C-band InP IQ-Mach-Zehnder-Modulator

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

Applications
APSK (QAM)

Features
- C-band operations (1527-1568nm)
- Traveling-wave-electrode design with zero chirp
- Low drive voltage ($V_{\pi}$), adjustable
- Small foot print (12 x 0.8 x 0.2mm)
- AR-coated facets with spot size converter for efficient optical coupling
- On-chip monitor PD

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>1527</td>
<td>1550</td>
<td>1568</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>40</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></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>8</td>
<td>@ max. transmission</td>
</tr>
<tr>
<td>Extinction ratio (DC)</td>
<td>ER</td>
<td>dB</td>
<td>&gt;22</td>
<td>child, parent</td>
</tr>
<tr>
<td>3dB EO cut-off frequency</td>
<td>$f_{3db}$</td>
<td>GHz</td>
<td>32</td>
<td></td>
</tr>
<tr>
<td>Bias voltage $V_{bias}$</td>
<td>$V_{bias}$</td>
<td>V</td>
<td>5</td>
<td></td>
</tr>
<tr>
<td>$V_{\pi}$</td>
<td>$V_{\pi}$</td>
<td>V</td>
<td>2.0</td>
<td>@ $V_{bias}$ = +5V</td>
</tr>
</tbody>
</table>

Small signal response (S21 eo)
QAM16 @ 32GBaud
$V_{\pi} = f (V_{bias}) @ 1550nm$
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General Instructions / Precautions
An InP-IQ-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 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: IQM_D_C_32_19

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

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