



# VCx-680H40A

## 680nm 40mW VCSEL Diode

Data Sheet

### Features

- 680nm 40mW red VCSEL diode
- Low wavelength drift, 0.045nm/°C
- High slope efficiency, high PCE
- Available in SMD or TO-can package options

### Applications

- Sensing applications
- Laser therapy
- Machine vision
- Cosmetic applications
- Medical applications

### Ordering Information

Part Number	Description
VC20A-680H40A	680nm 40mW VCSEL Diode, SMD 2016 Package
VCT5-680H40A	680nm 40mW VCSEL Diode, TO-56 Package

\* Additional package configurations may be available upon request.

### Absolute Maximum Ratings

Parameters	Symbol	Rating	Unit	Conditions
Case Operating Temperature	Top	-40 to 85	°C	
Storage Temperature	Tstg	-40 to 105	°C	
Reflow Soldering Temperature	Tsol	260	°C	10 seconds
Reverse Voltage	Vr	5	V	
Maximum Pulse Current	Imax	70	mA	
ESD Exposure (Human Body) Model	ESD	2K-4K	V	Class 2
ESD Exposure (Machine) Model	ESD	200-400	V	Class B
Moisture Sensitivity Level	MSL	1-3		

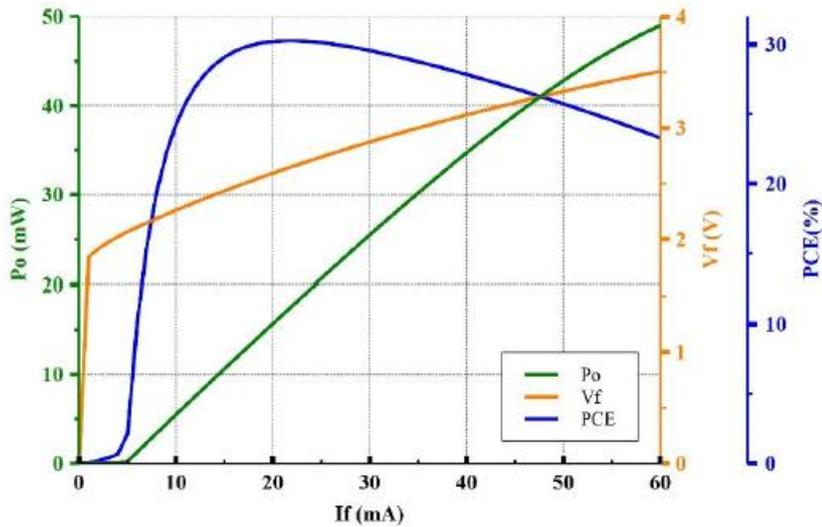
### Electro-Optical Characteristics (T<sub>op</sub>=25°C)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Conditions
Optical Power (0.1ms pulse width, 1% duty cycle)	P <sub>o</sub>	-	40	-	mW	I <sub>F</sub> =46mA
Optical Power (CW mode)	P <sub>o</sub>	-	40	-	mW	I <sub>F</sub> =50mA
Threshold Current	I <sub>th</sub>	-	5.0	-	mA	
Forward Current	I <sub>F</sub>	-	46	-	mA	
Power Conversion Efficiency	PCE	-	27	-	%	I <sub>F</sub> =46mA
Differential Resistance	R	-	21	-	Ω	I <sub>F</sub> =46mA
Slope Efficiency	η	-	0.98	-	mW/mA	P <sub>o</sub> =40mW
Peak Wavelength	λ <sub>P</sub>	670	680	690	nm	I <sub>F</sub> =46mA
Forward Voltage	V <sub>f</sub>	-	3.25	-	V	I <sub>F</sub> =46mA
Number of Emission Aperture		-	5	-	-	
Emission Area			48x74		um <sup>2</sup>	
Beam	(1/e <sup>2</sup> )	Θ	18	-	deg	
Divergence	FWHM	Θ	15	-	deg	
Wavelength Temperature Drift	Δλ <sub>P</sub> / ΔT	-	0.045	-	nm/°C	I <sub>F</sub> =46mA
Soldering Temperature	Tsol			260	°C	10 seconds

Note: Electro-optical characteristics with a package or diffuser would require further evaluation. Values are based on limited sample size and estimated values.

