SLOVENSKI STANDARD
oSIST prEN IEC 62149-4:2022

01-september-2022

Aktivne komponente in naprave optičnih vlaken - Izvedbeni standardi - 4. del: 1300 nm oddajnikov in sprejemnikov optičnih vlaken za Gigabit Ethernet uporabo

Fibre optic active components and devices - Performance standards - Part 4: 1 300 nm fibre optic transceivers for Gigabit Ethernet application

Aktive Lichtwellenleiterbauelemente und -geräte - Betriebsverhalten - Teil 4: 1 300-nm-Lichtwellenleiter-Sende- und Empfangsmodule für Gigabit-Ethernet-Anwendungen

Composants et dispositifs actifs fibroniques - Normes de performance - Partie 4: Emetteurs-récepteurs fibroniques de 1 300 nm pour application Gigabit Ethernet

Ta slovenski standard je istoveten z: **prEN IEC 62149-4:2022**

ICS:

33.180.20	Povezovalne naprave za optična vlakna	Fibre optic interconnecting devices

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COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER:	
IEC 62149-4 ED3	
DATE OF CIRCULATION:	CLOSING DATE FOR VOTING:
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86C/1724/CD, 86C/1739A/CC	

IEC SC 86C : FIBRE OPTIC SYSTEMS AND ACTIVE DEVICES	
SECRETARIAT: United States of America	SECRETARY: Mr Fred Heismann
OF INTEREST TO THE FOLLOWING COMMITTEES:	PROPOSED HORIZONTAL STANDARD: ☐ Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: ☐ EMC ☐ ENVIRONMENT ☒ QUALITY ASSURANCE ☐ SAFETY	
☒ SUBMITTED FOR CENELEC PARALLEL VOTING **Attention IEC-CENELEC parallel voting** The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	☐ NOT SUBMITTED FOR CENELEC PARALLEL VOTING

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TITLE:

Fibre optic active components and devices - Performance standards - Part 4: 1 300 nm fibre optic transceivers for Gigabit Ethernet application

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NOTE FROM TC/SC OFFICERS:

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – PERFORMANCE STANDARDS –

Part 4: 1 300 nm fibre optic transceivers for Gigabit Ethernet application

FOREWORD

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IEC 62149-4 has been prepared by subcommittee 86C: Fibre optic active devices, of IEC technical committee 86: Fibre optics. It is an International Standard.

This third edition cancels and replaces the second edition published in 2010. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) the normative references are updated;

b) the condition "for short periods" in Clause 5.1 is removed;

c) the absolute limiting rating for soldering temperature in Table 1 is modified;

d) the maximal optical output power (multimode fibre) in Table 4 is increased from −3,5 dBm to −3 dBm, to align value with the referenced document;

e) a note is added to Table 7 to clarify that out-of-specification products are not allowed to pass the performance tests.

The text of this International Standard is based on the following documents:

Draft	Report on voting
86C/XX/FDIS	86C/XX/RVD

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

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

A list of all parts of the IEC 62149 series, published under the general title *Fibre optic active components and devices – Performance standards,* can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

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

INTRODUCTION

Fibre optic transceivers are used to convert electrical signals into optical signals and vice versa. This document specifies performance standards for 1 300 nm fibre optic transceivers for Gigabit Ethernet application. The ISO/IEC/IEEE 8802-3 Gigabit Ethernet standard is used as the basis for determining the optical characteristics of the transceiver, which operates at a line rate of 1,25 Gbit/s.

FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – PERFORMANCE STANDARDS –

Part 4: 1 300 nm fibre optic transceivers for Gigabit Ethernet application

1 Scope

This part of IEC 62149 defines performance specifications for 1 300 nm fibre optic transceiver modules used for the ISO/IEC/IEEE 8802-3 Gigabit Ethernet application. The document contains definitions for product performance requirements as well as a series of tests and measurements, for which clearly defined conditions, severities and pass/fail criteria are provided. The tests are intended to be run on a “once-off” basis to prove any product’s ability to satisfy the performance standard’s requirements.

A product that has been shown to meet all the requirements of a performance standard can be declared as complying with the performance standard but will then be controlled by a quality assurance/quality conformance program.

