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INTERNATIONAL STANDARD

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

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CONTENTS

FOREWORD.....	8
INTRODUCTION.....	10
1 Scope.....	11
2 Normative references.....	13
3 Terms, definitions, symbols and abbreviations.....	14
3.1 Terms and definitions.....	14
3.2 Symbols.....	19
3.3 Abbreviations.....	19
4 Methods of measurement.....	21
4.1 Methods of measurement for digitally modulated signals.....	21
4.1.1 Introduction.....	21
4.1.2 Basic assumptions and measurement interfaces.....	21
4.1.3 Signal level for digitally modulated signals.....	21
4.2 Single-channel intermodulation specification for channel amplifier and frequency converter.....	23
4.3 Three-carrier intermodulation measurement.....	24
4.4 Two carrier intermodulation measurements for second and third-order products.....	25
4.4.1 Introduction.....	25
4.4.2 Intermodulation products with test signals at frequencies f_a and f_b	26
4.4.3 Signal levels.....	26
4.5 Carrier-to-spurious signal ratio at the output.....	26
4.5.1 Carrier-to-spurious signal ratio at the output of equipment for AM-TV systems.....	26
4.5.2 Carrier-to-spurious signal ratio at the output of equipment for FM-TV systems.....	27
4.5.3 Shoulder attenuation.....	28
4.6 Signal-to-noise measurement.....	29
4.6.1 Television carrier-to-noise ratio (analogue modulated signals).....	29
4.6.2 RF signal-to-noise ratio ($S_{D,RF}/N$) for digitally modulated signals.....	32
4.7 Differential gain and phase for PAL/SECAM signals.....	34
4.7.1 Introduction.....	34
4.7.2 Differential gain (for PAL/SECAM only).....	34
4.7.3 Differential phase.....	35
4.8 Group delay measurements.....	38
4.8.1 Group delay variation of analogue TV signals.....	38
4.8.2 Procedure for the measurement of group delay variation on DVB channel converters.....	39
4.9 Phase noise of an RF carrier.....	42
4.9.1 Introduction.....	42
4.9.2 Equipment required.....	42
4.9.3 Connection of the equipment.....	42
4.9.4 Measurement procedure.....	43
4.9.5 Presentation of the results.....	43
4.10 Hum modulation of carrier.....	44
4.10.1 Definition.....	44

4.10.2	Description of the method of measurement	45
4.10.3	Measuring Procedure	46
4.10.4	Calculating the hum modulation ratio	47
4.11	2T-pulse response, <i>K</i> -factor	48
4.12	Chrominance-luminance delay inequalities (20T-pulse method)	49
4.13	Luminance non-linearity	50
4.14	Intermodulation distortion (FM stereo radio)	51
4.14.1	Introduction	51
4.14.2	Equipment required	52
4.14.3	Connection of equipment	52
4.14.4	Measurement	52
4.15	Decoding margin (Teletext)	53
4.15.1	Definition	53
4.15.2	Method of measurement and measuring set-up (Figure 29)	53
4.15.3	Applicability of measuring set-up	53
5	Performance requirements and recommendations	54
5.1	Safety	54
5.2	Electromagnetic compatibility	54
5.3	Environmental	54
5.4	Marking	55
5.4.1	Marking of equipment	55
5.4.2	Marking of ports	55
6	Equipment characteristics required to be met	55
6.1	General	55
6.2	Power supply voltage	56
6.3	RF signal requirements	56
6.3.1	Impedance (input)	56
6.3.2	Impedance (output)	56
6.3.3	Return loss (input/output) of equipment	56
6.3.4	Return loss (output) of headend	56
6.3.5	Typical bandwidth for digital against analogue signals	57
6.3.6	Immunity against other signals in the FM radio and TV range	57
6.3.7	Carrier-to-spurious-signals ratio at output in the frequency range of 40 MHz to 862 MHz	57
6.3.8	Image rejection for AM TV and FM radio	57
6.3.9	Carrier to local oscillator signal ratio at the output for AM TV and FM radio	58
6.3.10	Frequency stability	58
6.3.11	Phase noise of digital modulated signals at the output of the headend	59
6.3.12	In-channel group delay variation for digital modulated signals	60
6.3.13	In-channel peak-to-peak amplitude response variation for digitally modulated signals	60
6.3.14	Stability of sound intercarrier	60
6.3.15	Stability of residual carrier amplitude	61
6.3.16	Frequency stability – SAT IF/IF converter	61
6.3.17	Typical modulation error ratio (MER) for a QAM signal	61
6.3.18	Minimum C/N values at the output of the headend	61
6.4	Composite video signal requirements	62
6.4.1	Impedance	62

