

# INTERNATIONAL STANDARD

Fibre optic active components and devices – Package and interface standards –  
Part 1: General and guidance

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PACKAGE AND INTERFACE STANDARDS –****Part 1: General and guidance****FOREWORD**

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International Standard IEC 62148-1 has been prepared by subcommittee 86C: Fibre optic systems and active devices, of IEC technical committee 86: Fibre optics.

This second edition cancels and replaces the first edition, published in 2002, and constitutes a technical revision.

This edition includes the following significant technical change with respect to the previous edition: addition of a free space optical coupling interface in Clause 5.

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

CDV	Report on voting
86C/1406A/CDV	86C/1466/RVC

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62148 series, published under the general title *Fibre optic active components and devices – Package and interface 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- withdrawn,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.

A bilingual version of this publication may be issued at a later date.

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## INTRODUCTION

Fibre optic active components and devices are used to convert electrical signals into optical signals or vice versa. The optical performance criteria are generally well specified for a number of internationally agreed application areas, for example, consulting ITU-T Recommendations originating in Study Group 15, *Networks, Technologies and Infrastructures for Transport, Access and Home*. Manufacturers using the standards are responsible for meeting the required performance and/or reliability and quality assurance under a recognized scheme.

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## FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES – PACKAGE AND INTERFACE STANDARDS –

### Part 1: General and guidance

#### 1 Scope

This part of IEC 62148 aims to assure interchangeability in physical interfaces between fibre optic active components and devices supplied by different manufacturers, but it does not guarantee operation between such devices.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 60191-1, *Mechanical standardization of semiconductor devices – Part 1: General rules for the preparation of outline drawings of discrete devices*

IEC 60794 (all parts), *Optical fibre cables*

IEC 61754 (all parts), *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces*

IEC 62148 (all parts), *Fibre optic active components and devices – Package and interface standards*

ISO 1101, *Geometrical product specifications (GPS) – Geometrical tolerancing – Tolerances of form, orientation, location and run-out*

#### 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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>

##### 3.1

##### **electrical terminal**

part of the fibre optic active component or device primarily used for making an electrical connection

##### 3.2

##### **footprint**

projection of the fibre optic active component or device on the seating plane for mounting purposes

Note 1 to entry: This includes the mounting space on the seating plane as well as positions and sizes of counterpart electrical terminals and mechanical fixtures.

### **3.3 interchangeability**

feature ensuring that mounting, mating and fixturing is possible for products from different manufacturers

### **3.4 mechanical fixture**

features for mounting and fixing the active components and devices on to the counterpart board

### **3.5 physical interface**

mechanical interface of case outline, optical interface, electrical interface, etc.

Note 1 to entry: This also includes assignments of electrical terminals and optical ports.

### **3.6 seating plane**

reference plane contacting with the case body or electrical terminals for mounting of the active components and devices

## **4 Classification**

Fibre optic transceiver modules can be classified into different forms according to the combination of mating types of electrical and optical interfaces.

- 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: free space optic coupling interface with direct solderable type electrical terminals.
- Type 6: free space optic coupling interface with plug-in type electrical terminals.
- Type 7: module that is not classified into types 1 to 6.

NOTE 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 Specifications of optical interfaces**

### **5.1 General**

This interface standard defines physical interfaces only, and no guarantee of performance is implied, nor should it be assumed.

The optical interface shall be selected from those whose interchangeability is guaranteed by other IEC standards (for example, IEC 61754 (all parts)).

### **5.2 Optical connector interfaces (types 1 and 2)**

Detailed drawings of the optical connector interface are not necessarily required when referenced to the appropriate IEC standard. Where an optical connector is not standardized under the IEC system, full detail drawings of the interface shall be presented.

### 5.3 Pigtail interfaces (types 3 and 4)

Generally, optical fibres and cables specified in IEC 60794 (all parts) shall be used for the pigtail interface.

### 5.4 Free space optical coupling interface (types 5 and 6)

This interface is equipped with single or multiple optical signal sending port(s) and/or single or multiple optical signal receiving port(s), where optical beam conditions such as optical axis direction(s), position(s), and three dimensional beam energy profile(s) are designed specifically, in order to have a predesigned coupling efficiency with external optical interface(s).

### 5.5 Optical port assignments

Where an optical port assignment is necessary to differentiate the receiving and transmitting elements for the transceiver, they should be identified and tabulated.

## 6 Specifications of electrical interfaces

### 6.1 General

The electrical interface should be selected from those whose interchangeability is guaranteed by other IEC standards (for example, IEC 60130 (all parts), IEC 60191 (all parts), IEC 60603 (all parts), IEC 60807 (all parts), IEC 61076 (all parts)).

