



## Product Catalog for Communications



**10 Gbps VCSELs  
for Communications**

1310 nm, 1490 nm, 1550 nm

- Enable 10 Gbps modules with sub 1W power budget
- Less than 30mW power dissipation
- LAN, SAN, FTTx, CWDM
- High-speed Interconnects
- TO-46, LC/SC TOSA, Pigtail
- Cost effective VCSEL technology

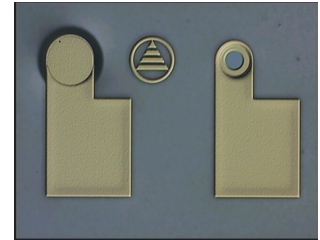
**More information: [www.vertilas.com](http://www.vertilas.com)**

## VCSEL Solutions 1310 nm, 1490 nm, 1550 nm, and CWDM



## Single-mode VCSEL from 1 Gbps to 10 Gbps

**Wavelengths:**  
**1310 nm, 1490 nm, 1550 nm, CWDM**



## Key Features

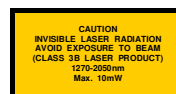
- Single-mode VCSEL
- TO-46 form factor
- 1 Gbps to 10 Gbps data rate product versions
- Operating temperature: -20 to +70 °C, extended -20 to +85 °C
- Low power consumption: Sub 30 mW
- Enables SFF modules with sub 1 W power budget
- Low drive currents and low threshold voltage
- Integrated monitoring diode optional
- Various packaging and TOSA options

## Description

The VERTILAS communications laser products are single-mode VCSEL diodes (Vertical-Cavity Surface-Emitting Laser) operating at data rates from 1 Gbps up to 10 Gbps. Packaging options include TO, receptacles, pigtails and other customer specific solutions. This high-performance single-mode VCSEL technology features a very low threshold current and provides an optical output power of up to 4.0 mW. The lasers feature fast rise and fall times, low threshold voltage, excellent SMSR performance and extremely low power dissipation. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10G Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

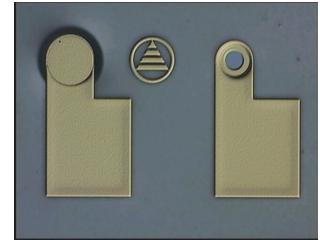
## Applications

- Small Form Factor modules for data and telecommunications
- Local Area Networks
- Storage Area Networks
- FTTx
- CWDM
- Industrial communication



## Multi-mode VCSEL from 1 Gbps to 10 Gbps

**Wavelengths:**  
**1310 nm, 1490 nm, 1550 nm, CWDM**



## Key Features

- Multi-mode VCSEL
- TO-46 form factor
- 1 Gbps to 10 Gbps data rate product versions
- Operating temperature: -20 to +70 °C, extended -20 to +85 °C
- Low power consumption: Sub 30 mW
- Enables SFF modules with sub 1 W power budget
- Low drive currents and low threshold voltage
- Integrated monitoring diode optional
- Various packaging and TOSA options

## Description

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## Applications

- Small Form Factor modules for data communications
- Local Area Networks and Storage Area Networks
- Industrial communication



## Configuration and Operating Conditions

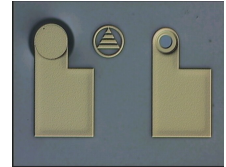
	Symbol	Min.	Typ	Max	Unit
Operating case temp. LC, H4 versions P4 version	Top	-10		+70	°C
	Top	0	-	+40	°C
Storage temp.	Tstg	-40	-	+85	°C
Soldering temp.	Stemp	-	260 *	-	°C
Soldering time	Stime	-	3	-	sec
CW current	I <sub>cw</sub>	-	10.0	12.0 **	mA
Reverse voltage	VR	-	-	1.0	V
Forward Voltage	VF	1.1	1.3	2.0	V

## Optical and Electrical Characteristics (T<sub>o</sub> = 20 °C)

	Symbol	Min.	Typ	Max	Unit	Conditions/ Comment
Threshold current	I <sub>th</sub>	0.5	1.5	5	mA	T <sub>o</sub> =20°C
Operating current	I <sub>o</sub>	-	10.0	12.0	mA	
Operating voltage @P <sub>max</sub>	V <sub>max</sub>	-	-	2	V	
Beam divergence	FWHM	10	12	20	deg.	
Spectral width @P <sub>max</sub>	Δλ	20	30	50	MHz	P <sub>max</sub> , T <sub>o</sub>
Slope efficiency	η	0.05	0.2	0.3	mW/ mA	T <sub>o</sub> =20°C
Wavelength drift with case temp.	TE <sub>λ</sub>	-	0.1	0.2	nm/ °C	20°C < T <sub>λ</sub> < 40 °C
Side mode suppression ratio	SMSR	30	40	-	dB	T <sub>o</sub> , I <sub>o</sub> > 2xI <sub>th</sub>
Return loss	S11	-	-17	-	dB	10dB attenuation at Input, I <sub>bias</sub> =7mA



