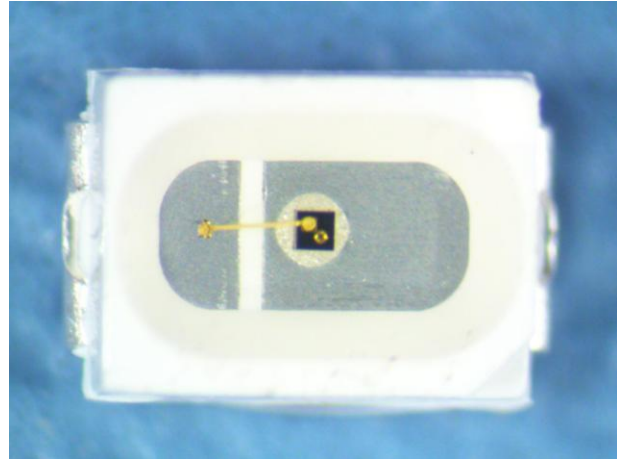


680nm Quasi Single-Mode Proton VCSEL

680Q-0000-x002*, 680Q-0000-x092



PRODUCT DESCRIPTION

Single transverse mode (Gaussian beam shape) 680nm VCSEL, with single linear polarized emission. Package options include:

- TO-46 hermetic can,
- TO-46 non-hermetic can (only for evaluation of electro-optical characteristics; not for reliability testing)
- PLCC-2 with encapsulant (Not for high temperature application)
- Other packages upon request.

Visible Vertical Cavity Surface Emitting Laser (VCSEL)

This quasi single-mode (Gaussian beam shape but not a single longitudinal mode) optical source is designed for non-modulated OEM applications such as position sensing, motion control, medical devices, printing, and bar code scanners. The red (680nm) wavelength is ideal for:

- Applications requiring beam visibility, such as aligning sensors
- Absorptive or spectroscopic sensors requiring a particular wavelength
- High resolution applications requiring a small spot size

Features:

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

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

* "x" denotes the character position of option designators. See "Ordering Information" at end of datasheet for details.

RoHS
Compliant



Absolute Maximum Ratings

Parameter	Symbol	Rating	Notes
Storage temperature		-40 to 125 °C	
Operating temperature (VCSEL)	Tv	0 to 60 °C	
Lead solder temperature		260°C, 10 seconds	
CW current (VCSEL)		4.5 mA	(Note 1)
Maximum pulsed current		10 mA	<1µs pulse width, 1% duty cycle, T=30°C (Note 2)
Laser reverse voltage		5 V	(Note 3)

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 (Tv) =30°C & Operating Current=3mA unless otherwise stated)

Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Maximum DC current (CW)		mA	--	--	4.2	To remain Gaussian beam shape
Threshold current	I _{th}	mA	1.0	1.6	2.1	
Operating voltage	V _f	Volts	--	2.4	2.8	
Series resistance (VCSEL)	R _s	Ohms	--	150	--	
Slope efficiency	SE	mW/mA	--	0.9	--	
Optical output power	L _{op}	mW	0.7	1.2	1.8	I _f =3mA, T=30°C
Optical output power	L _{op}	mW	--	0.6	--	I _f =3mA, T=50°C
Optical output power	L _{op}	mW	--	0.4	--	I _f =3mA, T=60°C
Reverse breakdown voltage		V	10	--	--	I _r ≤ 1nA
Operating wavelength	λ _{op}	nm	670	680	690	
Spectral width (RMS)	Δλ	nm	--	--	1.5	
Beam divergence 1/e ²		deg	9	12	16	Whole angle
Beam divergence FWHM	FWHM	deg	5	7	10	Whole angle
Wavelength current coefficient		nm/mA	0.15	0.30	0.5	
Wavelength temp. coefficient		nm/°C	0.044	0.045	0.05	
ESD Survival		V	1000	--	--	(Notes 3, 4)
ESD Survival without ESD diode		V	--	--	100	

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

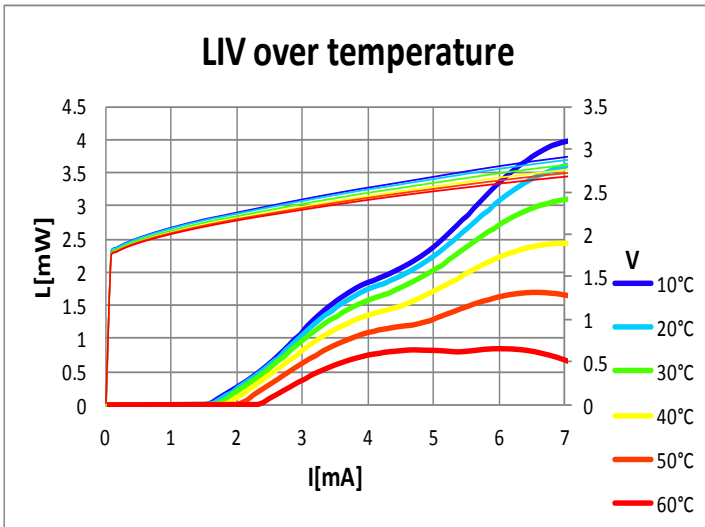
Note 2: For details refer to the Vixar Application Note "Operation of VCSELs Under Pulsed Conditions".
(<http://www.vixarinc.com/technology/applicationnotes.html>)

Note 3: For details refer to the Vixar Application Note "VCSEL EOS/ESD Considerations and Lifetime Optimization".
(<http://www.vixarinc.com/technology/applicationnotes.html>)

Note 4: Applies only to parts that include an ESD diode. ESD diodes cannot be used if the device is being modulated at rates higher than ~ 35MHz. VCSEL shall survive 3 ESD events applied in both the positive and negative polarity. ESD failures are defined as more than a 15% drop in output power or a 10% increase in reverse leakage current. This test is considered destructive and shall not be conducted on prototype or production parts that are shipped for use by the customer.

