

Fibre optic active components and devices — Performance standards —

Part 5: ATM-PON transceivers with LD driver and CDR ICs

The European Standard EN 62149-5:2003 has the status of a British Standard

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National foreword

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The UK participation in its preparation was entrusted by Technical Committee GEL/86, Fibre optics, to Subcommittee GEL/86/3, Fibre optic systems and active devices, which has the responsibility to:

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**Fibre optic active components and devices –
Performance standards
Part 5: ATM-PON transceivers with LD driver and CDR ICs
(IEC 62149-5:2003)**

Composants et dispositifs actifs
à fibres optiques –
Normes de fonctionnement
Partie 5: Émetteurs-récepteurs ATM-PON
avec programme de gestion LD
et ICs CDR
(CEI 62149-5:2003)

Aktive Lichtwellenleiterbauelemente
und -geräte –
Betriebsverhaltensnormen
Teil 5: ATM-PON Sende- und
Empfangsmodule mit Laserdioden-
treiberschaltungen und Takt- und
Datenrückgewinnungs-ICs
(IEC 62149-5:2003)

This European Standard was approved by CENELEC on 2003-11-01. 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.

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CENELEC

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

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Foreword

The text of document 86C/544/FDIS, future edition 1 of IEC 62149-5, 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 62149-5 on 2003-11-01.

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Annexes designated "normative" are part of the body of the standard.
In this standard, annexes A, B and ZA are normative.
Annex ZA has been added by CENELEC.

Endorsement notice

The text of the International Standard IEC 62149-5:2003 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 60130	NOTE	Harmonized in EN 60130 series (not modified).
IEC 60191	NOTE	Harmonized in EN 60191 series (not modified).
IEC 60603	NOTE	Harmonized in EN 60603 series (not modified).
IEC 60793	NOTE	Harmonized in EN 60793 series (modified).
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IEC 60825	NOTE	Harmonized in EN 60825 series (modified).
IEC 60874	NOTE	Harmonized in EN 60874 series (not modified).
IEC 61076	NOTE	Harmonized in EN 61076 series (not modified).
IEC 61280	NOTE	Harmonized in EN 61280 series (not modified).
IEC 61281-1	NOTE	Harmonized as EN 61281-1:1999 (not modified).
IEC 61754	NOTE	Harmonized in EN 61754 series (modified).
IEC 62007-1	NOTE	Harmonized as EN 62007-1:2000 (not modified).
IEC 62007-2	NOTE	Harmonized as EN 62007-2:2000 (not modified).
IEC 62148-1	NOTE	Harmonized as EN 62148-1:2002 (not modified).

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INTRODUCTION

Fibre optic transceivers are used to convert electrical signals into optical signals and vice versa. The optical performance criteria are generally well specified for a number of internationally agreed applications areas such as ITU Recommendation TG.983.1 and IEEE 802.3. This standard aims to assure inter-changeability in performance between fibre optic transceivers for ATM-PON systems supplied by different manufacturers, but does not guarantee operation between fibre optic transceivers.

Manufacturers using the standards are responsible for meeting the required performance and/or reliability and quality assurance under a recognized scheme.

FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – PERFORMANCE STANDARDS –

Part 5: ATM-PON transceivers with LD driver and CDR ICs

1 Scope

This part of IEC 62149 specifies standards on the transceiver modules for asynchronous-transfer-mode passive optical network (ATM-PON) systems recommended by the International Telecommunication Union (ITU) in Recommendation TG.983.1.

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 60068-2-6, *Environmental testing – Part 2: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-27, *Basic environmental testing procedures – Part 2: Tests – Test Ea and guidance: Shock*

IEC 60825-1, *Safety of laser products – Part 1: Equipment classification, requirements and user's guide*

IEC 60950-1, *Information technology equipment – Safety – Part 1: General requirements*

IEC 61280-1-1, *Fibre optic communication subsystem basic test procedures – Part 1-1: Test procedures for general communication subsystems – Transmitter output optical power measurement for single-mode optical fibre cable*

IEC 61280-1-3, *Fibre optic communication subsystem basic test procedures – Part 1-3: Test procedures for general communication subsystems – Central wavelength and spectral width measurement*

IEC 61280-2-2, *Fibre optic communication subsystem basic test procedures – Part 2-2: Test procedures for digital systems – Optical eye pattern, waveform, and extinction ratio*

