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Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve - 2-1. del: Meritve elektromagnetne združljivosti

Cable networks for television signals, sound signals and interactive services - Part 2-1: Electromagnetic compatibility measurements

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 2-1: Messungen der elektromagnetischen Verträglichkeit

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Cable networks for television signals, sound signals and interactive services - Part 2-1: Electromagnetic compatibility measurements

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Foreword

This document (CLC/TR 50083-2-1:2014) has been prepared by CLC/TC 209 "Cable networks for television signals, sound signals and interactive services".

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CENELEC [and/or CEN] shall not be held responsible for identifying any or all such patent rights.

1 Scope

1.1 General

Standards and deliverables of EN 60728 series deal 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.

1.2 Specific scope of CLC/TR 50083-2-1

This Technical Report describes EMC measurements using specific measuring apparatus or alternative methods of measurement (e.g. spectrum analyser) and applies to the radiation characteristics of EM-active equipment (active and passive equipment) for the reception, processing and distribution of television, sound and interactive multimedia signals as dealt with in the following parts of EN 50083 or EN 60728 series:

- EN 60728-3 "Active wideband equipment for coaxial cable networks";
- EN 60728-4 "Passive wideband equipment for coaxial cable networks";
- EN 60728-5 "Headend equipment";
- EN 60728-6 "Optical equipment";

and covers the following frequency ranges:

- 150 kHz to 30 MHz;
- 30 MHz to 1 GHz.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050-161, *International Electrotechnical Vocabulary (IEV) – Chapter 161: Electromagnetic compatibility*

EN 55016-1-1, *Specification for radio disturbance and immunity measuring apparatus and methods – Part 1-1: Radio disturbance and immunity measuring apparatus – Measuring apparatus (CISPR 16-1-1)*

ISO/IEC Guide 99:2007, *International vocabulary of metrology - Basic and general concepts and associated terms (VIM)*

3 Term, definitions, symbols and abbreviations

3.1 Terms and definitions

For the purpose of this document, the following terms and definitions apply. Also see IEC 60050-161 and the ISO/IEC Guide 99:2007.

3.1.1
bandwidth
***B*n**
the width of the overall selectivity curve of the receiver between two points at a stated attenuation below the midband response. The bandwidth is represented by the symbol B_n, where n is the stated attenuation in decibels

3.1.2
CATV network
originally defined as Community Antenna Television network; now covering regional and local broadband cable networks designed to provide sound and television signals as well as signals for interactive services to a regional or local area

3.1.3
CISPR indicating range
it is the range specified by the manufacturer which gives the maximum and the minimum meter indications within which the receiver meets the requirements of this section of CISPR 16

3.1.4
electrical charge time constant
***T*C**
the time needed after the instantaneous application of a constant sine-wave voltage to the stage immediately preceding the input of the detector for the output voltage of the detector to reach 63 % of its final value

Note 1 to entry: This time constant is determined as follows: A sine-wave signal of constant amplitude and having a frequency equal to the mid-band frequency of the IF amplifier is applied to the input of the stage immediately preceding the detector. The indication, *D*, of an instrument having no inertia (e.g., a cathode-ray oscilloscope) connected to a terminal in the DC amplifier circuit so as not to affect the behaviour of the detector, is noted. The level of the signal is chosen such that the response of the stages concerned remains within the linear operating range. A sine wave signal of this level, applied for a limited time only and having a wave train of rectangular envelope is gated such that the deflection registered is 0,63 *D*. The duration of this signal is equal to the charge time of the detector.

3.1.5
electrical discharge time constant
T_D
the time needed after the instantaneous removal of a constant sine-wave voltage applied to the stage immediately preceding the input of the detector for the output of the detector to fall to 37 % of its initial value

Note 1 to entry: The method of measurement is analogous to that for the charge time constant, but instead of a signal being applied for a limited time, the signal is interrupted for a definite time. The time taken for the deflection to fall to 0,37 *D* is the discharge time constant of the detector.

3.1.6
electromagnetic-active equipment
all passive and active equipment carrying RF signals are considered as electromagnetic-active equipment because they are liable to cause electromagnetic disturbances or the performance of them is liable to be affected by such disturbances

3.1.7
extended satellite television distribution network or system
distribution network or system designed to provide sound and television signals received by satellite receiving antenna to households in one or more buildings

Note 1 to entry: This kind of network or system could be eventually combined with terrestrial antennas for the additional reception of TV and/or radio signals via terrestrial networks.

Note 2 to entry: This kind of network or system could also carry control signals for satellite switched systems or other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction.

3.1.8
extended terrestrial television distribution network or system
distribution network or system designed to provide sound and television signals received by terrestrial receiving antenna to households in one or more buildings

Note 1 to entry: This kind of network or system could be eventually combined with a satellite antenna for the additional reception of TV and/or radio signals via satellite networks.

Note 2 to entry: This kind of network or system could also carry other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction.

3.1.9
impulse bandwidth
B_{imp}

$$B_{\mathrm{imp}} = A(t)_{\max} \;/\; (2G_o \times IS)$$

where

$A(t)_{max}$ is the peak of the envelope at the IF output of the receiver with an impulse area *IS* applied at the receiver input;

G_o is the gain of the circuit at the centre frequency.

Specifically for two critically-coupled tuned transformers,

$$B_{\mathrm{imp}} = 1{,}05 \times B_6 = 1{,}31 \times B_3$$

where

B_6 and B_3 are respectively the bandwidths at the –6 dB and –3 dB points.

