IEC 60728-5

Edition 2.0 2007-08

INTERNATIONAL STANDARD

Cable networks for television signals, sound signals and interactive services – Part 5: Headend equipment

INTERNATIONAL ELECTROTECHNICAL COMMISSION

PRICE CODE XC

ICS 33.060.40

ISBN 2-8318-9263-5

CONTENTS

INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

Part 5: Headend 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.
2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
5) IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with an IEC Publication.
6) All users should ensure that they have the latest edition of this publication.
7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
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 60728-5 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, of which it constitutes a technical revision.

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

- Revised title and scope
- Clause 3, several new terms and definitions
- Subclause 4.1, Methods of measurement for digitally modulated signals
- Subclause 4.6.2, RF signal-to-noise ratio ($S_{D,RF}/N$) for digitally modulated signals

- Subclause 4.8.2, Procedure for the measurement of group delay variation on DVB channel converters
- Subclause 4.9, Phase noise of an RF carrier
- Subclause 4.15, Decoding margin (Teletext)
- Annex D, Special national conditions
- Annex E, Correction factors for noise
- Annex F, Digital signal level and bandwidth
- Annex G, Minimum frequency distance of converted satellite signals in the IF range
- Annex H, Measurement errors which occur due to mismatched equipment
- Annex I, Correction factor for spectrum analyser

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

FDIS	Report on voting
100/1244/FDIS	100/1276/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 actual list of all parts of the IEC 60728 series 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.

For special national conditions existing in some countries, see Annex D.

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

- CATV[1]-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 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.

[1] This word encompasses the 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 5: Headend equipment

1 Scope

This part of IEC 60728 defines the characteristics of equipment used in the headends of terrestrial broadcast and satellite receiving systems (without satellite outdoor units and without those broadband amplifiers in the headend as described in IEC 60728-3). The satellite outdoor units for FSS are described in ETSI ETS 300 158, for BSS in ETSI ETS 300 249. Test methods for both types (FSS and BSS) of satellite outdoor units are laid down in ETSI ETS 300 457.

This standard

- covers the frequency range 5 MHz to 3 000 MHz,
- identifies performance requirements for certain parameters,
- lays down data publication requirements for certain parameters,
- stipulates methods of measurements;
- introduces minimum requirements defining quality grades (Q-grades).

This standard defines the overall characteristics for upstream/downstream signals between external sources/sinks (for example, antennas, cable modem termination systems, etc.) and the system interface to the cable network. In the case of modular headend systems, also single equipment as modulators, converters, etc. are described. Cable modem termination systems, encrypters, decrypters, etc. are not described in this standard. If such equipment is used in headends, the relevant parameters for RF, video, audio and data interfaces should be met.

According to the definitions in 3.1, the headends are divided into the following three quality grades:

- Grade 1: central headend;
- Grade 2: hub headend or hubsite;
- Grade 3: MATV headend/individual reception headend.

