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INTERNATIONAL STANDARD

**Cable networks for television signals, sound signals and interactive services –
Part 1-2: Performance requirements for signals delivered at the system outlet in
operation**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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CONTENTS

| | |
|--|----|
| FOREWORD..... | 4 |
| INTRODUCTION..... | 6 |
| 1 Scope..... | 7 |
| 2 Normative references | 8 |
| 3 Terms, definitions, symbols and abbreviations..... | 10 |
| 3.1 Terms and definitions | 10 |
| 3.2 Abbreviations | 15 |
| 4 Methods of measurement | 16 |
| 5 Subjective quality of television pictures in relation to the main impairments of the analogue composite television signal..... | 17 |
| 5.1 Subjective quality scale | 17 |
| 5.2 Subjective quality and objective parameters | 17 |
| 6 Summation of the impairments | 20 |
| 6.1 Impairments to be summed | 20 |
| 6.2 Summation laws | 21 |
| 6.2.1 General | 21 |
| 6.2.2 Voltage addition | 21 |
| 6.2.3 Power addition..... | 22 |
| 6.3 Examples | 22 |
| 7 Performance requirements in operation | 22 |
| 7.1 General..... | 22 |
| 7.2 Impedance | 23 |
| 7.3 Performance requirements at the terminal input | 23 |
| 7.3.1 Definition..... | 23 |
| 7.3.2 Signal level..... | 23 |
| 7.3.3 Other parameters | 23 |
| 7.4 Performance requirements at system outlets | 23 |
| 7.4.1 Minimum and maximum carrier levels | 23 |
| 7.4.2 Mutual isolation between system outlets..... | 23 |
| 7.4.3 Isolation between individual outlets in one household..... | 24 |
| 7.4.4 Isolation between forward and return path | 24 |
| 7.4.5 Long-term frequency stability of distributed carrier signals at any system outlet..... | 24 |
| 7.4.6 Carrier level differences at system outlet..... | 24 |
| 7.4.7 Frequency response within a television channel | 24 |
| 7.4.8 Random noise at system outlet..... | 24 |
| 7.4.9 Interference to television channels | 26 |
| Annex A (normative) RF carrier to noise ratio | 28 |
| Annex B (informative) Examples of summation of impairments..... | 31 |
| Bibliography..... | 33 |
| Figure 1 – CATV/MATV/SMATV cable network – Performance requirements | 8 |
| Figure 2 – Examples of location of HNI for various home network types..... | 13 |
| Figure 3 – Signal to echo ratio (dB) versus echo delay (µs) | 20 |
| Figure A.1 – Example of a TV receiver IF filter (systems B and G)..... | 28 |

| | |
|--|----|
| Figure A.2 – Example of a demodulated TV signal (systems B and G) | 29 |
| Table 1 – Methods of measurement of IEC 60728-1 applicable in operation..... | 17 |
| Table 2 – Impairment units versus subjective quality..... | 17 |
| Table 3 – Impairment grade versus un-weighted white noise | 18 |
| Table 4 – Impairment grade versus differential gain | 19 |
| Table 5 – Impairment grade versus differential phase | 19 |
| Table 6 – Impairment grade versus short time linear distortion (2T pulse)..... | 19 |
| Table 7 – Impairment grade versus chrominance-luminance gain inequality..... | 19 |
| Table 8 – Impairment grade versus chrominance-luminance delay inequality | 19 |
| Table 9 – Impairment grade versus echo rating (1µs echo delay)..... | 20 |
| Table 10 – Correction factors to be applied for delays different than 1 µs | 20 |
| Table 11 – Carrier-to-noise ratios and RF signal-to-noise ratios at system outlet (television) in operation | 25 |
| Table 12 – Carrier-to-noise ratios at system outlet (radio) in operation | 26 |
| Table B.1 – Examples of voltage addition | 31 |
| Table B.2 – Examples of power addition | 32 |

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**CABLE NETWORKS FOR TELEVISION SIGNALS,
SOUND SIGNALS AND INTERACTIVE SERVICES –****Part 1-2: Performance requirements for signals
delivered at the system outlet in operation**

FOREWORD

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International Standard IEC 60728-1-2 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 |
| 100/1531/FDIS | 100/1562/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.

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

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 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.

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

This part of IEC 60728 deals with the requirements that must be fulfilled at the system outlet or terminal input, when the CATV/MATV/SMATV system is in operation.