### 6.2 Electrical connector interfaces (types 2, 4 and 6)

Generally, electrical connectors used for the electrical interface of the fibre optic transceiver module should be those standardized in IEC 60130 (all parts), IEC 60191 (all parts), IEC 60603 (all parts), IEC 60807 (all parts) and IEC 61076 (all parts). Detailed drawings of the electrical connector interface are not necessarily required when referenced to the appropriate IEC standard. However, the mechanical datum necessary to guarantee interchangeability shall be specified in the drawings. Where an electrical connector is not standardized under the IEC system, full detail drawings of the interface shall be presented.

### 6.3 Non-connector type interfaces (types 1, 3 and 5)

Generally, non-connector type interfaces used as the electrical interface for the fibre optic transceiver module should be those specified in IEC 60191 (all parts). In this case, detailed drawings of the electrical interface are not necessarily required when referenced to the appropriate IEC standard. However, the mechanical datum necessary to guarantee interchangeability shall be specified in the drawings. Where an electrical interface is not standardized under the IEC system, the electrical interface shall be specified as complying with the requirements of IEC 60191-1.

### 6.4 Numbering of electrical terminals

Electrical terminals of the non-connector type interface should be identified by numbers according to the system specified in IEC 60191 (all parts). Electrical terminals of the connector type shall be numbered using the system appropriate to the connector and associated IEC reference. In general, this will involve the use of letters for rows and numbers for pins along the rows.

### 6.5 Electrical terminal assignment

Each electrical pin shall have its functionality (e.g. power, ground, data) assigned and tabulated in a supplementary table according to the electrical terminal number.

## 7 Outline and footprint of active components and devices

### 7.1 Drawings of case outline

The case outline of the active components and devices in subsequent parts of the IEC 62148 series shall be presented and interpreted as complying with the requirements described in ISO 1101.

### 7.2 Drawings of footprint

The footprint of the active components and devices in subsequent parts of the IEC 62148 series shall be presented and interpreted as complying with the drawing requirements described in ISO 1101.

### 7.3 Mechanical fixturing

Where mechanical features associated with fixing active components and devices to the board are present on the module, their positions and dimensions should be specified in the drawings. Their values and tolerances should be tabulated. These dimensions and tolerances shall be consistent with those of the footprint.

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## Bibliography

IEC 60130 (all parts), *Connectors for frequencies below 3 MHz*

IEC 60191 (all parts), *Mechanical standardization of semiconductor devices*

IEC 60603 (all parts), *Connectors for frequencies below 3 MHz for use with printed boards*

IEC 60603-1, *Connectors for frequencies below 3 MHz for use with printed boards – Part 1: Generic specification – General requirements and guide for the preparation of detail specifications, with assessed quality*

IEC 60603-2, *Connectors for frequencies below 3 MHz for use with printed boards – Part 2: Detail specification for two-part connectors with assessed quality, for printed boards, for basic grid of 2,54 mm (0,1 in) with common mounting features*

IEC 60603-3, *Connectors for frequencies below 3 MHz for use with printed boards – Part 3: Two-part connectors for printed boards having contacts spaced at 2,54 mm (0,100 in) centres and staggered terminations at that same spacing*

IEC 60603-4, *Connectors for frequencies below 3 MHz for use with printed boards – Part 4: Two-part connectors for printed boards having contacts spaced at 1,91 mm (0,075 in) centres and staggered terminations at that same spacing*

IEC 60603-5, *Connectors for frequencies below 3 MHz for use with printed boards – Part 5: Edge-socket connectors and two-part connectors for double-sided printed boards with 2,54 mm (0,1 in) spacing*

IEC 60603-6, *Connectors for frequencies below 3 MHz for use with printed boards – Part 6: Edge socket connectors and printed board connectors with 2,54 mm (0,1 in) contact spacing for single or double-sided printed boards of 1,6 mm (0,063 in) nominal thickness*

IEC 60603-8, *Connectors for frequencies below 3 MHz for use with printed boards – Part 8: Two-part connectors for printed boards, for basic grid of 2.54 mm (0.1 in), with square male contacts of 0.63 mm x 0.63 mm*

IEC 60603-11, *Connectors for frequencies below 3 MHz for use with printed boards – Part 11: Detail specification for concentric connectors (dimensions for free connectors and fixed connectors)*

IEC 60603-12, *Connectors for frequencies below 3 MHz for use with printed boards – Part 12: Detail specification for dimensions, general requirements and tests for a range of sockets designed for use with integrated circuits*

IEC 60603-13, *Connectors for frequencies below 3 MHz for use with printed boards – Part 13: Detail specification for two-part connectors of assessed quality, for printed boards for basic grid of 2,54 mm (0,1 in), with free connectors for non-accessible insulation displacement terminations (ID)*

IEC 60603-14, *Connectors for frequencies below 3 MHz for use with printed boards – Part 14: Detail specification for circular connectors for low-frequency audio and video applications such as audio, video and audio-visual equipment*

IEC 60603-7, *Connectors for electronic equipment – Part 7: Detail specification for 8-way, unshielded, free and fixed connectors*