



MXIQ-LN-40 optical modulator is a high bandwidth, low insertion loss Dual Parallel Mach-Zehnder Modulator. Photline Technologies proprietary "Magic Junction" (patent n° US2008193077) confers it an unmatched low insertion loss, and its X-cut design guarantees high stability and zero chirp in a wide range of operational conditions.

MXIQ-LN-40 modulator is key component for a variety of applications among which : DQPSK transmission, QAM, OFDM, Single Side Band modulation.

FEATURES

- Low Insertion loss < 4 dB
- Low ripple E-O bandwidth curve
- X-cut for high stability and zero chirp
- Internal photodiodes

APPLICATIONS

- 2 x 22 Gb/s DQPSK
- QAM, OFDM, SSB
- Research & Development

OPTIONS

- 1300 nm band version
- Hermetic sealing

RELATED EQUIPMENTS

- DR-AN-20-HO RF analog amplifiers
- DR-DG-20-HO RF digital amplifiers
- MBC-IQ-BT bias controller
- Turn-key ModBox Tx and Rx systems

Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1580	nm
Insertion loss	-	4	-	dB
Electro-optical bandwidth	-	20	-	GHz
V_{π} RF @20 Gb/s	-	7	-	V
Electrical return loss	-	70	-	dB
Input 3rd order intercept	-	12	-	dB

Specifications given at 25 °C, 50 Ω , 1550 nm

Electrical Characteristics 50 Ω RF input

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF ₁ & RF ₂ electrodes, from 2 GHz	18	20	-	GHz
Ripple S21	ΔS_{21}	RF ₁ & RF ₂ electrodes, f < 20 GHz	-	0.5	1	dB
Electrical return loss	ES ₁₁	RF ₁ & RF ₂ electrodes, f < 20 GHz	-	-12	-10	dB
V _π RF @50 kHz	V _{πRF} _{50 kHz}	RF ₁ & RF ₂ electrodes	-	5.7	6	V
V _π RF @20 Gb/s	V _{πRF} _{20 Gb/s}	RF ₁ & RF ₂ electrodes	-	7	8	V
V _π DC ₁ & DC ₂ electrodes	V _{πDC} _{1,2}	DC ₁ & DC ₂ electrodes	-	7	8	V
V _π DC ₃ electrodes	V _{πDC} ₃	DC ₃ electrodes	-	17	18	V
RF input impedance	Z _{in-RF}	-	-	35	-	Ω
DC input impedance	Z _{in-DC}	-	-	1	-	MΩ

Optical Characteristics All specifications given at 25°C, 1550 nm, unless differently specified

