CH 940nm 40 CHIP 9999-H00600A031-V02
940 nm 40 mil VCSEL Chip
Datasheet

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Datasheet

The specification applies to GaAs infrared chip for 940nm wavelength range.

Product Type: 940nm 40mil VCSEL Chip
Product Name: CH 940nm 40 CHIP 9999-H00600A031-V02

The **9999-H00600A031-V02** is a 940nm 40 mil Vertical Cavity Surface Emitting Laser (VCSEL) chip. VCSEL is attractive for many applications, The VCSEL combines advantages in low cost, high reliability, narrow and thermally stable spectrum, high power, easy system integration, 2D arrays in the infrared wavelength range, etc.

At 940nm wavelength, HLJ presents VCSEL chips with 2.4W/3A and 3W/3.8A peak pulse at 1% duty cycle, T=100ms.

Features
- GaAs infrared chip
- 940nm center optical wavelength
- 2.4W VCSEL (@3.0A)
- 3.0W VCSEL (@3.8A)
- Multi-mode beam profile
- Other configurations available on request

Applications
- Photoelectric sensors
- Optical encoders
- 3D sensing
## Electrical Optical Characteristics

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
<th>Unit</th>
<th>Condition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Threshold Current</td>
<td>$I_{th}$</td>
<td>-</td>
<td>0.5</td>
<td>-</td>
<td>A</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Output Power</td>
<td>$P_o$</td>
<td>-</td>
<td>2.4</td>
<td>-</td>
<td>W</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$V_f$</td>
<td>-</td>
<td>2.0</td>
<td>-</td>
<td>V</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Slope Efficiency (S.E.)</td>
<td>$\eta_s$</td>
<td>0.9</td>
<td>1</td>
<td>-</td>
<td>W/A</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Center Wavelength</td>
<td>$\lambda_c$</td>
<td>930</td>
<td>940</td>
<td>950</td>
<td>nm</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Beam Divergence</td>
<td>$\theta$</td>
<td>-</td>
<td>23</td>
<td>-</td>
<td>degree</td>
<td>$I_i = 3A$, Full Width 1/e$^2$</td>
</tr>
<tr>
<td>Wavelength Shift</td>
<td>$\Delta\lambda/\Delta T$</td>
<td>-</td>
<td>0.07</td>
<td>-</td>
<td>nm/°C</td>
<td>$I_i = 3A$</td>
</tr>
<tr>
<td>Output Power</td>
<td>$P_o$</td>
<td>-</td>
<td>3</td>
<td>-</td>
<td>W</td>
<td>$I_i = 3.8A$</td>
</tr>
<tr>
<td>Forward Voltage</td>
<td>$V_f$</td>
<td>-</td>
<td>2.2</td>
<td>-</td>
<td>V</td>
<td>$I_i = 3.8A$</td>
</tr>
</tbody>
</table>

Note:
- Test DUTs are mounted on star board and measured with operating bias current at $T_a = 25$°C, 1% duty cycle of $T = 100$ms.
- Forward Voltage ($V_f$) measurement allowance is ±0.1V.
- Center Wavelength ($\lambda_c$) measurement allowance is ±1.5nm.
- Others measurement allowance is ±5%.

## Absolute Maximum Rating

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Condition</th>
<th>Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>Storage Temperature</td>
<td>$T_{stg}$</td>
<td>-</td>
<td>-40°C to 150°C</td>
</tr>
<tr>
<td>Operating Temperature (VCSEL)</td>
<td>$T_{op}$</td>
<td>1% duty cycle</td>
<td>-20°C to 85°C</td>
</tr>
<tr>
<td>Maximum Package SMT Solder Reflow Temperature</td>
<td>-</td>
<td>-</td>
<td>260°C, 10 seconds</td>
</tr>
</tbody>
</table>

Note: The maximum pulse laser current in the Absolute Maximum Ratings is valid for the operating temperature noted at the table above. Stresses beyond those listed under Absolute Maximum Ratings may cause permanent damage to the device.
Typical Performance Curves

- Typical Electrical-Optical Characteristics ($T_a = 25°C$)

**LIV Curves**

![LIV Curves Graph](image)

Note: Curves measurement@ 0 ~ 8A current sweep with 1% duty cycle, T=100ms.

### Dimensions

<table>
<thead>
<tr>
<th>Specification</th>
<th>Unit</th>
<th>Min.</th>
<th>Typ.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of emitters</td>
<td>ea</td>
<td></td>
<td>600</td>
<td></td>
</tr>
<tr>
<td>Length(X), Width(Y)</td>
<td>μm</td>
<td>1000</td>
<td>1015</td>
<td>1030</td>
</tr>
<tr>
<td>Thickness</td>
<td>μm</td>
<td>85</td>
<td>100</td>
<td>115</td>
</tr>
<tr>
<td>Bond pad width</td>
<td>μm</td>
<td>-</td>
<td>90</td>
<td>-</td>
</tr>
</tbody>
</table>

Note: Chip backside cathode pad the same as chip size.
Packing Information
- Package Q’ty:
  1K ea/Die sheet, 8 Die sheet/Antistatic bag, 6 Antistatic bag/Box, 6 Box/Carton box.

Product Compliance Information
- HLJ’s VCSEL devices their unique properties, such as inherent fast response time and small size, also make them very susceptible to ESD and EOS.
  - ESD Sensitivity Ratings:
    - ESD Rating: Class 3
    - Value: 4000 V
    - Test Item: Human Body Model (HBM)
  - ESD Sensitivity Ratings:
    - ESD Rating: Class C3
    - Value: 1000 V
    - Test Item: Charged Device Model (CDM)
- RoHs Compliance:
  This part is compliant with EU 2011/65/EU RoHS directive (Restrictions on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment).