SLOVENSKI STANDARD

SIST EN 61290-10-3:2004

september 2004

Optični ojačevalci – Preskusne metode – 10-3. del: Parametri z več kanali - Metode merjenja s sondami (IEC 61290-10-3:2002)*

Optical amplifiers - Test methods - Part 10-3: Multichannel parameters - Probe methods (IEC 61290-10-3:2002)

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ICS 33.180.30

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EUROPEAN STANDARD **EN 61290-10-3**

NORME EUROPÉENNE

EUROPÄISCHE NORM July 2003

ICS 33.180.20

English version

Optical amplifiers - Test methods Part 10-3: Multichannel parameters - Probe methods

(IEC 61290-10-3:2002)

Amplificateurs optiques - Méthodes d'essai Partie 10-3: Paramètres à canaux multiples - Méthodes par sondage (CEI 61290-10-3:2002)

Prüfverfahren für Lichtwellenleiter-Verstärker Teil 10-3: Mehrkanalparameter - Sondenmessverfahren (IEC 61290-10-3:2002)

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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.

CENELEC members are the national electrotechnical committees of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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

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Ref. No. EN 61290-10-3:2003 E

Foreword

The text of document 86C/459/FDIS, future edition 1 of IEC 61290-10-3, prepared by SC 86C, Fibre optic systems and active devices, of IEC TC 86, Fibre optics, was submitted to the IEC-CENELEC parallel vote and was approved by CENELEC as EN 61290-10-3 on 2003-02-01.

This standard shall be read in conjunction with EN 61291-1:1998 and EN 61290-3:2000

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) 2004-02-01

– latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-02-01

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 annexes A and B are informative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61290-10-3:2002 was approved by CENELEC as a European Standard without any modification.

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In the official version, for Bibliography, the following notes have to be added for the standards indicated:

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IEC 60825-1	NOTE	Harmonized as EN 60825-1:1994 (not modified).
IEC 60825-2	NOTE	Harmonized as EN 60825-2:2000 (not modified).
IEC 60874-1	NOTE	Harmonized as EN 60874-1:1999 (not modified).

Annex ZA
(normative)

Normative references to international publications with their corresponding 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 (including amendments).

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

Publication	Year	Title	EN/HD	Year
IEC 61290-3	- [1)]	Optical fibre amplifiers - Basic specification Part 3: Test methods for noise figure parameters	EN 61290-3	2000 [2)]
IEC 61290-10-1	- [1)]	Optical amplifiers – Test methods Part 10-1: Multichannel parameters - Pulse method using an optical switch and optical spectrum analyzer	EN 61290-10-1	2003 [2)]
IEC 61290-10-2	- [1)]	Part 10-2: Multichannel parameters - Pulse method using a gated optical spectrum analyzer	EN 61290-10-2	2003 [2)]
IEC 61291-1	- [1)]	Optical fibre amplifiers Part 1: Generic specification	EN 61291-1	1998 [2)]
IEC 61291-4	- [1)]	Optical amplifiers Part 4: Multichannel applications - Performance specification template	EN 61291-4	2003 [2)]

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[1)] Undated reference.

[2)] Valid edition at date of issue.

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NORME INTERNATIONALE

INTERNATIONAL STANDARD

CEI
IEC
61290-10-3

Première édition
First edition
2002-12

Amplificateurs optiques – Méthodes d'essai –

Partie 10-3: Paramètres à canaux multiples – Méthodes par sondage

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Optical amplifiers – Test methods –

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Part 10-3: Multichannel parameters – Probe methods

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International Electrotechnical Commission
Международная Электротехническая Комиссия

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

OPTICAL AMPLIFIERS – TEST METHODS –

Part 10-3: Multichannel parameters – Probe methods

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 co-operation 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 express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested National Committees.
3) The documents produced have the form of recommendations for international use and are published in the form of standards, technical specifications, technical reports or guides and they are accepted by the National Committees in that sense.
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International Standard IEC 61290-10-3 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This standard should be read in conjunction with IEC 61291-1 and 61290-3

This bilingual version (2003-06) replaces the English version.

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

FDIS	Report on voting
86C/459/FDIS	86C/483/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 3.

The committee has decided that the contents of this publication will remain unchanged until 2008-12. At this date, the publication will be

- reconfirmed;
- withdrawn;
- replaced by a revised edition, or
- amended.

INTRODUCTION

Each abbreviation introduced in this International Standard is explained in the text at least the first time that it appears. However, for an easier understanding of the whole text, a list of all abbreviations used in this International Standard is given in Annex A.

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OPTICAL AMPLIFIERS – TEST METHODS –

Part 10-3: Multichannel parameters – Probe methods

1 Scope and object

This part of IEC 61290 applies to commercially available optical fibre amplifiers (OFAs) using active fibres containing rare-earth dopants as described in the following.

The object of this international standard is to establish uniform requirements for accurate and reliable measurements of the multichannel gain and noise parameters as defined in IEC 61291-4.

The test methods described in this standard use small-signal probes to obtain the multichannel gain and noise parameters while one or more lasers set the saturation condition for the OFA. These methods are classified as *indirect* in that there is not a laser source at each wavelength of the multichannel plan. Multichannel parameters are estimated from the probe data. IEC 61290-10-1 and IEC 61290-10-2 are test methods for measuring noise parameters using pulse techniques. These methods are *direct* in that the multichannel source is required to have a laser at each wavelength for which multichannel parameters are to be measured.

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Probe techniques provide clear advantages for measuring multichannel gain characteristics in that a simple source configuration can provide parameters for a wide range of multichannel plans. Either a small-signal laser or a broadband noise source serves as the probe signal, and single or multiple lasers are used to set the OFA saturation condition. Pulse modulation of the saturating sources may optionally be used to measure ASE at or near the saturating laser wavelengths without the contaminating effect of source spontaneous emission. If pulse modulation is not used, the source spontaneous emission must be measured, and its effect removed from the measured result. For a multichannel source with high spontaneous emission or at high total input power, the source noise subtraction method can lead to large uncertainty.

The probe techniques described herein are indirect in that laser sources are not required at each channel frequency. A measurement error results from inhomogeneous effects that are DUT dependent. The main source of this error is spectral hole burning (see [1][1] [2] and [4]).

The applicability of pulse modulation of the saturating signal(s) and the selection of the modulation rate are dependent on the optical fibre amplifier's characteristics, specifically its time response. They may be unsuitable for amplifiers with active automatic level control (ALC) or automatic gain control (AGC) circuits. They may also be unsuitable for praseodymium-doped OFAs that have gain relaxation times that are much faster than erbium-doped designs. For erbium-doped fibre amplifiers (EDFAs), inaccuracy due to modulation is generally small. Refer to IEC 61290-10-2 for a discussion of inaccuracy due to pulse repetition rate.

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[1] Numbers in brackets refer to the bibliography.