



BSI Standards Publication

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

National foreword

This Published Document is the UK implementation of CLC/TS 50083-3-3:2014.

The UK participation in its preparation was entrusted by Technical Committee EPL/100, Audio, video and multimedia systems and equipment, to Subcommittee EPL/100/4, Cable distribution equipment and systems.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2014.
Published by BSI Standards Limited 2014

ISBN 978 0 580 85962 5
ICS 33.060.40

Compliance with a British Standard cannot confer immunity from legal obligations.

This Published Document was published under the authority of the Standards Policy and Strategy Committee on 30 November 2014.

Amendments/corrigenda issued since publication

Date	Text affected
-------------	----------------------

TECHNICAL SPECIFICATION
SPÉCIFICATION TECHNIQUE
TECHNISCHE SPEZIFIKATION

CLC/TS 50083-3-3

November 2014

ICS 33.060.40

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.

CENELEC members are required to announce the existence of this TS in the same way as for an EN and to make the TS available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Bulgaria, Croatia, Cyprus, the Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

Foreword.....	3
Introduction.....	4
1 Scope	5
2 Normative references	5
3 Terms, definitions, symbols and abbreviations	5
3.1 Terms and definitions	5
3.2 Symbols	7
3.3 Abbreviations	8
4 Method of measurement of the maximum operating output level in the return path.....	8
4.1 General.....	8
4.1.1 Channel load and modulation format	8
4.1.2 Return path frequency ranges	8
4.1.3 Applied limit values	8
4.2 Measurement parameters for full channel load ($N = 6$ or $N = 8$)	9
4.3 Equipment required.....	9
4.4 Connection of the equipment.....	10
4.5 Measurement procedure	10
4.6 Presentation of the measurement results.....	11
4.7 Maximum operating output level for reduced channel loads	11
Annex A (normative) Null packet and PRBS definitions	12
A.1 Null packet definition	12
A.2 PRBS definition.....	13
Annex B (informative) Calculation formula for the maximum operating output level for reduced channel loads.....	14
B.1 General.....	14
B.2 Measurement results as basis for calculation formula for reduced channel loads	14
B.3 Calculation formula for median value	15
B.4 Calculation formula for worst-case value	15
Bibliography	16

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".

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.

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 μ V (across 75 Ω), i.e. in dB(μ V).