



## FEATURES

- Superior Extinction ratio : 40 dB
- High Bandwidth ( > 12 GHz)
- X-cut for high stability
- Low drive voltage
- Low insertion loss

## APPLICATIONS

- Pulse generation / picking
- Carrier suppression
- Fiber optics sensors
- Pulse applications

## OPTIONS

- 20 GHz version
- 1060 nm, 1300 nm band versions
- Hermetic sealing

## RELATED EQUIPMENTS

- DR-PL-10-MO, DR-AN-10-MO
- MBC Automatic Bias Controllers

The MXER-LN series of intensity modulators is a family of high performance modulators exhibiting superior Extinction Ratio. Their specific design relies on Photline Technologies "Magic Junction" (patent n° US2008193077).

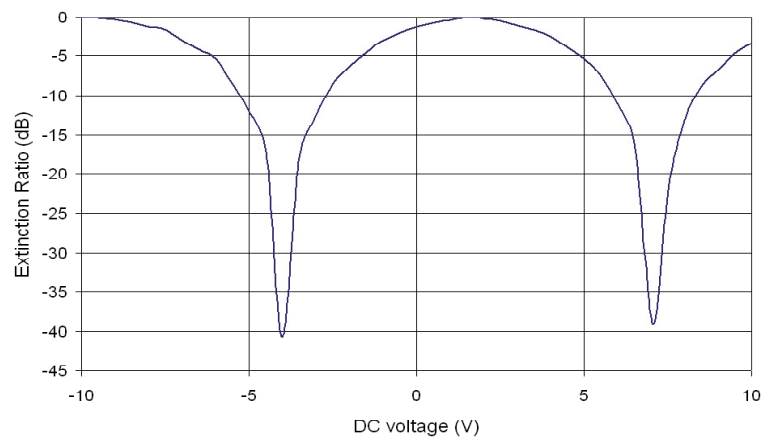
MXER-LN series intensity modulators are key devices in all applications where a combination of high extinction and high bandwidth is required : laser pulse picking prior optical amplification, pulse generation or lidar based sensing systems are a few examples, as well as fiber optics sensors.

## Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1580	nm
Insertion loss	-	4	-	dB
Extinction ratio	-	40	-	dB
Electro-optical bandwidth	-	12	-	GHz
V $\pi$ RF @10 GHz	-	6.5	-	V
Electrical return loss	-	-12	-	dB

Specifications given at 25 °C, 1550 nm

## Extinction Ratio Response



## Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	$S_{21}$	RF electrodes, from 2 GHz	10	12	-	GHz
Ripple S21	$\Delta S_{21}$	RF electrodes, $f < 12\text{GHz}$	-	0.5	1	dB
Electrical return loss	$ES_{11}$	RF electrodes	-	-12	-10	dB
$V_{\pi}$ RF @50 kHz	$V_{\pi RF_{50\text{ kHz}}}$	RF electrodes	-	5.5	6	V
$V_{\pi}$ RF @10 GHz	$V_{\pi RF_{10\text{ GHz}}}$	RF electrodes	-	6.5	7	V
$V_{\pi}$ DC electrodes	$V_{\pi DC}$	DC electrodes	-	6.5	7	V
RF input impedance	$Z_{in-RF}$	-	-	40	-	$\Omega$
DC input impedance	$Z_{in-DC}$	-	1	-	-	M $\Omega$

