

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 100 pcs)
- TO-46 non-hermetic can

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.



Absolute Maximum Ratings

| Parameter | Rating | Notes |
|-------------------------------|-------------------|--|
| Storage temperature | -40 to 125 °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.

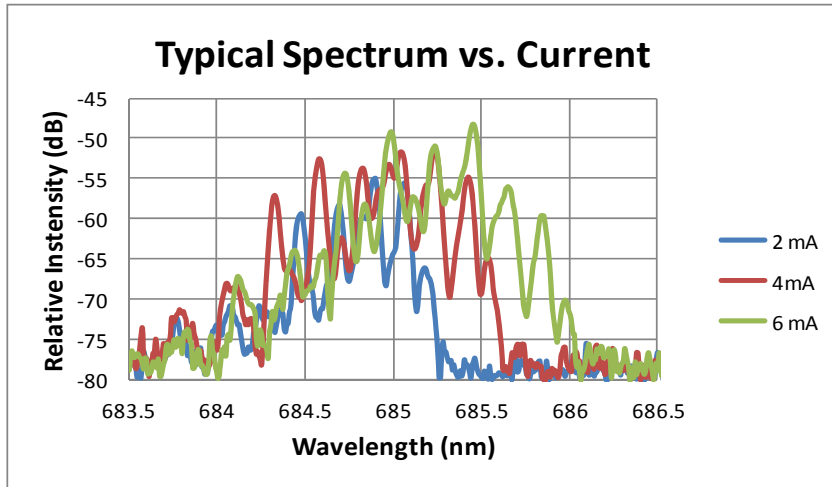
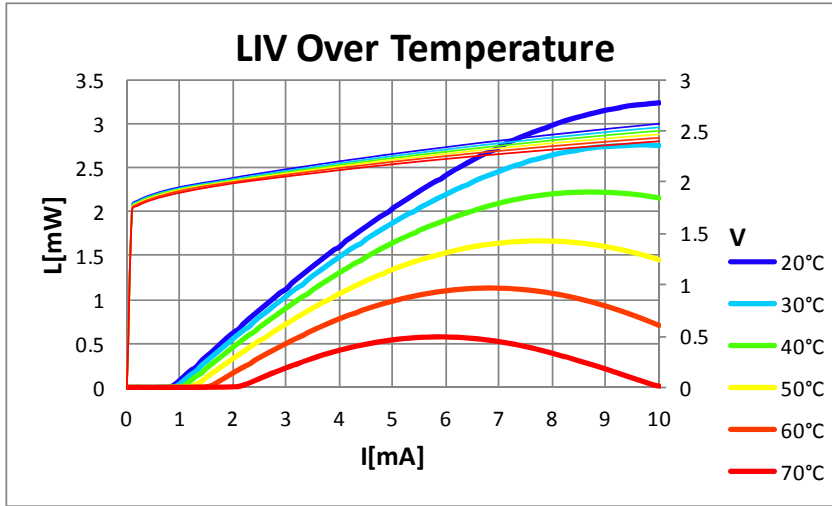
Electro-Optical Characteristics

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

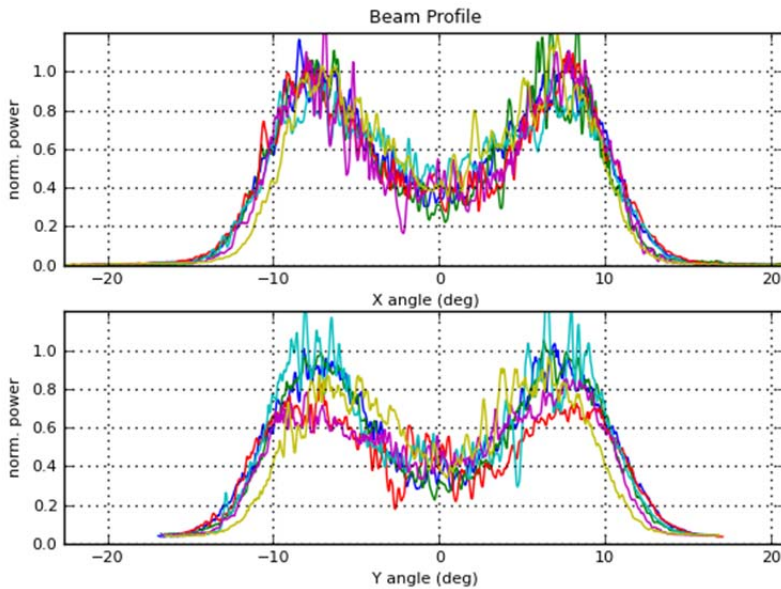
| Parameter | Symbol | Units | Minimum | Typical | Maximum | Notes |
|----------------------------------|-----------------|-------|---------|---------|---------|----------------------|
| Threshold current | I _{th} | mA | 0.6 | 1.0 | 2.0 | |
| Operating voltage | V _f | Volts | -- | 2.4 | 2.8 | |
| Series resistance (VCSEL) | R _s | Ohms | -- | 60 | -- | |
| Slope efficiency | SE | mW/mA | -- | 0.8 | -- | |
| Optical output power | L _{op} | mW | 1.4 | 2.2 | 3.0 | T=30°C |
| Optical output power | L _{op} | mW | -- | 1.3 | -- | T=50°C |
| Optical output power | L _{op} | mW | -- | 0.5 | -- | T=70°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 | 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 |