## Product Table 1310 nm Portfolio



Product	Wavelength	Data Rate	Package	Monitoring Diode
VL-1310-1G-P2-T4	1310 nm	1 Gbps	TO-46	Optional
VL-1310-1G-P2-R4	1310 nm	1 Gbps	TO-46 with ring	Optional
VL-1310-1G-P2-A4	1310 nm	1 Gbps	TO-46 with cap	Optional
VL-1310-1G-P2-LC	1310 nm	1 Gbps	TO-46 LC receptacle	Yes
VL-1310-1G-P2-SC	1310 nm	1 Gbps	TO-46 SC receptacle	Yes
VL-1310-1G-P2-H4	1310 nm	1 Gbps	TO-46 Pigtail	Yes
VL-1310-1G-P2-T4	1310 nm	3 Gbps	TO-46	Optional
VL-1310-1G-P2-R4	1310 nm	3 Gbps	TO-46 with ring	Optional
VL-1310-1G-P2-A4	1310 nm	3 Gbps	TO-46 with cap	Optional
VL-1310-1G-P2-LC	1310 nm	3 Gbps	TO-46 LC receptacle	Yes
VL-1310-1G-P2-SC	1310 nm	3 Gbps	TO-46 SC receptacle	Yes
VL-1310-1G-P2-H4	1310 nm	3 Gbps	TO-46 Pigtail	Yes
VL-1310-1G-P2-T4	1310 nm	10 Gbps	TO-46	Optional
VL-1310-1G-P2-R4	1310 nm	10 Gbps	TO-46 with ring	Optional
VL-1310-1G-P2-A4	1310 nm	10 Gbps	TO-46 with cap	Optional
VL-1310-1G-P2-LC	1310 nm	10 Gbps	TO-46 LC receptacle	Yes
VL-1310-1G-P2-SC	1310 nm	10 Gbps	TO-46 SC receptacle	Yes
VL-1310-1G-P2-H4	1310 nm	10 Gbps	TO-46 Pigtail	Yes



<b>Single-Mode VCSEL</b>	<b>10 Gbps</b>
<b>1310nm</b>	<b>LC</b>
<b>VL-1310-10G-P2-LC</b>	



## Key Features

- 1310nm single-mode VCSEL in LC receptacle
- TO-46 form factor
- 10GE IEEE 802.3aq and 10GE IEEE 802.3ae
- Operating temperature: -20 to +70 °C, extended -20 to +85 °C
- High data-rate modulation up to 10 Gbps
- Low power consumption
- Low drive currents and low threshold voltage
- Integrated monitoring diode

## Description

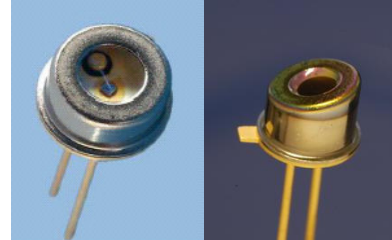
The VL-1310-10G-P2-LC is a 1310nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser) operating at data rates of up to 10 Gbps. It is available as LC receptacle with integrated monitoring diode. Other packaging options are available on request. This high-performance single-mode VCSEL TOSA (Transmit Optical Sub-Assembly) features a very low threshold current and provides a fiber coupled optical output power of up to 1.0 mW. The VL-1310-10G-P2-LC features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10G Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Small Form Factor modules for data and telecommunications
- Local Area Networks
- Storage Area Networks
- Industrial communication



<b>Single-Mode VCSEL</b>	<b>10 Gbps</b>
<b>1310nm</b>	<b>TO-46</b>
<b>VL-1310-10G-x4</b>	



## Key Features

- 1310nm single-mode VCSEL
- TO-46 form factor
- Operating temperature: -20 to +70 °C, extended -40 to +85 °C
- High data-rate modulation up to 10 Gbps
- Low power consumption
- Low drive currents and low threshold voltage
- Integrated monitoring diode optional

## Description

The VL-1310-10G-x4 is a 1310nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser) operating at data rates of up to 10 Gbps. It is available as TO-46, optional with integrated monitoring diode. Other packaging options are available on request. This high-performance single-mode VCSEL TOSA (Transmit Optical Sub-Assembly) features a very low threshold current and provides an optical output power of up to 4.0 mW. The VL-1310-10G-x4 features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10G Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Small Form Factor modules for data and tele communications
- Local Area Networks
- Storage Area Networks
- Industrial communication



