General Description
The Indium-Phosphide DFB laser Mach-Zehnder-Modulator is ideally suited for optical transport applications within the O-band. It features an integrated laser and an unique traveling-wave-electrode design, resulting in high bandwidth and zero chirp.

Applications
100GBaud OOK, 4PAM, 2PSK

Features
- O-band operation
- Integrated DFB laser
- High bandwidth
- Traveling-wave-electrode design with zero chirp
- Adjustable $V_\pi$
- Small foot print (5.0 x 0.5 x 0.2mm)
- AR-coated output facet with spot size converter for efficient optical coupling

Operating Conditions / Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature</td>
<td>$^\circ$C</td>
<td></td>
<td>20</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Bias current $I$</td>
<td>$mA$</td>
<td></td>
<td>95</td>
<td>120</td>
<td></td>
</tr>
<tr>
<td>Bias voltage $V_{bias}$</td>
<td>$V$</td>
<td></td>
<td>3</td>
<td>6</td>
<td>10</td>
</tr>
<tr>
<td>Phase-voltage</td>
<td>$V$</td>
<td></td>
<td>-10</td>
<td></td>
<td>0</td>
</tr>
</tbody>
</table>

Performance

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Unit</th>
<th>Typ</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Output Power</td>
<td>$P_{out}$</td>
<td>dBm</td>
<td>7</td>
<td>@ max. transmission</td>
</tr>
<tr>
<td>Wavelength</td>
<td>$\lambda$</td>
<td>nm</td>
<td>1293</td>
<td>@ 100 mA, 20°C</td>
</tr>
<tr>
<td>Side mode suppression ratio</td>
<td>SMSR</td>
<td>dB</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Extinction ratio (DC)</td>
<td>ER</td>
<td>dB</td>
<td>&gt; 20</td>
<td></td>
</tr>
<tr>
<td>3dB EO cut-off frequency</td>
<td>$f_{3dB}$</td>
<td>GHz</td>
<td>60</td>
<td></td>
</tr>
<tr>
<td>Phase voltage</td>
<td>$P1 \mid P2$</td>
<td>$V$</td>
<td>-3</td>
<td>quadrature point</td>
</tr>
<tr>
<td>$V_\pi$</td>
<td></td>
<td>$V$</td>
<td>3.6</td>
<td>@ $V_{bias}$ = +5 V</td>
</tr>
</tbody>
</table>

Small signal response ($S21_{eo}$)

$V_\pi = f(V_{bias})$ @ 1293 nm

HHI reserves the right to change specifications without any prior notice at any time

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O-band 100 GBaud InP DFB Laser Mach-Zehnder-Modulator

General Instructions / Precautions

An InP-Mach-Zehnder-Modulator contains several semiconductor-p-i-n junctions, a faulty DC-operation will result in an irreversible damage of the device. Please use the electric circuit diagram for correct DC-wiring. Don’t exceed maximum values for Phase- and Bias-voltages. $V_{bias}$ has to be always positive, referenced against GND. Phase voltages has to be always negative, referenced against $V_{bias}$. Use voltage sources with integrated current limiter. The laser should not be connected to GND.

Limits: $V_{bias}$: 3 mA, Phase: 1 mA, Laser: 2.5 V.

The use of an external temperature controller is highly recommended, otherwise the laser heats up and the operating point is not stable over time.

Connections / Specifications

- Optical coupling: SSMF with tapered fiber / lense recommended
- Contact-pad material: Au
- DC-pad dimensions: 85 x 85 μm
- RF-pitch: 150 μm, external 50 Ω needed for RF-operation

Device diagram

Acoustic circuit diagram

Chip dimensions [μm]

Part Number

- Chip: LMZM_D_O_60_19

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