These performance requirements for signals at the system outlet or terminal input in operation are derived from considerations of the characteristics of the received signals at the input of the headend (see Clause 6 of IEC 60728-1) and the summation of the impairments produced by the headend, the CATV/MATV/SMATV network and the home network, when the requirements given in IEC 60728-1 and IEC 60728-1-1 are fulfilled.

This document gives the guidelines for calculation of the operational characteristics at system outlet, taking into account the performance requirements of the CATV/MATV/SMATV network, of the home networks and of the received signals, given in the International Standards IEC 60728-1 and 60728-1-1 prepared by TA 5: Cable networks for television signals, sound signals and interactive services, of IEC technical committee 100: Audio, video and multimedia systems and equipment.

¹ This word encompasses the Hybrid Fibre Coaxial (HFC) 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 1-2: Performance requirements for signals delivered at the system outlet in operation

1 Scope

This part of IEC 60728 provides the minimum performance requirements to be fulfilled in operation at the system outlet or terminal input and describes the summation criteria for the impairments present in the received signals and those produced by the CATV/MATV/SMATV cable network, including individual receiving systems.

NOTE 1 When a change of signal format is made at the headend, the summation of the impairments does not apply (see also Clause 7).

In a building divided into apartment blocks, the signals received by the antennas are distributed by the MATV/SMATV cable network up to the home network interface (HNI); the television signals are then distributed (inside the home) by home networks (HN) of various types up to the system outlet or terminal input. The cable network can support two way operation, from the system outlet (or terminal input) towards the headend.

The home network can use coaxial cables, balanced pair cables, fibre optic cables (glass or plastic) and also wireless links inside a room (or a small number of adjacent rooms) to replace wired cords.

This part of IEC 60728 is applicable to cable networks intended for television signals, sound signals and interactive services operating between about 5 MHz and 3 000 MHz. The frequency range is extended to 6 000 MHz for home distribution techniques that replace wired cords with a wireless two way communication inside a room (or a small number of adjacent rooms) that uses the 5 GHz to 6 GHz frequency band.

Figure 1 shows the main sections of a general CATV/MATV/SMATV system, indicating the parts of the IEC 60728-1 series documents where the relevant performance requirements are indicated.

- The requirements for the signals received at the headend are given in Clause 6 of IEC 60728-1.
- The requirements for the CATV/MATV/SMATV cable network, assuming an unimpaired input signal at the input of the headend, up to the system outlet are given in IEC 60728-1, Clause 5.
- The requirements for the CATV/MATV/SMATV cable network up to the home network interface (HNI) are given in IEC 60728-1, Clause 7, assuming an unimpaired input signal at the input of the headend.
- The specific requirements from HNI to the system outlet or terminal input are given in IEC 60728-1-1, Clause 5, assuming an unimpaired input signal at the HNI.
- The requirements at the system outlet in operation are given in Clause 7 of this standard.

The expression “in operation” means that the received signals, with their impairments, are applied to the headend input of the CATV/MATV/SMATV cable network. The requirements at the system outlet “in operation” are derived, therefore, by summing the impairments of the various cascaded parts of the system and of the input signal.

When a change of signal format from analogue to analogue (e.g. from FM to AM-VSB) or from digital to digital (e.g. from QPSK to QAM) or from digital to analogue (e.g. from DVB-S/S2 to AM-VSB or DVB-T to AM-VSB) is made at the headend, the summation of the impairments that produce a relaxation of requirements at system outlet does not apply. Such a case will be the equivalence of unimpaired signals applied at the headend input. Therefore the requirements at system outlet given in IEC 60728-1 apply.

