

INTERNATIONAL STANDARD



**Fibre optic active components and devices – Package and interface standards –
Part 15: Discrete vertical cavity surface emitting laser packages**

(<https://standards.iteh.ai>)
Document Preview

IEC 62148-15:2021

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>



THIS PUBLICATION IS COPYRIGHT PROTECTED
Copyright © 2021 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

IEC Central Office
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC online collection - oc.iec.ch

Discover our powerful search engine and read freely all the publications previews. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 000 terminological entries in English and French, with equivalent terms in 18 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

International Standards
Document Preview
standards.iteh.ai

[IEC 62148-15:2021](http://iec.62148-15.2021)

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>



IEC 62148-15

Edition 3.0 2021-03
REDLINE VERSION

INTERNATIONAL STANDARD



**Fibre optic active components and devices – Package and interface standards –
Part 15: Discrete vertical cavity surface emitting laser packages**

Document Preview

[IEC 62148-15:2021](https://standards.iteh.ai/iec/62148-15/2021)

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

ICS 33.180.20

ISBN 978-2-8322-9660-8

Warning! Make sure that you obtained this publication from an authorized distributor.

CONTENTS

FOREWORD	5
INTRODUCTION	2
1 Scope	8
2 Normative references	8
3 Terms, definitions and abbreviated terms	9
3.1 Terms and definitions	9
3.2 Abbreviated terms	9
4 Classification	9
5 Specification of the optical interface	9
5.1 General	9
5.2 Optical connector interface (type 1)	9
5.3 Pigtail interface (type 3)	10
6 Specifications of electrical interfaces	10
6.1 General	10
6.2 Electrical interface specifications for VCSEL TO CAN packages	10
6.2.1 General	10
6.2.2 Numbering of electrical terminals	10
6.2.3 Electrical terminal assignment	10
6.3 Electrical interface specifications for VCSEL TOSA package with an LC connector	11
6.3.1 General	11
6.3.2 Numbering of electrical terminals	11
6.3.3 Electrical terminal assignment	12
6.4 Electrical interface specifications for VCSEL TOSA package with an SC connector	12
6.4.1 General	12
6.4.2 Numbering of electrical terminals	12
6.4.3 Electrical terminal assignment	12
7 Outline	12
7.1 General	12
7.2 Outline of VCSEL TO CAN packages	12
7.2.1 Drawings of case outline	12
7.2.2 Dimensions of VCSEL TO CAN packages	13
7.3 Outlines of VCSEL TOSA package with an LC connector for uses at low speed (below 8 Gbps Gbit/s)	14
7.3.1 Drawings of case outline	14
7.3.2 Dimensions of VCSEL TOSA package with an LC connector for uses at low speed (below 8 Gbps Gbit/s)	15
7.3.3 Optical receptacle LC style	15
7.4 Outlines of VCSEL TOSA package with an SC connector for uses at low speed (below 8 Gbps Gbit/s)	15
7.4.1 Drawings of case outline	15
7.4.2 Dimensions of VCSEL TOSA package with an SC connector for uses at low speed (below 8 Gbps Gbit/s)	16
7.4.3 Optical receptacle SC style	16
7.5 Outlines of VCSEL TOSA package with an LC connector for uses at high speed (\geq 8 Gbps Gbit/s)	16

7.5.1	Drawings of case outline.....	16
7.5.2	Dimensions of VCSEL TOSA package with an LC connector for uses at high speed (≥ 8 -Gbps Gbit/s).....	18
7.6	Outlines of VCSEL TOSA package with an SC connector for uses at high speed (≥ 8 -Gbps Gbit/s).....	18
7.6.1	Drawings of case outline.....	18
7.6.2	Dimensions of VCSEL TOSA package with an SC connector for uses at high speed (≥ 8 -Gbps Gbit/s).....	19
7.7	Electrical terminals of high-speed (≥ 8 -Gbps Gbit/s) VCSEL TOSA packages for both cases with LC and SC connectors.....	20
7.7.1	Pin out terminals.....	20
7.7.2	Pad terminals.....	21
7.8	Outlines of VCSEL pigtail package.....	21
7.8.1	Drawings of case outline.....	21
7.8.2	Dimensions of VCSEL pigtail package.....	22
7.8.3	Optical connectors.....	22
	Bibliography.....	23

Figure 1 – Electrical terminal numbering assignments of 3-pin and 4-pin type TO CAN packages with optional colour code C for pin configuration 10

