SLOVENSKI STANDARD
oSIST prEN IEC 60728-101-1:2022

01-november-2022

RF kabli za dvosmerna domača omrežja z obremenitvami popolnoma digitaliziranih kanalov (TA5)

RF cabling for two-way home networks with all-digital channels load (TA5)

Câblage RF pour réseaux domestiques bidirectionnels soumis à une charge de porteuses exclusivement numériques (TA5)

Ta slovenski standard je istoveten z: **prEN IEC 60728-101-1:2022**

ICS:

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33.160.01	Avdio, video in avdiovizualni sistemi na splošno	Audio, video and audiovisual systems in general

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IEC TA 5 : CABLE NETWORKS FOR TELEVISION SIGNALS, SOUND SIGNALS AND INTERACTIVE SERVICES

SECRETARIAT: Japan	SECRETARY: Mr Hiroo Tamura
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TITLE:

RF cabling for two-way home networks with all-digital channels load (TA5)

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NOTE FROM TC/SC OFFICERS:

CONTENTS

142

143

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 101-1: RF cabling for two-way home networks with all-digital channels load

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International Standard IEC 60728-101-1 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 International Standard is to be used in conjunction with IEC 60728-101:2016.

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

FDIS	Report on voting
100/xx/FDIS	100/xx/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

197 The language used for the development of this International Standard is English.

198 This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in
199 accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at
200 https://www.iec.ch/members_experts/refdocs. The main document types developed by IEC are
201 described in greater detail at https://www.iec.ch/standardsdev/publications.

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

204 The committee has decided that the contents of this document will remain unchanged until the
205 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
206 specific document. At this date, the document will be

207 • reconfirmed,
208 • withdrawn,
209 • replaced by a revised edition, or
210 • amended.

211

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INTRODUCTION

Standards and deliverables of IEC 60728 series deals with cable networks including equipment and associated methods of measurement for headend reception, processing and distribution of television and sound signals and for processing, interfacing and transmitting all kinds of data signals for interactive services using all applicable transmission media. These signals are typically transmitted in networks by frequency-multiplexing techniques.

This includes for instance

- regional and local broadband cable networks,
- extended satellite and terrestrial television distribution systems,
- individual satellite and terrestrial television receiving systems,

and all kinds of equipment, systems and installations used in such cable networks, distribution and receiving systems.

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 of the customer premises equipment.

The standardization work will consider coexistence with users of the RF spectrum in wired and wireless transmission systems.

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 the IEC 60728 deals with the requirements and implementation guidelines for a home network that can be realised with different techniques. The following types of home networks (HN) are possible:

- passive coaxial home network;
- active coaxial home network;
- different home network types.

Figure 1 shows typical situations that are possible when considering RF home networks.

The RF home network can be realised using coaxial cables, balanced cables, optical cables or radio links.

This document considers digital signals only and is based on IEC 60728-101 dealing with system performance of forward paths loaded with digital channels only. For RF cable systems loaded with analogue and digital signals refer to IEC 60728-1-1 ED2.

Figures 4 to 9 have been amended to take into account the level requirement for digital signals only.

Although the upper frequency range of terrestrial broadcast signals depends on the allocation frequency plan of each region (e.g., in Europe it is reduced to 694 MHz, being the 700 MHz and 800 MHz bands assigned to telecommunication services), the upper frequency range into the cable networks can be maintained to 862 MHz in order to maximise the number of channels to be distributed in the cable networks, assuming that sufficient immunity (screening efficiency) to signals radiated in the 700 MHz and 800 MHz bands is provided.

