SLOVENSKI STANDARD
SIST-TS CLC/TS 50083-3-3:2015

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Kabelska omrežja za televizijske in zvokovne signale ter interaktivne storitve - 3-3. del: Aktivna širokopasovna oprema za kabelska omrežja - Metode za merjenje največje ravni operacijskega izhoda na povratni poti

Cable networks for television signals, sound signals and interactive services - Part 3-3: Active wideband equipment for cable networks - Methods of measurement of the maximum operating output level in the return path

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 3-3: Aktive Breitbandgeräte für Kabelnetze - Messverfahren für den maximalen Betriebs-Ausgangspegel im Rückweg

Systèmes de distribution par cables destinés aux signaux de radiodiffusion sonore, de télévision et multimedia interactive - Partie 3-3 : ….

Ta slovenski standard je istoveten z: **CLC/TS 50083-3-3:2014**

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33.060.40 Kabelski razdelilni sistemi Cabled distribution systems

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TECHNICAL SPECIFICATION

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English Version

Cable networks for television signals, sound signals and interactive services - Part 3-3: Active wideband equipment for cable networks - Methods of measurement of the maximum operating output level in the return path

Réseaux de distribution par câbles pour signaux de télévision, signaux de radiodiffusion sonore et services interactifs - Partie 3-3: Matériel actifs à large bande utilisés dans les réseaux de distribution - Méthodes de mesure du niveau de sortie maximal de fonctionnement dans la voie de retour

Kabelnetze für Fernsehsignale, Tonsignale und interaktive Dienste - Teil 3-3: Aktive Breitbandgeräte für Kabelnetze - Messverfahren für den maximalen Betriebs-Ausgangspegel im Rückweg

This Technical Specification was approved by CENELEC on 2014-09-30.

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European Committee for Electrotechnical Standardization
Comité Européen de Normalisation Electrotechnique
Europäisches Komitee für Elektrotechnische Normung

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Foreword

This document (CLC/TS 50083-3-3:2014) has been prepared by CLC/TC 209 “Cable networks for television signals, sound signals and interactive services”.

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Introduction

Standards and deliverables of EN 60728 series and EN 50083 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 Scope

This Technical Specification is applicable to the method of nonlinearity measurement for active cable network equipment which carry a digital channel load in the return path. The digital channel load is represented by standard DVB-C signals. The method of measurement of the maximum operating output level takes account of a full channel load in the return path frequency range although different applications of return path amplifiers with partial channel load or single channel load are also in practical use. The maximum operating output level for applications with reduced channel loads could be derived from the result with a full channel load by applying a given calculation formula.

The method considers the specific signal form and behaviour of digitally modulated signals and can be applied in the return path frequency range (5 MHz to 65 MHz) as well as in the extended return path frequency range (5 MHz to 85 MHz) according to EN 60728-10.

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.

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

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

3 Terms, definitions, symbols and abbreviations

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

3.1 Terms and definitions

3.1.1
attenuation
ratio of the input power to the output power of an equipment or system, usually expressed in decibels

3.1.2
bit error ratio
BER
ratio between erroneous bits and the total number of transmitted bits

3.1.3
gain
ratio of the output power to the input power, usually expressed in decibels

3.1.4
level
decibel ratio of any power P_1 to the standard reference power P_0, i.e

$$10 \lg \frac{P_1}{P_0}$$

decibel ratio of any voltage U_1 to the standard reference voltage U_0, i.e

$$20 \lg \frac{U_1}{U_0}$$

Note 1 to entry: The power level may be expressed in decibels relative to $P_0 = (U_0^2/R) = (1/75)$ pW, i.e. in dB(P_0), taking into account that the level of P_0 corresponds to 0 dB(P_0) or, as more usually, in dB(pW), taking into account that the level of P_0 corresponds to –18,75 dB(pW). The voltage level is expressed in decibels relative to 1 µV (across 75 Ω), i.e. in dB(µV).

