

# Preliminary 940nm Multi-Mode VCSEL

Part number code: 940M-0000-X001

## PRODUCT DESCRIPTION

A Multi- transverse mode 940nm Infrared VCSEL designed for OEM applications such as perceptual computing, industrial position and motion sensing.

## Major Applications:

- Biometric sensing
- Free space data links
- Industrial sensors
- Pulse oximetry

## Features:

- Low divergence angle
- 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
- 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°C to 90 °C	
Lead solder temperature	260°C, 10 seconds	
CW current (VCSEL)	25 mA	(Note 1) at room temperature
Maximum pulsed current	80 mA	(Note 2) <100ns 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".

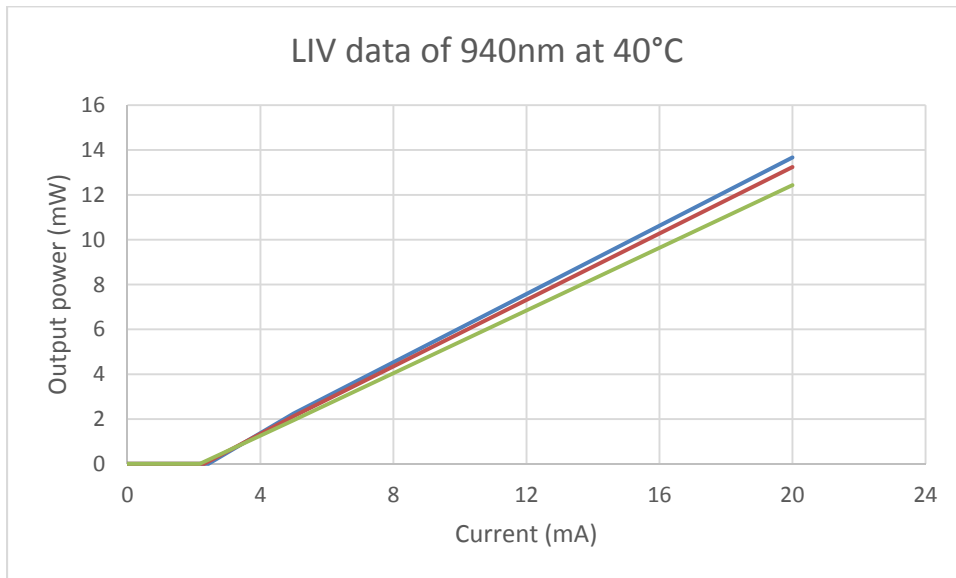
Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device. These are stress ratings only. Functional operation of the device at these or any other conditions beyond those indicated for extended periods of time may affect device reliability.

## Electro-Optical Characteristics

VCSEL Operating Temp (T<sub>v</sub>) =40°C & Operating Current=16mA unless otherwise stated)

Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Threshold current	I <sub>th</sub>	mA	1.8	2.3	3.2	
Operating voltage	V <sub>f</sub>	Volts	--	1.8	2.4	
Series resistance (VCSEL)	R <sub>s</sub>	Ohms	--	30	--	
Slope efficiency	SE	mW/mA	--	0.8	--	
Optical output power	L <sub>op</sub>	mW	8.0	10.0	12.0	T=40°C
Optical output power	L <sub>op</sub>	mW	--	8.0	--	T=90°C
Power conversion efficiency	WPE <sub>max</sub>			0.35		
Reverse breakdown voltage		V	10	--	--	I <sub>r</sub> ≤ 1nA
Operating wavelength	λ <sub>op</sub>	nm	930	940	950	
Spectral width (RMS)	Δλ	nm	--	--	1.5	
Beam divergence FWHM	FWHM	deg	--	18	--	
Current tuning		nm/mA		0.5		
Wavelength temp. coefficient		nm/°C		0.065		

## TYPICAL PERFORMANCE CURVES:



## ORDERING INFORMATION

Description	ESD Diode (1)	Package	Hermetically Sealed (2)	Part Number
940 nm Multi-mode VCSEL bare die		Die only <sup>(3)</sup>		940M-0000-A001
940 nm Multi-mode VCSEL on a TO can package		TO-46		940M-0000-B001
940 nm Multi-mode VCSEL on a TO can package with ESD diode	✓	TO-46		940M-0000-B091
940 nm Multi-mode VCSEL on a hermetic sealed TO can package		TO-46	✓ <sup>(2)</sup>	940M-0000-G001
940 nm Multi-mode VCSEL on a hermetic sealed TO can package with ESD diode	✓	TO-46	✓ <sup>(2)</sup>	940M-0000-G091
940 nm Multi-mode VCSEL on a PLCC-2 package		PLCC-2		940M-0000-D001
940 nm Multi-mode VCSEL on a PLCC-2 package with ESD diode	✓	PLCC-2		940M-0000-D091

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

<sup>(2)</sup> Hermetically sealed (highly recommended for production or reliability testing). Minimum quantity order is 100 pieces

<sup>(3)</sup> For some applications, a burn-in period for VCSEL die is recommended to stabilize the output power. Please contact Vixar for a recommendation.

Vixar

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