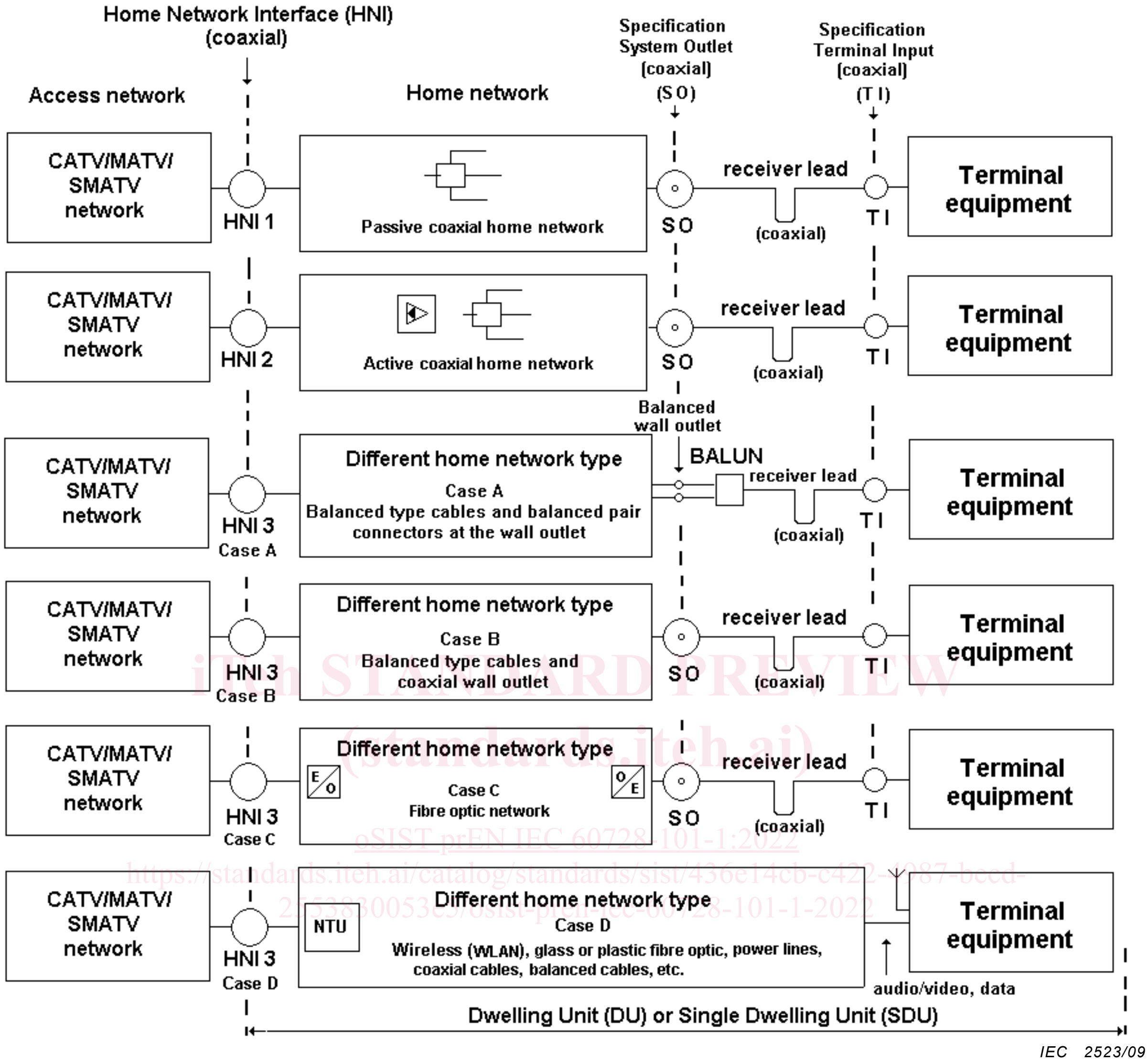

Figure 1 – Examples of RF home network types

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

Part 101-1: RF cabling for two-way home networks with all-digital channels load

1 Scope

This part of IEC 60728 provides the requirements and describes the implementation guidelines of RF cabling for two-way home networks; it is applicable to any home network that distributes signals provided by CATV/MATV/SMATV cable networks (including individual receiving systems) having a coaxial cable output. It is also applicable to home networks where some part of the distribution network uses wireless links, for example in place of the receiver cord.

This part of IEC 60728 is therefore applicable to RF cabling for two-way home networks with wired cords or wireless links inside a room and primarily intended for television and sound signals operating between about 5 MHz and 3 300 MHz. The frequency range is extended to 6 000 MHz for 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 band.