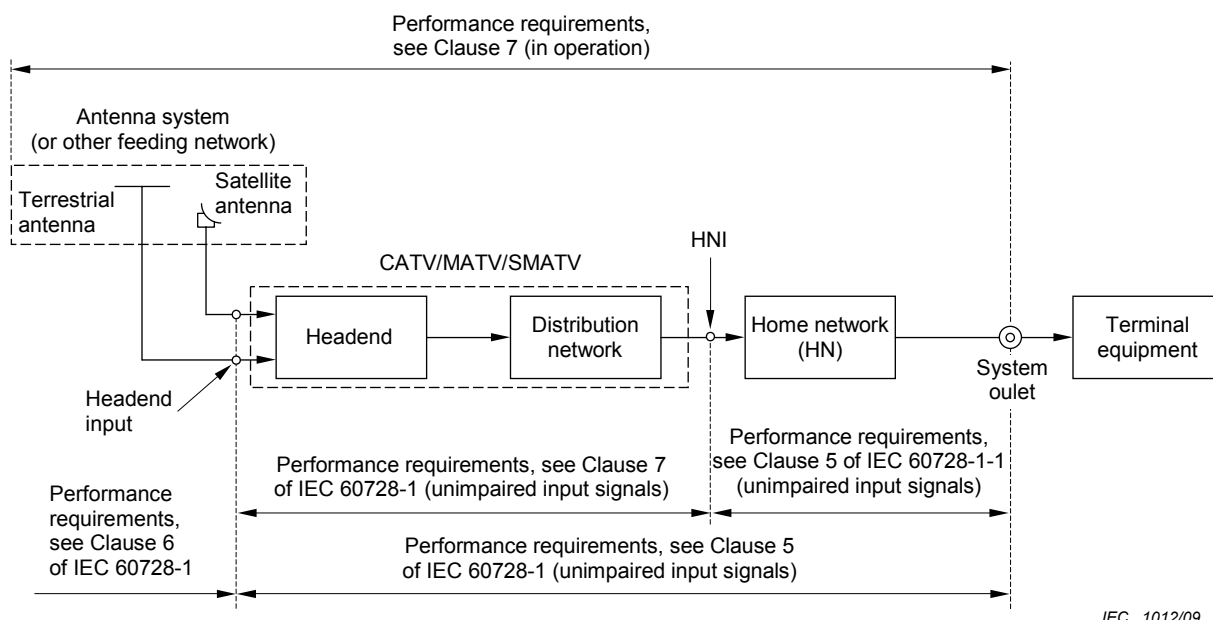


Diagram of the main sections of a CATV/MATV/SMATV cable network and the relevant parts of the IEC 60728-1 series where the requirements are indicated.

Figure 1 – CATV/MATV/SMATV cable network – Performance requirements

This standard also provides references for the basic methods of measurement of the operational characteristics of the downstream cable network in order to assess its performance.

All requirements refer to the performance limits to be achieved in operation at any system outlet when terminated in a resistance equal to the nominal load impedance of the system, unless otherwise specified. Where system outlets are not used, the above applies to the terminal input.

NOTE 2 If the home network is subdivided into a number of parts, using different transmission media (e.g. coaxial cabling, balanced cabling, optical cabling, wireless links) the accumulation of degradations should not exceed the figures given below.

NOTE 3 Performance requirements of return paths as well as special methods of measurement for the use of the return paths in cable networks are described in IEC 60728-10.

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 60050-705, *International Electrotechnical Vocabulary (IEV) – Chapter 705: Radio wave propagation*

IEC 60050-712, *International Electrotechnical Vocabulary (IEV) – Chapter 712: Antennas*

IEC 60050-725, *International Electrotechnical Vocabulary (IEV) – Chapter 725: Space radiocommunications*

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

IEC 60728-1-1,– *Cable networks for television signals, sound signals and interactive services – Part 1-1: RF cabling for two way home networks (to be published)*

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

IEC 60966-2-4, *Radio frequency and coaxial cable assemblies – Part 2-4: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3 000 MHz, IEC 61169-2 connectors*

IEC 60966-2-5, *Radio frequency and coaxial cable assemblies – Part 2-5: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 1 000 MHz, IEC 61169-2 connectors*

IEC 60966-2-6, *Radio frequency and coaxial cable assemblies – Part 2-6: Detail specification for cable assemblies for radio and TV receivers – Frequency range 0 MHz to 3 000 MHz, IEC 61169-24 connectors*

ITU-R Recommendation BT.500-7, *Methodology for the subjective assessment of the quality of television pictures*

ITU-R Recommendation BT.654, *Subjective quality of television pictures in relation to the main impairments of the analogue composite television signal*

ITU-R Recommendation BT.655, *Radio-frequency protection ratios for AM vestigial sideband terrestrial television systems interfered with by unwanted analogue vision signals and their associated sound signals*

ITU-T Recommendation J.61, *Transmission performance of television circuits designed for use in international connections*

ITU-T Recommendation J.63, *Insertion of test signals in the field-blanking interval of monochrome and colour television signals*

ETSI EN 300 421, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for 11/12 GHz satellite services*

ETSI EN 300 429, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for cable systems*

ETSI EN 300 473, *Digital Video Broadcasting (DVB); Satellite Master Antenna Television (SMATV) distribution systems*

ETSI EN 300 744, *Digital Video Broadcasting (DVB); Framing structure, channel coding and modulation for digital terrestrial television*

ETSI EN 302 307, *Digital Video Broadcasting (DVB); Second generation framing structure, channel coding and modulation systems for Broadcasting, Interactive Services, News Gathering and other broadband satellite applications*