680nm Communications Grade VCSEL

Part number code: 680C-0000-X002

PRODUCT DESCRIPTION
A high speed Multi-mode 680nm VCSEL specifically designed for modulated applications up to 10 Gbps rate. This product is particularly useful when using PMMA (Poly methyl methacrylate) and PCP (partially chlorinated POF) formulations of Polymer Optical Fiber (POF).

Major Applications:
- Data communications
- Medical devices
- Plastic Optical Fiber

Features:
- Up to 10Gbps modulation rate
- Narrow Spectral width
- Low operating current
- 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, 2nd 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.

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Absolute Maximum Ratings

Parameter	Rating	Notes
Storage temperature	-40 to 125 °C	For PLCC packages: -40 to 100°C
Operating temperature (VCSEL)	-20 to 70 °C	
Lead solder temperature	260°C, 10 seconds	
CW current (VCSEL)	7 mA	(Note 1) at room temperature
Maximum pulsed current	15 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 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".

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 (Tv) =30°C & Operating Current=5mA unless otherwise stated)

Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Threshold current	Ith	mA	0.6	1.2	2.0	
Operating voltage	Vf	Volts	--	2.2	2.6	
Series resistance (VCSEL)	Rs	Ohms	--	60	--	
Slope efficiency	SE	mW/mA	--	0.8	--	
Optical output power	Lop	mW	1.4	2.2	3.0	T=30°C
Optical output power	Lop	mW	--	1.3	--	T=50°C
Optical output power	Lop	mW	--	0.6	--	T=70°C
Reverse breakdown voltage		V	10	--	--	Ir ≤ 1nA
Operating wavelength	λop	nm	670	680	690	
Spectral width (RMS)	Δλ	nm	--	--	1.5	
Beam divergence 1/e2		deg	23	25	27	Whole angle
Beam divergence FWHM	FWHM	deg	18	21	23	Whole angle
Modulation Bandwidth	BW	Gbps	5.0	--	--	
Wavelength temp. coefficient		nm/°C	0.044	0.045	0.05	
Rise time		ps	--	--	80	20%-80%
Fall time		ps	--	--	80	20%-80%
Relative intensity noise	RIN		--	-130	--	DC to 3GHz

