

# 895nm Single-Mode VCSEL

Part number code: 895S-0000-X005

## PRODUCT DESCRIPTION

A true (both spectrally single mode and Gaussian beam shape) single transverse mode 895nm Infrared VCSEL, with single linear polarized emission designed for pulsed & modulated applications. Qualities such as low power dissipation, polarization & spectral stability make this product ideal for OEM applications.

## Major Applications:

- Spectroscopic sensors
- Atomic clock
- Magnetometer
- Interferometry

## Features:

- Low divergence angle
- Circular beam profile
- Single Spectral & Spatial mode
- Narrow spectral width
- Stable SM beam divergence emission over both temperature and current
- Linear stable 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

**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	
Operating temperature (VCSEL)	-20 to 110 °C	
Lead solder temperature	260°C, 10 seconds	
CW current (VCSEL)	3 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 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 "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.

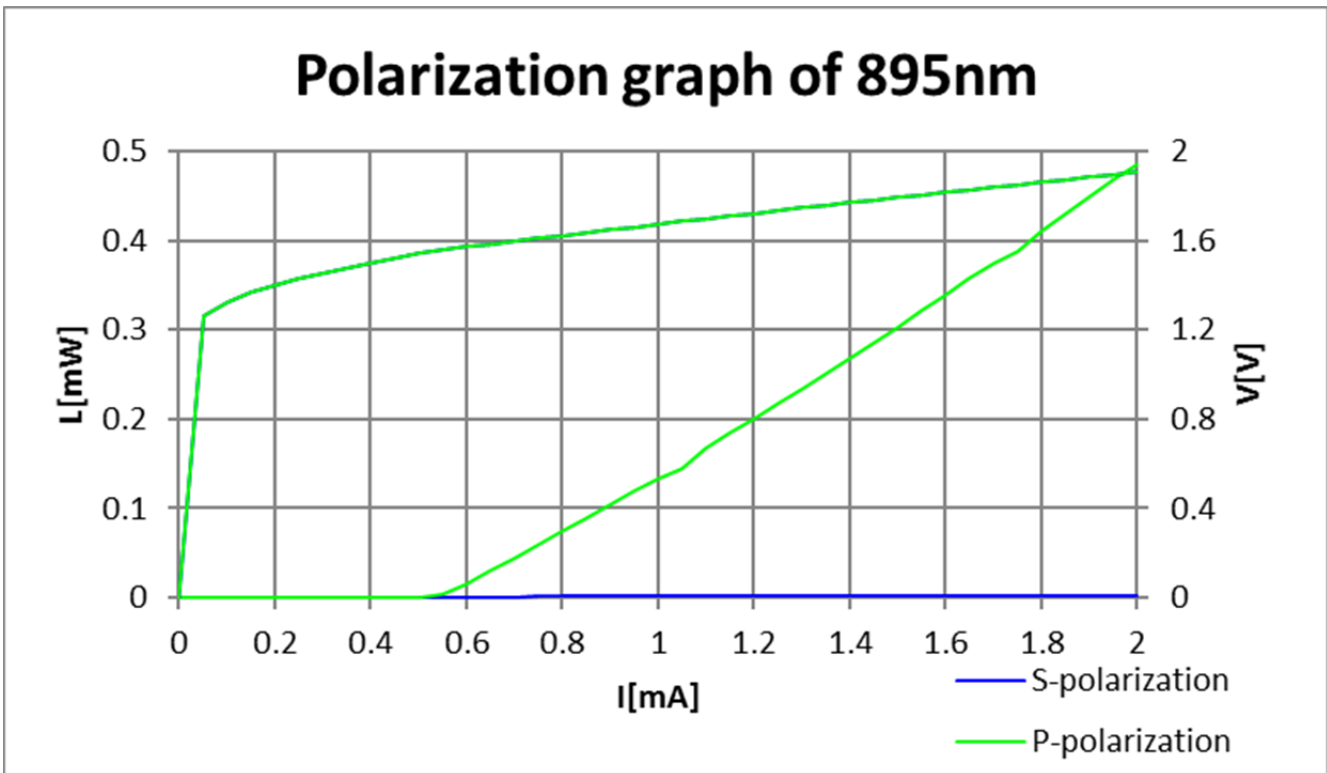
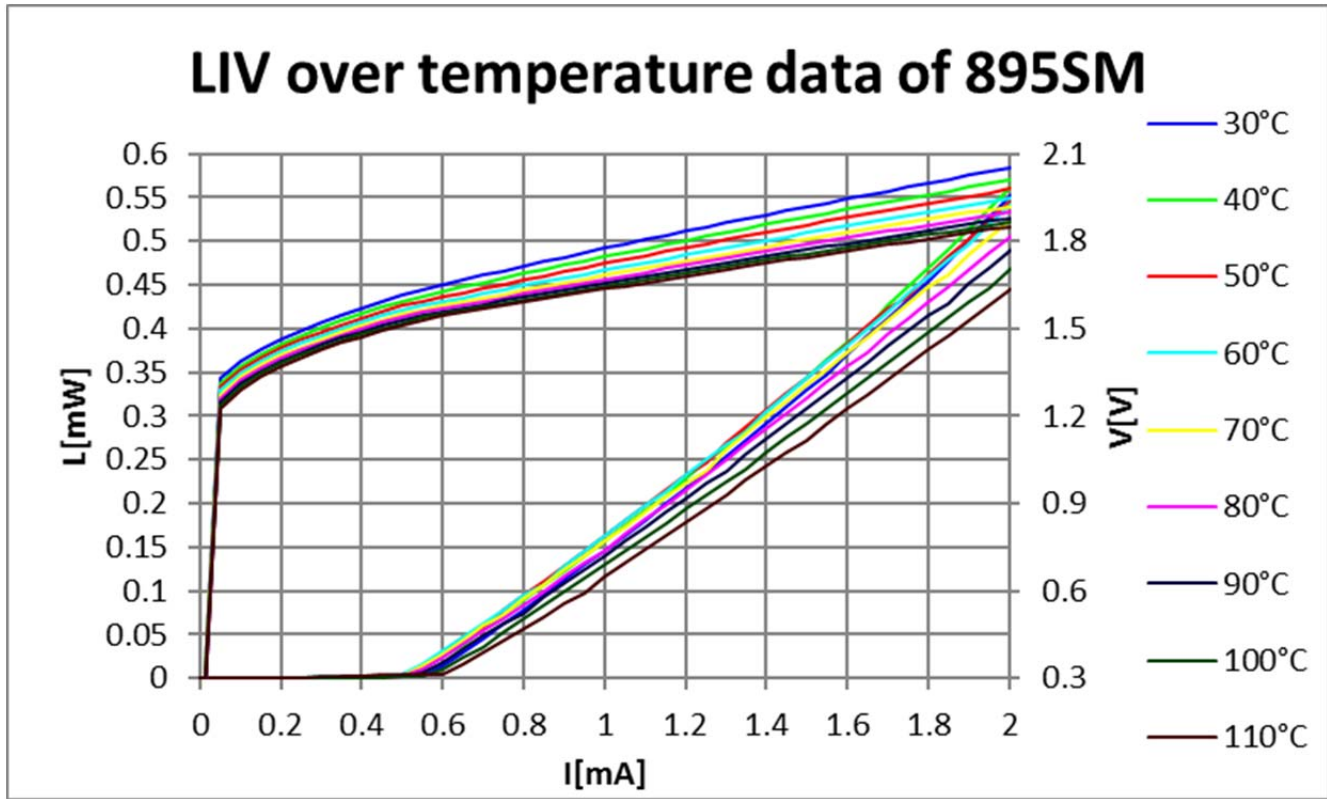
## Electro-Optical Characteristics

VCSEL Operating Temp (Tv) =80°C & Operating Current=1.2mA unless otherwise stated)