In a building divided into apartment blocks, the distribution of the signals inside the home starts from the home network interface (HNI) up to the system outlet or terminal input. The requirements at the system outlet are given in IEC 60728-101, Clause 5 and the requirements at the HNI are given in IEC 60728-101, Clause 7. In Clause 5 of this standard additional requirements are given.

This document deals with various possibilities to distribute signals in a home network, using 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 document gives references to basic methods of measurement of the operational characteristics of the home cable network in order to assess its performance.

All requirements refer to the performance limits, which are obtained between the input(s) at the home network interface (HNI) and the output 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 1 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 2 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.

Clause 5 defines the performance limits measured at system outlet or terminal input for an unimpaired (ideal) test signal applied at the HNI. Under normal operating conditions for any digital channel and meeting these limits, the cumulative effect of the impairment of any single parameter at the HNI and that due to the home network will produce signals not worse than the requirements given in IEC 60728-101-2. For digitally modulated signals the quality requirement is a QEF (Quasi Error Free) reception.

This document describes the physical layer connection for home networks. Description of protocols required for Layer 2 and higher layers is out of the scope of this document. Logical connections between devices within the home network are therefore not always guaranteed.

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 – Chapter 705: Radio wave propagation*

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

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

IEC 60617, *Graphical symbols for diagrams*

IEC 60728-101:2016, *Cable networks for television signals sound signals and interactive services – Part 1: System performance of forward paths loaded with digital channels only*

IEC 60728-101-2, *Cable networks for television signals sound signals and interactive services – Part 1-2: Performance requirements for signals delivered at system outlet in operation with all-digital channels load*

IEC 60728-3:2010, *Cable networks for television signals sound signals and interactive services – Part 3: Active wideband equipment for coaxial cable networks*

IEC 60728-10, *Cable networks for television signals, sound signals and interactive services – Part 10: System performance of return paths*

IEC 60966 (all parts), *Radio frequency and coaxial cable assemblies*

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*

ISO/IEC/IEEE 8802.11:2018, *Information technology – Telecommunications and information exchange between systems – Local and metropolitan area network – Specific Requirements – Part 11: Wireless LAN medium access control (MAC) and physical layer (PHY) specifications*

IEEE 802.11ax, *IEEE Standard for Information Technology - Telecommunications and Information Exchange between Systems - Local and Metropolitan Area Networks - Specific Requirements - Part 11: Wireless LAN Medium Access Control (MAC) and Physical Layer (PHY) Specifications - Amendment 1: Enhancements for High-Efficiency WLAN*

EN 50117-2-4, *Coaxial cables – Part 2-4: Sectional specification for cables used in cabled distribution networks - Indoor drop cables for systems operating at 5 MHz to 3000 MHz*

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

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

ETSI EN 300 473, *Digital Video Broadcasting (DVB): 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 301 893 V2.1.1 (2017-05) *5 GHz RLAN; Harmonised Standard covering the essential requirements of article 3.2 of Directive 2014/53/EU*

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*

ETSI EN 302 755, *Digital Video Broadcasting (DVB): Frame structure channel coding and modulation for a second-generation digital terrestrial television broadcasting system (DVB-T2)*

ETSI EN 302 769 (2015), *Digital Video Broadcasting (DVB); Frame structure channel coding and modulation for a second generation digital transmission system for cable systems (DVB-C2)*

3 Terms, definitions, symbols and abbreviations

3.1 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1.1
active home network
home network that uses active equipment (for example, amplifiers) in addition to passive equipment like splitters, taps, system outlets, cables and connectors up to the coaxial RF interface (input and/or output) of the terminal equipment for distributing and combining RF signals

[SOURCE: IEC 60728-1:2014, 3.1.2]

3.1.2
antenna
part of a radio transmitting or receiving system which is designed to provide the required coupling between a transmitter or a receiver and the medium in which the radio wave propagates

Note 1 to entry: In practice, the terminals of the antenna or the points to be considered as the interface between the antenna and the transmitter or receiver are specified.