
Irish Standard
I.S. EN 60728-6:2011

# Cable networks for television signals, sound signals and interactive services -- Part 6: Optical equipment (IEC 60728 -6:2011 (EQV))

# I.S. EN 60728-6:2011

*Incorporating amendments/corrigenda issued since publication:*

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


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NSAI
1 Swift Square,
Northwood, Santry
Dublin 9

T +353 1 807 3800
F +353 1 807 3838
E standards@nsai.ie
W NSAI.ie

Sales:
T +353 1 857 6730
F +353 1 857 6729
W standards.ie


Údarás um Chaighdeáin Náisiúnta na hÉireann

**I.S. EN 60728-6:2011**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 60728-6

June 2011

ICS 33.060.40; 33.160.99

Supersedes EN 60728-6:2003

English version

# Cable networks for television signals, sound signals and interactive services - Part 6: Optical equipment

(IEC 60728-6:2011)

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 6: Matériels optiques (CEI 60728-6:2011)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 6: Optische Geräte (IEC 60728-6:2011)

This European Standard was approved by CENELEC on 2011-05-16. 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, 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**



Ref. No. EN 60728-6:2011 E

## Foreword

The text of document 100/1654/CDV, future edition 3 of IEC 60728-6, prepared by technical area 5, Cable networks for television signals, sound signals and interactive services, of IEC TC 100, Audio, video and multimedia systems and equipment, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 60728-6 on 2011-05-16.

This European Standard supersedes EN 60728-6:2003.

EN 60728-6:2011 includes the following significant technical changes with respect to EN 60728-6:2003.

– The normative references were updated.

– The methods of measurement for optical power and return loss were substituted by references to other standards.

– The method of measurement for polarization dependent loss was deleted.

– A method of measurement for carrier-to-crosstalk ratio (CCR) was added.

– The methods of measurement for CSO and CTB of optical amplifiers were substituted by a method of measurement for microscopic gain tilt of optical amplifiers. This parameter can be used for calculating the second order distortion of optical amplifiers according to the method described in the new Annex B.

– New classes for optical transmitters and receivers have been defined.

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 EN has to be implemented at national level by publication of an identical national standard or by endorsement | (dop) | 2012-02-16 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2014-05-16 |

Annex ZA has been added by CENELEC.

## Endorsement notice

The text of the International Standard IEC 60728-6:2011 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 series | NOTE Harmonized in EN 60068 series (not modified). |
| IEC 60068-2-48 | NOTE Harmonized as EN 60068-2-48. |
| IEC 60169-2 | NOTE Harmonized as EN 60169-2. |
| IEC 60728-5 | NOTE Harmonized as EN 60728-5. |

| | | |
|---|---|---|
| IEC 60793-2-50 | NOTE | Harmonized as EN 60793-2-50. |
| IEC 60825-2 | NOTE | Harmonized as EN 60825-2. |
| IEC 61280-2-2 | NOTE | Harmonized as EN 61280-2-2. |
| IEC 61280-4-2 | NOTE | Harmonized as EN 61280-4-2. |
| IEC 61281-1:1999 | NOTE | Harmonized as EN 61281-1:1999 (not modified). |
| IEC 61290-1-1 | NOTE | Harmonized as EN 61290-1-1. |
| IEC 61290-1-2 | NOTE | Harmonized as EN 61290-1-2. |
| IEC 61290-3-1 | NOTE | Harmonized as EN 61290-3-1. |
| IEC 61290-6-1 | NOTE | Harmonized as EN 61290-6-1. |
| IEC 61291-4 | NOTE | Harmonized as EN 61291-4. |

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

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60068-1<br>+ corr. October | 1988<br>1988 | Environmental testing -<br>Part 1: General and guidance | EN 60068-1[1)] | 1994 |
| IEC 60068-2-1 | - | Environmental testing -<br>Part 2-1: Tests - Test A: Cold | EN 60068-2-1 | - |
| IEC 60068-2-2 | - | Environmental testing -<br>Part 2-2: Tests - Test B: Dry heat | EN 60068-2-2 | - |
| IEC 60068-2-6 | 2007 | Environmental testing -<br>Part 2-6: Tests - Test Fc: Vibration (sinusoidal) | EN 60068-2-6 | 2008 |
| IEC 60068-2-14 | - | Environmental testing -<br>Part 2-14: Tests - Test N: Change of temperature | EN 60068-2-14 | - |
| IEC 60068-2-27 | - | Environmental testing -<br>Part 2-27: Tests - Test Ea and guidance: Shock | EN 60068-2-27 | - |
| IEC 60068-2-30 | - | Environmental testing -<br>Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle) | EN 60068-2-30 | - |
| IEC 60068-2-31 | - | Environmental testing -<br>Part 2-31: Tests - Test Ec: Rough handling shocks, primarily for equipment-type specimens | EN 60068-2-31 | - |
| IEC 60068-2-40 | - | Environmental testing -<br>Part 2-40: Tests. Test Z/AM: Combined cold/low air pressure tests | EN 60068-2-40 | - |
| IEC 60169-24 | - | Radio-frequency connectors -<br>Part 24: Radio-frequency coaxial connectors with screw coupling, typically for use in 75 ohm cable distribution systems (Type F) | EN 60169-24 | - |
| IEC 60529 | - | Degrees of protection provided by enclosures (IP Code) | - | - |
| IEC 60728-1 | - | Cable networks for television signals, sound signals and interactive services -<br>Part 1: System performance of forward paths | EN 60728-1 | - |