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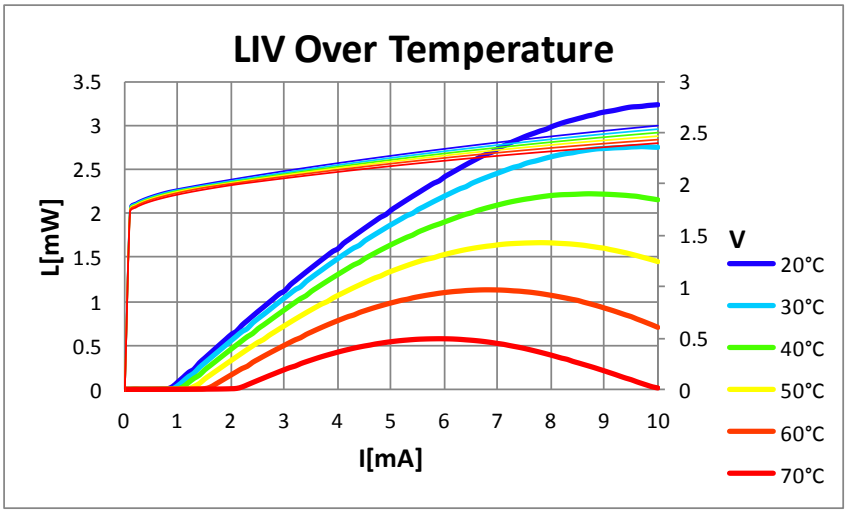
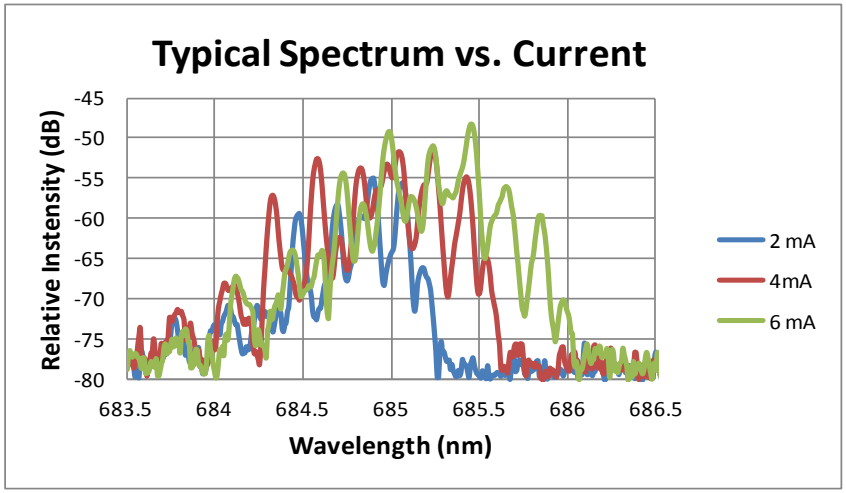
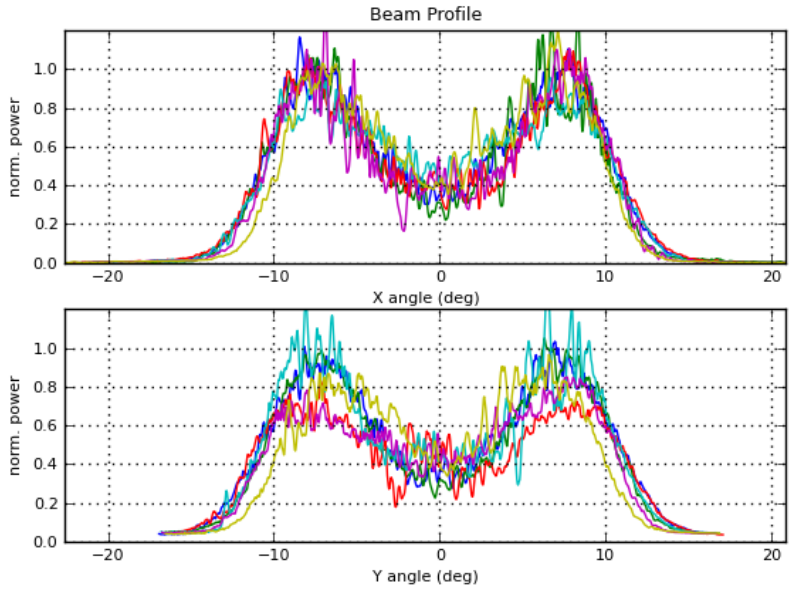
TYPICAL PERFORMANCE CURVES:





Far Field Beam Divergence at 5mA, Room Temperature



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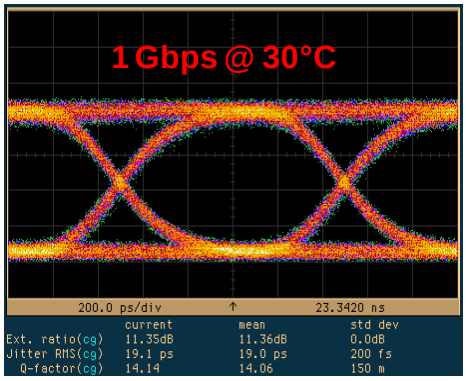
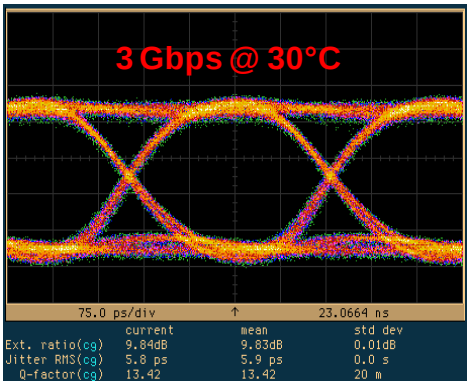
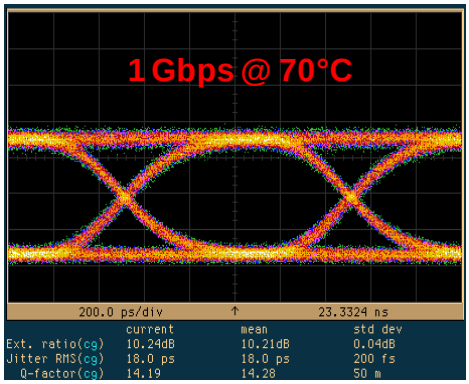
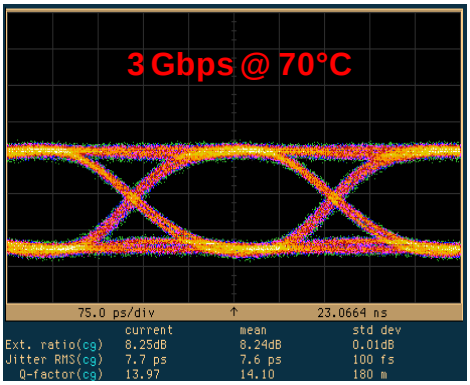
Eye diagrams at different temperature and modulation rate

