

# 680nm Quasi Single-Mode VCSEL

Part number code: 680Q-0000-X002

## PRODUCT DESCRIPTION

A Quasi (Gaussian beam shape; but multi spectral mode) 680nm VCSEL, with single linear polarized emission also designed for modulated applications. The red wavelength is ideal for applications requiring beam visibility such as aligning sensors & high resolution applications requiring a small spot size.

## Major Applications:

- Laser Printing
- Medical devices
- Bar code scanners
- Holography

## Features:

- Low operating current
- Low divergence angle
- Circular beam profile
- Linear polarization orientated along chip edge

## Package options include:

- TO-46 hermetic can (Minimum quantity order of 50 pcs)
- TO-46 non-hermetic can
- TO can with TEC and Thermistor for Temperature Control Applications
- PLCC-2 with encapsulant
- Other packages upon request.

**Package Details:** See separate packages datasheet at <http://www.vixarinc.com/pdf/PackagesDS.pdf> .



COMPLIES WITH IEC 60825-1, 2<sup>nd</sup> Edition 2007.



COMPLIES WITH 21 CFR 1040.10 AND 1040-10.11 EXCEPT FOR DEVIATIONS PURSUANT TO LASER NOTICE NO.50 DATED 27 MAY 2001.



## Absolute Maximum Ratings

Parameter	Rating	Notes
Storage temperature	-40 to 125 °C	For PLCC packages: -40 to 100°C
Operating temperature (VCSEL)	-20 to 60 °C	
Lead solder temperature	260°C, 10 seconds	
CW current (VCSEL)	4 mA	(Note 1) at room temperature
Maximum pulsed current	10 mA	(Note 2) <1μs pulse width, 1% duty cycle T=30°C
Laser reverse voltage	5 V	(Note 3)

Note 1: The maximum CW laser current in the Absolute Maximum Ratings is valid for the operating temperature noted at the table above. The maximum CW laser current decreases with increasing temperature. Contact Vixar for maximum CW laser current values at other temperatures.

Note 2: For details refer to the Vixar Application Note "Operation of VCSELs Under Pulsed Conditions".

Note 3: For details refer to the Vixar Application Note "VCSEL EOS/ESD Considerations and Lifetime Optimization".

Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated for extended periods of time may affect device reliability.

## Electro-Optical Characteristics

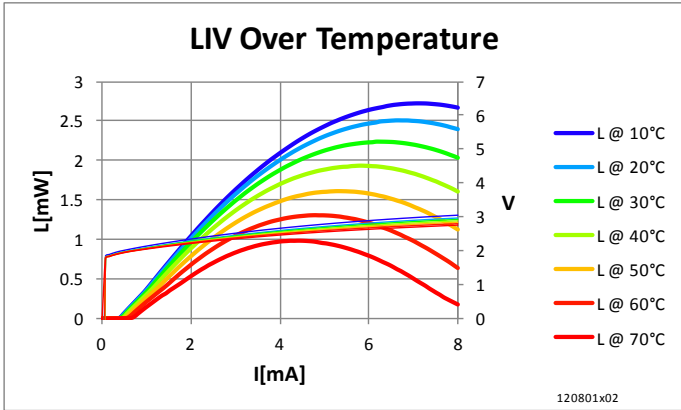
VCSEL Operating Temp (T<sub>v</sub>) =30°C & Operating Current=3mA unless otherwise stated)

Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Threshold current	I <sub>th</sub>	mA	0.2	0.5	1.4	
Operating voltage	V <sub>f</sub>	Volts	--	2.4	2.8	
Series resistance (VCSEL)	R <sub>s</sub>	Ohms	--	150	--	
Slope efficiency	SE	mW/mA	--	0.3	--	
Optical output power	L <sub>op</sub>	mW	0.5	0.8	1.2	I <sub>f</sub> =3mA, T=30°C
Optical output power	L <sub>op</sub>	mW	--	0.6	--	I <sub>f</sub> =3mA, T=50°C
Optical output power	L <sub>op</sub>	mW	--	0.4	--	I <sub>f</sub> =3mA, T=60°C
Reverse breakdown voltage		V	10	--	--	I <sub>r</sub> ≤ 1nA
Operating wavelength	λ <sub>op</sub>	nm	670	680	690	
Spectral width (RMS)	Δλ	nm	--	--	1.5	
Beam divergence 1/e <sup>2</sup>		deg	20	23	26	Whole angle
Beam divergence FWHM	FWHM	deg	12	15	18	Whole angle
Wavelength current coefficient		nm/mA	0.15	0.30	0.5	
Wavelength temp. coefficient		nm/°C	0.044	0.045	0.05	