TYPICAL PERFORMANCE CURVES:

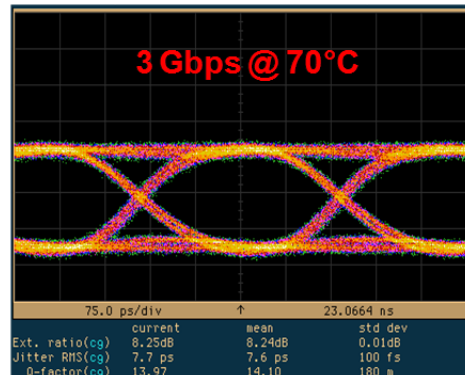
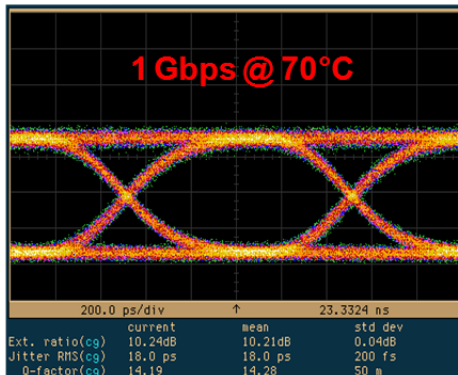
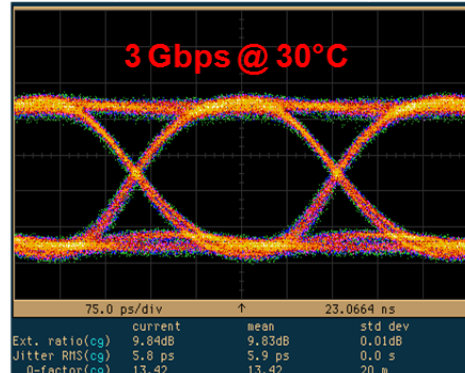
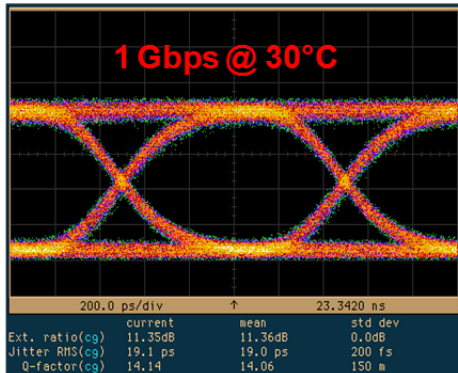


Far Field Beam Divergence at 5mA, Room Temperature

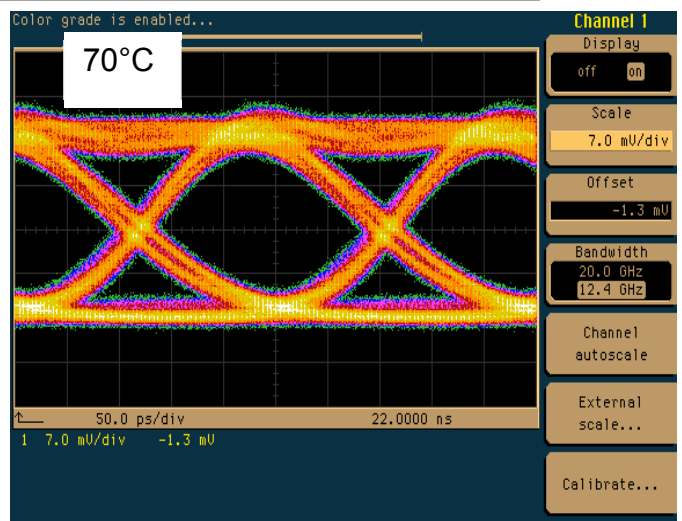
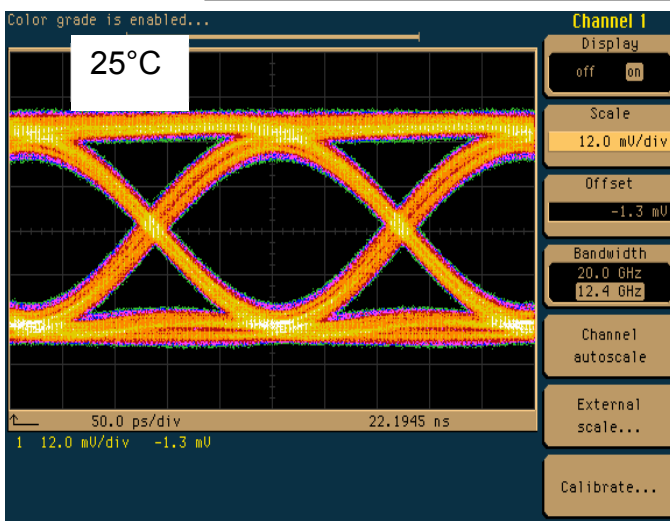