3.1.5
maximum operating output level (worst-case)
***U*max (*N*)**
worst-case of maximum channel output level of a digitally modulated signal in the 64 QAM format with a symbol rate of 6,9 MSymb/s with 15 % cosine roll-off, measured with full digital channel load

3.1.6
maximum operating output level
***U*max,i (*N*)**
measured maximum operating output level of a single measurement channel i with full digital channel load

3.1.7
modulation error ratio
MER
sum of the squares of the magnitudes of the ideal symbol vectors is divided by the sum of the squares of the magnitudes of the symbol error vectors of a sequence of symbols, the result being expressed as a power ratio in dB

$$MER = 10 \lg \left\{ \frac{\sum_{j=1}^{N} \left(I_j^2 + Q_j^2 \right)}{\sum_{j=1}^{N} \left(\delta I_j^2 + \delta Q_j^2 \right)} \right\} \text{ in dB}$$

3.1.8
modulation error ratio of EUT
***MER*EUT**

calculated value of modulation error ratio of the EUT following Figure 1 and using the following formula

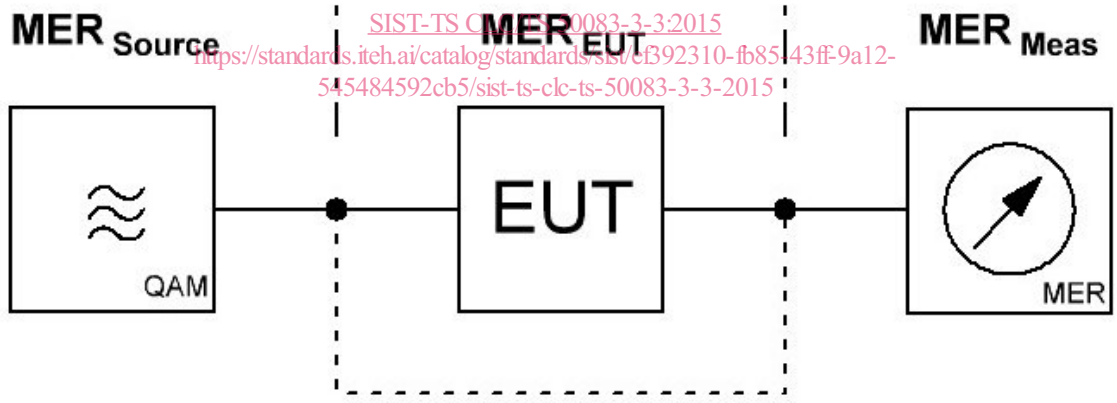


Figure 1 − Interrelation between different MER contributions

$$MER_{\text{EUT}} = -10 \ \lg \left(10^{-\frac{MER_{\text{Meas}}}{10}} - 10^{-\frac{MER_{\text{Source}}}{10}} \right)$$

Note 1 to entry: The calculation with 10·lg is used for simplification reasons although it is well known that the disturbing signal comprises of noise and nonlinear portions.

3.1.9
modulation error ratio of complete measurement setup
***MER*$_{Meas}$**
measured value of modulation error ratio of the complete measurement setup according to Figure 1 including the equipment under test (EUT)

3.1.10
modulation error ratio of signal source
***MER*$_{Source}$**
measured value of modulation error ratio of the signal generator when signal generator and measurement receiver are directly connected

3.1.11
slope
difference in gain or attenuation at two specified frequencies between any two points in an equipment or system

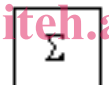
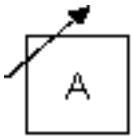
Note 1 to entry: The slope sign is considered

a) negative when the attenuation increases with frequency (cables) or the gain (amplifiers) decreases with frequency,

b) positive when the gain (amplifiers) increases with frequency (compensating slope).

3.2 Symbols

The following graphical symbols are used in the figures of this Technical Specification. These symbols are either listed in IEC 60617 or based on symbols defined in IEC 60617.

Symbols	Terms	Symbols	Terms
	Equipment Under Test based on [IEC 60617-S00059 (2001–07)]		Combiner based on [IEC 60617-S00059 (2001–07)]
	Variable attenuator [IEC 60617-S01245 (2001–07)]		Amplifier [IEC 60617-S01239 (2001–07]
	Modulator [IEC 60617-S01278 (2001–07)]		Demodulator [IEC 60617-S01278 (2001–07]