

940nm True Single-Mode VCSEL

Part number code: 940S-0000-X001

PRODUCT DESCRIPTION

A true (both spectrally single mode and Gaussian beam shape) single transverse mode 940nm VCSEL, with linear polarized emission.

Features:

- Low divergence angle
- Circular beam profile
- Narrow spectral width
- Stable SM beam divergence emission over both temperature and 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
- 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.



Absolute Maximum Ratings

Parameter	Rating	Notes
Storage temperature	-40 to 125 °C	For PLCC packages: -40 to 100°C
Operating temperature (VCSEL)	-20 to 120 °C	
Lead solder temperature	260°C, 10 seconds	
CW current (VCSEL)	6 mA	(Note 1)
Laser reverse voltage	5 V	(Note 2)

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 "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

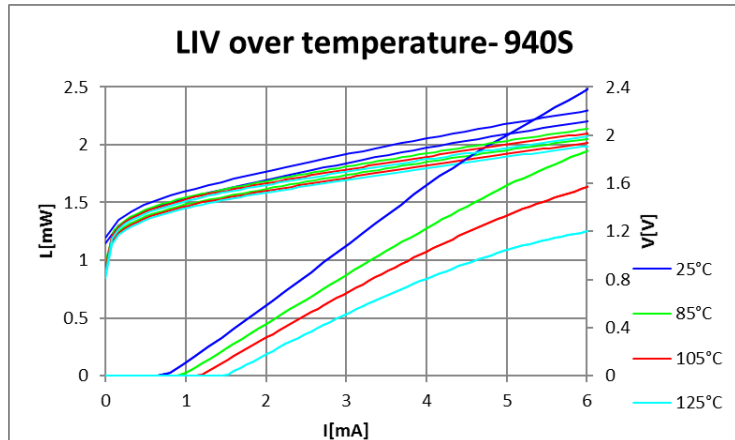
VCSEL Operating Temp (T_v) =30°C & Operating Current=4mA unless otherwise stated)

Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Maximum DC current (CW)		mA	--	--	6	To remain spectrally single mode
Threshold current	I_{th}	mA	0.6	0.85	1.2	
Operating voltage	V_f	Volts	--	2.0	2.4	
Series resistance (VCSEL)	R_s	Ohms	--	125	--	
Slope efficiency	SE	mW/mA	--	0.5	--	
Optical output power	L_{op}	mW	1.0	1.5	2.0	$T=30^\circ\text{C}$
Optical output power	L_{op}	mW	--	1.2	--	$T=80^\circ\text{C}$
Reverse breakdown voltage		V	10	--	--	$I_r \leq 1\text{nA}$
Operating wavelength	λ_{op}	nm	930	940	950	
Single mode Suppression Ratio	SMSR	dB	20	--	--	Unmodulated
Spectral width (RMS)	$\Delta\lambda$	MHz	--	--	100	Unmodulated
Beam divergence 1/e ²		deg	--	12	--	
Beam divergence FWHM	FWHM	deg	--	7	--	
Wavelength current coefficient		nm/mA	0.15	0.30	0.5	
Wavelength temp. coefficient		nm/°C	--	0.065	--	



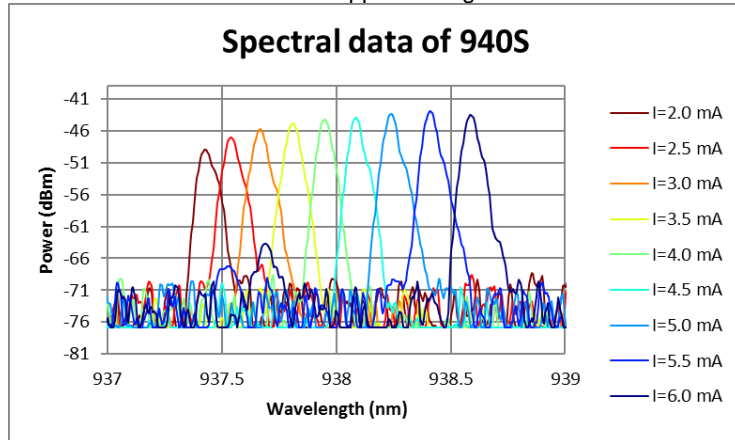
TYPICAL PERFORMANCE CURVES:

