 -
Tests 26a to 26g
(IEC 60512-26-100:2008/A1:2011)**

Connecteurs pour équipements
électroniques -
Essais et mesures -
Partie 26-100: Montage de mesure,
dispositifs d'essai et de référence et
mesures pour les connecteurs conformes
à la CEI 60603-7 -
Essais 26a à 26g
(CEI 60512-26-100:2008/A1:2011)

Steckverbinder für elektronische
Einrichtungen -
Mess- und Prüfverfahren -
Teil 26-100: Messaufbau, Prüf- und
Referenzanordnung und Messverfahren
für Steckverbinder nach IEC 60603-7 -
Prüfungen 26a bis 26g
(IEC 60512-26-100:2008/A1:2011)

This amendment A1 modifies the European Standard EN 60512-26-100:2008; it was approved by CENELEC on 2011-04-18. 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

I.S. EN 60512-26-100:2008

EN 60512-26-100:2008/A1:2011

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Foreword

The text of document 48B/2065/CDV, future amendment 1 to IEC 60512-26-100:2008, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as amendment A1 to EN 60512-26-100:2008 on 2011-04-18.

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) 2012-01-18
- latest date by which the national standards conflicting with the amendment have to be withdrawn (dow) 2014-04-18

Endorsement notice

The text of amendment 1:2011 to the International Standard IEC 60512-26-100:2008 was approved by CENELEC as an amendment to the European Standard without any modification.

FOREWORD

This amendment has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

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

| | |
|---------------|------------------|
| FDIS | Report on voting |
| 48B/2065/FDIS | 48B/2149/RVD |

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.

4.5.4.2 Triaxial set-up

Replace the existing third paragraph by the following:

R_1 is the inner circuit terminating load and is chosen to be within $\pm 2\%$ of Z_1 , the inner circuit impedance (see 4.5.4.3.2), utilising one or more standard value resistors.

R_2 is the outer circuit terminating load and is chosen to be within $\pm 2\%$ of the value, utilizing one or more standard value resistors, determined according to

$$R_2 = Z_2 - 50$$

where Z_2 is the outer circuit impedance (see 4.5.4.3.3).

**Connectors for electronic equipment -
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Connecteurs
pour équipements électroniques -
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Steckverbinder
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Teil 26-100: Messaufbau,
Prüf- und Referenzanordnung
und Messverfahren für Steckverbinder
nach IEC 60603-7 -
Prüfungen 26a bis 26g
(IEC 60512-26-100:2008)

This European Standard was approved by CENELEC on 2008-10-01. 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.

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, Bulgaria, 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

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

I.S. EN 60512-26-100:2008

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Foreword

The text of document 48B/1892/FDIS, future edition 1 of IEC 60512-26-100, prepared by SC 48B, Connectors, of IEC TC 48, Electromechanical components and mechanical structures for electronic equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60512-26-100 on 2008-10-01.

This European Standard cancels and replaces the annexes of EN 60603-7-x documents dealing with transmission characteristics for interoperability and backward compatibility.

This standard is to be read in conjunction with EN 60512-1 and EN 60512-1-100 which explains the structure of the EN 60512 series.

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) 2009-07-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2011-10-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60512-26-100:2008 was approved by CENELEC as a European Standard without any modification.

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

- IEC 60068-1 NOTE Harmonized as EN 60068-1:1994 (not modified).
- IEC 60512-25 NOTE Harmonized in EN 60512-25 series (not modified).

Annex ZA (normative)

Normative references to international publications with their corresponding European publications

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.

NOTE 1 When an international publication has been modified by common modifications, indicated by (mod), the relevant EN/HD applies.