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 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60068-2-20, *Environmental testing – Part 2-20: Tests – Test Ta and Tb: Test methods for solderability and resistance to soldering heat of devices with leads*

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

IEC 60068-2-38, *Environmental testing – Part 2-38: Tests – Test Z/AD: Composite temperature/humidity cyclic test*

IEC 60028-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

IEC 60749-26, *Semiconductor devices – Mechanical and climatic test methods – Part 26: Electrostatic discharge (ESD) sensitivity testing – Human body model (HBM)*

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

IEC 60938-1, *Fixed inductors for electromagnetic interference suppression – Part 1: Generic specification*

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

IEC 61300-2-47, *Fibre optic interconnecting devices and passive components – Basic test and measurement procedures – Part 2-47: Tests – Thermal shocks*

ISO/IEC/IEEE 8802-3:2021, *Telecommunications and exchange between information technology systems – Requirements for local and metropolitan area networks – Part 3: Standard for Ethernet*

3 Terms, definitions, symbols and abbreviated terms

3.1 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.2 Symbols

E_r	extinction ratio
I_{ih}	data input current – high
I_{il}	data input current – low
I_{out}	output current
P_a	alarm off level
P_d	alarm on level
P_o	optical output power
P_{opt}	optical input power
R_{dl}	data output load
RH	relative humidity
S	receiver sensitivity
T_{amb}	ambient operating temperature
TD	transmit disable function
T_f	optical output fall time
T_r	optical output rise time
T_{stg}	storage temperature
V_{cc}	supply voltage
$V_{ih} - V_{cc}$	data input voltage – high
$V_{il} - V_{cc}$	data input voltage – low
V_{nom}	nominal operating voltage
V_{oh}	alarm output high voltage
$V_{oh} - V_{cc}$	data output voltage – high
V_{ol}	alarm output low voltage
$V_{ol} - V_{cc}$	data output voltage – low
V_{pp}	transmitter differential input voltage swing
ΔP_o	optical output power change from pre-test value to post-test value
ΔS	receiver sensitivity change from pre-test value to post-test value
$\Delta\lambda$	spectral width (r.m.s.)
λ_{ce}	central wavelength

3.3 Abbreviated terms

BER	bit error ratio
ECL	emitter-coupled logic
EO	electro-optical

206 ESD electrostatic discharge
207 HBM human body model
208 LVTTL low voltage transistor-transistor logic
209 NRZ non-return-to-zero
210 PECL pseudo emitter-coupled logic
211 PRBS pseudo random bit sequence
212 SD signal detect
213 TTL transistor-transistor logic
214 TTL/CMOS transistor-transistor logic / complementary metal-oxide-semiconductor

215 # 4 Product parameters

216 ## 4.1 Absolute limiting ratings

217 Absolute limiting (maximum and/or minimum) ratings, as shown in Table 1, imply that no
218 catastrophic damage will occur if the product is subjected to these ratings, provided each
219 limiting parameter is in isolation and all other parameters have values within the normal
220 performance parameters. It should not be assumed that limiting values of more than one
221 parameter can be applied at any one time.

222 **Table 1 – Absolute limiting ratings**

Parameter	Symbol	Minimum	Maximum	Unit
Storage temperature	T_{stg}	–40	+85	°C
Ambient operating temperature	T_{amb}	–10	+80	°C
Lead soldering temperature (minimum distance to case specified)			+260 (for 10 s)	°C
Output current	I_{out}	0	50	mA
Data input voltage		–0,5	V_{cc}	V
Transmitter differential input voltage swing	V_{pp}	0,30	1,40	V
Supply voltage [a]		–0,5	(V_{nom} +40 %)	V
Relative humidity [b]	RH	5	85	%

[a] Nominal operating voltages (V_{nom}) of 5 V and 3,3 V apply.
[b] No condensation allowed.

223

224 ## 4.2 Operating environment

225 The parameters for the operating environment are shown in Table 2.

226 **Table 2 – Operating environment**

Parameter	Symbol	Minimum	Maximum	Unit
Supply voltage [a]	V_{cc}	(V_{nom} – 5 %)	(V_{nom} + 5 %)	V
Ambient operating temperature	T_{amb}	0	70	°C
Relative humidity [b]	RH	5	85	%

[a] For a nominal operating voltage (V_{nom}) of 5 V. For 3,3 V nominal operating voltage, the minimum value is 3,15 V and the maximum value is 3,45 V.
[b] No condensation allowed.

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