
Methods of measurement for equipment used in digital microwave radio transmission systems - Part 2: Measurements on terrestrial radio-relay systems - Section 4: Transmitter/receiver including modulator/demodulator (IEC 60835-2-4:1993)

Methods of measurement for equipment used in digital microwave radio transmission systems -- Part 2: Measurements on terrestrial radio-relay systems -- Section 4: Transmitter/receiver including modulator/demodulator

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Meßverfahren für Geräte in digitalen Mikrowellen-Funkübertragungssystemen -- Teil 2: Messungen an terrestrischen Richtfunksystemen -- Hauptabschnitt 4: Sender/Empfänger einschließlich Modulator/Demodulator

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Méthodes de mesure applicables au matériel utilisé pour les systèmes de transmission numérique en hyperfréquence -- Partie 2: Mesures applicables aux faisceaux hertziens terrestres -- Section 4: Emetteur/récepteur, modulateur/démodulateur inclus

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33.060.30 Radiorelejni in fiksni satelitski komunikacijski sistemi Radio relay and fixed satellite communications systems

SIST EN 60835-2-4:2002**en**

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EUROPEAN STANDARD

EN 60835-2-4

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IEC/SC17E

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Descriptors: Radiocommunications, telecommunications, communication equipment, radio-relay systems, microwave frequencies, digital technics, transmitters, receivers, modems, measurements, characteristics

English version

**Methods of measurement for equipment used in digital
microwave radio transmission systems
Part 2: Measurements on terrestrial radio-relay systems
Section 4: Transmitter/receiver including modulator/demodulator
(IEC 835-2-4:1993)**

Méthodes de mesure applicables au matériel utilisé pour les systèmes de transmission numérique en hyperfréquence

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(CEI 835-2-4:1993)

Meßverfahren für Geräte in digitalen Mikrowellen-Funkübertragungssystemen

Teil 2: Messungen an terrestrischen Richtfunksystemen

Hauptabschnitt 4: Sender/Empfänger einschließlich Modulator/Demodulator
(IEC 835-2-4:1993)

This European Standard was approved by CENELEC on 1994-12-06. CENELEC members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CENELEC member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CENELEC member into its own language and notified to the Central Secretariat has the same status as the official versions.

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CENELEC

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

Central Secretariat: rue de Stassart 35, B - 1050 Brussels

Foreword

The text of the International Standard IEC 835-2-4:1993, prepared by SC 12E, Radio-relay and fixed satellite communications systems, of IEC TC 12, Radiocommunications, was submitted to the formal vote and was approved by CENELEC as EN 60835-2-4 on 1994-12-06 without any modification.

The following dates were fixed:

- latest date by which the EN has to be implemented at national level by publication of an identical national standard or by endorsement (dop) 1995-12-01
- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 1995-12-01

Annexes designated "normative" are part of the body of the standard.
Annexes designated "informative" are given for information only.
In this standard, annex ZA is normative and annex A is informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 835-2-4:1993 was approved by CENELEC as a European Standard without any modification.

SIST EN 60835-2-4:2002

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ANNEX ZA (normative)

OTHER INTERNATIONAL PUBLICATIONS QUOTED IN THIS STANDARD
WITH THE REFERENCES OF THE RELEVANT EUROPEAN PUBLICATIONS

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

NOTE : When the international publication has been modified by CENELEC common modifications, indicated by (mod), the relevant EN/HD applies.

IEC Publication	Date	Title	EN/HD	Date
835-1-1	1990	Methods of measurement for equipment used in digital microwave radio transmission systems - Part 1: Measurements common to terrestrial radio-relay systems and satellite earth stations - Section 1: General	EN 60835-1-1	1992
835-1-2	1992	Section 2: Basic characteristics	EN 60835-1-2	1993
835-1-3	1992	Section 3: Transmission characteristics	EN 60835-1-3	1995
835-1-4	1992	Section 4: Transmission performance	EN 60835-1-4	1995
835-2-1	1990	Part 2: Measurements on terrestrial radio-relay systems Section 1: General	EN 60835-2-1	1992
835-2-5	1993	Section 5: Digital signal processing sub-system	EN 60835-2-5	1995
835-2-8	1993	Section 8: Adaptive equalizer	EN 60835-2-8	1993