NOTE 2 Where a standard cited below belongs to the EN 50000 series, the European Standard applies instead of the relevant International Standard.

| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|--------------------|-----------------|---|----------------|--------------------|
| - | - | Communication cables - Specifications for test methods - Part 1-14: Electrical test methods - Coupling attenuation or screening attenuation of connecting hardware | EN 50289-1-14 | - ¹⁾ |
| IEC 60169-15 | - ¹⁾ | Radio-frequency connectors - Part 15: R.F. coaxial connectors with inner diameter of outer conductor 4,13 mm (0,163 in) with screw coupling - Characteristic impedance 50 ohms (Type SMA) | - | - |
| IEC 60512-1 | - ¹⁾ | Connectors for electronic equipment - Tests and measurements - Part 1: General | EN 60512-1 | 2001 ²⁾ |
| IEC 60512-1-100 | - ¹⁾ | Connectors for electronic equipment - Tests and measurements - Part 1-100: General - Applicable publications | EN 60512-1-100 | 2006 ²⁾ |
| IEC 60603-7 | - ¹⁾ | Connectors for electronic equipment - Part 7: Detail specification for 8-way, unshielded, free and fixed connectors | EN 60603-7 | 200X ³⁾ |
| IEC 60603-7-2 | - ¹⁾ | Connectors for electronic equipment - Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz | EN 60603-7-2 | 200X ³⁾ |
| IEC 60603-7-3 | - ¹⁾ | Connectors for electronic equipment - Part 7-3: Detail specification for 8-way, shielded, free and fixed connectors, for data transmission with frequencies up to 100 MHz | EN 60603-7-3 | 200X ³⁾ |
| IEC 60603-7-4 | 2005 | Connectors for electronic equipment - Part 7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz | EN 60603-7-4 | 2005 |
| IEC 60603-7-5 | 2007 | Connectors for electronic equipment - Part 7-5: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz | EN 60603-7-5 | 200X ³⁾ |

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

³⁾ To be ratified.

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| <u>Publication</u> | <u>Year</u> | <u>Title</u> | <u>EN/HD</u> | <u>Year</u> |
|----------------------------|-----------------|---|---|--------------------|
| IEC 61156 | Series | Multicore and symmetrical pair/quad cables for digital communications | - | - |
| IEC 61169-16 | - ¹⁾ | Radio-frequency connectors - Part 16: Sectional specification - RF coaxial connectors with inner diameter of outer conductor 7 mm (0,276 in) with screw coupling - Characteristics impedance 50 ohms (75 ohms) (type N) | EN 61169-16 | 2007 ²⁾ |
| ISO/IEC 11801 | 2002 | Information technology - Generic cabling for customer premises | EN 50173-1 ⁴⁾ and EN 50173-2 ⁵⁾ | 2007 2007 |
| ITU-T Recommendation G.117 | - ¹⁾ | Transmission aspects of unbalance about earth | - | - |
| ITU-T Recommendation O.9 | - ¹⁾ | Measuring arrangements to assess the degree of unbalance about earth | - | - |

⁴⁾ The title of EN 50173-1 is: *Information technology - Generic cabling systems – Part 1: General requirements.*

⁵⁾ The title of EN 50173-2 is: *Information technology - Generic cabling systems – Part 2: Office premises.*

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CONNECTORS FOR ELECTRONIC EQUIPMENT –
TESTS AND MEASUREMENTS –**

**Part 26-100: Measurement setup, test and reference arrangements and
measurements for connectors according to IEC 60603-7 – Tests 26a to 26g**

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.
- 2) The formal decisions or agreements of 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 IEC National Committees.
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- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

International Standard IEC 60512-26-100 has been prepared by subcommittee 48B: Connectors, of IEC technical committee 48: Electromechanical components and mechanical structures for electronic equipment.

This standard cancels and replaces the Annexes of IEC 60603-7-x documents dealing with transmission characteristics for interoperability and backward compatibility.

This standard is to be read in conjunction with IEC 60512-1 and IEC 60512-1-100 which explains the structure of the IEC 60512 series.

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60512-26-100 © IEC:2008

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

| | |
|---------------|------------------|
| FDIS | Report on voting |
| 48B/1892/FDIS | 48B/1925/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.

A list of all parts of the IEC 60512 series, under the general title *Connectors for electronic equipment – Tests and measurements*, can be found on the IEC website.

The committee has decided that the contents of this publication will remain unchanged until the maintenance result 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.

INTRODUCTION

Detail specifications for 8-way, free and fixed connectors such as IEC 60603-7-4:2005 and IEC 60603-7-5:2007 define measurement setup, test and reference arrangements and measurements for interoperability and backward compatibility tests for connectors according IEC 60603-7 up to 250 MHz for insertion loss (IL), near end crosstalk (NEXT), far end crosstalk (FEXT), return loss (RL) and balance (transverse conversion loss, TCL, and transverse conversion transfer loss, TCTL) as well as the de-embedding method to qualify the fixed (outlet) connector.

