
**Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve - 13.
del: Optični sistemi za razpršeno oddajanje signalov (IEC 60728-13:2010)**

Cable networks for television signals, sound signals and interactive services - Part 13:
Optical systems for broadcast signal transmissions (IEC 60728-13:2010)

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 13: Optische
Anlagen zur Übertragung von Rundfunksignalen (IEC 60728-13:2010)

Réseaux de distribution par câbles destinés aux signaux de télévision, de radiodiffusion
sonore et aux services interactifs - Partie 13 : Systèmes optiques pour transmission de
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and interactive services -
Part 13: Optical systems for broadcast signal transmissions
(IEC 60728-13:2010)**

Réseaux de distribution par câbles
destinés aux signaux de télévision,
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et aux services interactifs -
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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.

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CENELEC

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

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Foreword

The text of document 100/1623/FDIS, future edition 1 of IEC 60728-13, prepared by 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 60728-13 on 2010-02-01.

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 EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 2010-11-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2013-02-01

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 60728-13:2010 was approved by CENELEC as a European Standard without any modification. (standards.iteh.ai)

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

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IEC 60068	NOTE Harmonized in EN 60068 series (not modified).
IEC 60728-1-2	NOTE Harmonized as EN 60728-1-2:2009 (not modified).
IEC 60728-3	NOTE Harmonized as EN 60728-3.
IEC 60728-5	NOTE Harmonized as EN 60728-5.
IEC 60728-10	NOTE Harmonized as EN 60728-10.
IEC 60728-11	NOTE Harmonized as EN 60728-11.
IEC 60875-1	NOTE Harmonized as EN 60875-1.
IEC 61280-1-1	NOTE Harmonized as EN 61280-1-1.
IEC 61280-1-3	NOTE Harmonized as EN 61280-1-3.
IEC 61280-2-9	NOTE Harmonized as EN 61280-2-9.
IEC 61281-1	NOTE Harmonized as EN 61281-1.
IEC 61290-1-2	NOTE Harmonized as EN 61290-1-2.
IEC 61290-1-3	NOTE Harmonized as EN 61290-1-3.

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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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 60068-1	1988	Environmental testing - Part 1: General and guidance	EN 60068-1 ¹⁾	1994
IEC 60728-1	2007	Cable networks for television signals, sound signals and interactive services - Part 1: System performance of forward paths	EN 60728-1	2008
IEC 60728-6	2003	Cable networks for television signals, sound signals and interactive services - Part 6: Optical equipment	EN 60728-6	2003
IEC/TR 60728-6-1	2006	Cable networks for television signals, sound signals and interactive services - Part 6-1: System guidelines for analogue optical transmission systems	-	-
IEC 60825-1	-	Safety of laser products - Part 1: Equipment classification and requirements	EN 60825-1	-
IEC 60825-2	-	Safety of laser products - Part 2: Safety of optical fibre communication systems (OFCS)	EN 60825-2	-
IEC 60825-12	-	Safety of laser products - Part 12: Safety of free space optical communication systems used for transmission of information	EN 60825-12	-
IEC 61291-1	2006	Optical amplifiers - Part 1: Generic specification	EN 61291-1	2006
IEC 61755-1	2005	Fibre optic connector optical interfaces - Part 1: Optical interfaces for single mode non-dispersion shifted fibres - General and guidance	EN 61755-1 + corr. December	2006 2006
IEC/TR 61930	1998	Fibre optic graphical symbology	-	-
IEC/TR 61931	1998	Fibre optic - Terminology	-	-
ITU-T Recommendation G.692	-	Optical interfaces for multichannel systems with optical amplifiers	-	-
ITU-T Recommendation G.694.2	-	Spectral grids for WDM applications: CWDM wavelength grid	-	-

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



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**Cable networks for television signals, sound signals and interactive services –
Part 13: Optical systems for broadcast signal transmissions**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 13: Optical systems for broadcast signal transmissions

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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International Standard IEC 60728-13 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.

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

FDIS	Report on voting
100/1623/FDIS	100/1646/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.

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 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.

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

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

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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 includes

- CATV¹-networks;
- MATV-networks and SMATV-networks;
- individual receiving networks;

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

The extent of this standardization 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 standardization 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.

