# VCx-940P4WA
## 940nm 4W Pulsed VCSEL Diode

**Data Sheet**

### Features

- 940nm VCSEL Diode
- Output power: 4000mW (ms pulse)
- Single wavelength emission
- Low wavelength drift
- Low threshold current
- Available in SMD or T-mount package options

### Applications

- 3D sensor systems
- Lidar and scanning detection
- IR illumination and night vision
- Medical and diagnostics
- Gesture and proximity sensing
- Broadband access and consumer electronics

### Ordering Information

| Part Number | Description |
|---|---|
| VC50A-940P4WA | 940nm 4W Pulsed VCSEL Diode, SMD 5050 Package |
| VCTMC-940P4WA | 940nm 4W Pulsed VCSEL Diode, T-Mount 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 Continuous Current | Imax | 6 | A | |
| ESD Exposure (Human Body) Model | ESD | 2K | V | |

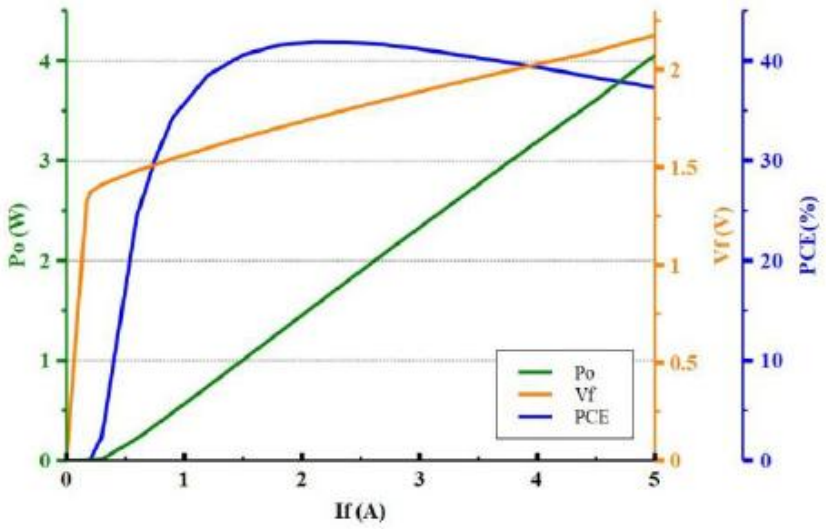
### Electrical-Optical Characteristics ($T_{op}$=25°C, Pulse width 0.1ms, Duty cycle 1%)

| Parameters | Symbol | Min. | Typ. | Max. | Unit | Conditions |
|---|---|---|---|---|---|---|
| Optical Output Power | $P_o$ | - | 4000 | - | mW | $I_F$=5A |
| Threshold Current | $I_{th}$ | - | 400 | - | mA | |
| Forward Current | $I_F$ | - | 5.0 | - | A | |
| Slope Efficiency | η | - | 0.86 | - | W/A | $P_o$=4000mW |
| Power Conversion Efficiency | PCE | - | 38 | - | % | $I_F$=5A |
| Peak Wavelength | $\lambda_P$ | 930 | 940 | 950 | nm | $I_F$=5A |
| Laser Forward Voltage | $V_F$ | - | 2.16 | - | V | $I_F$=5A |
| Series Resistance | $R_S$ | - | 0.15 | - | Ω | $I_F$=5A |
| Beam Divergence | $FWHM_B$ | - | 20 | - | deg | |
| Wavelength Temperature Drift | $\Delta\lambda_P/\Delta T$ | - | - | 0.07 | nm/°C | $I_F$=5A |
| Emission Area | | - | 846x811 | | $um^2$ | |
| No. of Emission Aperture | | - | 598 | - | | |

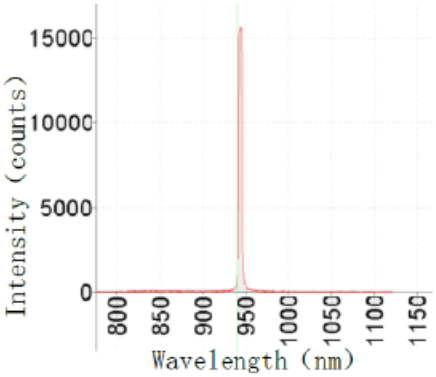
Note: Electro-optical characteristic with a package or diffuser would require further evaluation. Values are based on limited sample size and estimated values.

