HL6312G/13G
AlGaInP Laser Diodes

Description

The HL6312G/13G are 0.63 \(\mu\)m band AlGaInP laser diodes with a multi-quantum well (MQW) structure. Wavelength is equal to He-Ne Gas laser. They are suitable as light sources in bar code readers, laser levelers and various other types of optical equipment. Hermetic sealing of the package achieves high reliability.

Features

- Visible light output: \(\lambda_p = 635 \text{ nm Typ}\)
- Single longitudinal mode
- Optical output power: 5 mW CW
- Low Operating voltage: 2.7 V Max
- Built-in photodiode for monitoring laser output
- TM mode oscillation

Internal Circuit

- HL6312G
- HL6313G

Package Type

- HL6312G/13G: G2
Absolute Maximum Ratings

\((T_c = 25^\circ C)\)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Rated Value</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical output power</td>
<td>(P_o)</td>
<td>5</td>
<td>mW</td>
</tr>
<tr>
<td>Pulse optical output power</td>
<td>(P_{o(pulse)})</td>
<td>(6^*)</td>
<td>mW</td>
</tr>
<tr>
<td>LD reverse voltage</td>
<td>(V_{RLD})</td>
<td>2</td>
<td>V</td>
</tr>
<tr>
<td>PD reverse voltage</td>
<td>(V_{RPD})</td>
<td>30</td>
<td>V</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>(T_{opr})</td>
<td>–10 to +50</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>(T_{stg})</td>
<td>–40 to +85</td>
<td>°C</td>
</tr>
</tbody>
</table>

Note: Pulse condition: Pulse width \(\leq 1\ \mu s\), duty \(\leq 50\%\)

Optical and Electrical Characteristics

\((T_c = 25^\circ C)\)

<table>
<thead>
<tr>
<th>Item</th>
<th>Symbol</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
<th>Unit</th>
<th>Test Conditions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical output power</td>
<td>(P_o)</td>
<td>5</td>
<td>—</td>
<td>—</td>
<td>mW</td>
<td>—</td>
</tr>
<tr>
<td>Threshold current</td>
<td>(I_{th})</td>
<td>20</td>
<td>45</td>
<td>70</td>
<td>mA</td>
<td>—</td>
</tr>
<tr>
<td>Operating current</td>
<td>(I_{op})</td>
<td>—</td>
<td>55</td>
<td>85</td>
<td>mA</td>
<td>(I_{op} = 5 \text{ mW})</td>
</tr>
<tr>
<td>Operating voltage</td>
<td>(V_{op})</td>
<td>—</td>
<td>—</td>
<td>2.7</td>
<td>V</td>
<td>(I_{op} = 5 \text{ mW})</td>
</tr>
<tr>
<td>Beam divergence parallel to the junction</td>
<td>(\theta_{//})</td>
<td>5</td>
<td>8</td>
<td>11</td>
<td>deg.</td>
<td>(I_{op} = 5 \text{ mW})</td>
</tr>
<tr>
<td>Beam divergence perpendicular to the junction</td>
<td>(\theta_{\perp})</td>
<td>25</td>
<td>31</td>
<td>37</td>
<td>deg.</td>
<td>(I_{op} = 5 \text{ mW})</td>
</tr>
<tr>
<td>Astigmatism</td>
<td>(A_s)</td>
<td>—</td>
<td>8</td>
<td>—</td>
<td>μm</td>
<td>(I_{op} = 5 \text{ mW}, \ NA = 0.55)</td>
</tr>
<tr>
<td>Lasing wavelength</td>
<td>(\lambda_p)</td>
<td>625</td>
<td>635</td>
<td>640</td>
<td>nm</td>
<td>(I_{op} = 5 \text{ mW})</td>
</tr>
<tr>
<td>Monitor current</td>
<td>(I_s)</td>
<td>0.2</td>
<td>0.4</td>
<td>0.8</td>
<td>mA</td>
<td>(I_{op} = 5 \text{ mW}, \ V_{RPD} = 5 \text{ V})</td>
</tr>
</tbody>
</table>
Typical Characteristic Curves

Optical Output Power vs. Forward Current

Monitor Current vs. Optical Output Power

Far Field Pattern

Lasing Spectrum

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Typical Characteristic Curves (cont)

Threshold Current vs. Case Temperature

Slope Efficiency vs. Case Temperature

Monitor Current vs. Case Temperature

Lasing Wavelength vs. Case Temperature

Characteristics:
- **Threshold Current, \( I_{th} \) (mA)**
- **Case temperature, \( T_C \) (°C)**
- **Slope Efficiency, \( \eta_s \) (mW/mA)**
- **Monitor Current, \( I_S \) (mA)**
- **Lasing Wavelength, \( \lambda_p \) (nm)**

Parameters:
- **\( P_O = 5 \) mW**
- **\( V_{R(PD)} = 5 \) V**
Typical Characteristic Curves (cont)

Astigmatism vs. Optical Output Power

\[ T_C = 25^\circ C \]
\[ NA = 0.55 \]

Optical output power, \( P_O \) (mW)

Astigmatism, \( A_S \) (\( \mu m \))

Polarization Ratio vs. Optical Output Power

\[ T_C = 25^\circ C \]
\[ NA = 0.4 \]
\[ NA = 0.25 \]

Optical output power, \( P_O \) (mW)

Polarization ratio

Electrostatic Destruction (MIL method)

LD Forward
\[ N = 10\text{pcs} \]
judgment : \( \Delta IO \geq 10\% \)

Survival rate (%)

Applied voltage (V)

LD Reverse
\[ N = 10\text{pcs} \]
judgment : \( \Delta IO \geq 10\% \)

Survival rate (%)

Applied voltage (V)
Package Dimensions

As of July, 2002
Unit: mm

<table>
<thead>
<tr>
<th>OPJ Code</th>
<th>JEDEC</th>
<th>JEITA</th>
<th>Mass (reference value)</th>
</tr>
</thead>
<tbody>
<tr>
<td>LD/G2</td>
<td>—</td>
<td>—</td>
<td>1.1 g</td>
</tr>
</tbody>
</table>
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