6.4.2	Return loss	62
6.4.3	Signal voltage	62
6.4.4	Polarity	62
6.4.5	Offset voltage	62
6.5	Audio signal requirements	62
6.5.1	Input impedance	62
6.5.2	Output impedance	62
6.5.3	Signal level	63
6.6	Requirements for decoding margin (teletext)	63
6.7	IF signal requirements (AM-TV)	63
6.7.1	Impedance	63
6.7.2	Return loss	63
6.8	Antennas for terrestrial reception	63
6.8.1	Impedance	63
6.8.2	Return loss	63
6.9	Antenna amplifier	63
7	Equipment characteristics required to be published	64
7.1	General	64
7.2	Environmental conditions	64
7.3	Maximum permissible output level	64
7.4	Operating range for output level	65
7.5	TV standard	65
7.6	Clamp	65
7.7	Noise figure	65
7.7.1	Equipment without AGC	65
7.7.2	Equipment with AGC	66
7.8	Data control signals, description of interface	66
7.9	Output level stability for TV modulators, TV converters and pilot generators	66
7.10	Pilot signal	66
7.11	Differential gain and phase	67
7.11.1	Differential gain	67
7.11.2	Differential phase	67
7.12	Group delay variation for analogue TV signals	67
7.13	Luminance non-linearity	68
7.14	2T-pulse	68
7.15	20T-pulse	68
7.16	Ham modulation	68
7.17	Television carrier-to-noise ratio	68
7.18	Audio in TV	68
7.19	Processing units for FM radio	69
7.19.1	Audio input	69
7.19.2	Stereo crosstalk	69
7.19.3	Total harmonic distortion	69
7.19.4	Intermodulation distortion	69
7.19.5	Deviation, pre-emphasis	69
7.20	Antennas for terrestrial reception	69
7.20.1	Antenna gain	69
7.20.2	Sidelobe suppression	69
7.20.3	Return loss of antennas	69

7.21 Control signals for outdoor units.....	70
Annex A (normative) Definition of the specified test frequency range for return loss and noise figure.....	71
Annex B (informative) Audio connector for European system.....	73
Annex C (informative) Selectivity diagram for adjacent channel transmission.....	74
Annex D (informative) Differences in some countries.....	79
Annex E (normative) Correction factors for noise.....	80
Annex F (informative) Digital signal level and bandwidth.....	82
Annex G (informative) Minimum frequency distance of converted satellite signals in the IF range.....	83
Annex H (informative) Measurement errors which occur due to mismatched equipment.....	86
Annex I (normative) Correction factor for spectrum analyser.....	87
Bibliography.....	88
Figure 1 – Example of headend.....	12
Figure 2 – Frequencies and levels of test carriers.....	24
Figure 3 – Test carrier and interfering products in the pass band.....	25
Figure 4 – Example showing products formed when $2f_a > f_b$	26
Figure 5 – Carrier-to-spurious signal ratio in the output.....	27
Figure 6 – Carrier-to spurious signal ratio at the output.....	28
Figure 7 – Shoulder attenuation.....	28
Figure 8 – Arrangement of test equipment for carrier-to-noise ratio measurement.....	29
Figure 9 – Arrangement of test equipment for measurement of differential gain and phase.....	37
Figure 10 – Signal D2 waveform.....	37
Figure 11 – Example of modified staircase.....	37
Figure 12 – Measuring set-up for determining the group delay variation.....	38
Figure 13 – RF signal (time domain) amplitude-modulated with a split-frequency signal.....	39
Figure 14 – Spectral presentation of the group delay measurement.....	40
Figure 15 – Description of the measuring set-up.....	41
Figure 16 – Choices of measuring aperture (value of the split frequency) for various measurement tests.....	41
Figure 17 – Test set-up for phase noise measurement.....	43
Figure 18 – Mask for phase noise measurements.....	44
Figure 19 – Carrier/hum ratio.....	45
Figure 20 – Test set-up for equipment with built-in power supply.....	46
Figure 21 – Test set-up for equipment with external power supply.....	46
Figure 22 – Oscilloscope display.....	47
Figure 23 – K-factor mask for Quality Grade 2.....	48
Figure 24 – Generation of 20T-pulse.....	49
Figure 25 – Example of amplitude and delay error using 20T-pulse.....	50
Figure 26 – Staircase signal for measurement of luminance non-linearity before and after differentiation.....	51