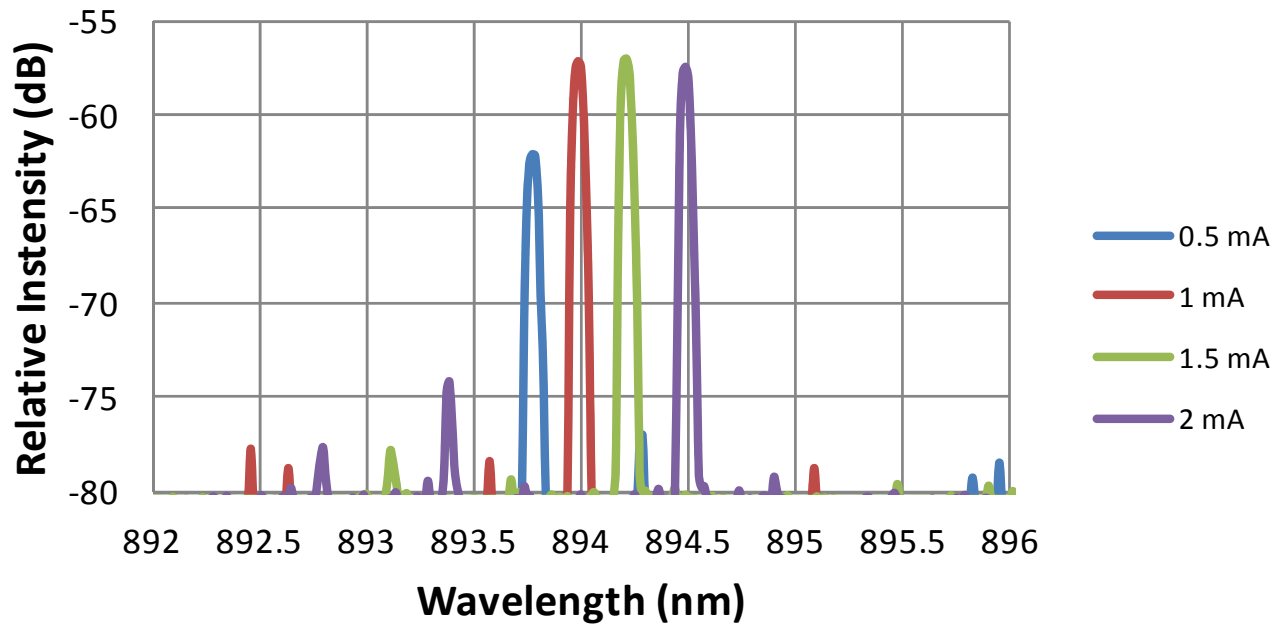
Parameter	Symbol	Units	Minimum	Typical	Maximum	Notes
Maximum DC current (CW)		mA	--	--	2.0	To remain single mode & polarization stable
Threshold current	I <sub>th</sub>	mA	0.3	0.5	0.8	
Operating voltage	V <sub>f</sub>	Volts	--	1.65	2.0	
Series resistance (VCSEL)	R <sub>s</sub>	Ohms	--	200	--	
Slope efficiency	SE	mW/mA	--	0.35	--	
Optical output power	L <sub>op</sub>	mW	0.18	0.23	--	T=50°C
Optical output power	L <sub>op</sub>	mW	0.15	0.20	--	T=80°C
Reverse breakdown voltage		V	10	--	--	I <sub>r</sub> ≤ 1nA
Operating wavelength	λ <sub>op</sub>	nm	894.1	894.6	895.1	
Single mode Suppression Ratio	SMSR	dB	20	--	--	Unmodulated
Spectral width (RMS)	Δλ	MHz	--	--	50	Unmodulated
Polarization Extinction ratio	PER	dB	13	--	--	
Beam divergence 1/e <sup>2</sup>		deg	16	20	26	
Beam divergence FWHM	FWHM	deg	9	13	16	
Wavelength current coefficient		nm/mA	0.35	0.5	0.65	
Wavelength temp coefficient		nm/°C	--	0.06	--	
Modulation Frequency		GHz	4.0	--	--	
Rise time		ps	--	--	100	20%-80%
Fall time		Ps	--	--	100	20%-80%