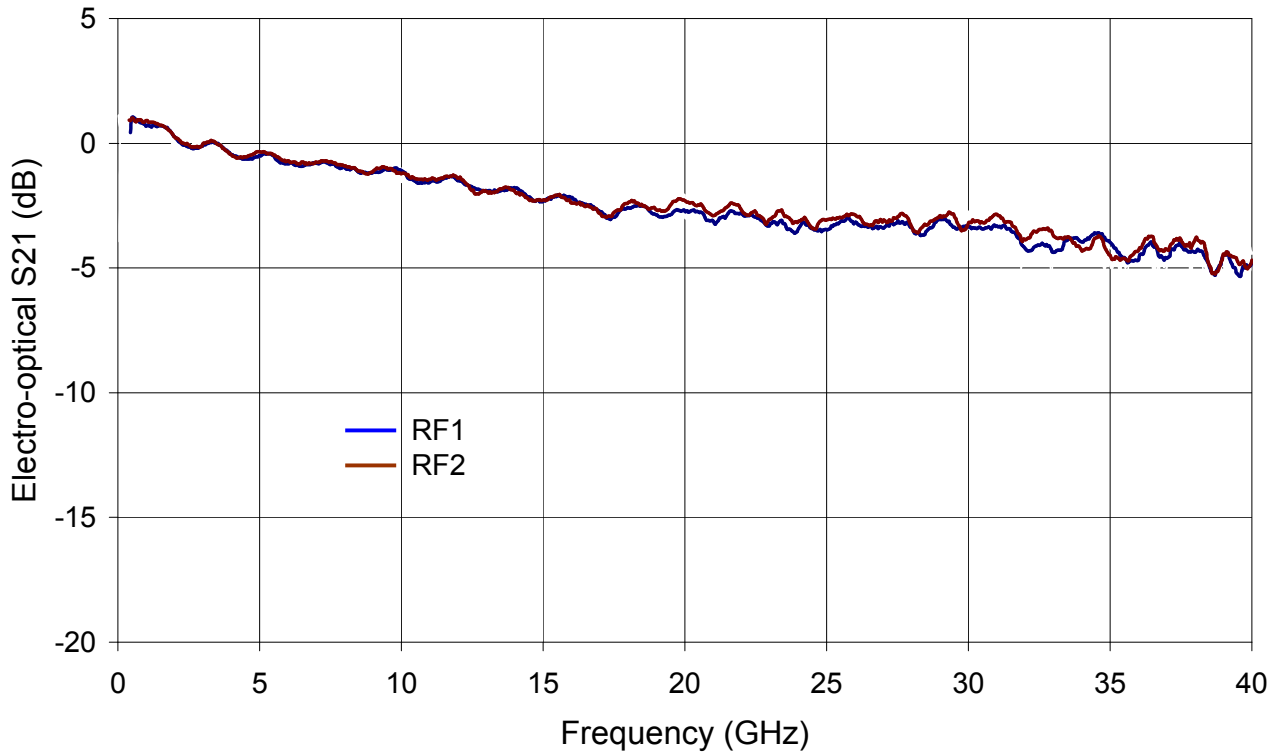
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Standard, without connectors	-	6	7	dB
		Option Low IL, without connectors	-	4	5	dB
DC extinction ratio @DC ₃	ER	Measured with narrow source linewidth < 200 MHz	20	22	-	dB
Optical return loss	ORL	-	-40	-45	-	dB
Chirp	α	-	-0.1	0	0.1	-

Absolute Maximum Ratings

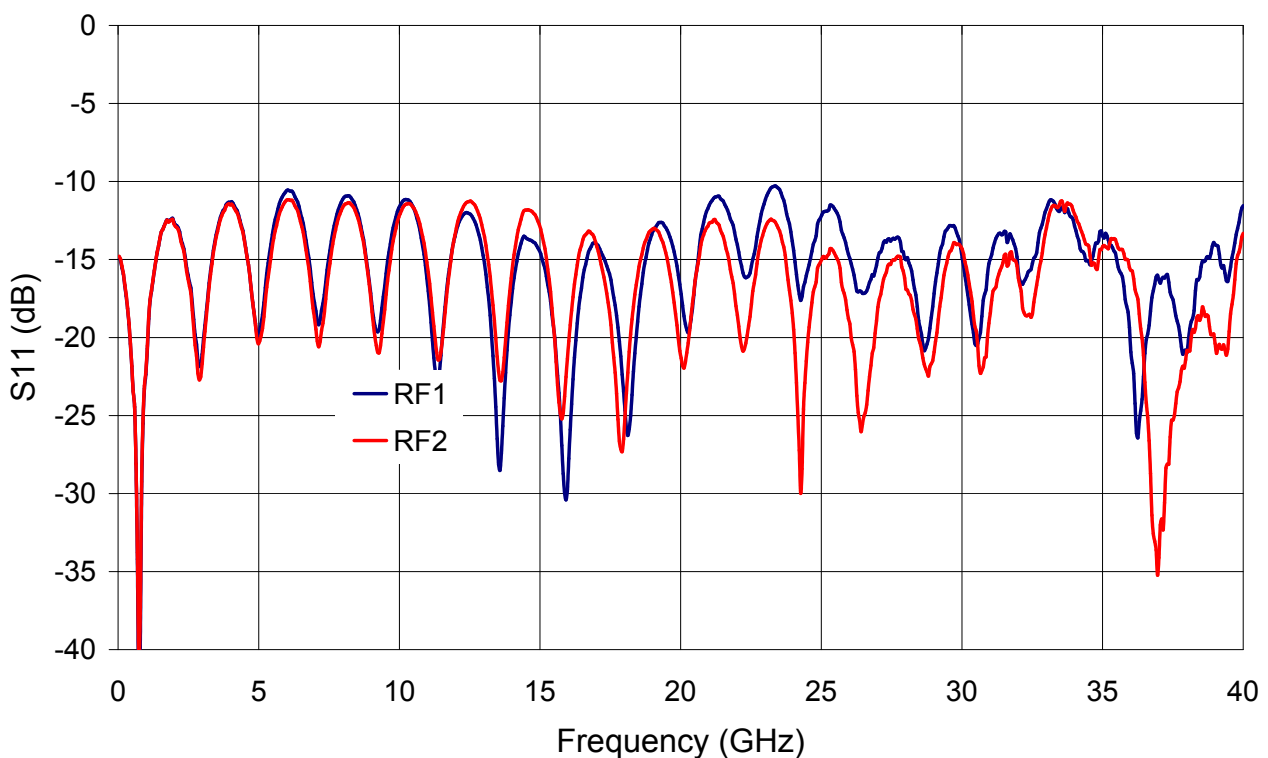
Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