Figure 27 – Example of a possible frequency combination displayed on a spectrum analyser.....	51
Figure 28 – Arrangement of test equipment for intermodulation distortion	52
Figure 29 – Principal measuring set-up for determination of decoding margin	53
Figure 30 – Example of diagram of <i>NF</i> , <i>C/N</i> or <i>S/N</i> for equipment with AGC	66
Figure A.1 – Test frequency range for TV channel processors	71
Figure A.2 – Test frequency range for sub-band, full-band, multi-band amplifier	71
Figure A.3 – Test frequency range for FM radio channel processor.....	72
Figure B.1 – Mechanical dimensions.....	73
Figure C.1 – Selectivity diagram	74
Figure C.2 – Selectivity diagram	75
Figure C.3 – Selectivity diagram	76
Figure C.4 – Group delay mask.....	76
Figure C.5 – Group delay pre-correction diagram.....	77
Figure C.6 – Selectivity diagram	77
Figure C.7 – Group delay mask.....	78
Figure C.8 – Selectivity diagram	78
Figure E.1 – Noise correction factor <i>CF</i> (dB) versus measured level difference <i>D</i> (dB)	81
Figure G.1 – Frequency tolerance of converted signals in the IF range	85
Figure H.1 – Error concerning return loss measurement	86
Figure H.2 – Maximum ripple	86
Table 1 – Test signal levels in decibels relative to reference level	23
Table 2 – Test signal levels in decibels relative to reference level	24
Table 3 – Test signal levels in decibels relative to reference level	27
Table 4 – Noise bandwidth.....	31
Table 5 – Frequency distances for phase noise measurement	43
Table 6 – Publications for environmental requirements of headend equipment.....	55
Table 7 – Return loss (input/output) of equipment.....	56
Table 8 – Return loss (input) of headend	56
Table 9 – Typical level of digital signals with respect to analogue signals (back off).....	57
Table 10 – Carrier-to-spurious-signals ratio of digital modulated channel with respect to the peak level of an analogue TV carrier.....	57
Table 11 – Frequency stability for AM TV related to the nominal AM TV frequency	58
Table 12 – Long-term frequency stability for digital modulated signals	58
Table 13 – Shoulder attenuation for digital modulated signals.....	59
Table 14 – Phase noise of a DVB signal (PSK and QAM).....	59
Table 15 – Phase noise of a DVB signal (OFDM).....	59
Table 16 – In-channel group delay variation for digital modulated signals	60
Table 17 – In-channel peak-to-peak amplitude response variation of DVB signals	60
Table 18 – Stability of sound intercarrier.....	60
Table 19 – Stability of residual carrier amplitude.....	61
Table 20 – Frequency stability – SAT IF/IF converter.....	61
Table 21 – Minimum requirements for MER for different QAM modulation schemes	61

Table 22 – C/N values for converters at the headend output	61
Table 23 – Return loss	62
Table 24 – Signal voltage	62
Table 25 – Signal level	63
Table 26 – Requirements for decoding margin (Teletext)	63
Table 27 – Return loss – IF signal	63
Table 28 – Return loss – Antennas for terrestrial reception	63
Table 29 – Recommended temperature ranges	64
Table 30 – Carrier-to-third-order intermodulation ratio for maximum output level of channel amplifiers/frequency converters	64
Table 31 – Carrier-to-third-order intermodulation ratio for maximum output level of sub-band, full band, multi-band amplifiers and multi-channel frequency converters for AM TV (not for channel amplifier)	64
Table 32 – Carrier-to-second-order intermodulation ratio for maximum output level of sub-band, full band, multi-band amplifiers and frequency converters for AM TV or FM radio (not for channel amplifier)	65
Table 33 – Carrier-to-intermodulation ratio for maximum output level of FM TV channel amplifiers/frequency converters	65
Table 34 – Carrier-to-third-order intermodulation ratio for maximum output level of FM TV full band, sub-band amplifiers	65
Table 35 – Output level stability for TV modulators and TV converters	66
Table 36 – Recommendation for differential gain	67
Table 37 – Recommendation for differential phase	67
Table 38 – Recommendation for group delay variation	67
Table 39 – Recommendation for luminance non-linearity	68
Table 40 – K-factor masks for 2T-pulse responses	68
Table 41 – Recommendations for sidetone suppression	69
Table 42 – Recommendation for return loss of antennas	69
Table B.1 – Mechanical dimensions	73
Table B.2 – Pin and signal allocation	73
Table B.3 – Application	73
Table C.1 – Selectivity table	75
Table C.2 – Group delay pre-correction table	77
Table E.1 – Noise correction factor	80
Table F.1 – Examples of bandwidths for digital modulation techniques	84

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.
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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 content 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

- 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 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.

