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**Optični ojačevalci – Preskusne metode – 10-1. del: Parametri z več kanali - Metoda s pulzom pri uporabi optičnega stikala in optičnega spektralnega analizatorja (IEC 61290-10-1:2003)\***

Optical amplifiers - Test methods - Part 10-1: Multichannel parameters - Pulse method using an optical switch and optical spectrum analyzer (IEC 61290-10-1:2003)

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English version

**Optical amplifiers -  
Test methods  
Part 10-1: Multichannel parameters -  
Pulse method using an optical switch  
and optical spectrum analyzer  
(IEC 61290-10-1:2003)**

Amplificateurs optiques -  
Méthodes d'essai  
Partie 10-1: Paramètres à canaux  
multiples -  
Méthode d'impulsion utilisant  
un interrupteur optique  
et un analyseur de spectre optique  
(CEI 61290-10-1:2003)

Prüfverfahren für Lichtwellenleiter-  
Verstärker  
Teil 10-1: Mehrkanalparameter -  
Pulsmethode bei Verwendung  
eines optischen Schalters  
und optischen Spektralanalysators  
(IEC 61290-10-1:2003)

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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 document 86C/498/FDIS, future edition 1 of IEC 61290-10-1, 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 61290-10-1 on 2003-05-01.

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- latest date by which the national standards conflicting with the EN have to be withdrawn (dow) 2006-05-01

The International Electrotechnical Commission (IEC) and CENELEC draw attention to the fact that it is claimed that compliance with this International Standard/European Standard may involve the use of two patents.

One patent concerns a technique for determining the amplified spontaneous emission noise of an optical amplifier in the presence of an optical signal given in clause 3 and clause 5.

The IEC and CENELEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured the IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with the IEC. Information may be obtained from:

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Attention is drawn to the possibility that some of the elements of this International Standard/European Standard may be the subject of patent rights other than those identified above. IEC and CENELEC shall not be held responsible for identifying any or all such patent rights.

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, B, and C are informative.  
Annex ZA has been added by CENELEC.

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### Endorsement notice

The text of the International Standard IEC 61290-10-1:2003 was approved by CENELEC as a European Standard without any modification.

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

IEC 60793-1	NOTE	Harmonized in EN 60793-1 series (modified).
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).
IEC 61290-1-1	NOTE	Harmonized as EN 61290-1-1:1998 (not modified).

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## 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.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN/HD</u>	<u>Year</u>
IEC 61290-3	- <sup>1)</sup>	Optical fibre amplifiers - Basic specification Part 3: Test methods for noise figure parameters	EN 61290-3	2000 <sup>2)</sup>
IEC 61291-1	- <sup>1)</sup>	Optical fibre amplifiers Part 1: Generic specification	EN 61291-1	1998 <sup>2)</sup>

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<sup>1)</sup> Undated reference.

<sup>2)</sup> Valid edition at date of issue.

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INTERNATIONALE  
INTERNATIONAL  
STANDARD**

**CEI  
IEC**

**61290-10-1**

Première édition  
First edition  
2003-03

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**Amplificateurs optiques –  
Méthodes d'essai –**

**Partie 10-1:  
Paramètres à canaux multiples –  
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optique et un analyseur de spectre optique**

**Optical amplifiers –  
Test methods –**

**Part 10-1:  
Multichannel parameters –  
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and optical spectrum analyzer**

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## INTERNATIONAL ELECTROTECHNICAL COMMISSION

**OPTICAL AMPLIFIERS –  
TEST METHODS –****Part 10-1: Multichannel parameters –  
Pulse method using an optical switch  
and optical spectrum analyzer**

## 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.
- 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.
- 5) The IEC provides no marking procedure to indicate its approval and cannot be rendered responsible for any equipment declared to be in conformity with one of its standards.

The International Electrotechnical Commission (IEC) draws attention to the fact that it is claimed that compliance with this document may involve the use of two patents.

One patent concerns a technique for determining the amplified spontaneous emission noise of an optical amplifier in the presence of an optical signal given in Clause 3 and Clause 5.

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International Standard IEC 61290-10-1 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 IEC 61290-3.

This bilingual version (2003-05) replaces the English version.

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

FDIS	Report on voting
86C/498/FDIS	86C/533/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 2.

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

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

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## INTRODUCTION

As far as can be determined, this part of IEC 61290 is the first International Standard on this subject. The technology of optical fibre amplifiers is quite new and still emerging, hence amendments and new editions to this document can be expected.

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

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## OPTICAL AMPLIFIERS – TEST METHODS –

### Part 10-1: Multichannel parameters – Pulse method using an optical switch and optical spectrum analyzer

#### 1 Scope and object

This part of IEC 61290 applies to optical fibre amplifiers (OFAs) using active fibres, containing rare-earth dopants, currently commercially available. It establishes uniform requirements for accurate and reliable measurements of the signal-spontaneous noise figure as defined in 3.1.18 of IEC 61291-1.

The test method independently detects amplified signal power and amplified spontaneous emission (ASE) power by launching optical pulses into the OFA under test and synchronously detecting “on” and “off” levels of the output pulses by using an optical sampling switch and an optical spectrum analyzer (OSA).

Such a measurement is possible because the gain response of the rare-earth doped OFA is relatively slow, particularly in Er-doped OFAs. However, since the OFA gain dynamics vary with amplifier types, operating conditions and control scheme, the amplifier type should be considered when applying the present test method.

The test method is described basically for multichannel applications, which includes single channel applications as a special case of multichannel (wavelength-division multiplexed) applications.

NOTE All numerical values followed by (‡) are intended to be currently under study.

#### 2 Normative references

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

IEC 61290-3, *Optical fibre amplifiers – Basic specification – Part 3: Test methods for noise figure parameters*

IEC 61291-1, *Optical fibre amplifiers – Part 1: Generic specification*

#### 3 Apparatus

The basic measurement set-up is given in Figure 1.