

INTERNATIONAL STANDARD

IEC
60728-10

Second edition
2005-06

**Cable networks for television signals,
sound signals and interactive services –**

**Part 10:
System performance of return paths**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,
SOUND SIGNALS AND INTERACTIVE SERVICES –****Part 10: System performance for return paths**

FOREWORD

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International Standard IEC 60728-10 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 second edition cancels and replaces the first edition published in 2001 and constitutes a technical revision.

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

- New measurement method for amplitude response variation, 4.3
- Additional recommendations to documentation of measurement results in 4.5.6, 4.6.5.
- New subclause for measurement of group delay variation, 4.8

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

FDIS	Report on voting
100/948FDIS	100/978/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.

IEC 60728 consists of the following parts, under the general title *Cable networks for television signals, sound signals and interactive services*:

- Part 1: Methods of measurement and system performance
- Part 2: Electromagnetic compatibility for equipment
- Part 3: Active coaxial wideband distribution equipment (this publication)
- Part 4: Passive coaxial wideband distribution equipment
- Part 5: Headend equipment
- Part 6: Optical equipment
- Part 7-1: Hybrid fibre coax outside plant status monitoring – Physical (PHY) layer specification
- Part 7-2: Hybrid fibre coax outside plant status monitoring – Media access control (MAC) layer specification
- Part 7-3: Hybrid fibre coax outside plant status monitoring – Power supply to transponder interface bus (PSTIB) specification
- Part 9: Interfaces for CATV/SMATV headends and similar professional equipment for DVB/MPEG-2 transport streams
- Part 10: System performance of return path
- Part 11: Safety
- Part 12: Electromagnetic compatibility of systems

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.

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, interactive multimedia signals, interfaces and their associated data signals, using all applicable transmission media.

This includes:

- CATV-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 standardisation work is from the antennas, 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, terminals, etc.) as well as of any coaxial, balanced and optical cables and accessories thereof is excluded.

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

Part 10: System performance for return paths

1 Scope

This part of IEC 60728 deals with the transparent return path of cable networks operated in the frequency range between 5 MHz and 65 MHz or parts thereof. Higher frequencies may be used in fibre based networks.

NOTE In addition, it is possible to use the frequency range from 0 MHz to 5 MHz for return path transmissions, for example for NMS or other control, monitoring and signalling purposes. Applications below 5 MHz are not covered by this standard.

An active return path carries typically only return signals. A passive return path can be used for both return and forward signals.

This standard lays down the basic methods of measurement for signals typically used in the return path of cable networks in order to assess the performance of those signals and their performance limits.

All requirements refer to the performance limits, which shall be obtained between the reference points (Figure 1) of the return path system.

One reference point is the network termination close to the subscriber. It is the last point where all forward and return signals are present and carried on the same cable. If no network termination point exists, the reference point is the system outlet.

The other reference point is the input of the return signal receiver (or transceiver). At this point, the transparent signal path ends and beyond this point, the signal is treated in a non-transparent way. The return signal receiver can be situated at the headend but can also be at the node of the coaxial cell or at any other point of the network.

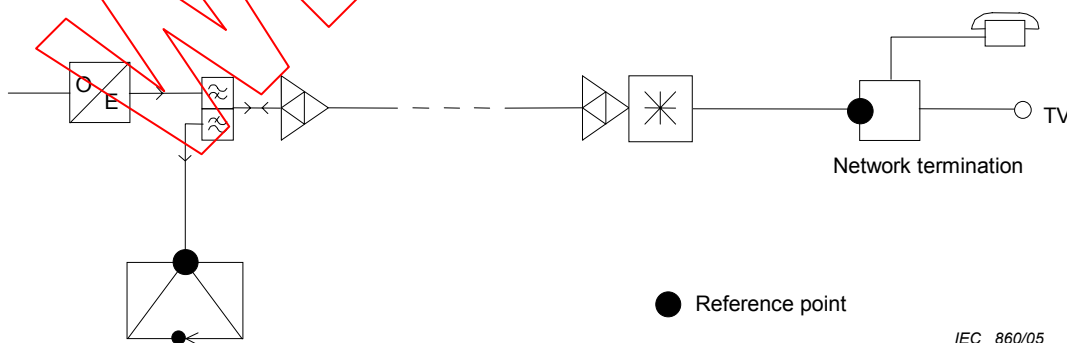


Figure 1 – Reference points of an active return path system (example)

In addition to the system performance requirements for the transparent return path, system performance recommendations were laid down in this standard, for example for the overall frequency allocation, for the use of specific modulation techniques for different interactive multimedia services or for different sub-bands within the return path frequency range, etc.

Specific equipment installed in cable networks for the operation of such return paths is standardised in the relevant equipment standards, parts 3 to 6 of the IEC 60728 series.

Transmission systems are not within the scope of this standard.

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 60728-1:2001, *Cable networks for television signals, sound signals and interactive services – Part 1: Methods of measurement and system performance*

IEC 60728-2:2002, *Cable networks for television signals, sound signals and interactive services – Part 2: Electromagnetic compatibility for equipment*

IEC 60728-3, *Cable networks for television signals, sound signals and interactive services – Part 3: Active coaxial wideband distribution equipment*

IEC 60728-4:2000, *Cable networks for television signals, sound signals and interactive services – Part 4: Passive coaxial wideband distribution equipment*

IEC 60728-5:2001, *Cable networks for television signals, sound signals and interactive services – Part 5: Headend equipment*

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

IEC 60728-11:2005, *Cable networks for television signals, sound signals and interactive services – Part 11: Safety*

IEC 60728-12:2001, *Cable networks for television signals, sound signals and interactive services – Part 12: Electromagnetic compatibility of systems*

ITU-R Recommendation BT.6/BL22: 2005, *Conventional analogue television systems*

ITU-T Recommendation J.61:1990, *Transmission performance of television circuits designed for use in international connections* (Published as ITU-R Rec. CMTT 567-3 in CCIR Recommendations, Volume XII, Düsseldorf, 1990)

ES 200 800 V1.3.1:2001, *Digital Video Broadcasting (DVB); DVB interaction channel for Cable TV distribution systems (CATV)*

3 Terms, definitions, symbols and abbreviations

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

3.1 Terms and definitions

3.1.1

amplitude response variation

peak-to-peak variation in frequency amplitude response of a specified signal path over a specified frequency band, expressed in dB

3.1.2

broadcast signal

signal comprising of video and/or audio and/or data content which is distributed to several receivers simultaneously

3.1.3

channel availability

percentage of the time during which the channel fulfils all performance requirements. The duration of the observation time has to be published

3.1.4

downstream direction

direction of signal flow in a cable network from the headend or any other central point (node) of a cable network to the subscribers' area

3.1.5

forward path (downstream)

part of a cable network by which signals are distributed in the downstream direction from the headend or any other central point (node) of a cable network to the subscribers' area

3.1.6

frequency error

quality of supply evaluated on the basis of the actual frequency of an electrical system compared to the nominal value. It consists of initial error, short term and long term frequency stability

3.1.7

headend

equipment which is connected between receiving antennas or other signal sources and the remainder of the cable network, to process the signals to be distributed

NOTE The headend may, for example, comprise antenna amplifiers, frequency converters, combiners, separators and generators.

3.1.8

hybrid fibre coaxial network

HFC

cable network which is comprised of optical equipment and cables and coaxial equipment and cables in different parts

3.1.9

impulse noise

noise which is caused by electromagnetic interference into cable networks. Impulse noise is characterised by pulses with a duration of typically <10 µs