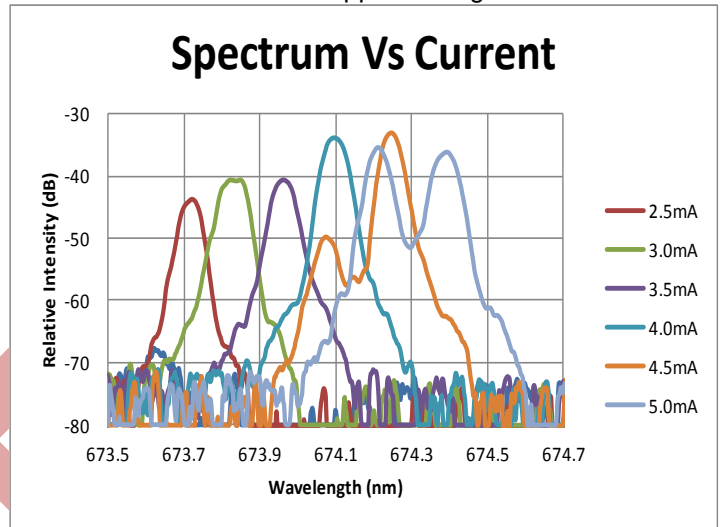
TYPICAL PERFORMANCE CURVES:

Output Power vs. Current over Temperature

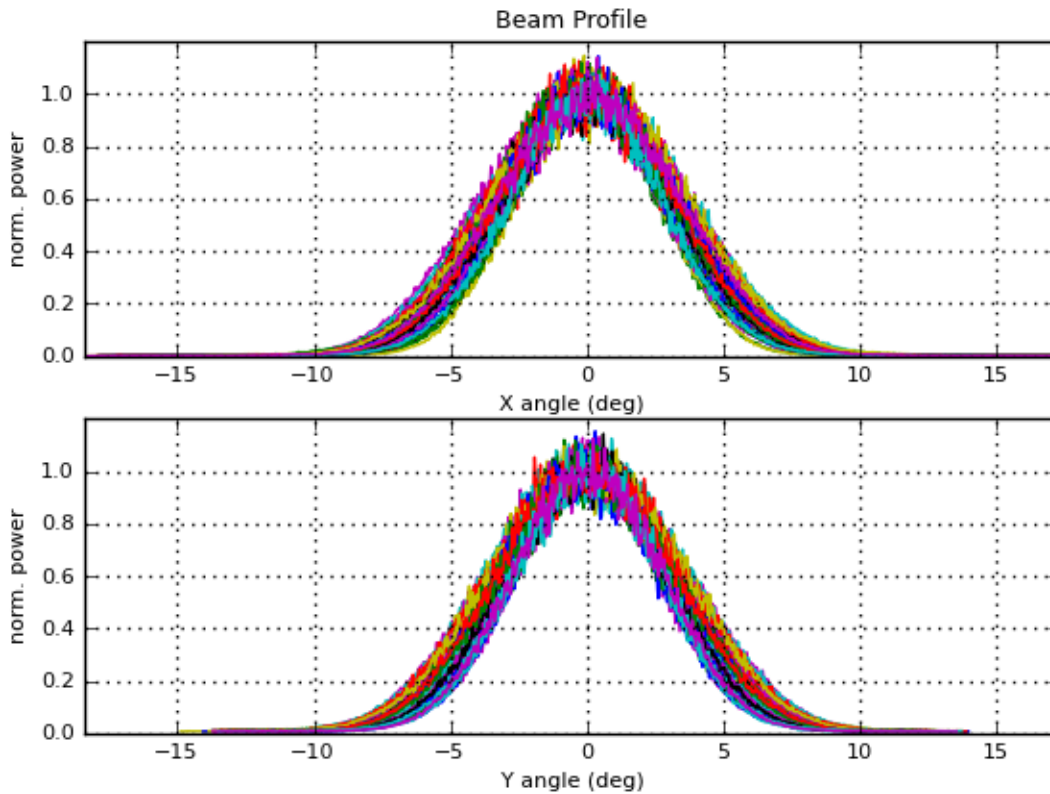


Single Mode Wavelength Spectrum vs. Current

Note that side modes appear at higher currents.



Far Field Beam Divergence at Room Temperature
(Independent of Temperature)



ORDERING INFORMATION

Description	ESD Diode ⁽¹⁾	Package	Hermetically Sealed ⁽²⁾	Part Number
680 nm single-mode VCSEL		TO-46		680Q-0000-B002
680 nm single-mode VCSEL	✓	TO-46		680Q-0000-B092
680 nm single-mode VCSEL		TO-46	✓ ⁽²⁾	680Q-0000-G002
680 nm single-mode VCSEL	✓	TO-46	✓ ⁽²⁾	680Q-0000-G092
680 nm single-mode VCSEL		PLCC-2 ⁽³⁾		680Q-0000-D002
680 nm single-mode VCSEL	✓	PLCC-2 ⁽³⁾		680Q-0000-D092

⁽¹⁾ Do not include an ESD diode if the part will be modulation frequency ≥ 35 MHz.

⁽²⁾ Hermetically sealed (highly recommended for 680 nm quasi single-mode VCSELs used for production or reliability testing).

⁽³⁾ Do not include encapsulant for high temperature (above 40°C) application



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