3.1.10
impulse area
IS
the impulse area (sometimes called impulse strength, *IS*) is the voltage-time area of a pulse defined by the integral:

$$IS = \int_{-\infty}^{+\infty} V(t)\,\mathrm{d}t \qquad \text{(expressed in µVs or dB(µVs))}$$

Note 1 to entry: Spectral density (δ) is related to impulse area and expressed in µV/MHz or dB(µV/MHz). For rectangular impulses of pulse duration T at frequencies $f << 1/T$, the relationship δ (µV/MHz) = 2 10^6 *IS* (µVs) applies.

3.1.11
individual satellite television receiving system
system designed to provide sound and television signals received from satellite(s) to an individual household

Note 1 to entry: This kind of system could also carry control signals for satellite switched systems or other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction.

3.1.12
individual terrestrial television receiving system
system designed to provide sound and television signals received via terrestrial broadcast networks to an individual household

Note 1 to entry: This kind of system could also carry other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction.

3.1.13
local broadband cable network
network designed to provide sound and television signals as well as signals for interactive services to a local area (e.g. one town or one village)

3.1.14
MATV network
originally defined as Master Antenna Television network; now covering extended terrestrial television distribution networks or systems designed to provide sound and television signals received by terrestrial receiving antenna to households in one or more buildings

Note 1 to entry: This kind of network or system could be eventually combined with a satellite antenna for the additional reception of TV and/or radio signals via satellite networks.

Note 2 to entry: This kind of network or system could also carry other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction.

3.1.15
mechanical time constant of a critically damped indicating instrument
***T*M**

$$T_{\mathrm{M}} = T_{\mathrm{L}} / \ 2\pi$$

where:

T_{L} is the period of free oscillation of the instrument with all damping removed.

Note 1 to entry: For a critically damped instrument, the equation of motion of the system may be written as:

$$T_{\mathrm{M}}{}^{2}\left(\mathrm{d}^{2}\alpha / \ \mathrm{d}t^{2}\right) + 2T_{\mathrm{M}}\left(\mathrm{d}\alpha / \ \mathrm{d}t\right) + \alpha = \mathrm{k}i$$

where:

α is the deflection;

i is the current through the instrument;

k is a constant.

It can be deduced from this relationship that the time constant is also equal to the duration of a rectangular pulse (of constant amplitude) that produces a deflection equal to 35 % of the steady deflection produced by a continuous current having the same amplitude as that of the rectangular pulse.

Note 2 to entry: The methods of measurement and adjustment are deduced from one of the following:

a) The period of free oscillation having been adjusted to $2\pi T_M$, damping is added so that $\alpha T = 0{,}35\alpha_{max}$.

b) When the period of oscillation cannot be measured, the damping is adjusted to be just below critical such that the over swing is not greater than 5 % and the moment of inertia of the movement is such that $\alpha T = 0{,}35\alpha_{max}$.

3.1.16
overload factor
the ratio of the level that corresponds to the range of practical linear function of a circuit (or a group of circuits) to the level that corresponds to full-scale deflection of the indicating instrument. The maximum level at which the steady-state response of a circuit (or group of circuits) does not depart by more than 1 dB from ideal linearity defines the range of practical linear function of the circuit (or group of circuits)

3.1.17
regional broadband cable network
network designed to provide sound and television signals as well as signals for interactive services to a regional area covering several towns and/or villages

3.1.18
SMATV network
originally defined as Satellite Master Antenna Television network; now covering extended distribution networks or systems designed to provide sound and television signals received by satellite receiving antenna to households in one or more buildings

Note 1 to entry: This kind of network or system could be eventually combined with terrestrial antennas for the additional reception of TV and/or radio signals via terrestrial networks.

Note 2 to entry: This kind of network or system could also carry control signals for satellite switched systems or other signals for special transmission systems (e.g. MoCA or WiFi) in the return path direction

3.1.19
symmetric voltage
in a two-wire circuit, such as a single-phase mains supply, the symmetric voltage is the radiofrequency disturbance voltage appearing between the two wires. This is sometimes called the differential mode voltage. If V_a is the vector voltage between one of the mains terminals and earth and V_b is the vector voltage between the other mains terminal and earth, the symmetric voltage is the vector difference (V_a-V_b)

3.1.20
weighting (of e.g. impulsive disturbance)
the pulse-repetition-frequency (PRF) dependent conversion (mainly a reduction) of a peak detected impulse voltage level to an indication that corresponds to the interference effect on radio reception:

– for an analogue receiver, the psychophysical annoyance of the interference is a subjective quantity (audible or visual);

– for a digital receiver, the interference effect is an objective quantity that may be defined by the critical bit error ratio (BER) (or bit error probability (BEP)) for which perfect error correction can still occur or by another, objective and reproducible parameter

3.1.21
weighting characteristic
the peak voltage level as a function of PRF for a constant effect on a specific radio communication system, i.e., the disturbance is weighted by the radio communication system itself

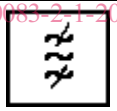
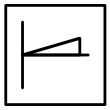
3.1.22
weighting function or weighting curve
the relationship between input peak voltage level and PRF for constant level indication of a measuring receiver with a weighting detector, i.e. the curve of response of a measuring receiver to repeated pulses

3.1.23
weighting factor
the value in dB of the weighting function relative to a reference PRF or relative to the peak value

3.1.24
weighting detector
detector which provides an agreed weighting function

3.1.25
weighted disturbance measurement
measurement of disturbance using a weighting detector

3.2 Symbols

Graphical Symbol	Reference number and Title	Graphical Symbol	Reference number and Title
	Receiving antenna		Amplifier [S01239]
	IEC 60617 (SO1248) Low pass filter		Band-pass filter (BPF) [S01249]
	level meter		Display unit
	IEC 60617 (SO1226) Sinusoidal signal generator		Sweep signal generator
	Detector		Mixer