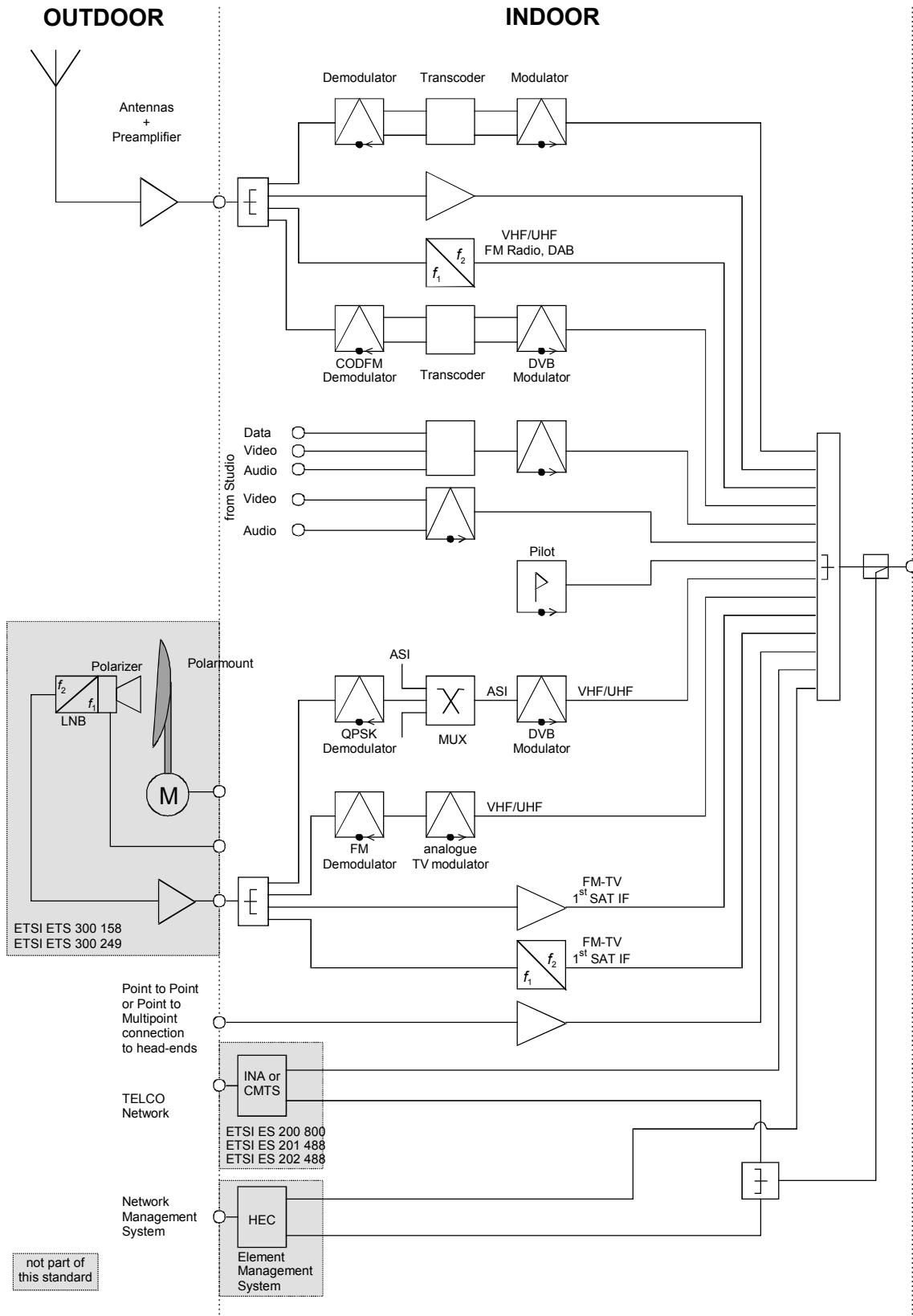


Figure 1 – Example of headend

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, *Graphical 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)*