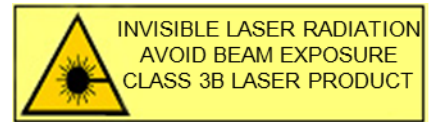


948±1 nm single-mode VCSEL

TO46 & TEC

- internal TEC and Thermistor
- Narrow linewidth
- 2nm tunability with TEC
- High performance and reliability
- ESD protection diode



PRELIMINARY

ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	UNITS	MIN	TYP	MAX	TEST CONDITIONS
Emission wavelength	λ_R	nm	947	948	949	$T = 20^\circ\text{C}$, $I_{\text{TEC}} = 0$, $P_{\text{OP}} = 0.5 \text{ mW}$
Threshold current	I_{TH}	mA		0.50		$T = 20^\circ\text{C}$
Output power	P_{opt}	mW	0.50			$T = 0 \dots 50^\circ\text{C}$
Threshold voltage	U_{TH}	V		1.60		
Laser current	I_{OP}	mA			2.0	$P_{\text{opt}} = 0.5 \text{ mW}$
Laser voltage	U_{OP}	V		2.0		$P_{\text{opt}} = 0.5 \text{ mW}$
Wallplug efficiency	η_{WP}	%		12		$P_{\text{opt}} = 0.5 \text{ mW}$
Slope efficiency	η_s	W/A		0.3		$T = 20^\circ\text{C}$
Differential series resistance	R_s	Ω		250		$P_{\text{opt}} = 0.5 \text{ mW}$
3dB modulation bandwidth	$\nu_{3\text{dB}}$	GHz	0.10			$P_{\text{opt}} = 0.5 \text{ mW}$ (due to ESD protection diode)
Relative intensity noise	RIN	dB/Hz		-130	-120	$P_{\text{opt}} = 0.5 \text{ mW @ 1 GHz}$
Wavelength tuning over current		nm/mA		0.6		
Wavelength tuning over temperature		nm/K		0.06		
Thermal resistance (VCSEL chip)	R_{thermal}	K/mW	3		5	
Side mode suppression		dB	30			
Beam divergence	θ	$^\circ$	10		25	$P_{\text{opt}} = 0.5 \text{ mW}$, full width $1/e^2$
Spectral bandwidth		MHz		100		$P_{\text{opt}} = 0.5 \text{ mW}$
TEC current		mA			500	appropriate heatsink required
NTC Thermistor Resistance		k Ω	9.5	10.0	10.5	$T = 25^\circ\text{C}$
NTC Temperature Dependence		k Ω	$10/\exp[3892 \cdot (1/298\text{K} - 1/T_{\text{op}})]$			
Wavelength tuning over TEC current		nm/mA		0.008		TEC current < 200 mA

NOTICE: Stresses greater than those listed under „Absolute Maximum Ratings“ may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other condition beyond those indicated for extended periods of time may effect device reliability.



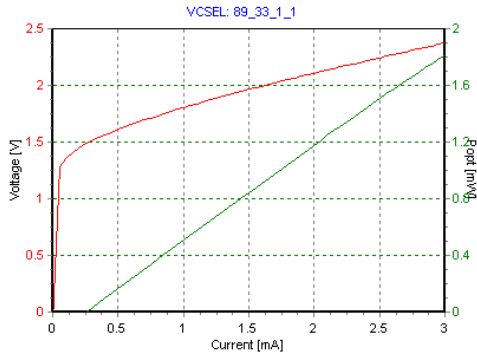
ATTENTION: Electrostatic Sensitive Devices
Observe Precautions for Handling

Absolute Maximum Ratings

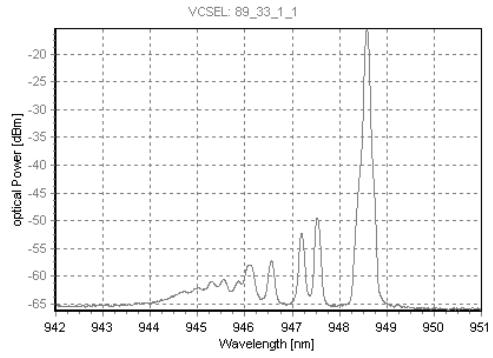
Storage temperature	-40 .. 125 $^\circ\text{C}$
Operating temperature	-20 .. 80 $^\circ\text{C}$
Electrical power dissipation	5 mW
Continuous forward laser current	2 mA
Continuous reverse current	10 mA
Soldering temperature*:	270 $^\circ\text{C}$

(*TEC temperature must be below 150 $^\circ\text{C}$)

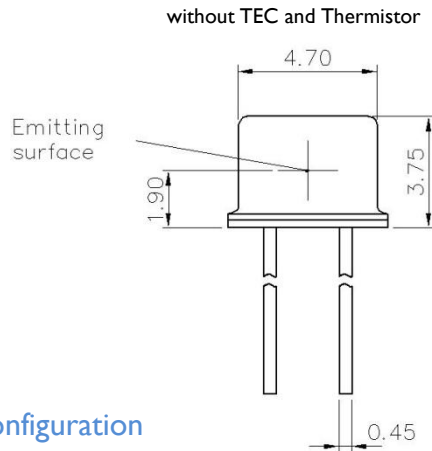
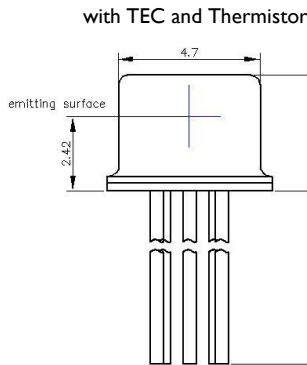
LIV



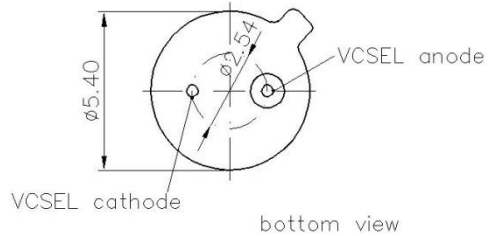
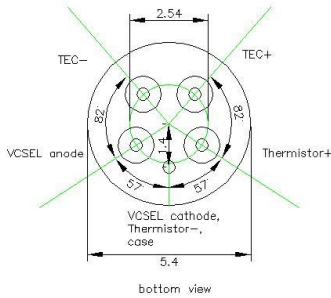
Spectral characteristics



TO dimensions



Pin configuration



Unit: mm

For order please use:

	± 1 nm	± 3 nm
with TEC/Thermistor	ULM948-01-TN-S46FTT	ULM948-03-TN-S46FTT
without TEC/Thermistor	ULM948-01-TN-S46FZP	ULM948-03-TN-S46FZP

OPTION:

- Wide range of TO headers & caps (flat, tilted, ball)
- Customer specific wavelength selection on request



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