## Optical Characteristics

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

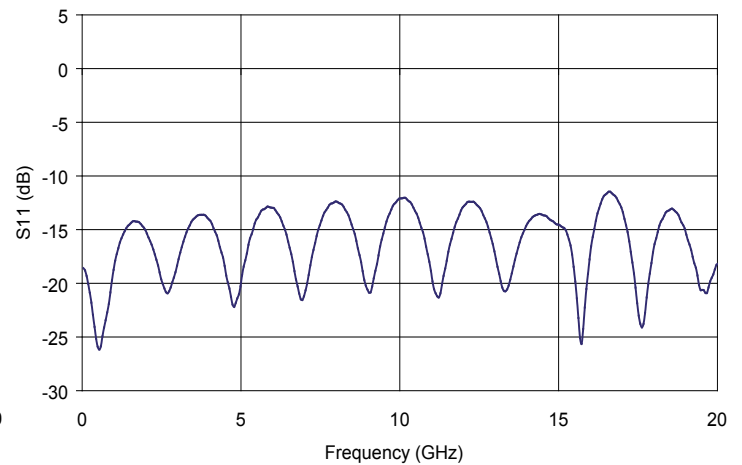
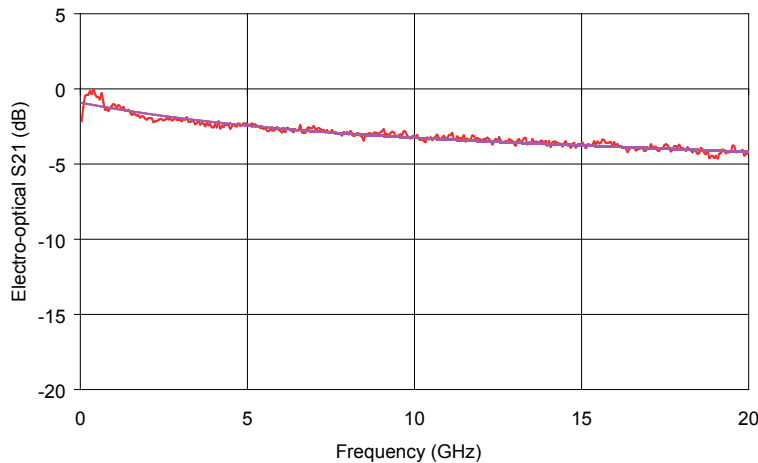
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Operating wavelength	$\lambda$	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	4	5	dB
DC extinction ratio	ER > 30	Measured with narrow source linewidth < 200 MHz	30	-	-	dB
	ER > 35		35	-	-	dB
	ER > 40		40	-	-	dB
Optical return loss	ORL	-	-40	-45	-	dB
Chirp	$\alpha$	-	-0.1	0	0.1	-

## Absolute Maximum Ratings

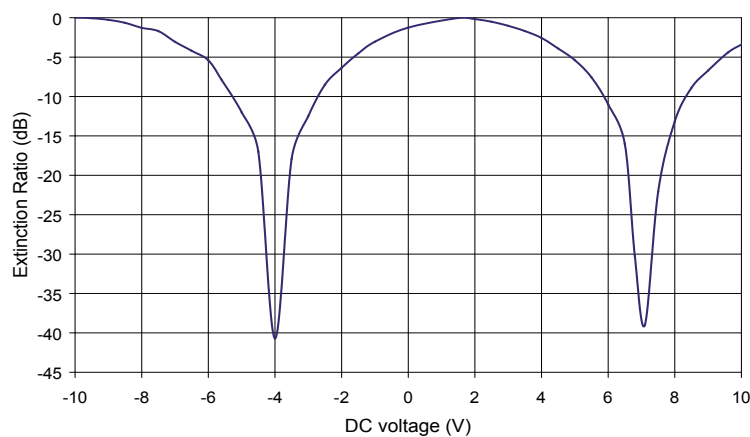
Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute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

Parameter	Symbol	Min	Max	Unit
RF input power	$EP_{in}$	-	28	dBm
Bias voltage	$V_{bias}$	-20	+20	V
Optical input power	$OP_{in}$	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