Figure 2 – Electrical terminal numbering assignments of 3-pin and 4-pin type TOSA packages with LC connector and with optional colour code C..... 11

Figure 3 – Electrical terminal numbering assignments of 3-pin and 4-pin type TOSA packages with SC connector and with optional colour code C 12

Figure 4 – Schematic diagrams and pin-out of VCSEL TO CANs with flat window, with ball lens, and with tilted window with optional colour code C on the bottom..... 13

Figure 5 – Schematic diagram of VCSEL TOSA package with LC connector and with optional colour code C on the bottom for uses at low speed (below 8-Gbps Gbit/s)..... 14

Figure 6 – Schematic diagram of VCSEL TOSA package with SC connector and with optional colour code C on the bottom for uses at low speed (below 8-Gbps Gbit/s)..... 16

Figure 7 – Schematic diagram of VCSEL TOSA package with LC connector and with optional colour code C for pin-type notation for uses at high speed (≥ 8 -Gbps Gbit/s)..... 17

Figure 8 – Schematic diagram of VCSEL TOSA package with SC connector and with optional colour code C for pin-type notation for uses at high speed (≥ 8 -Gbps Gbit/s)..... 19

Figure 9 – Schematic diagram and pin-out of VCSEL pigtail package with optional colour code C 22

Table 1 – Pin-function definitions of 4-pin type VCSEL TO CAN packages..... 11

Table 2 – Pin-function definitions of 3-pin type VCSEL TO CAN packages..... 11

Table 3 – Dimension of VCSEL TO CANs with flat window, ball lens and tilted window..... 14

Table 4 – Dimensions of VCSEL TOSA package with LC connector for uses at low speed (below 8-Gbps Gbit/s)..... 15

Table 5 – Dimension of VCSEL TOSA package with SC connector for uses at low speed (below 8-Gbps Gbit/s)..... 16

Table 6 – Dimension of VCSEL TOSA package with LC connector for uses at high speed (≥ 8 -Gbps Gbit/s)..... 18

Table 7 – Dimension of VCSEL TOSA package with SC connector for uses at high speed (≥ 8 -Gbps Gbit/s)..... 20

Table 8 – Pin out terminals of VCSEL TOSA package with LC and SC connectors for uses at high speed (≥ 8 -Gbps Gbit/s)..... 21

Table 9 – Pad terminals of VCSEL TOSA package with LC and SC connectors and with flexible printed circuit board for uses at high speed (≥ 8 ~~Gbps~~ Gbit/s) 21

Table 10 – Dimensions of VCSEL pigtail package 22

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 62148-15:2021](https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021)

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**FIBRE OPTIC ACTIVE COMPONENTS AND DEVICES –
PACKAGE AND INTERFACE STANDARDS –****Part 15: Discrete vertical cavity surface emitting laser packages**

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of 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, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). 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. 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 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 IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62148-15:2014. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62148-15 has been prepared by subcommittee 86C: Fibre optic systems and 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 2014. This edition constitutes a technical revision.

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

- a) the classification of optical/electrical interface types is generalized and referred to IEC 62148-1;
- b) a new pin mode is added to Table 1;
- c) several dimensions of the VCSEL TO CAN package are changed in Table 3 to reflect the current state of technology;
- d) Figure 7 is updated to show the complete details of the VCSEL TOSA package.

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

FDIS	Report on voting
86C/1709/FDIS	86C/1712/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.

A list of all parts of 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.

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.

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.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Fibre optic laser devices are used to convert electrical signals into optical signals. This document covers the physical dimension and interface for discrete vertical cavity surface emitting laser (VCSEL) packages.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

[IEC 62148-15:2021](https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021)

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>

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

Part 15: Discrete vertical cavity surface emitting laser packages

1 Scope

This part of IEC 62148 covers the physical dimension and interface specifications for discrete vertical cavity surface emitting laser (VCSEL) devices in optical telecommunication and optical data transmission applications.