This standard keeps the technical content of the test methods specified in the annexes C to J as specified in IEC 60603-7-4:2005 and annexes C to K as specified in IEC 60603-7-5:2007, but it structures and harmonizes the measurements for better readability. This standard is intended to be referenced by the future second editions of IEC 60603-7-x and the future first editions of IEC 60603-7-xy (under preparation). This standard is intended to be referenced by IEC 60603-7-x Edition 2.0 and IEC 60603-7-xy Edition 1.0 standards (under preparation) and may be referenced for all IEC standards with 60603-7 interface.

IEC 60516-26-100: Connectors for electronic equipment – Tests and measurements – Part 26-100, consists of the following clauses:

- Clause 3: General requirements for measurement setup
- Clause 4: Connector measurement up to 250 MHz

NOTE 1 Clauses 3 and 4 define the measurement procedures to qualify the outlet

- Clause 5: Construction and qualification of test plugs

NOTE 2 The wiring of the plug has an effect on the mated connector performance. Extensive measurements show that NEXT and FEXT are affected in a particular way so that the properties of the test plug must be controlled. To ensure adequate performance for the outlet over the expected range of different plug wiring, it shall be tested with a set of up to 12 test plugs with different NEXT performances. The outlet complies with the NEXT requirements of the standard only if all the combinations comply with their requirements for near end crosstalk. FEXT is handled in a similar way, but only one test plug is required. Clause 5 describes the construction and qualification of test plugs. Test plugs are used in the laboratory as long as possible to avoid the costly procedure to find new test plugs.

- Clause 6: Reference jack construction and measurement – the basics of the de-embedding test method

NOTE 3 Clause 6 describes the preparation and measurements of the reference plugs and jacks as a basis of the de-embedding test method.

The test methods provided here are:

- insertion loss, test 26a;
- return loss, test 26b;
- near-end crosstalk (NEXT), test 26c;
- far-end crosstalk (FEXT), test 26d;
- transfer impedance (Z_T), test 26e;
- transverse conversion loss (TCL), test 26f;
- transverse conversion transfer loss (TCTL), test 26g.

For the coupling attenuation, see EN 50289-1-14.

CONNECTORS FOR ELECTRONIC EQUIPMENT – TESTS AND MEASUREMENTS –

Part 26-100: Measurement setup, test and reference arrangements and measurements for connectors according to IEC 60603-7 – Tests 26a to 26g

1 Scope

This part of IEC 60512 specifies the test and measurements and the related measurement setup and reference arrangements for interoperability and backward compatibility tests for the development and qualification of 8-way, free and fixed connectors for data transmission.

2 Normative reference

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 60169-15, *Radio-frequency connectors – Part 15: R.F. coaxial connectors with inner diameter of outer conductor 4.13 mm (0.163 in) with screw coupling – Characteristic impedance 50 ohms (Type SMA)*

IEC 60512-1, *Connectors for electronic equipment – Tests and measurements – Part 1: General*

IEC 60512-1-100, *Connectors for electronic equipment – Tests and measurements – Part 1-100: General – Applicable publications*

IEC 60603-7, *Connectors for frequencies below 3 MHz for use with printed boards – Part 7: Detail specification for connectors, 8-way, including fixed and free connectors with common mating features, with assessed quality*

IEC 60603-7-2, *Connectors for electronic equipment – Part 7-2: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz*

IEC 60603-7-3, *Connectors for electronic equipment – Part 7-3: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 100 MHz*

IEC 60603-7-4:2005, *Connectors for electronic equipment – Part: 7-4: Detail specification for 8-way, unshielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz*

IEC 60603-7-5:2007, *Connectors for electronic equipment – Part: 7-5: Detail specification for 8-way, shielded, free and fixed connectors, for data transmissions with frequencies up to 250 MHz*

IEC 61156 (all parts), *Multicore and symmetrical pair/quad cables for digital communications*

IEC 61169-16, *Radio-frequency connectors – Part 16: RF coaxial connectors with inner diameter of outer conductor 7 mm (0,276 in) with screw coupling – Characteristic impedance 50 ohms (75 ohms) (Type N)*

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