Other publications:

-
- CCIR Recommendation 556 - Hypothetical reference digital path for radio-relay systems which may form part of an integrated services digital network; systems with a capacity above the second hierarchical level
- CCIR Recommendation 557 - Availability objective for a hypothetical reference circuit and a hypothetical reference digital path

Other publications:

-
- CCIR Recommendation 594 - Allowable bit error ratios at the output of the hypothetical reference digital path for radio-relay systems which may form part of an integrated services digital network
- CCITT Recommendation 0.151 - Specification for instrumentation to measure error performance on digital systems
- CCITT Recommendation G.703 - Physical/electrical characteristics of hierarchical digital interfaces

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**NORME
INTERNATIONALE
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STANDARD**

**CEI
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First edition
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**Méthodes de mesure applicables au matériel
utilisé pour les systèmes de transmission
numérique en hyperfréquence**

Partie 2:
Mesures applicables aux faisceaux hertziens
terrestres

**Section 4: Emetteur/récepteur,
modulateur/démodulateur inclus**

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**Methods of measurement for equipment used
in digital microwave radio transmission
systems**

Part 2:
Measurements on terrestrial radio-relay systems
**Section 4: Transmitter/receiver including
modulator/demodulator**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**METHODS OF MEASUREMENT FOR EQUIPMENT
USED IN DIGITAL MICROWAVE RADIO
TRANSMISSION SYSTEMS**

**Part 2: Measurements on terrestrial
radio-relay systems
Section 4: Transmitter/receiver including
modulator/demodulator**

FOREWORD

- 1) The IEC (International Electrotechnical Commission) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of the IEC is to promote international cooperation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, the IEC publishes International Standards. 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. The 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 the IEC on technical matters, prepared by technical committees on which all the National Committees having a special interest therein are represented, express, as nearly as possible, an international consensus of opinion on the subjects dealt with.
- 3) They have the form of recommendations for international use published in the form of standards, technical reports or guides and they are accepted by the National Committees in that sense.
- 4) In order to promote international unification, IEC National Committees undertake to apply IEC International Standards transparently to the maximum extent possible in their national and regional standards. Any divergence between the IEC Standard and the corresponding national or regional standard shall be clearly indicated in the latter.

International Standard IEC 835-2-4 has been prepared by sub-committee 12E: Radio-relay and fixed satellite communications systems, of IEC technical committee 12: Radiocommunications.

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

DIS	Report on Voting
12E(CO)137	12E(CO)150

Full information on the voting for the approval of this standard can be found in the report on voting indicated in the above table.

IEC 835 consists of the following parts, under the general title: Methods of measurement for equipment used in digital microwave radio transmission systems:

- Part 1: Measurements common to terrestrial radio-relay systems and satellite earth stations.
- Part 2: Measurements on terrestrial radio-relay systems.
- Part 3: Measurements on satellite earth stations.

Annex A is for information only.

INTRODUCTION

Several types of modulation may be used for the transmission of the main digital signal. Of these, only measurements applicable to systems using phase modulation or phase and amplitude modulation, e.g. PSK and n-QAM, will be covered in this section of IEC 835-2, since these modulation types are employed in the majority of digital radio-relay systems.

The digital transmitter is preceded by a transmit signal processor which modifies the multiplexed digital to facilitate radio transmission. Similarly, the receiver is followed by a receive signal processor in order to recover the digital signal. Measurements on these signal processors are dealt with in IEC 835-2-5, but in order to clarify their main functions and interconnection points in transmitter/receiver measurements, examples are given in figure 1. A further function of signal processors, not shown in figure 1, may be the combination and separation of more than one bit-stream.

The interconnection points between the transmit processor and modulators and also between the receive processor and demodulator are not always accessible.

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Digital transmitter and receiver measurements are conveniently grouped into three parts for testing; measurements on transmitters including modulators are given in clause 3, measurements on receivers including demodulators in clause 4, whilst clause 5 deals with transmit-receive section (or "hop") measurements. For some of the parameters, only those aspects related to the fact that the measurement is carried out on a transmitter or receiver are given, and reference is made to other sections of IEC 835-2 for detailed methods of measurements.

All measurements should be carried out under specified environmental conditions, such as temperature and humidity, in accordance with IEC 835-2-1.