The intent of this document is to adequately specify the physical requirements of VCSEL devices that will enable mechanical interchangeability of laser devices or transmitters complying with this document both at the printed circuit wiring board and for any panel-mounting requirement

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 60793-2 (all parts), Optical fibres – Part 2: Product specifications~~

IEC 60793-2-50, *Optical fibres – Part 2-50: Product specifications – Sectional specification for class B single-mode fibres*

<https://standards.iteh.ai/catalog/standards/iec/e426d3f8-6b7f-4a23-9e98-bd12e7aa71c0/iec-62148-15-2021>

IEC 60874 (all parts), *Fibre optic interconnecting devices and passive components – Connectors for optical fibres and cables*

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

~~IEC 61754-4-1, Fibre optic connector interfaces – Part 4-1: Type SC connector family – Simplified receptacle SC-PC connector interfaces~~

IEC 61754-4-100, *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces – Part 4-100: Type SC connector family – Simplified receptacle SC-PC connector interfaces*

IEC 61754-20, *Fibre optic interconnecting devices and passive components – Fibre optic connector interfaces – Part 20: Type LC connector family*

IEC 62148-1, *Fibre optic active components and devices – Package and interface standards – Part 1: General and guidance*

ITU-T Recommendation G.652, *Characteristics of a single-mode optical fibre and cable*

ASTM B-652.B, *Standard Specification for Niobium-Hafnium Alloy Ingots*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the following terms, definitions and abbreviated terms 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 Terms and definitions

3.1.1

pigtail package

package type of photonic devices which has a length of fibre attachment for both optical input and output ports

3.2 Abbreviated terms

CAN	airtight sealed metal container (see IEC 60747-1)
PD	photodiode
TO	transistor outline
TOSA	transmitter optical subassembly
VCSEL	vertical cavity surface emitting laser

4 Classification

~~This part of IEC 62148, which gives the physical dimension and interface specifications for the discrete vertical cavity surface emitting laser devices, specifies the interface of types 1 and 3 modules with direct solderable type electrical terminals.~~

~~IEC 62148-15:2021~~

~~Fibre optic transceiver modules are classified into five several types of forms according to the combination of mating types of electrical and optical interfaces. The classifications provided in IEC 62148-1 apply. Details are described in IEC 62148-1. The five types are as follows:~~

~~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 are 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 Specification of the optical interface

5.1 General

The intent of this document is to adequately specify the physical requirements of a VCSEL device that will enable mechanical interchangeability of laser devices or transmitters to this document both at the printed circuit board and for any panel mounting requirement.

5.2 Optical connector interface ~~(type 1)~~

This document applies to the LC and SC optical connector interfaces. Detailed dimensions of the optical receptacle are specified in IEC 61754-20 and ~~IEC 61754-4-1~~ IEC 61754-4-100.

5.3 Pigtail interface ~~(type 3)~~

All optical fibres defined in ~~the IEC 60793-2 series~~ IEC 60793-2-50, ASTM B-652.B and ITU-T Recommendation G.652 are applicable.

All optical connectors defined in IEC 60874 (all parts) and IEC 61754 (all parts) are applicable, if a pigtail ~~has to be~~ is terminated with an optical connector.

6 Specifications of electrical interfaces

6.1 General

Specifications for the electrical interface of VCSEL TO CAN, TOSA and VCSEL pigtail packages are described in 6.2.

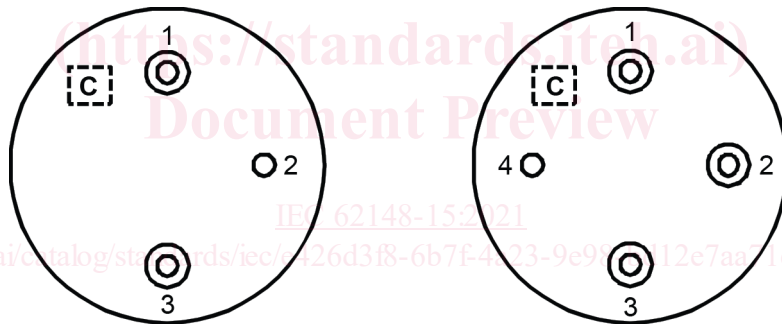
6.2 Electrical interface specifications for VCSEL TO CAN packages

6.2.1 General

The electrical interface in this document defines only the basic functionality of each pin.

6.2.2 Numbering of electrical terminals

Pin numbering assignments are shown in Figure 1.



IEC

NOTE The electrical terminals as viewed from the bottom of the package module with pins underneath.

Figure 1 – Electrical terminal numbering assignments of 3-pin and 4-pin type TO CAN packages with optional colour code C for pin configuration

6.2.3 Electrical terminal assignment

Electrical terminal assignments are defined in Table 1 and Table 2.