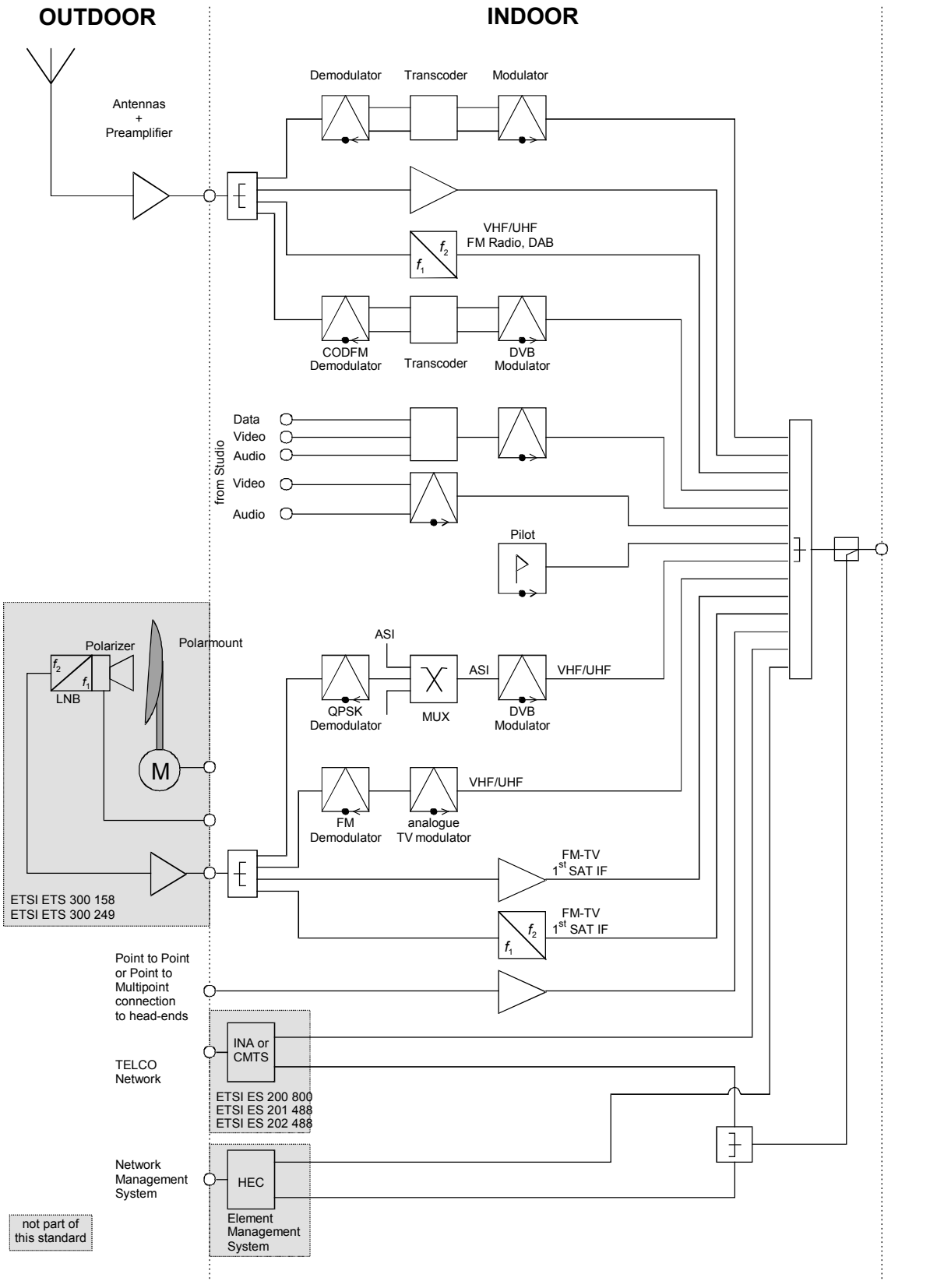

Figure 1 – Example of headend

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 (all parts), *Environmental testing*

IEC 60130-9, *Connectors for frequencies below 3 MHz – Part 9: Circular connectors for radio and associated sound equipment*

IEC 60244-5, *Methods of measurement for radio transmitters – Part 5: Performance characteristics of television transmitters*

IEC 60417, G*raphical symbols for use on equipment*

NOTE IEC 60417 can be consulted on the IEC website.

IEC 60529, *Degrees of protection provided by enclosures (IP Code)*

IEC 60617, *Graphical symbols for diagrams*

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

IEC 60728-2, *Cabled distribution systems for television and sound signals – Part 2: Electromagnetic compatibility for equipment*

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

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

IEC 61319-1, *Interconnections of satellite receiving equipment – Part 1: Europe*

ISO/IEC 13818-1, *Information technology – Generic coding of moving pictures and associated audio information: Systems*

ISO/IEC 13818-2, *Information technology – Generic coding of moving pictures and associated audio information: Video*

ISO/IEC 13818-3, *Information technology – Generic coding of moving pictures and associated audio information – Part 3: Audio*

ISO/IEC 13818-4, *Information technology – Generic coding of moving pictures and associated audio information – Part 4: Conformance testing*

ITU-R Recommendation BS.468-4, *Measurement of audio-frequency noise voltage level in sound broadcasting*

ITU-R Report BT.624-4, *Characteristics of television systems*

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

ITU-T Recommendation J.101, *Measurement methods and test procedures for teletext 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 300 468, *Digital Video Broadcasting (DVB): Specification for Service Information (SI) in DVB 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*

ETSI ETS 300 163, *Television systems; NICAM 728: Specification for transmission of two-channel digital sound with terrestrial television systems B, G, H, I and L*

ETSI TR 101 211, *Digital Video Broadcasting (DVB): Guidelines on implementation and usage of Service Information (SI)*