

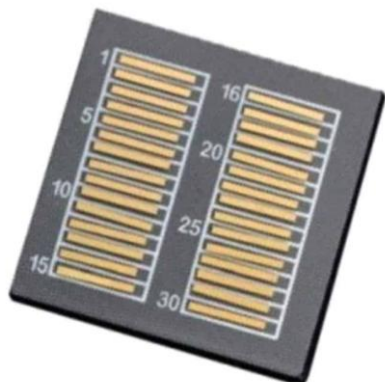
Single Mode VCSEL Diode Chips

850nm, 10mW



DATASHEET

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Features

- 850nm single longitudinal mode
- Low wavelength drift
- Oxide isolation technology
- Low threshold current
- Small emission area
- Easy to collimate
- Modulation and width >2GHz

Applications

- Proximity sensors
- Consumer electronics
- Active optical cables
- Medical applications
- Range finder sensors



We provide a wide range of premium laser diode chips for all application scenarios. These laser diode chips are produced using state-of-the-art quantum-well epitaxial layer growth and a reliable ridge waveguide structure. We offer these lasers in many configurations, with various back-face and front-face reflection options. Custom designs and production are also available. The chips are typically offered as metalized bar chips or on submount, with full testing and burn-in processes. Additionally, we provide packaging and fiber pigtail services.

Due to their high sensitivity to electrostatic discharge, warranty coverage applies only to fully metal covered modules the benchtops, which include proper protection. Other versions of the lasers and photodetectors are not covered by any warranty. Please use them with great caution.

Specifications

Parameter	Min	Typical	Max	Unit
Threshold Current		0.5		mA
Slope Efficiency		1.0		mW/A
Optical Output Power		10	12	mW
Forward Current		11		mA
Power Conversion Efficiency		38		%
Series Resistance		60		Ω
Peak Wavelength	840	850	860	nm
Laser Forward Voltage		2.5	2.7	V
Emission area		$\Phi 12$		μm
Beam Angle	(1/e ²)	23		Degree
	FWHM	18		
Wavelength Temp. Drift		0.07		nm/°C
Soldering	AlN, FeNi Alloy		260(10s)	°C
Temperature	Cu/Ag		180(10s)	°C
Substrate	AlN, Cu/Ag, FeNi Alloy			
Case Operating Temperature	-25		70	°C
Storage Temperature	-40		85	°C
Reverse Voltage		5		V
Maximum Continuous Current			20	mA
ESD exposure (Human body) model		2k-4k (Class 2)		V
ESD exposure (Machine) Model		200-400 (Class B)		V

Note:

1. Electro-Optical Characteristic with a package or diffuser would require further evaluation. Values are based on limited sample size and estimated values.
2. Stresses greater than those listed under "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or other conditions above those indicated in the operations section for extended periods of time may affect reliability.
3. In its maximum rating diode laser operation could damage its performance or cause potential safety hazard such as equipment failure.
4. Electrostatic discharge is the main reason for the laser fault of the diode. Take effective precautions against ESD. When dealing with laser diodes, use the wrist strap, grounding work surface and strict antistatic technology.

Note: Applying current to a bare chip can damage the device. These maximum parameters should only be applied after the chip is properly bonded to a heat sink. Prolonged exposure to absolute maximum ratings may adversely affect the reliability of the device.

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link](#):

