

**Optical amplifiers - Test methods -- Part 10-2:
Multichannel parameters - Pulse method
using a gated optical spectrum analyzer**

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Multichannel parameters - Pulse method using a
gated optical spectrum analyzer

EESTI STANDARDI EESSÕNA**NATIONAL FOREWORD**

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| <p>Käesolev Eesti standard EVS-EN 61290-10-2:2008 sisaldab Euroopa standardi EN 61290-10-2:2008 ingliskeelset teksti.</p> | <p>This Estonian standard EVS-EN 61290-10-2:2008 consists of the English text of the European standard EN 61290-10-2:2008.</p> |
| <p>Standard on kinnitatud Eesti Standardikeskuse 20.02.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> | <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 20.02.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> |
| <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 31.01.2008.</p> | <p>Date of Availability of the European standard text 31.01.2008.</p> |
| <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p> | <p>The standard is available from Estonian standardisation organisation.</p> |

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Võtmesõnad: amplifiers, basic specification, measuring techniques, optical fibres, optical waveguides, optics, testing

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English version

**Optical amplifiers -
Test methods -
Part 10-2: Multichannel parameters -
Pulse method using a gated optical spectrum analyzer
(IEC 61290-10-2:2007)**

Amplificateurs optiques -
Méthodes d'essai -
Partie 10-2: Paramètres
à canaux multiples -
Méthode d'impulsion utilisant un analyseur
de spectre optique stroboscopique
(CEI 61290-10-2:2007)

Prüfverfahren für
Lichtwellenleiter-Verstärker -
Teil 10-2: Mehrkanalparameter -
Pulsmethode bei Verwendung
eines ausblendbaren optischen
Spektralanalysators
(IEC 61290-10-2:2007)

This European Standard was approved by CENELEC on 2007-10-01. 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.

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

Foreword

The text of document 86C/772/FDIS, future edition 2 of IEC 61290-10-2, 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 61290-10-2 on 2007-10-01.

This European Standard supersedes EN 61290-10-2:2003.

EN 61290-10-2:2008 is a technical revision with updated references and cautions on proper use of the procedure.

This standard is to be used in conjunction with EN 61291-1.

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) | 2008-08-01 |
| – latest date by which the national standards conflicting with the EN have to be withdrawn | (dow) | 2010-10-01 |

The International Electrotechnical Commission (IEC) and CENELEC draw 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 4 and Clause 6.

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:

Agilent Technologies
Palo Alto (CA)
USA

Another patent concerns a measurement system and noise measurement apparatus for an optical amplifier given in Clause 4 and Clause 6.

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:

Fujitsu Limited
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Japan

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

Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 61290-10-2:2007 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 61290-3-1 | NOTE | Harmonized as EN 61290-3-1:2003 (not modified). |
|---------------|------|---|

| | | |
|----------------|------|--|
| IEC 61290-10-1 | NOTE | Harmonized as EN 61290-10-1:2003 (not modified). |
|----------------|------|--|

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Annex ZA

(normative)

Normative references to international publications with their corresponding European publications

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.

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 61291-1 | - ¹⁾ | Optical amplifiers - Part 1: Generic specification | EN 61291-1 | 2006 ²⁾ |

¹⁾ Undated reference.

²⁾ Valid edition at date of issue.

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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 amplifiers is still evolving, hence amendments and new editions to this document should 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 all abbreviations used is given in Clause 3.

OPTICAL AMPLIFIERS – TEST METHODS –

Part 10-2: Multichannel parameters – Pulse method using a gated optical spectrum analyzer

1 Scope and object

This part of IEC 61290 applies to optical fibre amplifiers (OFA) using active fibres, containing rare-earth dopants, currently commercially available.

The object of this International Standard is to establish uniform requirements for accurate and reliable measurements of the signal-spontaneous noise figure as defined in 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. The ASE level is measured by synchronously measuring the power on an optical spectrum analyzer (OSA) during the optical pulse off period. The average optical signal level is measured by random sampling in the OSA.

Such measurement is possible because the gain response of the rare-earth doped OFA is relatively slow, particularly in Er-doped OFA. However, since the OFA gain dynamics vary with amplifier types, operating conditions, and control schemes, the gain dynamics should be carefully considered when applying the present test method to various OFA. The manufacturer of the OFA should present data validating the required modulation frequency to limit the error to <1 dB. The measurements for obtaining this information are described in Annex A.

Two alternatives for determining the signal-spontaneous noise figure are specified; namely, the optical switching technique and the gated-OSA technique. The procedure described in this standard is the gated-OSA technique. The optical switching technique is described in IEC 61290-10-1.

The test method described is, in general, for multichannel applications. Single-channel applications are a special case of multichannel applications.

NOTE All numerical values followed by (±) are suggested values for which the measurement is assured. Other values may be acceptable but should be verified.

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