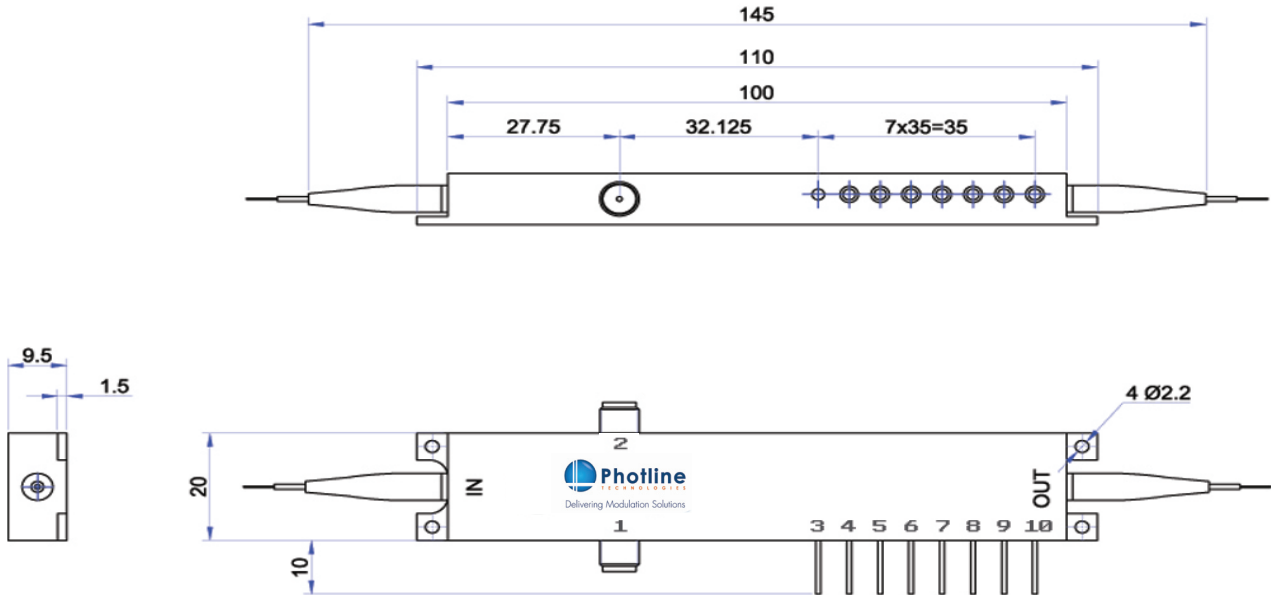
Parameter	Symbol	Min	Max	Unit
RF input power	EP _{in}	-	28	dBm
Bias voltage	V _{bios}	-20	+20	V
Optical input power	OP _{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