<b>Single-Mode VCSEL</b>	<b>3.125Gbps</b>
<b>1310nm</b>	<b>TOSA</b>
<b>VL-1310-3G-P2-TOSA</b>	

## Key Features

- 1310nm single-mode VCSEL TOSA (Transmit Optical Sub-Assembly)
- Optical output power: 0.9mW at  $T_o=20^{\circ}\text{C}$
- Operating temperature:  $-20$  to  $+70^{\circ}\text{C}$
- High data-rate modulation up to 3.125 Gbps
- Low power consumption
- Low drive currents and low threshold voltage

## Description

The VL-1310-3G-P2-TOSA is a 1310 nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser). It is available as a standard ST, LC, SC receptacle or as pigtail version with FC/APC connector. Other packaging options (TO-46, die-on-submount, etc.) are also available. This high-performance single-mode VCSEL features a very low threshold current and provides an optical output power of up to 0.9. The VL-1310-3G-P2-TOSA features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. An integrated monitoring diode is optional. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 3.125 Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Datacom and telecom optical modules
- SONET/SDH
- Ethernet
- Fiber Channel
- Industrial communication
- Field Bus





<b>Single-Mode VCSEL</b>	<b>10 Gbps</b>
<b>1310 nm</b>	<b>LC/SC, Pigtail</b>
<b>VL-1310-10G-P2 TOSA</b>	



## Key Features

- 1310 nm single-mode VCSEL TOSA (Transmit Optical Sub-Assembly)
- Optical output power: 0.7mW at  $T_o=20\text{ }^\circ\text{C}$
- Operating temperature:  $-20$  to  $+70\text{ }^\circ\text{C}$
- High data-rate modulation up to 10 Gbps
- Low power consumption
- Low drive currents and low threshold voltage

## Description

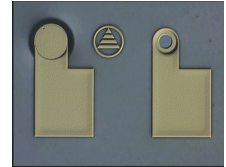
The VL-1310-10G-P2 TOSA is a 1310 nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser). It is available as a standard LC or as pigtail version with FC/APC connector. Other packaging options (TO-46, die-on-submount, etc.) are also available. This high-performance single-mode VCSEL features a very low threshold current and provides a typ. optical output power of up to 0.9mW. The VL-1310-10G-P2 TOSA features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. An integrated monitoring diode is optional. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10 Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Datacom and telecom optical modules
- SONET/SDH
- Ethernet
- Fiber Channel
- Industrial communication
- Field Bus



## Product Table 1550 nm Portfolio



Product	Wavelength	Data Rate	Package	Monitoring Diode
VL-1550-1G-P2-T4	1550 nm	1 Gbps	TO-46	Optional
VL-1550-1G-P2-R4	1550 nm	1 Gbps	TO-46 with ring	Optional
VL-1550-1G-P2-A4	1550 nm	1 Gbps	TO-46 with cap	Optional
VL-1550-1G-P2-LC	1550 nm	1 Gbps	TO-46 LC receptacle	Yes
VL-1550-1G-P2-SC	1550 nm	1 Gbps	TO-46 SC receptacle	Yes
VL-1550-1G-P2-H4	1550 nm	1 Gbps	TO-46 Pigtail	Yes
VL-1550-1G-P2-T4	1550 nm	3 Gbps	TO-46	Optional
VL-1550-1G-P2-R4	1550 nm	3 Gbps	TO-46 with ring	Optional
VL-1550-1G-P2-A4	1550 nm	3 Gbps	TO-46 with cap	Optional
VL-1550-1G-P2-LC	1550 nm	3 Gbps	TO-46 LC receptacle	Yes
VL-1550-1G-P2-SC	1550 nm	3 Gbps	TO-46 SC receptacle	Yes
VL-1550-1G-P2-H4	1550 nm	3 Gbps	TO-46 Pigtail	Yes
VL-1550-1G-P2-T4	1550 nm	10 Gbps	TO-46	Optional
VL-1550-1G-P2-R4	1550 nm	10 Gbps	TO-46 with ring	Optional
VL-1550-1G-P2-A4	1550 nm	10 Gbps	TO-46 with cap	Optional
VL-1550-1G-P2-LC	1550 nm	10 Gbps	TO-46 LC receptacle	Yes
VL-1550-1G-P2-SC	1550 nm	10 Gbps	TO-46 SC receptacle	Yes
VL-1550-1G-P2-H4	1550 nm	10 Gbps	TO-46 Pigtail	Yes



<b>Single-Mode VCSEL</b>	<b>10 Gbps</b>
<b>1550 nm</b>	<b>LC, Pigtail</b>
<b>VL-1550-10G-P2 TOSA</b>	



