O-band 100GBaud InP Mach-Zehnder-Modulator

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

Applications
100GBaud OOK, 4PAM, 2PSK

Features
- O-band operations (1280-1340nm)
- High bandwidth
- Traveling-wave-electrode design with zero chirp
- Adjustable $V_\pi$
- Small foot print (5.5 x 0.5 x 0.2mm)
- AR-coated facets with spot size converter for efficient optical coupling

Operating Conditions / Absolute Maximum Ratings

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Unit</th>
<th>Min</th>
<th>Typ</th>
<th>Max</th>
</tr>
</thead>
<tbody>
<tr>
<td>Optical wavelength</td>
<td>nm</td>
<td>1280</td>
<td>1310</td>
<td>1340</td>
</tr>
<tr>
<td>Optical input power</td>
<td>dBm</td>
<td>10</td>
<td>16</td>
<td></td>
</tr>
<tr>
<td>Temperature</td>
<td>°C</td>
<td>25</td>
<td>50</td>
<td></td>
</tr>
<tr>
<td>Bias voltage $V_{bias}$</td>
<td>V</td>
<td>3</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Phase-voltage</td>
<td>V</td>
<td>-10</td>
<td>0</td>
<td></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>Insertion loss</td>
<td>IL</td>
<td>dB</td>
<td>4</td>
<td>@ max. transmission</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>58</td>
<td></td>
</tr>
<tr>
<td>Bias voltage</td>
<td>$V_{bias}$</td>
<td>V</td>
<td>8</td>
<td></td>
</tr>
<tr>
<td>Phase voltage</td>
<td>P1</td>
<td>P2</td>
<td>V</td>
<td>-3</td>
</tr>
<tr>
<td>$V_\pi$</td>
<td>V</td>
<td>3.5</td>
<td></td>
<td>@ $V_{bias} = +8V$</td>
</tr>
</tbody>
</table>

Small signal response ($S21 eo$)

$V_\pi = f (V_{bias})$ @ 1310nm

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

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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. \( V_{\text{bias}} \) has to be always positive, referenced against GND. Phase voltages has to be always negative, referenced against \( V_{\text{bias}} \). Use voltage sources with integrated current limiter.

Limits: \( V_{\text{bias}} \) : 3 mA, Phase: 1 mA.

The use of an external temperature controller is highly recommended, otherwise 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 85μm
• RF-pitch: 100μm, external 50Ω needed for RF-operation

Device diagram

Electric circuit diagram

Chip dimensions [μm]

Part Number

• Chip: MZM_D_O_58_19

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