Typical S21 curves at RF₁ and RF₂ ports



Typical S11 curves at RF₁ and RF₂ ports



Mechanical Diagram and pinout All measurements in mm


Port	Function	Note
IN	Optical input port	Polarization maintaining fiber, Corning PM 98-U25A, Length 1.5 meter. Buffer diameter 900 μ m
OUT	Optical output port	Polarization maintaining fiber, Corning PM 98-U25A, Length 1.5 meter. Buffer diameter 900 μ m
1	RF ₁ input port	Wiltron female K (SMA compatible)
2	RF ₂ input port	Wiltron female K (SMA compatible)
3	Ground	Pin feed through diameter 1.0 mm
4	DC ₁	Pin feed through diameter 1.0 mm
5	DC ₂	Pin feed through diameter 1.0 mm
6	DC ₃	Pin feed through diameter 1.0 mm
7	Photodiode 1 cathode	Pin feed through diameter 1.0 mm
8	Photodiode 1 anode	Pin feed through diameter 1.0 mm
9	Photodiode 2 cathode	Pin feed through diameter 1.0 mm
10	Photodiode 1 anode	Pin feed through diameter 1.0 mm

Ordering information
MXIQ-LN-40-XX-Y-Z-AB-CD

XX = Internal photodiode : 00 Not integrated PD PD Integrated

Y = Input fiber : P Polarisation maintaining S Standard single mode

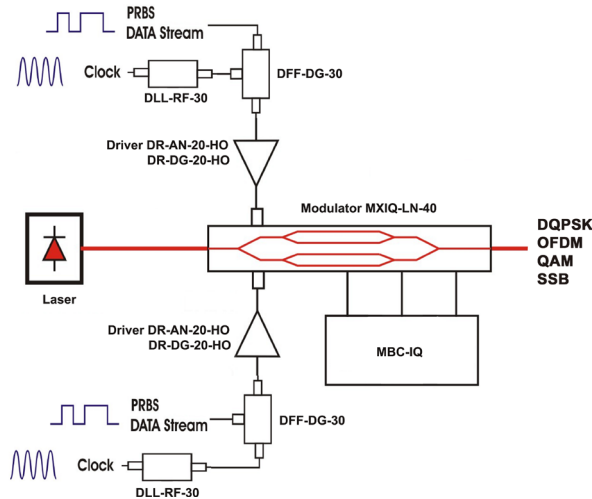
Z = Input fiber : P Polarisation maintaining S Standard single mode

AB = Output connector : 00 bare fiber FA FC/APC FC FC/SPC

CD = Output connector : 00 bare fiber FA FC/APC FC FC/SPC

Note : optical connectors are Seikoh-Giken with narrow key or equivalent

Related equipments & Examples of application



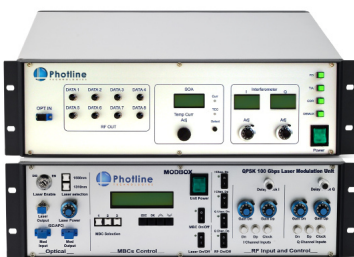
QPSK, OFDM transmission

The DR-AN-20-HO and DR-DG-20-HO are a family of wideband RF amplifier modules designed for analog and digital applications requiring an upper operation voltage.

The DFF-DG-30 is a D-type Flip Flop (DFF) module which is primarily intended for retiming of high data rate signals.

The DLL-RF-30 is an adjustable delay line connectorized module that is used for digital and analog applications and adds a user adjustable delay from 05 to 140 ps.

The MBC-IQ-BT is a bench top automatic bias controller specially designed to lock the operating point of LiNbO₃ dual parallel Mach-Zehnder modulators and ensure a stable operation over time and environmental conditions.



The ModBox-DQPSK and ModBox-OFDM are bench-top Modulation and Demodulation Units dedicated to digital (D)QPSK and OFDM modulation transmission and operating in the C-band.

The ModBox-DQPSK Tx and Rx family allow 40 Gbps, 56 Gbps and 100 Gbps high performances transmission.

About us

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company LiNbO₃ modulators and high-speed electronics modules. Photline Technologies offers high speed and high data rate modulation solutions for the telecommunication industry and the defense, aerospace, instruments and sensors markets. The products offered by the company include : comprehensive range of intensity and phase modulators (800 nm, 1060 nm, 1300 nm, 1550 nm), RF drivers and modules, transmitters and modulation units.