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>V</td>
<td>-3</td>
<td>quadrature point</td>
</tr>
<tr>
<td>( V_\pi )</td>
<td></td>
<td>V</td>
<td>3.5</td>
<td>@ ( V_{bias} = +8V )</td>
</tr>
</tbody>
</table>

Small signal response (S21 eo)
\( V_\pi = f \left( V_{bias} \right) \) @ 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: $V_{\text{bias}} : 3 \, \text{mA}$, Phase: $1 \, \text{mA}$.

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: $85 \times 85 \mu m$
- RF-pitch: $100 \mu m$, external $50 \Omega$ needed for RF-operation

Device diagram

Electric circuit diagram

Chip dimensions [\mu m]

Part Number
- Chip: MZM_D_O_58_19

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