Rev 11/21/25

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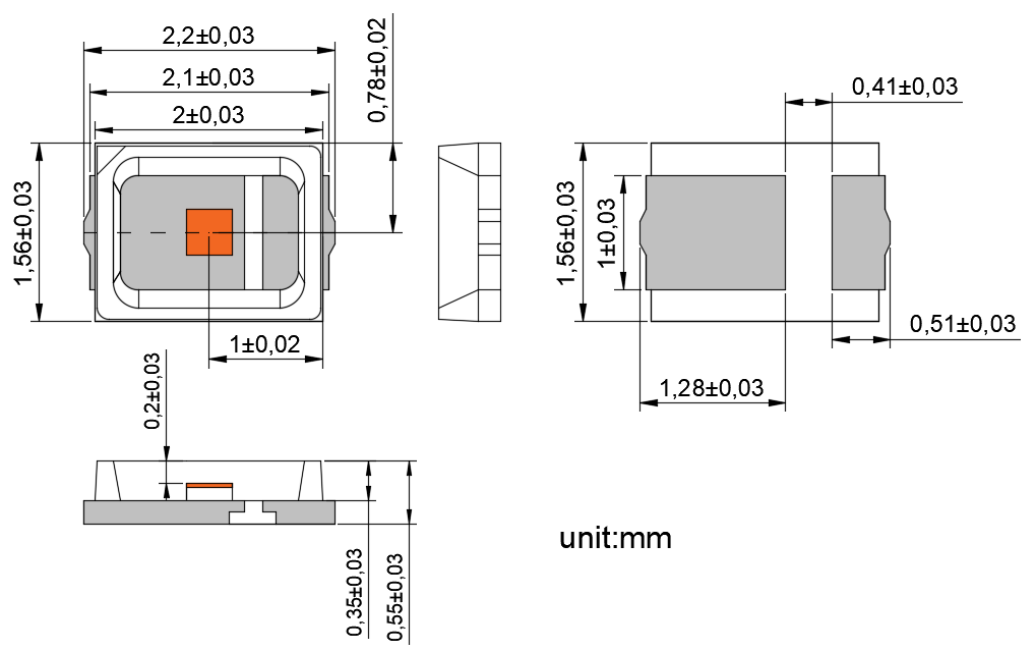
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Mechanical Dimension (mm)



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

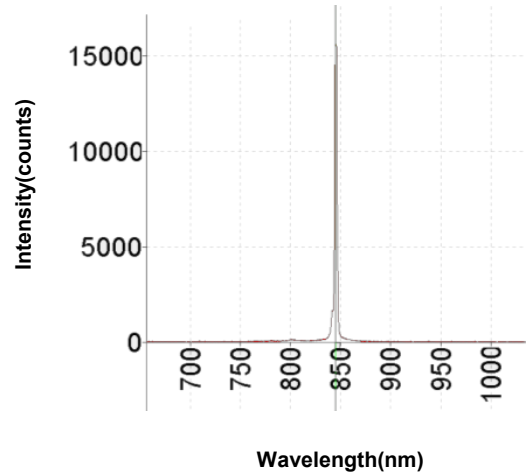
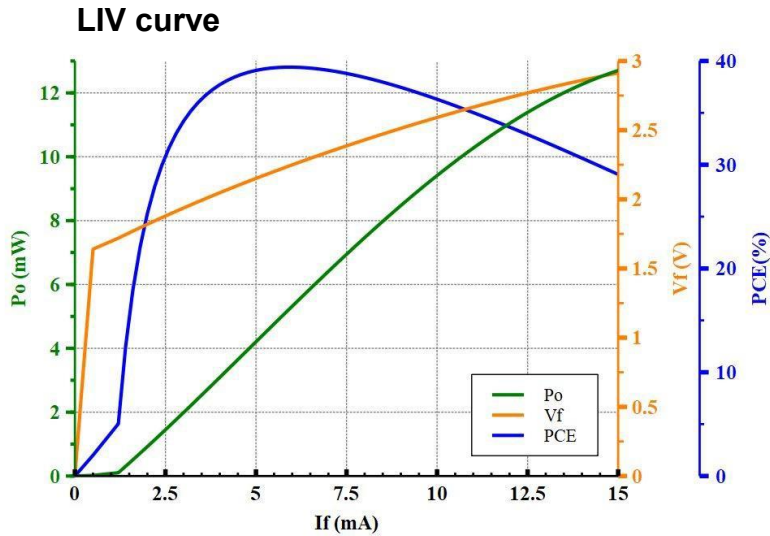
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Typical Performance



Note:

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 (VF) measurement allowance is ± 0.1 V.
3. Peak Wavelength (λ_P) measurement allowance is ± 1.5 nm.
4. Others measurement allowance is $\pm 10\%$.

