High Power Density 0.5W Laser Diode

Description
The SLD322V is a high power, gain-guided laser diode produced by MOCVD method\(^1\). Compared to the SLD300 Series, this laser diode has a high brightness output with a doubled optical density which can be achieved by QW-SCH structure\(^2\).

\(^1\) MOCVD: Metal Organic Chemical Vapor Deposition
\(^2\) QW-SCH: Quantum Well Separate Confinement Heterostructure

Features
• High power
  Recommended optical power output: \(P_o = 0.5\) W
• Low operating current: \(I_{op} = 0.75\) A (\(P_o = 0.5\) W)

Applications
• Solid state laser excitation
• Medical use
• Material processes
• Measurement

Structure
GaAlAs quantum well structure laser diode

Absolute Maximum Ratings (\(T_c = 25^\circ\)C)
• Optical power output \(P_o\) 0.55 W
• Reverse voltage \(V_R\) LD 2 V
  PD 15 V
• Operating temperature (\(T_c\)) \(T_{opr}\) –10 to +30 \(^\circ\)C
• Storage temperature \(T_{stg}\) –40 to +85 \(^\circ\)C

Pin Configuration

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**Electrical and Optical Characteristics**

(Tc: Case temperature, Tc = 25°C)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold current</td>
<td>Ith</td>
<td></td>
<td>0.18</td>
<td>0.3</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Operating current</td>
<td>Iop</td>
<td>P₀ = 0.5W</td>
<td>0.75</td>
<td>1.2</td>
<td></td>
<td>A</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>Vop</td>
<td>P₀ = 0.5W</td>
<td>2.1</td>
<td>3.0</td>
<td></td>
<td>V</td>
</tr>
<tr>
<td>Wavelength*1</td>
<td>λₚ</td>
<td>P₀ = 0.5W</td>
<td>790</td>
<td>840</td>
<td></td>
<td>nm</td>
</tr>
<tr>
<td>Monitor current</td>
<td>Imon</td>
<td>P₀ = 0.5W</td>
<td>0.15</td>
<td>0.8</td>
<td>3.0</td>
<td>mA</td>
</tr>
<tr>
<td>Radiation angle (F. W. H. M.*)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perpendicular</td>
<td>θ⊥</td>
<td>P₀ = 0.5W</td>
<td>20</td>
<td>30</td>
<td>40</td>
<td>degree</td>
</tr>
<tr>
<td>Parallel</td>
<td>θ∥</td>
<td></td>
<td>4</td>
<td>9</td>
<td>17</td>
<td>degree</td>
</tr>
<tr>
<td>Positional accuracy</td>
<td>ΔX, ΔY</td>
<td>P₀ = 0.5W</td>
<td>±50</td>
<td></td>
<td>μm</td>
<td></td>
</tr>
<tr>
<td>Angle</td>
<td>Δφ⊥</td>
<td></td>
<td>±3</td>
<td></td>
<td></td>
<td>degree</td>
</tr>
<tr>
<td>Differential efficiency</td>
<td>ηD</td>
<td>P₀ = 0.5W</td>
<td>0.5</td>
<td>0.9</td>
<td></td>
<td>W/A</td>
</tr>
</tbody>
</table>

* F. W. H. M. : Full Width at Half Maximum

**1 Wavelength Selection Classification**

<table>
<thead>
<tr>
<th>Type</th>
<th>Wavelength (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLD322V-1</td>
<td>795 ± 5</td>
</tr>
<tr>
<td>SLD322V-2</td>
<td>810 ± 10</td>
</tr>
<tr>
<td>SLD322V-3</td>
<td>830 ± 10</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Type</th>
<th>Wavelength (nm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLD322V-21</td>
<td>798 ± 3</td>
</tr>
<tr>
<td>SLD322V-24</td>
<td>807 ± 3</td>
</tr>
<tr>
<td>SLD322V-25</td>
<td>810 ± 3</td>
</tr>
</tbody>
</table>

**Handling Precautions**

Eye protection against laser beams

The optical output of laser diodes ranges from several mW to 3W. However the optical power density of the laser beam at the diode chip reaches 1MW/cm². Unlike gas lasers, since laser diode beams are divergent, uncollimated laser diode beams are fairly safe at a laser diode. For observing laser beams, ALWAYS use safety goggles that block infrared rays. Usage of IR scopes, IR cameras and fluorescent plates is also recommended for monitoring laser beams safely.
Example of Representative Characteristics

Optical power output vs. Forward current characteristics

Optical power output vs. Monitor current characteristics

Threshold current vs. Temperature characteristics

Power dependence of far field pattern (Parallel to junction)

Power dependence of far field pattern (Perpendicular to junction)

Temperature dependence of far field pattern (Parallel to junction)
Temperature dependence of far field pattern (Perpendicular to junction)

Dependence of wavelength

Differential efficiency vs. Temperature characteristics
Power dependence of spectrum

1. $T_c = 25°C$, $P_0 = 0.2W$
2. $T_c = 25°C$, $P_0 = 0.3W$
3. $T_c = 25°C$, $P_0 = 0.4W$
4. $T_c = 25°C$, $P_0 = 0.5W$
Temperature dependence of spectrum (Po = 0.5W)
Package Outline

Unit: mm

M-248 (LO-11)

Reference Slot

Photo Diode

Window Glass

Reference Plane

LD Chip

+Optical Distance = 2.55 ± 0.05

PCD ø2.54

SONY CODE  M-248
EIAJ CODE
JEDEC CODE

PACKAGE WEIGHT  1.2g