

# TSM-3E20

## VCSEL for general purpose

### FEATURES:

- Surface mount package with flat emission surface.
- Miniature, epoxy molded.
- Driving current between 8 to 15 mA.
- Nominal 10° emission angle.
- Ideal for sensing applications.

### ELECTRO-OPTICAL CHARACTERISTICS:

PARAMETERS	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS <sup>(1)</sup>
Threshold Current	$I_{th}$		5	10	mA	
Output Power	$P_o$	1	2	4	mW	$I_F=15\text{ mA}$ <sup>(2)</sup>
Operating Current	$I_{OP}$		12		mA	Adjustable to establish 1.5 mW output power
Slope Efficiency	$\eta$		0.20		mW/mA	$I_F=15\text{ mA}$ <sup>(3)</sup>
Wavelength	$\lambda_p$	820	850	870	nm	$I_F=15\text{ mA}$
Forward Voltage	$V_F$	2	2.2	2.5	V	$I_F=15\text{ mA}$
Breakdown voltage	$V_{BD}$	10	15		V	$I_R=10\text{ }\mu\text{A}$
Series Resistance	$R_S$		40		$\Omega$	$I_F=15\text{ mA}$
Beam Divergence	$\theta$		10		degree	$I_F=15\text{ mA}$ <sup>(4)</sup>

Notes:

1. All parameters except mentioned are measured at  $I_F=15\text{ mA}$ , 25°C, CW.
2. Higher power can be provided under request.
3. Slope efficiency is defined as  $\Delta P/(15-I_{th})$  at 25°C.
4. Beam divergence is defined as the angle of light intensity at Full Width at Half Maximum (FWHM).

### THERMAL CHARACTERISTICS:

PARAMETERS	SYMBOL	MIN	TYP	MAX	UNIT	TEST CONDITIONS
Thermal Resistance	$R_{th}$		900		°C /W	$T_A=25^\circ\text{C}$
$I_{th}$ Temperature Variation	$\Delta I_{th}$	-1.5		1.5	mA	$T_A=0\sim 70^\circ\text{C}$
$V_F$ Temperature Coefficient	$\Delta V_F/\Delta T$		-3.0		mV/°C	$T_A=0\sim 70^\circ\text{C}$ , $I_F=15\text{ mA}$
$\eta$ Temperature Coefficient	$\Delta\eta/\Delta T$		-0.25		%/°C	$T_A=0\sim 70^\circ\text{C}$
$\lambda_p$ Temperature Coefficient	$\Delta\lambda_p/\Delta T$		0.07		nm/°C	$T_A=0\sim 70^\circ\text{C}$ , $I_F=15\text{ mA}$

### ABSOLUTE MAXIMUM RATINGS:

PARAMETERS	MIN	MAX	UNIT	CONDITIONS
Storage Temperature	-40	100	°C	
Operating Temperature	-20	85	°C	
Lead Solder Temperature		260	°C	5 seconds
Continuous Forward Current		40	mA	
Continuous Reverse Voltage		10	V	

Fig. 1 Typical Optical Characteristics

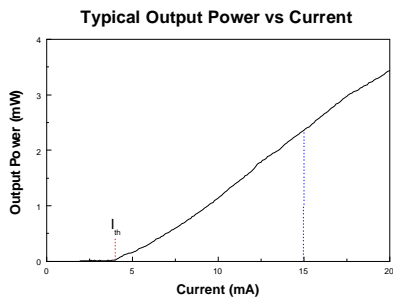


Fig. 2 Typical Electrical Characteristics

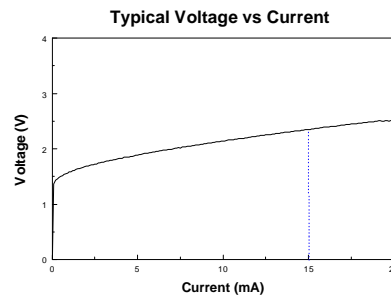
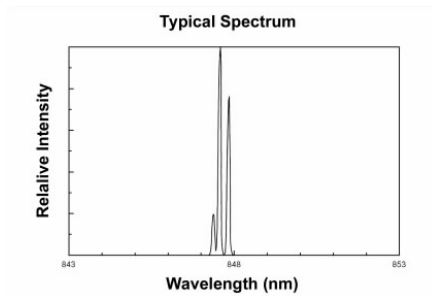
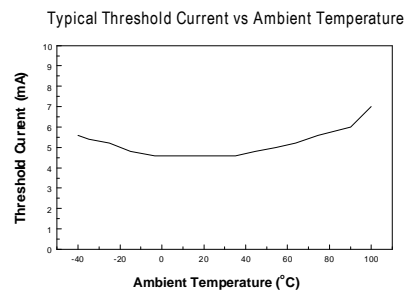


Fig. 3 Spectrum When Driving Current 15 mA



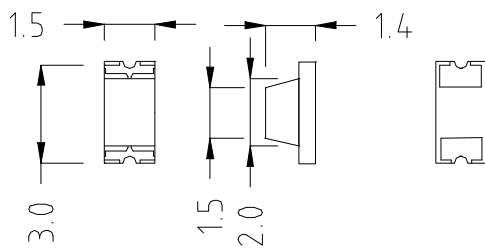
3 transverse modes typically.

Fig. 4 Temperature Dependence of Threshold Current



**OUTLINE DIMENSIONS:**

- Unit: mm



The VCSEL is a class IIIb laser in the safety standard ANSI Z136.1 and should be treated as a potential eye hazard.



**WARNING:**