CL-QM-12.5
Quadrature Modulator

Preliminary

Key Features

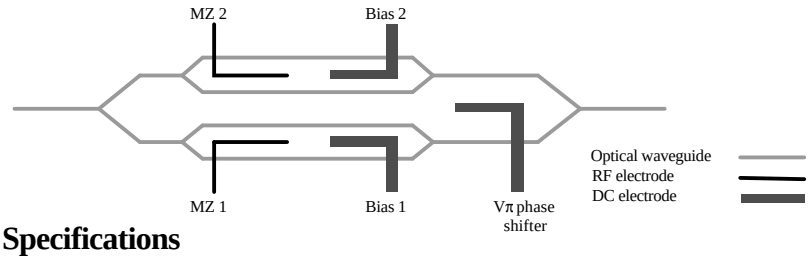
- Designed for optical Quadrature Modulation (e.g., QPSK, QAM)
- X-cut Ti:$LiNbO_3$
- Dual Mach-Zehnder modulator configuration on a single chip
- Wide optical bandwidth (1 to 1.6 µm)
- 50-Ohm RF drive impedance
- DC bias capability integrated on chip eliminates need for external bias-T
- Additional DC bias input for adjusting the quadrature phase difference between the two MZ arms

Applications

- Coherent optical communications
- Single Side-Band modulation (SSB)
- Optical frequency ramp generation
- High-speed optical test and measurement equipment
- Remote sensing and LADAR
- Opto-electronic warfare
- Signal intelligence

Description

The $LiNbO_3$-based integrated CL-QM-12.5 is designed for 12.5 Gsymbol/s using quadrature modulation (e.g., QPSK, QAM). The device is based on X-cut Ti in-diffused $LiNbO_3$ integrated optical waveguide technology. Two parallel Mach-Zehnder (MZ) modulators are combined using two 3-dB Y-junctions at the input and output. Each MZ modulator is driven by RF signals applied to the on-chip coplanar waveguides (CPW) electrodes designed for 50-Ohm impedance. Separate bias pads are utilized to optimize the DC bias point of each MZ modulator. An additional phase shifter (Vπ) pad has been added to obtain quadrature (90°) phase difference between the two outputs of the MZ modulators.



Specifications

	Min.	Typ.	Max.	Units
Optical				
Total Insertion Loss	7	10	12	dB
Extinction ratio per MZ (DC)	20	30	-	dB
Optical return loss	-	-15	-	dB
Electrical				
Vπ per MZ (DC)	3	5	10	V
Vπ per MZ (1 GHz)	5	7.5	15	V
Vπ per phase shifter (DC)	-20	-	20	V
Phase shifter extinction ratio	20	25	30	dB
Vπ bias per MZ (DC)		15	30	V
RF return loss per MZ (S_{11} .13-10 GHz)	-	-	-10	dB
EO bandwidth per MZ	9	12.5		GHz
RF impedance per MZ		50		Ω

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Preliminary Data Sheet – March 2004