Ordering Information (Part Number)

	□ □ □	□ □ □	1	□	1
Prefix	Wavelength	Power	Package		
VCSEL-	850nm = 850	5mW = 005 10mW = 010		Submount = S Special = 0	

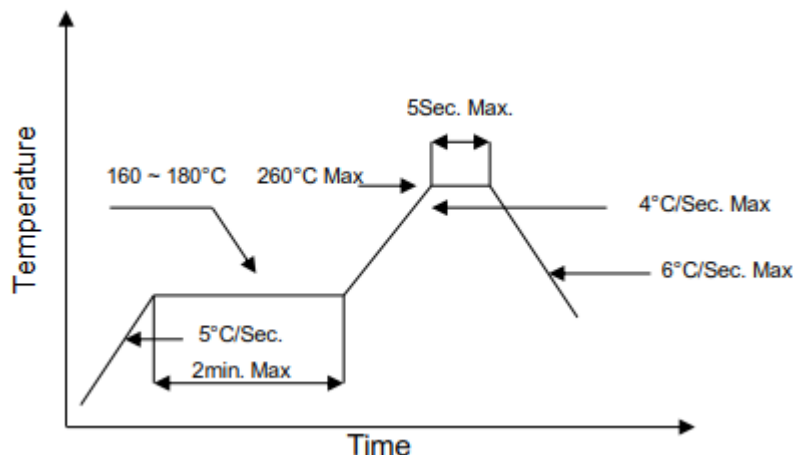
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SMT Reflow Soldering Curve



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

Treatment and protection measures

Soldering precautions

The temperature of soldering iron must be controlled under 300°C during manual soldering. Also, VCSEL can be only soldered one time with the soldering time less than 3s. but, it is very hard to control the soldering temperature and homogenize solder paste because of the smaller size of VCSEL. In addition, it is easy to damage VCSEL structure even causes VCSEL losing efficacy. So, we advise you to use re-flow soldering machine for operation.

Storage precautions

Our products were sealed by aluminum foil bag attaching packed desiccant, they are moisture proof and anti-static. Please handle these gently to avoid damage. At the same time, please be ready for storage and take some moisture-proof measures to keep the diode away from dampness that may causes reliability failure.

Before opening, the diode must be saved for at least 90 days below 30 °C with 60% RH.

After opening, the diode must be kept in an environment that temperature lower than 30 °C and humidity lower than 60% RH and used up within 24 hours. When the storage humidity reaches and exceeds 60%, the products must be dehumidified at 60 °C for more than 24 hours before use.

Others

1. Please use solder paste to cure the laser diode.
2. Please make sure that the heat of the diode has been completely conducted to metal shell, to avoid affecting the optical power output.
3. This diode can be only used in constant voltage and current.
4. Operating voltage and current, refer to the table in paragraph II.
5. Please do not aim the laser to people or animal.
6. You can observe the laser spot through an image monitoring equipment.

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Caution Electrostatic Sensitivity



- Never touch laser diode and the module using hands
- Always use protections when handle a laser diode
- Recommend mounting the laser diode using an ionic gun and ESD finger cots



Laser Safety

This product meets the appropriate standard in Title 21 of the Code of Federal Regulations (CFR). FDA/CDRH Class 1M laser product. This device has been classified with the FDA/CDRH under accession number 0220191. All versions of this laser are Class 1M laser products, tested according to IEC 60825-1:2007 / EN 60825-1:2007. An additional warning for Class 1M laser products. For diverging beams, this warning shall state that viewing the laser output with certain optical instruments (for example eye loupes, magnifiers, and microscopes) within a distance of 100 mm may pose an eye hazard. For collimated beams, this warning shall state that viewing the laser output with certain instruments designed for use at a distance (for example telescopes and binoculars) may pose an eye hazard.

Wavelength = 1.3/1.5 μm .

Maximum power = 30 mW.



*Caution - Use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.

*IEC is a registered trademark of the International Electrotechnical Commission.

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