Eye diagrams at different temperature and modulation rate

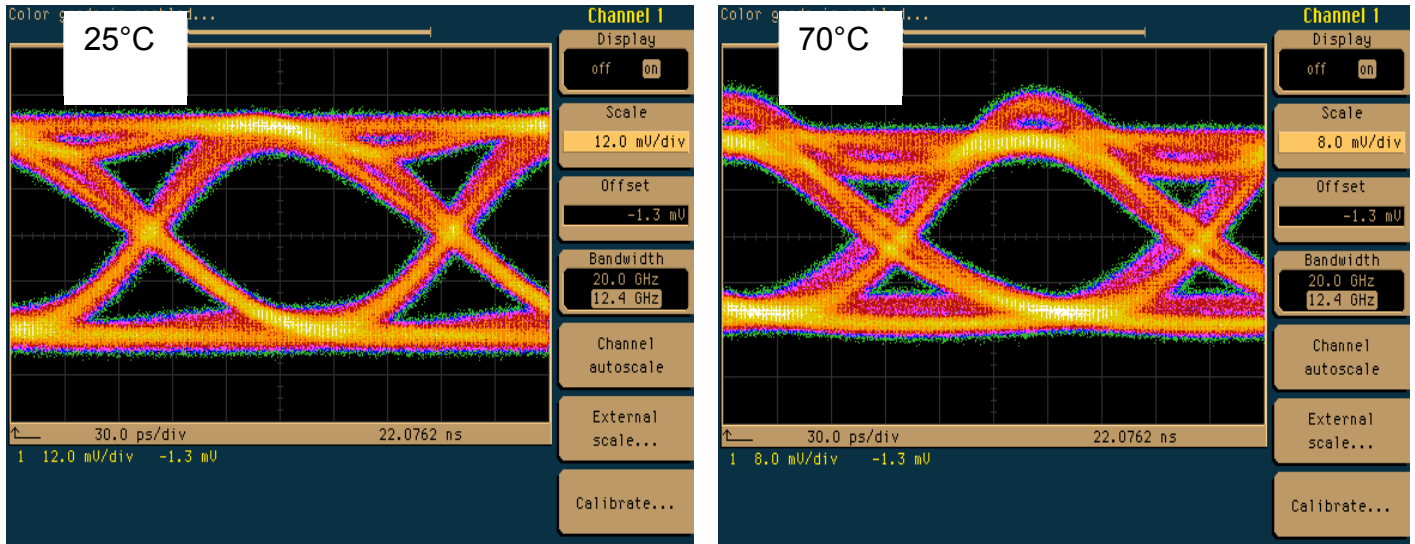
680nm VCSEL: 1.0 Gbps & 3 Gbps



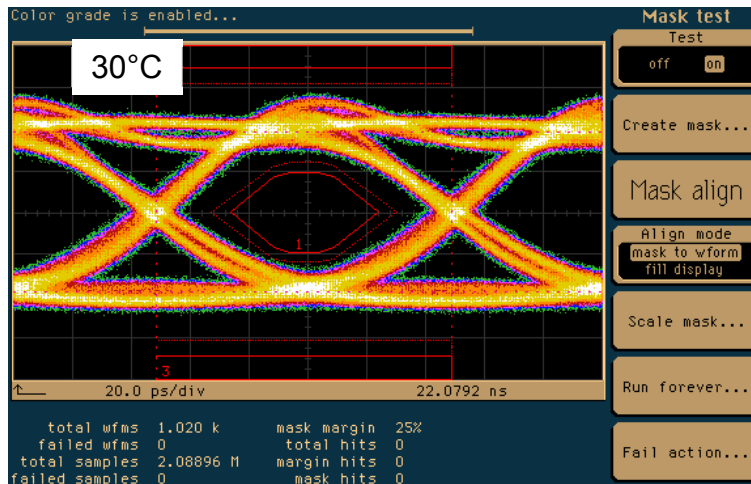
680nm VCSEL: 4.25 Gbps



680nm VCSEL: 6.0 Gbps



680nm VCSEL: 10.0 Gbps





ORDERING INFORMATION

| Description | Package | Hermetically Sealed ⁽¹⁾ | Part Number |
|--|----------|------------------------------------|----------------|
| 680 nm Communication grade VCSEL bare die | Die only | | 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 | ✓ ⁽¹⁾ | 680C-0000-G002 |

⁽¹⁾ Hermetically sealed (recommended for very high reliability or harsh environment applications). Minimum quantity order is 100 pieces

Special Note:

For some applications, a burn-in period for VCSEL die is recommended to stabilize the output power. Please contact Vixar for a recommendation.



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