Table 1 – Pin-function definitions of 4-pin type VCSEL TO CAN packages

Pin number	Function (VCSEL with a monitor photodiode)				
	Common cathode	Common anode	Float (type K)	Float (type A)	Float (type D)
1	VCSEL anode	VCSEL cathode	VCSEL anode	VCSEL cathode	VCSEL cathode
2	VCSEL cathode/PD anode	VCSEL anode/PD cathode	VCSEL cathode	VCSEL anode	PD anode
3	PD cathode	PD anode	PD cathode	PD cathode	VCSEL anode/PD cathode
4	Ground/case (option)	Ground/case (option)	PD anode/case	PD anode/case	case
Optional colour code (C)	Blue	Red	Green	Black	Yellow

Table 2 – Pin-function definitions of 3-pin type VCSEL TO CAN packages

Pin number	Function (VCSEL with a monitor photodiode)	
	Common anode	Common cathode
1	VCSEL cathode	VCSEL anode
2	VCSEL anode/PD cathode	VCSEL cathode/PD anode
3	PD anode	PD cathode
Optional colour code (C)	Red	Blue

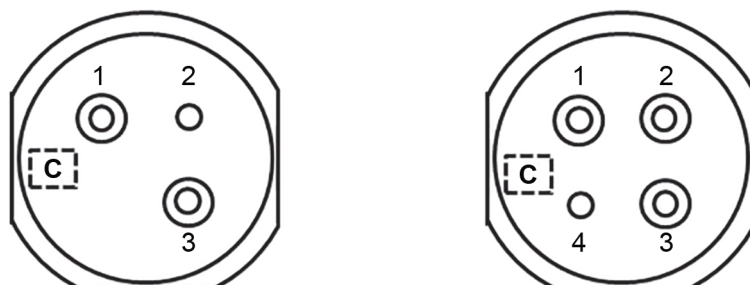
6.3 Electrical interface specifications for VCSEL TOSA package with an LC connector

6.3.1 General

The electrical interface in this document defines only the basic functionality of each pin.

6.3.2 Numbering of electrical terminals

Pin numbering assignments are shown in Figure 2.



IEC

NOTE The electrical terminals as viewed from the bottom of the package module with pins underneath.

Figure 2 – Electrical terminal numbering assignments of 3-pin and 4-pin type TOSA packages with LC connector and with optional colour code C

6.3.3 Electrical terminal assignment

The pin-function definitions of the 3-pin and 4-pin type VCSEL TOSA packages with an LC connector are the same as those of the VCSEL TO CAN packages as specified in Table 1 and Table 2.

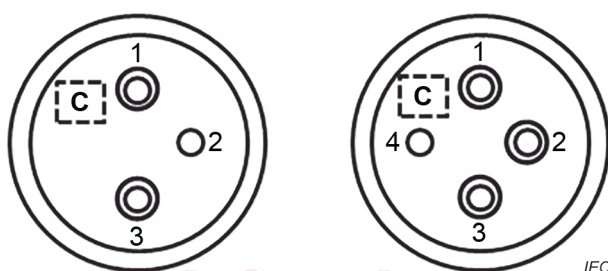
6.4 Electrical interface specifications for VCSEL TOSA package with an SC connector

6.4.1 General

The electrical interface in this document defines only the basic functionality of each pin.

6.4.2 Numbering of electrical terminals

Pin numbering assignments are shown in Figure 3.



NOTE The electrical terminals as viewed from the bottom of the package module with pins underneath.

Figure 3 – Electrical terminal numbering assignments of 3-pin and 4-pin type TOSA packages with SC connector and with optional colour code C

6.4.3 Electrical terminal assignment

The pin-function definitions of the 3-pin and 4-pin type VCSEL TOSA packages with an SC connector are the same as those of the VCSEL TO CAN packages as specified in Table 1 and Table 2.

7 Outline

7.1 General

The outline, dimensions and electrical interface of VCSEL TO CAN, TOSA and VCSEL pigtail packages are described ~~as follows~~ in 7.2 to 7.8.

7.2 Outline of VCSEL TO CAN packages

7.2.1 Drawings of case outline

~~Case outline Drawings of VCSEL TO CAN packages are shown in Figure 4.~~ Drawings of case outlines for various VCSEL TO CAN packages are shown in Figure 4 a) to Figure 4 e).