### Typical Characteristics

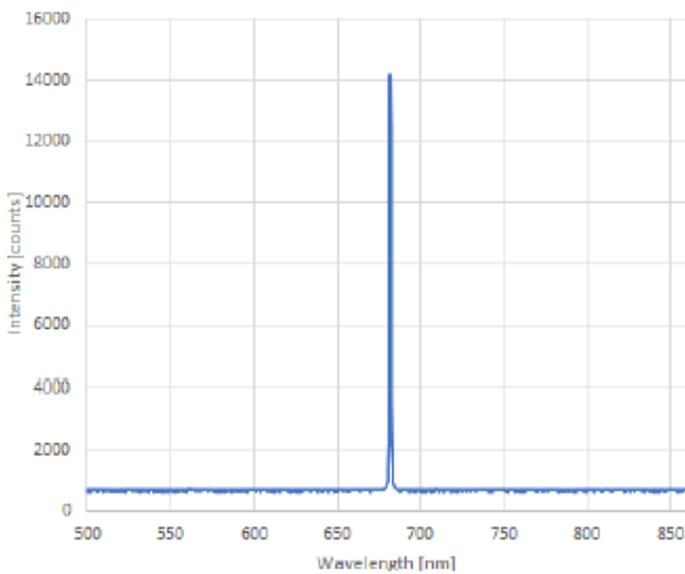
#### LIV Graph



#### Notes:

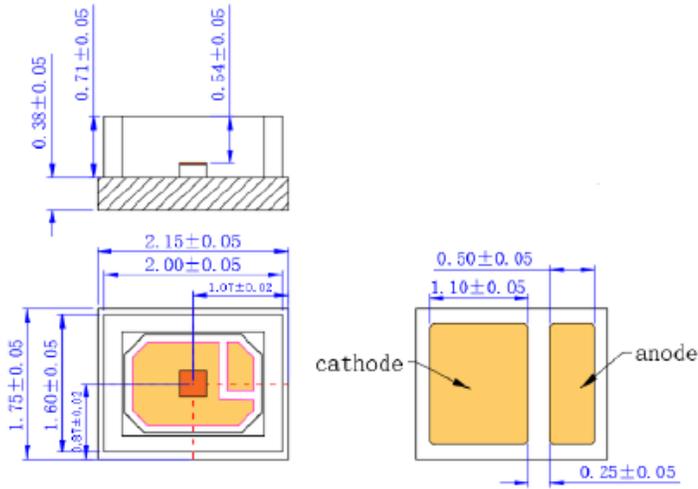
1. LIV graph was measured at 25°C (left); power output, voltage and power conversion efficiency variation trend with changed operating temperature (right, normalized).
2. Forward Voltage ( $V_f$ ) measurement allowance is  $\pm 0.1V$ .
3. Peak Wavelength ( $\lambda_p$ ) measurement allowance is  $\pm 1.5nm$ .
4. Others measurement allowance is  $\pm 10\%$ .

#### Spectral Wavelength

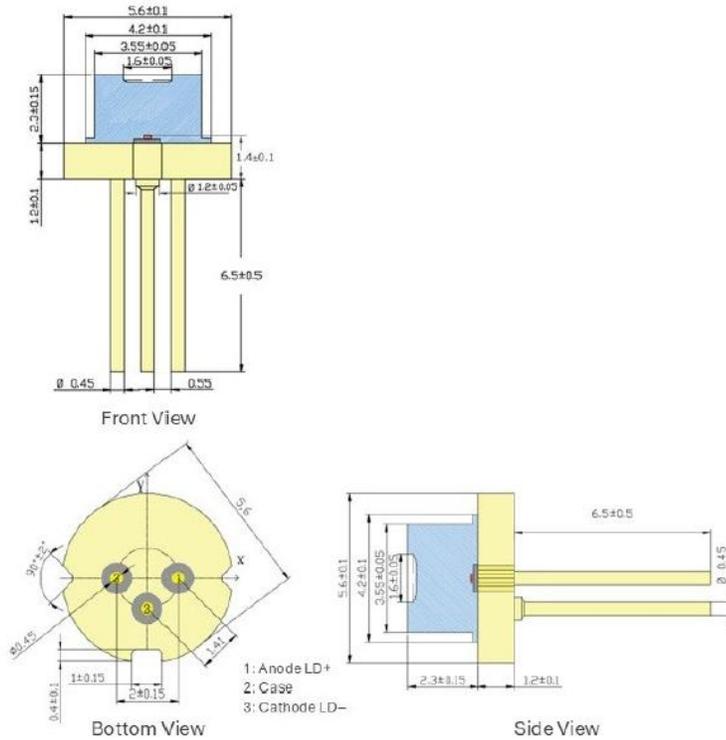


**Outline Dimensions (unit: mm)**

**SMD 2016 Package**



**TO-56 Package**



### SMT Reflow Soldering Curve



Note: Reflow soldering can be operated only one time. During the temperature ramp-up, no forces may be exerted on the LD which would deform or damage them. After soldering is completed, please do not process until the product temperature ramps down to room temperature.

### Additional Notes

1. Stresses exceeding those listed in Absolute Maximum Ratings may cause permanent damage to the device. These ratings are stress limits only and do not imply functional operation under such conditions. Exposure to conditions beyond recommended operating limits may affect device reliability.
2. Operation at or near maximum ratings may degrade performance and may create potential safety risks, including device failure.
3. The device is sensitive to electrostatic discharge (ESD). Proper ESD precautions, including grounded wrist straps, antistatic work surfaces, and ESD-safe handling procedures, must be followed during handling and assembly.
4. Adequate thermal management must be provided. The VCSEL device should be properly mounted to ensure efficient heat transfer to the package or system thermal path to maintain stable optical performance.
5. Avoid direct exposure of laser radiation to human eyes or skin. Follow applicable laser safety regulations and system-level safety design practices.
6. The emitting surface of the VCSEL should not be touched or contaminated. Mechanical contact or contamination may degrade optical performance or damage the device.
7. Use appropriate pick-and-place handling tools, such as ceramic or ESD-safe vacuum nozzles, to prevent mechanical or electrostatic damage during assembly.
8. Specifications are subject to change without notice.