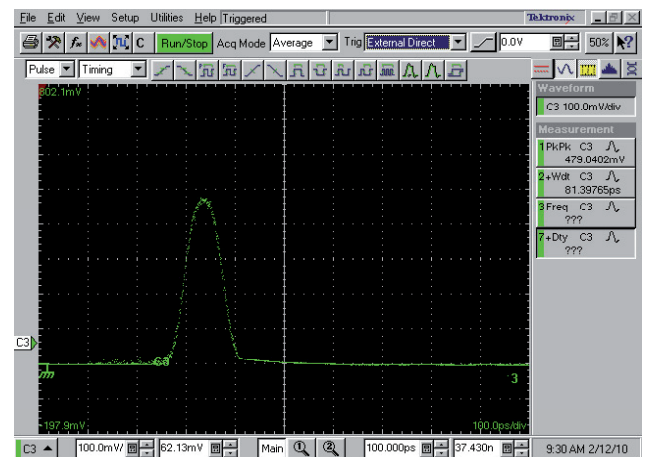
### Typical S21 & S11 Parameters Curves



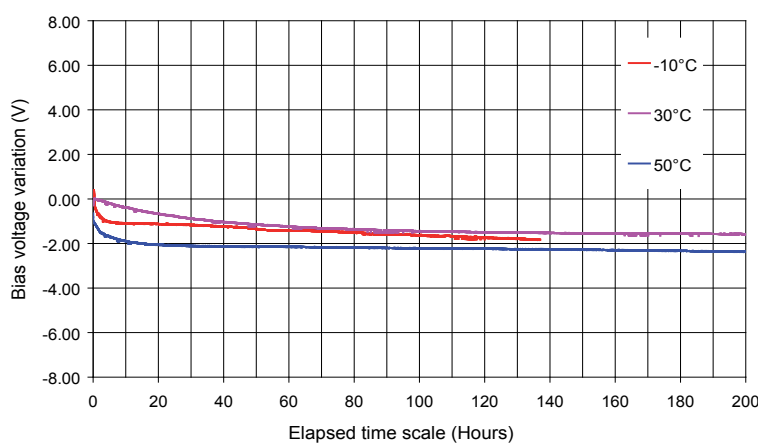
### Extinction Ratio



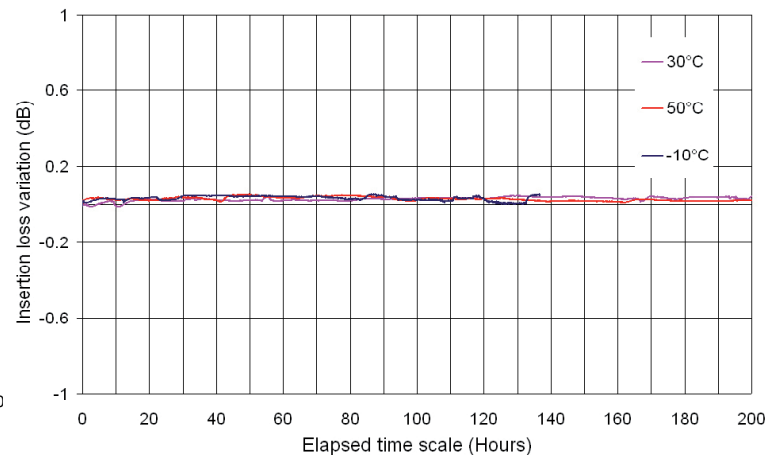
### Generated 80 ps Pulse



### Stability with Time and Temperature

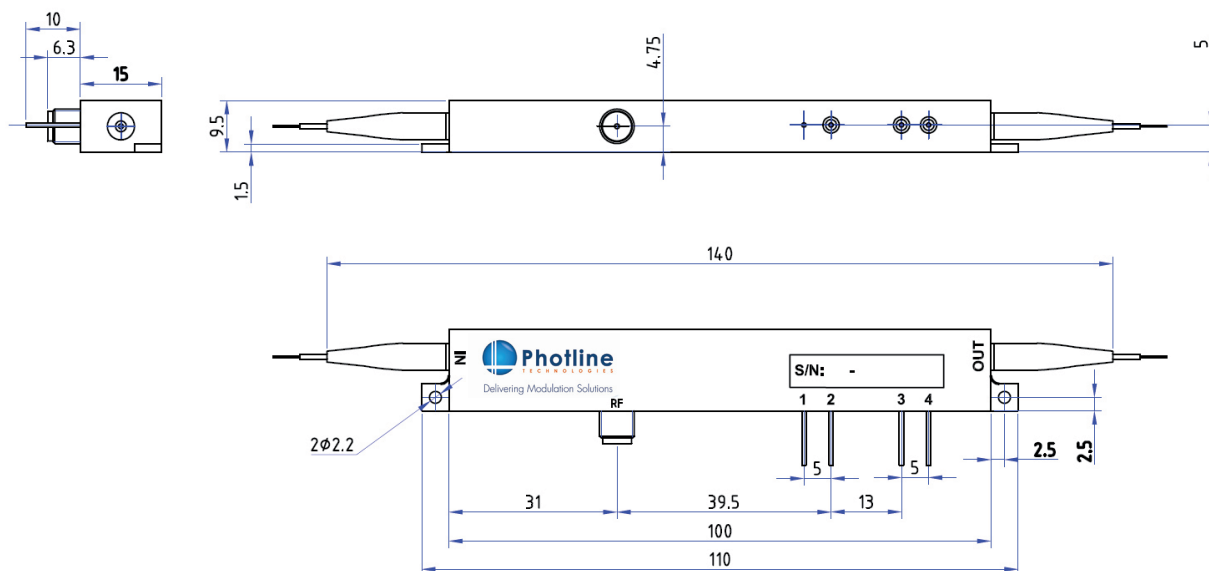


### Insertion Loss with Time and Temperature



## Mechanical Diagram and Pinout

All measurements in mm



Port	Function	Note
IN	Optical input port	Polarization maintaining fiber, SM-15-P-8/125UV/UV-400, Length 1.5 meter. Buffer diameter 900 $\mu$ m
OUT	Optical output port	Polarization maintaining fiber, SM-15-P-8/125UV/UV-400, Length 1.5 meter. Buffer diameter 900 $\mu$ m
RF	RF input port	Wiltron female K
1	Ground	Pin feed through diameter 1.0 mm
2	DC	Pin feed through diameter 1.0 mm
3	Photodiode cathode	Pin feed through diameter 1.0 mm
4	Photodiode anode	Pin feed through diameter 1.0 mm

## Ordering Information

### MXER-LN-BW-XX-Y-Z-AB-CD-xxdB

BW = Bandwidth, 10 : 10 GHz - 20 : 20 GHz

XX = Internal photodiode PD, 00 : Not integrated - PD : Integrated

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

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

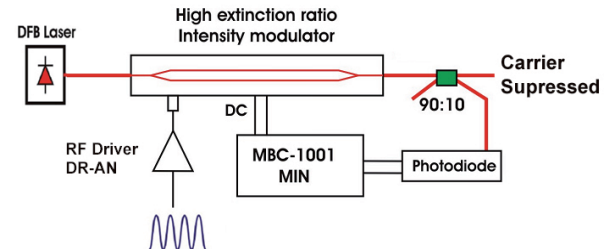
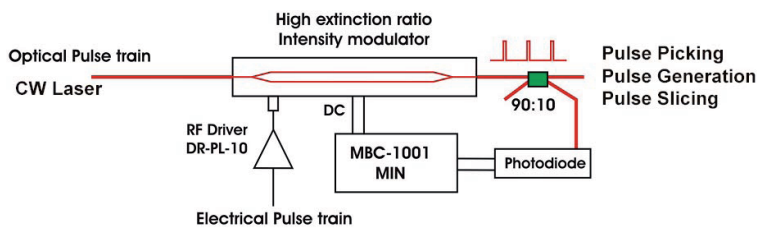
AB = Output connector, 00 : bare fiber - FA : FC/APC - FC : FC/SPC

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

xxdB = Extinction ratio, 30 : 30 dB - 35 : 35dB - 40 : 40dB

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

## Related equipments



### Pulse Generation / Picking / Slicing

DR-PL series amplifiers are designed to drive NIR-MX-LN modulators so as to generate undistorted optical pulses.

MBC-DG-BT is an automatic bias controller that locks the operating point of the NIR-MX-LN modulators. When paired with the proper modulator, MBC-DG-BT can achieve an extinction ratio up to 50 dB.

### Carrier suppressed / Analog modulation

DR-AN series modules are wideband RF amplifiers designed to drive optical modulators at frequencies up to 40 GHz.

MBC-DG-BT is continuously tunable : it can lock on any point of the modulator transfer curve, and adapt to a variety of applications.



Pulse ModBoxes are turnkey optical transmitters and benchtop modulation units for pulse applications. They can be tailored to specific pulse applications : generation, picking, splicing.

## About us

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company  $\text{LiNbO}_3$  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, 2000 nm), RF drivers and modules, transmitters and modulation units.

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