[1)] EN 60068-1 includes A1 to IEC 60068-1 + corr. October.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 60728-2 | - | Cabled distribution systems for television and sound signals - Part 2: Electromagnetic compatibility for equipment | - | - |
| IEC 60728-3 | 2010 | Cable networks for television signals, sound signals and interactive services - Part 3: Active wideband equipment for cable networks | EN 60728-3 | 2011 |
| IEC 60728-11 | - | Cable networks for television signals, sound signals and interactive services - Part 11: Safety | EN 60728-11 | - |
| IEC 60728-13<br>+ corr. August | 2010<br>2010 | Cable networks for television signals, sound signals and interactive services - Part 13: Optical systems for broadcast signal transmissions | EN 60728-13 | 2010 |
| IEC 60793-2-50 | 2008 | Optical fibres - Part 2-50: Product specifications - Sectional specification for class B single-mode fibres | EN 60793-2-50 | 2008 |
| IEC 60825-1 | - | Safety of laser products - Part 1: Equipment classification and requirements | EN 60825-1 | - |
| IEC 61280-1-1 | - | Fibre optic communication subsystem basic test procedures - Part 1-1: Test procedures for general communication subsystems - Transmitter output optical power measurement for single-mode optical fibre cable | EN 61280-1-1 | - |
| IEC 61280-1-3 | - | Fibre optic communication subsystem test procedures - Part 1-3: General communication subsystems - Central wavelength and spectral width measurement | EN 61280-1-3 | - |
| IEC/TR 61282-4 | - | Fibre optic communication system design guides - Part 4: Accomodation and utilization of non-linear effects | - | - |
| IEC 61290-1 | Series | Optical amplifiers - Test methods - Part 1: Optical power and gain parameters | EN 61290-1 | Series |
| IEC 61290-1-3 | - | Optical amplifiers - Test methods - Part 1-3: Power and gain parameters - Optical power meter method | EN 61290-1-3 | - |
| IEC 61290-3-2 | 2003 | Optical amplifiers - Part 3-2: Test methods for noise figure parameters - Electrical spectrum analyzer method | EN 61290-3-2[2)] | 2003 |
| IEC 61290-5 | Series | Optical amplifiers - Test methods - Part 5: Reflectance | EN 61290-5 | Series |
| IEC 61290-6 | Series | Optical fibre amplifiers - Basic specification - Part 6: Test methods for pump leakage parameters | EN 61290-6 | Series |

[2)] EN 61290-3-2 is superseded by EN 61290-3-2:2008, which is based on IEC 61290-3-2:2008.

| Publication | Year | Title | EN/HD | Year |
|---|---|---|---|---|
| IEC 61290-11 | Series | Optical amplifier - Test methods - Part 11: Polarization mode dispersion parameter | EN 61290-11 | Series |
| IEC 61291-1 | - | Optical amplifiers - Part 1: Generic specification | EN 61291-1 | - |
| IEC 61291-5-2 | - | Optical amplifiers - Part 5-2: Qualification specifications - Reliability qualification for optical fibre amplifiers | EN 61291-5-2 | - |
| IEC 61300-3-6 | - | Fibre optic interconnecting devices and passive components - Basic test and measurement procedures - Part 3-6: Examinations and measurements - Return loss | EN 61300-3-6 | - |
| IEC 61754-4 | - | Fibre optic connector interfaces - Part 4: Type SC connector family | EN 61754-4 | - |
| IEC/TR 61931 | 1998 | Fibre optic - Terminology | - | - |
| IEC 80416 | Series | Basic principles for graphical symbols for use on equipment | EN 80416 | Series |
| IEC 60417 | database | Graphical symbols for use on equipment | - | - |
| IEC 60617 | database | Graphical symbols for diagrams | - | - |

# CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

# CABLE NETWORKS FOR TELEVISION SIGNALS, SOUND SIGNALS AND INTERACTIVE SERVICES –

## Part 6: Optical equipment

## 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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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 60728-6 has been prepared by technical area 5: Cable networks for television signals, sound signals and interactive services, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

This third edition cancels and replaces the second edition published in 2003 of which it constitutes a technical revision.

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

- The normative references were updated.
- The methods of measurement for optical power and return loss were substituted by references to other standards.
- The method of measurement for polarization dependent loss was deleted.

- A method of measurement for carrier-to-crosstalk ratio (CCR) was added.
- The methods of measurement for CSO and CTB of optical amplifiers were substituted by a method of measurement for microscopic gain tilt of optical amplifiers. This parameter can be used for calculating the second order distortion of optical amplifiers according to the method described in the new Annex B.
- New classes for optical transmitters and receivers have been defined.

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

| CDV | Report on voting |
|---|---|
| 100/1654/CDV | 100/1789/RVC |

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.

The list of all the parts of the IEC 60728 series, under the general title *Cable networks for television signals, sound signals and interactive services,* can be found on the IEC website.

The committee has decided that the contents of this 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.

A bilingual version of this publication may be issued at a later date.

# INTRODUCTION

Standards of the IEC 60728 series deal with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television signals, sound signals and their associated data signals and for processing, interfacing and transmitting all kinds of signals for interactive services using all applicable transmission media.

- This covers all kinds of networks that convey modulated RF carriers such as CATV-networks;
- MATV-networks and SMATV-networks;
- individual receiving networks;

and all kinds of equipment, systems and installations installed in such networks.

NOTE CATV encompasses the Hybrid Fibre Coaxial (HFC) networks used nowadays to provide telecommunications services, voice, data and audio and video both broadcast and narrowcast.

The extent of this standardisation work is from the antennas and/or special signal source inputs to the headend or other interface points to the network up to the terminal input.

The standardisation of any user terminals (i.e. tuners, receivers, decoders, multimedia terminals, etc.) as well as of any coaxial, balanced and optical cables and accessories thereof is excluded.

The reception of television signals inside a building requires an outdoor antenna and a distribution network to convey the signal to the TV receivers.