Output Power vs. Current over Temperature

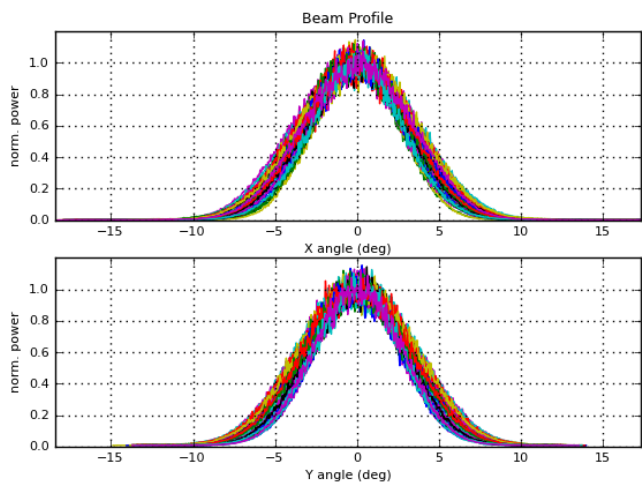


Single Mode Wavelength Spectrum vs. Current

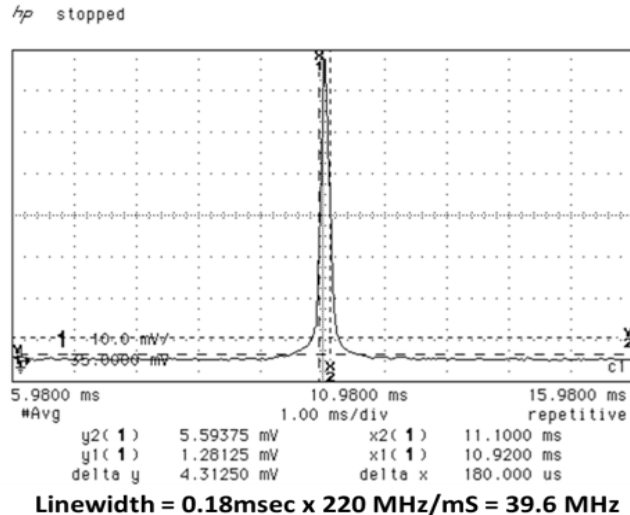
Note that side modes appear at higher currents.



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



Sample Linewidth data on a single mode VCSEL



ORDERING INFORMATION

Description	ESD Diode ⁽¹⁾	Package	Hermetically Sealed ⁽²⁾	Part Number
940 nm single-mode VCSEL bare die		Die only ⁽³⁾		940S-0000-A001
940 nm single-mode VCSEL on a TO can package		TO-46		940S-0000-B001
940 nm single-mode VCSEL on a TO can package with ESD diode	✓	TO-46		940S-0000-B091
940 nm single-mode VCSEL on a hermetic sealed TO can package		TO-46	✓ ⁽²⁾	940S-0000-G001
940 nm single-mode VCSEL on a hermetic sealed TO can package with ESD diode	✓	TO-46	✓ ⁽²⁾	940S-0000-G091
940 nm single-mode VCSEL on a PLCC-2 package		PLCC-2		940S-0000-D001
940 nm single-mode VCSEL on a PLCC-2 package with ESD diode	✓	PLCC-2		940S-0000-D091
940 nm single-mode VCSEL on a TO can six leaded can with TEC & Thermistor		TO-46 6 Leaded		940S-0000-BC01
940 nm single-mode VCSEL on a TO can six leaded can with TEC, Thermistor & ESD diode	✓	TO-46 6 Leaded		940S-0000-BC91
940 nm single-mode VCSEL on a hermetic sealed TO can six leaded can with TEC & Thermistor		TO-46 6 Leaded	✓ ⁽²⁾	940S-0000-GC01
940 nm single-mode VCSEL on a hermetic sealed TO can six leaded can with TEC, Thermistor & ESD diode	✓	TO-46 6 Leaded	✓ ⁽²⁾	940S-0000-GC91

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

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

⁽³⁾ To burn in the bare die, operate them at 6mA for 24 hours at room temperature. Contact Vixar for information regarding suitable die attach epoxies and curing times and temperatures.





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