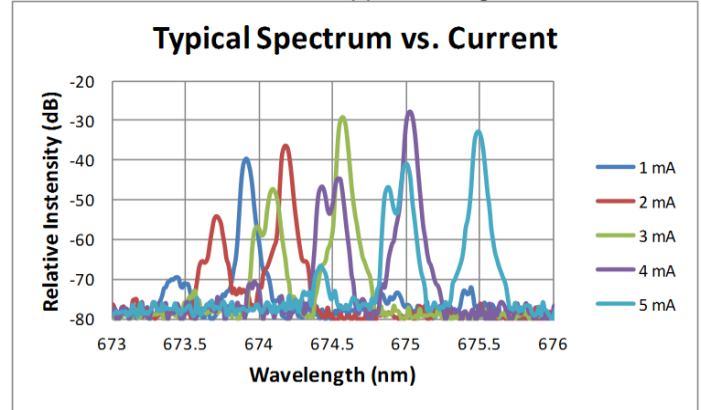
**TYPICAL PERFORMANCE CURVES:**

**Output Power vs. Current over Temperature**

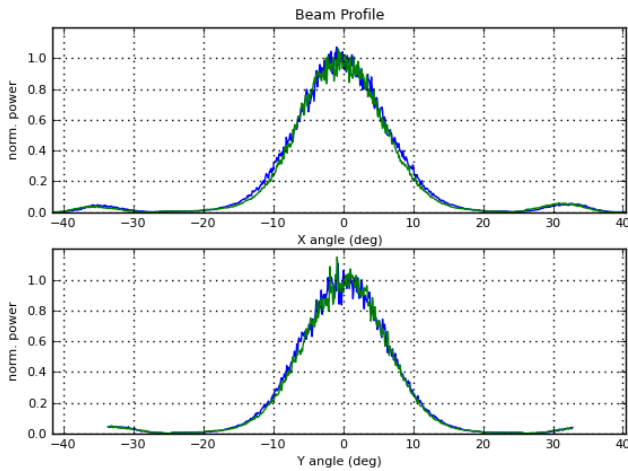


**Single Mode Wavelength Spectrum vs. Current**

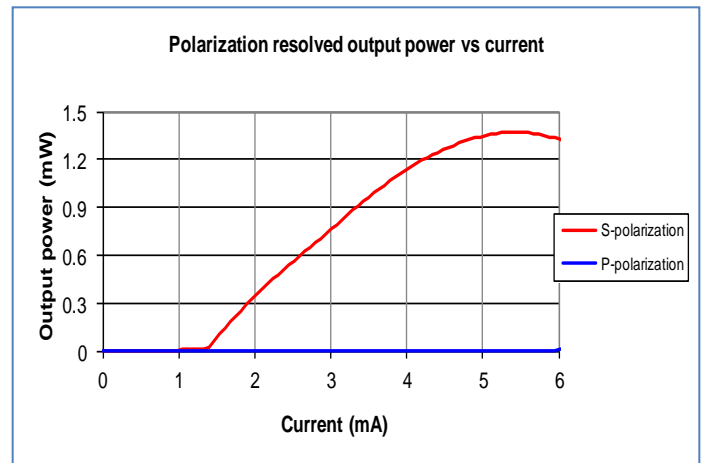
Note that side modes appear at higher currents.



**Far Field Beam Divergence at Room Temperature  
(Independent of Temperature & Current)**



**Polarization graph of 680nm VCSEL**





## ORDERING INFORMATION

Description	ESD Diode <sup>(1)</sup>	Package	Hermetically Sealed <sup>(2)</sup>	Part Number
680 nm Quasi single-mode VCSEL bare die		Die only <sup>(3)</sup>		680Q-0000-A002
680 nm Quasi single-mode VCSEL on a TO can package		TO-46		680Q-0000-B002
680 nm Quasi single-mode VCSEL on a TO can package with ESD diode	✓	TO-46		680Q-0000-B092
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can package		TO-46	✓ <sup>(2)</sup>	680Q-0000-G002
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can package with ESD diode	✓	TO-46	✓ <sup>(2)</sup>	680Q-0000-G092
680 nm Quasi single-mode VCSEL on a PLCC-2 package		PLCC-2		680Q-0000-D002
680 nm Quasi single-mode VCSEL on a PLCC-2 package with ESD diode	✓	PLCC-2		680Q-0000-D092
680 nm Quasi single-mode VCSEL on a TO can six leaded can with TEC & Thermistor		TO-46 6 Leaded		680Q-0000-BC02
680 nm Quasi single-mode VCSEL on a TO can six leaded can with TEC, Thermistor & ESD diode	✓	TO-46 6 Leaded		680Q-0000-BC92
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can six leaded can with TEC & Thermistor		TO-46 6 Leaded	✓ <sup>(2)</sup>	680Q-0000-GC02
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can six leaded can with TEC, Thermistor & ESD diode	✓	TO-46 6 Leaded	✓ <sup>(2)</sup>	680Q-0000-GC92
680 nm Quasi single-mode VCSEL on a TO can 8 leaded can with TEC & Thermistor		TO-5		680Q-0000-EC02
680 nm Quasi single-mode VCSEL on a TO can 8 leaded can with TEC, Thermistor & ESD diode	✓	TO-5		680Q-0000-EC92
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can 8 leaded can with TEC & Thermistor		TO-5	✓ <sup>(2)</sup>	680Q-0000-IC02
680 nm Quasi single-mode VCSEL on a hermetic sealed TO can 8 leaded can with TEC, Thermistor & ESD diode	✓	TO-5	✓ <sup>(2)</sup>	680Q-0000-IC92

<sup>(1)</sup> Do not include an ESD diode if the part will be modulation frequency  $\geq 35$  MHz.

<sup>(2)</sup> Minimum quantity order is 50 pieces

<sup>(3)</sup> To burn in the devices, operate them at 3mA for 24 hours at room temperature. Contact Vixar for information regarding suitable epoxy materials and curing times and temperatures.

# Vixar

# Vixar

2950 Xenium Lane, Suite 104  
Plymouth, MN 55441  
763-746-8045  
763-746-8048(fax)  
email: [info@vixarinc.com](mailto:info@vixarinc.com)  
website: [www.vixarinc.com](http://www.vixarinc.com)  
Copyright ©VIXAR 2014