## Key Features

- 1550nm single-mode VCSEL TOSA (Transmit Optical Sub-Assembly)
- Optical output power: 0.7mW at  $T_o=20^{\circ}\text{C}$
- Operating temperature:  $-20$  to  $+70^{\circ}\text{C}$
- High data-rate modulation up to 10 Gbps
- Low power consumption
- Low drive currents and low threshold voltage

## Description

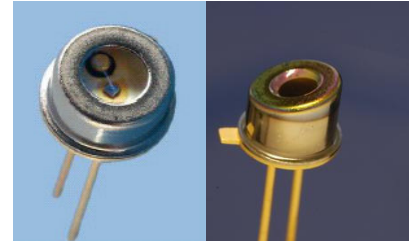
The VL-1550-10G-P2 TOSA is a 1550 nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser). It is available as a standard LC or as pigtail version with FC/APC connector. Other packaging options (TO-46, die-on-submount, etc.) are also available. This high-performance single-mode VCSEL features a very low threshold current and provides a typ. optical output power of up to 0.9mW. The VL-1550-10G-P2 TOSA features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. An integrated monitoring diode is optional. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10 Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Datacom and telecom optical modules
- SONET/SDH
- Ethernet
- Fiber Channel
- Industrial communication
- Field Bus



<b>Single-Mode VCSEL</b>	<b>10 Gbps</b>
<b>1550nm</b>	<b>TO-46</b>
<b>VL-1550-10G-P2-x4</b>	



## Key Features

- 1550nm single-mode VCSEL in TO-46
- Optical output power: 3.5 mW at  $T_o=20\text{ }^\circ\text{C}$
- Operating temperature:  $-20$  to  $+70\text{ }^\circ\text{C}$
- High data-rate modulation up to 10.3125 Gbps
- Low power consumption
- Low drive currents and low threshold voltage
- Integrated monitoring diode optional

## Description

The VL-1550-10G-P2 is a 1550 nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser). It is available in a standard TO-46 can with angled cap and anti-reflection window. Other packaging options (die on submount, TOSA, Pigtail, etc.) are available on request. This high-performance single-mode VCSEL features a very low threshold current and provides an optical output power of up to 3.5 mW. The VL-1550-10G-P2 features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. An integrated monitoring diode is optional. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 10.3125 Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Datacom and telecom optical modules
- SONET/SDH
- Ethernet
- Fiber Channel
- Industrial communication
- Field Bus



<b>Single-Mode VCSEL</b>	<b>3.125Gbps</b>
<b>1550nm</b>	<b>TO-46</b>
<b>VL-1550-3G-P2-x4</b>	



## Key Features

- 1550nm single-mode VCSEL in TO-46
- Optical output power: 3.5 mW at  $T_o=20\text{ }^\circ\text{C}$
- Operating temperature:  $-20$  to  $+70\text{ }^\circ\text{C}$
- High data-rate modulation up to 3.125 Gbps
- Low power consumption
- Low drive currents and low threshold voltage
- Integrated monitoring diode optional

## Description

The VL-1550-3G-P2 is a 1550 nm single-mode VCSEL (Vertical-Cavity Surface-Emitting Laser). It is available in a standard TO-46 can with angled cap and anti-reflection window. Other packaging options (die on submount, etc.) are available on request. This high-performance single-mode VCSEL features a very low threshold current and provides an optical output power of up to 3.5 mW. The VL-1550-3G-P2 features fast rise and fall times, low threshold voltage, excellent SMSR performance and low power dissipation. An integrated monitoring diode is optional. This VCSEL is well suited for high-performance, single-mode and multi-mode communications solutions with a data-rate of up to 3.125 Gbps. The low drive current enables simplified system design and reduces power dissipation and system cost.

## Applications

- Datacom and telecom optical modules
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- Ethernet
- Fiber Channel
- Industrial communication
- Field Bus



## General notes and recommendations

- This product is a class 3B laser product and emits invisible laser radiation. Do not expose eyes to this laser beam, as it may be harmful to the eye.
- Do not operate or store this product beyond the specified operating or storage conditions. Doing so may damage the product and VERTILAS does not assume any responsibility or warranty in this case.
- Any product that is supplied in a non-hermetically sealed package is subject to limited warranty. A non-hermetically sealed VCSEL is potentially exposed to hazardous conditions, such as moisture, gases, physical damage, in the customer application, that may damage the product or alter its performance. VERTILAS does not assume responsibility in this case.
- Handle and operate this product with care. VCSEL products are sensitive, and can be easily damaged, e.g. by electro-static discharge, supply power peaks, signal peaks, overload and other operating or storage conditions. Failing to prevent these conditions may damage the product and VERTILAS does not assume any responsibility or warranty in this case.
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