IEC 61300-2-4, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-4: Tests – Fibre/cable retention*

IEC 61300-2-17:2003, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-17: Tests – Cold*

IEC 61300-2-18, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-18: Tests – Dry heat – High temperature endurance*

IEC 61300-2-19, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-19: Tests – Damp heat (steady state)*

IEC 61300-2-22, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-22: Tests – Change of temperature*

IEC 61300-3-6:2003, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 3-6: Examinations and measurements – Return loss*

IEC 61753-1-1, *Fibre optic interconnecting devices and passive components performance standard – Part 1-1: General and guidance – Interconnecting devices (connectors)*

ITU Recommendation T G.983.1: *Broadband optical access systems based on Passive Optical Networks (PON)*

3 Terms, definitions and abbreviations

For the purposes of this part of IEC 62149, the following definitions apply.

Further terminology concerning related physical concepts, types of devices, general terms, and terms related to ratings and characteristics can be found in IEC 61931.

It is also recommended to refer to ITU Recommendation T G.983.1.

3.1 Terms and definitions

3.1.1

OAN (optical access network)

set of access links sharing the same network-side interfaces and supported by optical access transmission systems. The OAN may include a number of ODNs connected to the same OLT

3.1.2

ODN (optical distribution network)

apparatus or component that provides the optical transmission means from the OLT to the users, and vice versa. It utilizes passive optical components

3.1.3

OLT (optical line termination)

apparatus that provides the network-side interface of the OAN and is connected to one or more ODNs

3.1.4

ONU (optical network unit)

apparatus that provides (directly or remotely) the user-side interface of the OAN and is connected to the ODN

3.2 Abbreviations

ATM-PON	Asynchronous transfer mode passive optical network
ATT	Attenuator
BER	Bit error ratio
CDR	Clock and data recovery
DUT	Device under test
ERD	Error ratio detector
EX	Extinction ratio
FTT Cab/C/B/H	Fibre to the cabinet/curb/building/home
IC	Integrated circuit
LD	Laser diode
MLM	Multi-longitudinal mode
PPG	Pulse pattern generator
RMS	Root mean square
SLM	Single-longitudinal modes
WDM	Wavelength division multiplexing

4 Classification

This part of IEC 62149 specifies the performance of optical transceivers with laser diode (LD) driver circuits and clock and data recovery (CDR) ICs.

Fibre optic transceiver modules are classified into 5 types of forms according to the combination of mating types of electrical and optical interfaces (for details see IEC 62148-1). These include the following:

- Type 1: Fibre optic connector interface with direct solderable type electrical terminals.
- Type 2: Fibre optic connector interface with plug-in type electrical terminals.
- Type 3: Fibre optic pigtail interface with direct solderable type electrical terminals.
- Type 4: Fibre optic pigtail interface with plug-in type electrical terminals.
- Type 5: Modules not classified into type 1 – type 4. (A typical example is a module that has both electrical connectors and non-connector type terminals as an electrical interface such as a coaxial connector for signal and lead terminals for the power supply.)

5 Product definition

5.1 Description of transceiver module

Information on the following devices constituting the optical transceiver module shall be stated. This statement shall include details of technologies. For example, technologies used for ICs such as CMOS, bipolar, etc., shall be described.

- For a transmitter:
 - laser diode (in this description, a single- or a multi-longitudinal mode type shall be specified);
 - monitoring photodiode;
 - driver IC;
 - thermal sensor (where appropriate).
- For a receiver:
 - photodiode;
 - pre-amp IC;
 - data/clock recovery IC.
- For a WDM device:
 - technology used for this device.
- For a package:
 - refer to the IEC document number standardized as a package interface standard.

5.2 Description of applied form

According to ITU Recommendation T G.983.1, applied form of nominal bit rate, class (class B or class C), applied unit (ONU or OLT), and the number of fibres (one for duplex working or two for simplex working) shall be stated.

5.3 Block diagram

Block diagram or equivalent circuit information on the optical transceiver module shall be given.

The following terminals may be distinguished:

- supply terminals, i.e., terminals intended to be connected to the power supplies;
- input and output terminals, i.e., terminals into or out of which signals are passed.

The term “signal” includes both pulse and more complex waveforms, and includes strobe or control pulses.