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¹ This word encompasses the HFC (Hybrid Fibre Cable) networks used nowadays to provide telecommunications services, voice, data, audio and video both broadcast and narrowcast.

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

Part 13: Optical systems for broadcast signal transmissions

1 Scope

This part of IEC 60728 is applicable to optical transmission system for broadcast signal transmission that consists of a head-end equipment, optical transmission lines, in-house wirings and a system outlet. The system is primarily intended for television and sound signals using analogue and/or digital transmission technology. This standard specifies the basic system parameters and methods of measurement for optical distribution system having a system outlet in order to assess the system performance and its performance limits.

The purpose of this part of IEC 60728 is to describe the system specification of FTTH (fibre to the home) network for broadcast signal transmission. This standard is also applicable to the broadcast signal transmission using telecommunication network if it satisfies the optical portion of this standard. This standard describes RF transmission for broadcast and narrowcast (limited area distribution of broadcast) signals over FTTH, and introduces xPON system as a physical layer media. The detailed description of physical layer is out of the scope of this standard. The scope is limited to RF signal transmission over FTTH, thus, it does not include IP transport technologies, such as IP Multicast and associate protocols. Some interference descriptions between telecommunication system and broadcast system addressed in Clause 7 and Annex D should be referred to for detailed explanations. Annex A describes actual service systems with design consideration based on this standard. Annex B gives an overview of the optical transmission systems applicable for broadcast signal transmission.

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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 60068-1:1988, *Environmental testing – Part 1: General and guidance*

IEC 60728-1:2007, *Cable networks for television signals, sound signals and interactive services – Part 1: System performance of forward paths*

IEC 60728-6:2003, *Cable networks for television signals, sound signals and interactive services – Part 6: Optical equipment*

IEC/TR 60728-6-1:2006, *Cable networks for television signals, sound signals and interactive services – Part 6-1: System guidelines for analogue optical transmission systems*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification and requirements*

IEC 60825-2, *Safety of laser products – Part 2: Safety of optical fibre communication systems (OFCS)*

IEC 60825-12, *Safety of laser products – Part 12: Safety of free space optical communication systems used for transmission of information*

IEC 61291-1:2006, *Optical amplifiers – Part 1: Generic specification*

IEC 61755-1:2005, *Fibre optic connector optical interfaces – Part 1: Optical interfaces for single mode non-dispersion shifted fibres – General and guidance*

IEC 61930:1998, *Fibre optic graphical symbology*

IEC 61931:1998, *Fibre optic – Terminology*

ITU-T Recommendation G.692, *Optical interfaces for multichannel systems with optical amplifiers*

ITU-T Recommendation G.694.2, *Spectral grids for WDM applications: CWDM wavelength grid*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1.1

optical transmitting unit optical transmitter

transmit fibre optic terminal device accepting at its input port an electrical signal and providing at its output port an optical carrier modulated by that input signal

[IEC 61931, definition 2.9.6]

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NOTE 1 For the purposes of this document, optical transmitters may have more than one input port accepting electrical RF signals.

NOTE 2 This piece of equipment amplifies frequency multiplexed electrical signals and converts these electrical signals into optical signals. The optical wavelength is a 1 500 nm band ($1\ 550 \pm 10$ nm in 1 530 nm to 1 625 nm region).

3.1.2

optical receiving unit optical receiver

receive fibre optic terminal device accepting at its input port a modulated optical carrier, and providing at its output port the corresponding demodulated electrical signal (with the associated clock, if digital)

[IEC 61931, definition 2.9.7]

NOTE For the purposes of this document, optical receivers may have more than one output port providing electrical RF signals.

3.1.3

optical amplifier

optical waveguide device containing a suitably pumped, active medium which is able to amplify an optical signal

[IEC 61931, definition 2.7.75]

NOTE 1 In this document, Erbium Doped Fibre Amplifier (EDFA) is used for amplification in the 1 550 nm band.

NOTE 2 There are several methods based on wavelength to be used for amplification. The term “Erbium Doped Fibre Amplifier (EDFA)” is the synonym of optical amplifier in this document.