**TYPICAL PERFORMANCE CURVES:**

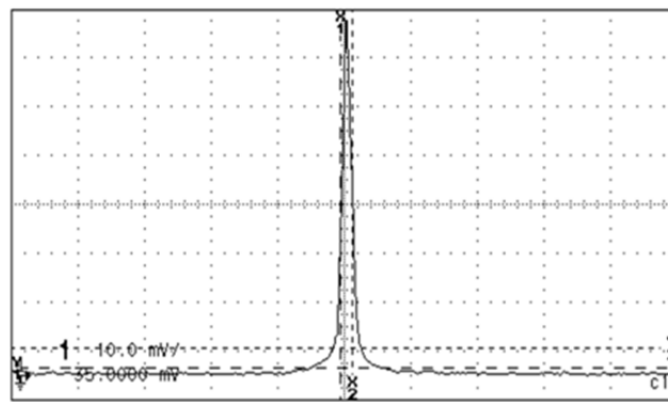


## Typical Spectrum vs. Current



### Sample Line-width data on a single mode VCSEL

hp stopped

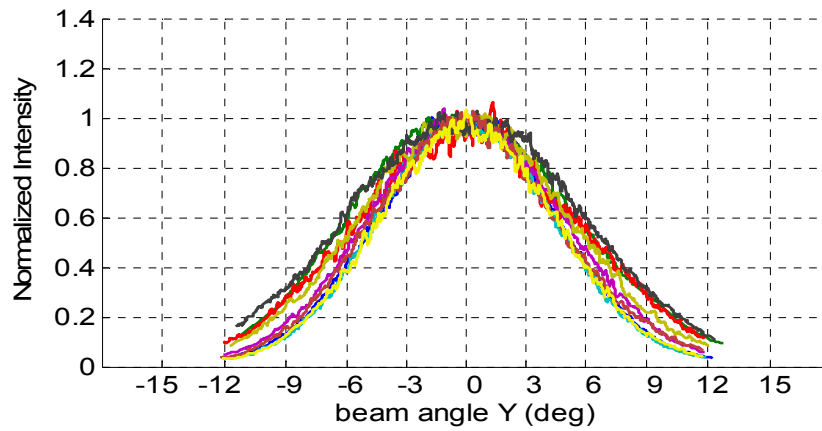
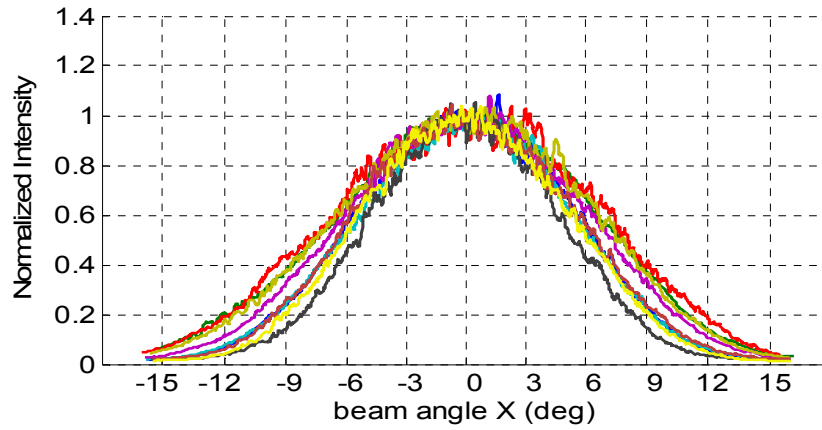


5.9800 ms 10.9800 ms 15.9800 ms  
 #Avg 1.00 ms/div repetitive  
 y2(1) 5.59375 mV x2(1) 11.1000 ms  
 y1(1) 1.28125 mV x1(1) 10.9200 ms  
 delta y 4.31250 mV delta x 180.000 us

**Linewidth = 0.18msec x 220 MHz/mS = 39.6 MHz**

## Far Field Beam Divergence

(Independent of Temperature & Current)





## ORDERING INFORMATION

Description	Package	Hermetically Sealed <sup>(1)</sup>	Part Number
895±0.5nm single-mode VCSEL bare die	Die only		895S-0000-A005
895±0.5nm single-mode VCSEL on a TO can package	TO-46		895S-0000-B005
895±0.5nm single-mode VCSEL on a hermetic sealed TO can package	TO-46	✓ <sup>(1)</sup>	895S-0000-G005
895±0.5nm single-mode VCSEL on a TO can six leaded can with TEC & Thermistor	TO-46 6 Leaded		895S-0000-BC05
895±0.5nm single-mode VCSEL on a hermetic sealed TO can six leaded can with TEC & Thermistor	TO-46 6 Leaded	✓ <sup>(1)</sup>	895S-0000-GC05

<sup>(1)</sup> Hermetically sealed. Minimum quantity order is 100 pieces

### Special notes:

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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