680nm VCSEL: 1.0 Gbps & 3 Gbps

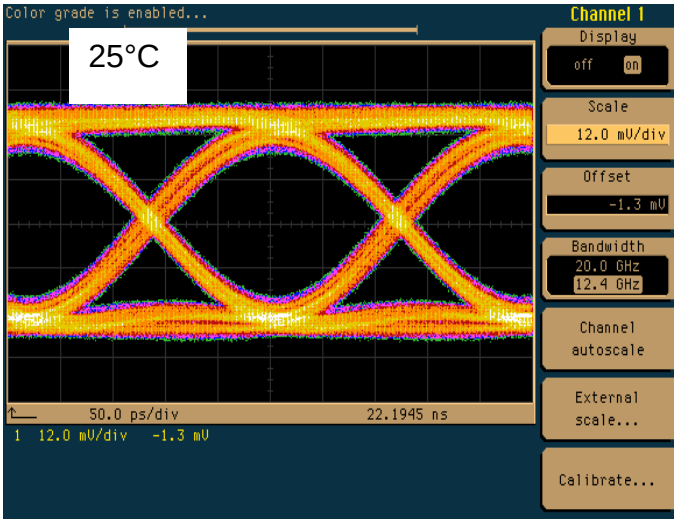


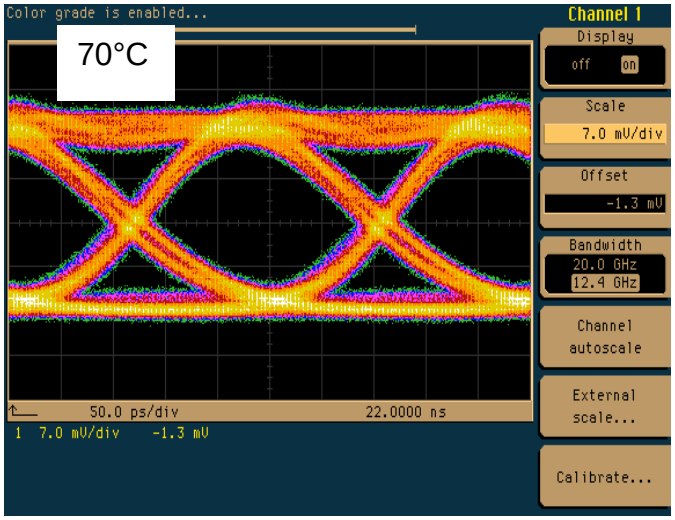






680nm VCSEL: 4.25 Gbps





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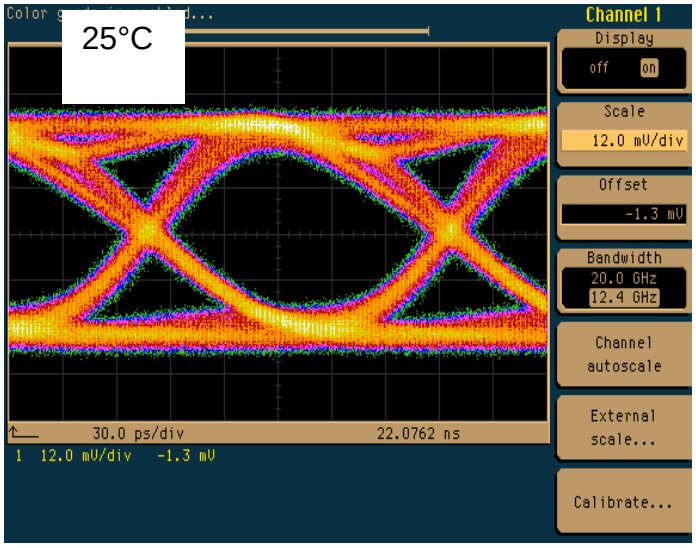
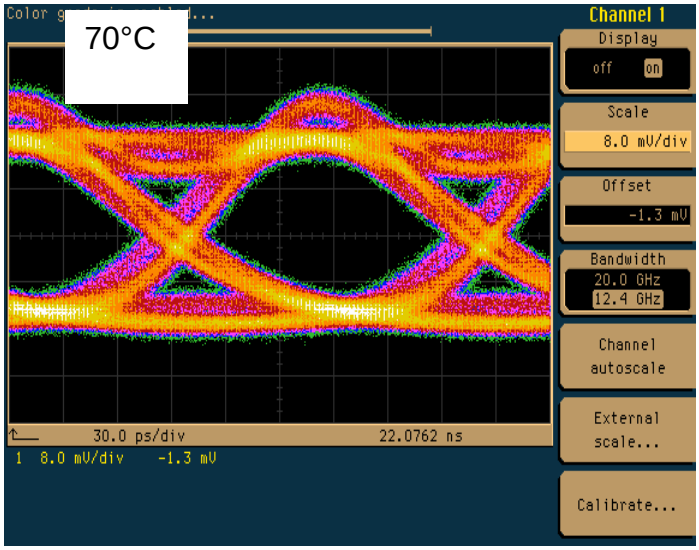
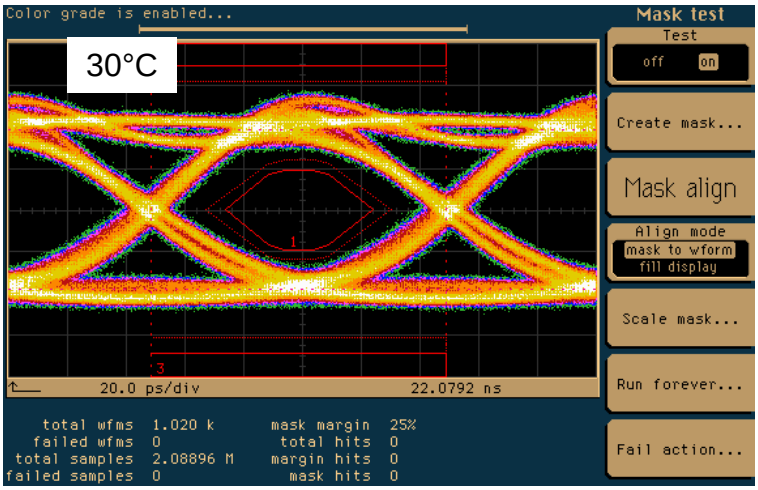
680nm VCSEL: 6.0 Gbps





680nm VCSEL: 10.0 Gbps



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ORDERING INFORMATION

Description	Package	Hermetically Sealed (2)	Part Number
680 nm Communication grade VCSEL bare die	Die only (1)		680C-0000-A002
680 nm Communication grade VCSEL on a TO can package	TO-46		680C-0000-B002
680 nm Communication grade VCSEL on a hermetic sealed TO can package	TO-46	✓(2)	680C-0000-G002
680 nm Communication grade VCSEL on a PLCC-2 package	PLCC-2		680C-0000-D002
680 nm Communication grade VCSEL on a TO can six leaded can with TEC & Thermistor	TO-46 6 Leaded		680C-0000-BC02
680 nm Communication grade VCSEL on a hermetic sealed TO can six leaded can with TEC & Thermistor	TO-46 6 Leaded	✓(2)	680C-0000-GC02
680 nm Communication grade VCSEL on a TO can 8 leaded can with TEC & Thermistor	TO-5		680C-0000-EC02
680 nm Communication grade VCSEL on a hermetic sealed TO can 8 leaded can with TEC & Thermistor	TO-5	✓(2)	680C-0000-IC02

(1) To burn-in bare die, operate them at 5mA for 24 hours at 85°C after packaging. Contact Vixar for information regarding epoxy attach materials and cure times and temperatures.
(2) Hermetically sealed (highly recommended for production or reliability testing). Minimum quantity order is 50 pieces

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