## Typical Characteristics

### LIV Graph

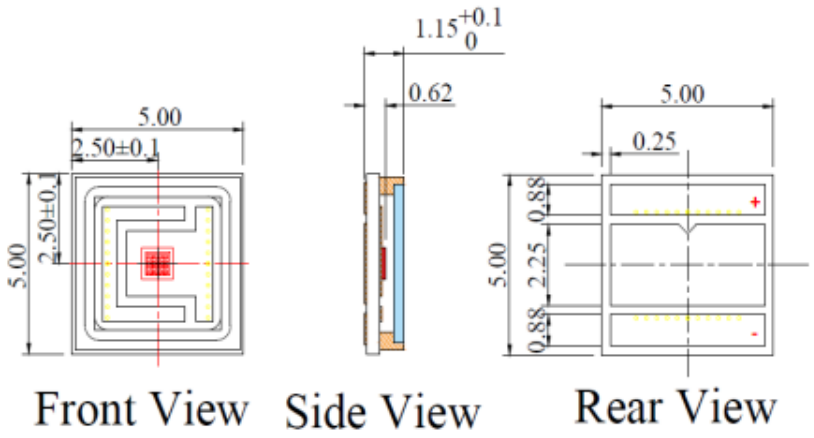



### Intensity vs. Wavelength

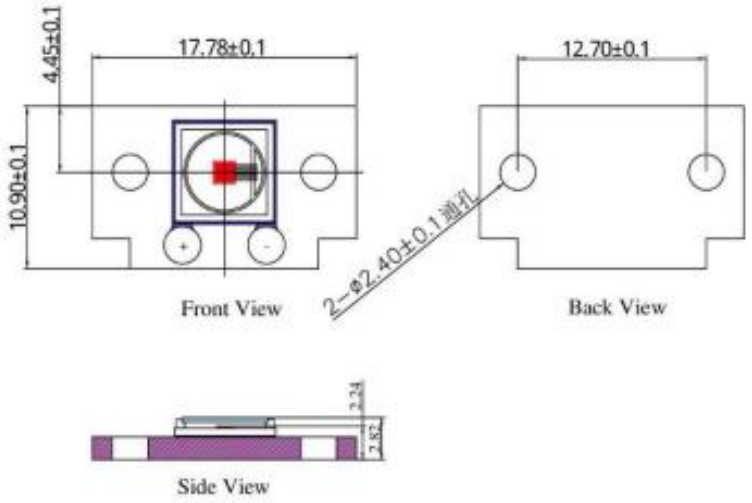


## Outline Dimensions (unit: mm)

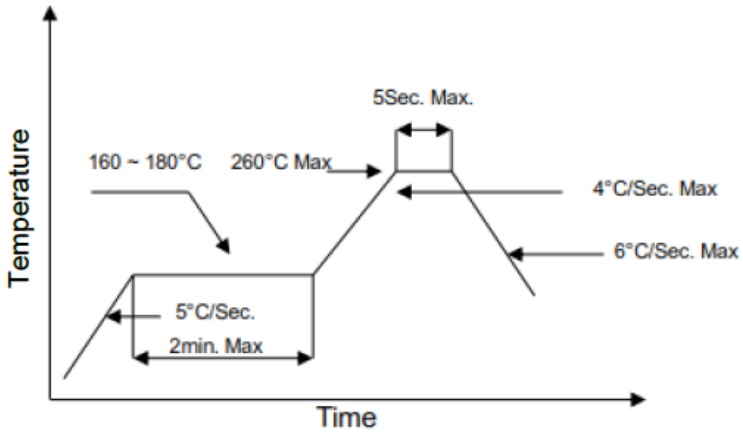
### SMD 5050 Package




### T-Mount 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.