

## MODULATOR

# MPX1300 and MPZ1300 series

## Low frequencies to 20 GHz Phase Modulators

The iXblue MPX1300 and MPZ1300 series are lithium niobate ( $\text{LiNbO}_3$ ) phase modulators specially designed for operation in the 1310 nm wavelength band. Thanks to their O-Band optimized optical waveguides design and their 1310 nm selected fibers, the MPX1300 and MPZ1300 can be claimed genuine 1310 nm phase modulators.

- The MPZ1300-LN-10 is ideally suited for wide bandwidth operation up to 20 GHz.
- The MPX1300-LN-0.1 has a high impedance input optimized for modulation frequencies up to 300 MHz.



Designed using state-of-the-art and proven lithium niobate technology, MPX1300 and MPZ1300 series phase modulators are easy to operate and to integrate. These modulators come with a comprehensive range of options (DC Coupled, High Electric Power) to offer the highest performance for a wide range of applications from laboratory experiments to demanding industrial systems.

### FEATURES

- Low and wide EO bandwidth
- Full O-Band operation
- Low  $V_\pi$
- Low insertion loss

### APPLICATIONS

- Side bands generation
- Laser Combining
- Interferometric sensing
- Frequency shifting / broadening
- Quantum Key Distribution (QKD)
- Pound-Drever-Hall locking (PDH)
- High data rate telecommunications

### OPTIONS

- DC coupled
- Low residual intensity modulation
- High electrical input power capability
- Optical E and S bands version

### RELATED EQUIPMENTS

- Matched RF amplifiers
- MX, MXAN, MXER intensity modulators
- Short optical pulse ModBox

### MPX1300-LN-0.1 Phase Modulators Highlights

Parameter	
Operating wavelength	1270 nm - 1360 nm
Usable Electro-optical bandwidth	300 MHz
$V_\pi$ RF @50 kHz	3 V
Insertion loss	3 dB

### MPZ1300-LN-10 Phase Modulators Highlights

Parameter	
Operating wavelength	1270 nm - 1360 nm
Usable electro-optical bandwidth	20 GHz
$V_\pi$ RF @50 kHz	4 V
Insertion loss	3.3 dB

# MPX1300-LN-0.1

Up to 300 MHz Phase Modulator

## Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	$S_{21}$	-	-	150	-	MHz
Usabe electro-optical bandwidth	$S_{21}$	-	-	300	-	MHz
$V_{\pi}$ RF @50 kHz	$V_{\pi_{RF\ 50\ kHz}}$	-	-	3	3.5	V
RF Input Impedance	$Z_{in-RF}$	-	-	10 000	-	$\Omega$

## Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	$\lambda$	-	1270	1310	1360	nm
Insertion loss	IL	Without optical connectors	-	3	4	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 1310 nm, unless differently specified.

## 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
Modulation voltage range	$EV_{in}$	-20	+20	V
Optical input power	$OP_{in}$	-	+20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

# MPZ1300-LN-10

Up to 20 GHz Phase Modulator

## Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	$S_{21}$	-	10	12	-	GHz
Usable electro-optical bandwidth	$S_{21}$	-	-	20	-	GHz
Ripple $S_{21}$	$\Delta S_{21}$	-	-	0.5	1	dB
Electrical return loss	$S_{11}$	-	-	-17	-13	dB
		HEP option	-	-14	-10	dB
$V_{\pi}$ RF @50 kHz	$V_{\pi_{RF\ 50\ kHz}}$	-	-	3.3	4	V
$V_{\pi}$ RF @10 GHz	$V_{\pi_{RF\ 10\ GHz}}$	-	-	4.5	5.5	V
RF impedance matching	$Z_{in-RF}$	-	-	50	-	$\Omega$
$V_{\pi}$ DC electrodes	$V_{\pi_{DC}}$	DCC option, housing #B	-	3.3	6	V
DC port impedance matching	$Z_{in-DC}$	DCC option, housing #B	1	-	-	$M\Omega$

## Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate Z-Cut Y-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	$\lambda$	-	1270	1310	1350	nm
Insertion loss	IL	Without optical connectors	-	2.5	3.5	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 1310 nm, unless differently specified.

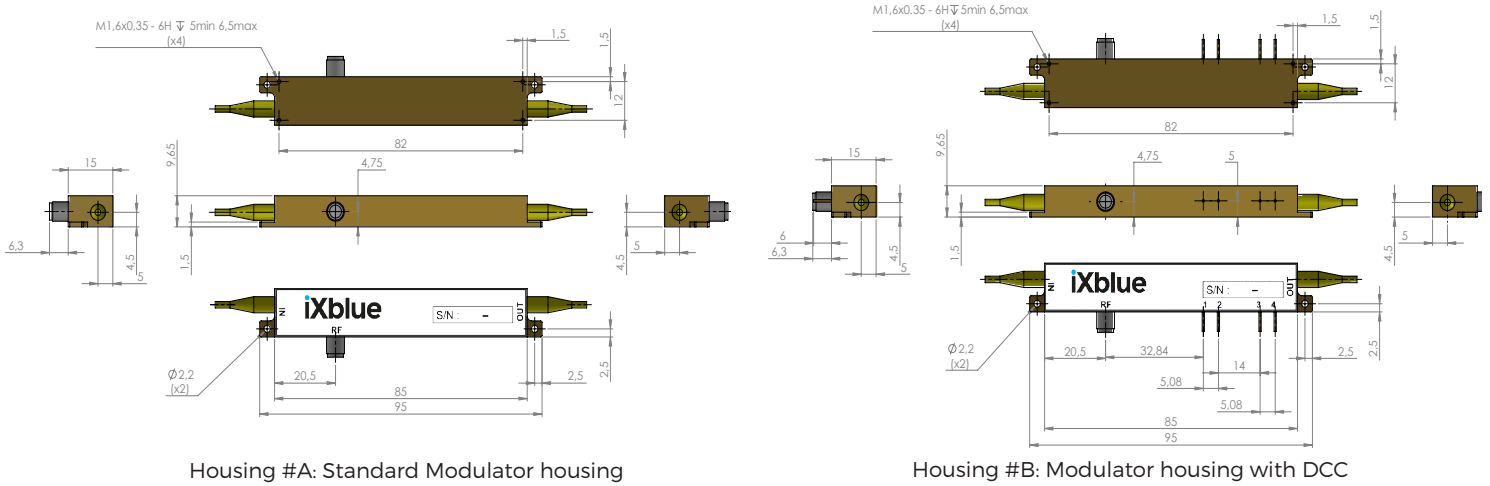
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Parameter	Symbol	Condition	Min	Typ	Max	Unit
RF input power	$EP_{in}$	-	-	-	+28	dBm
High electrical input power option	$HEP_{in}$	HEP option	-	-	+33	dBm
Optical input power	$OP_{in}$	For optimal performance	-	-	+12	dBm
		Before failure	-	-	+20	dBm
Bias voltage range	$V_{DCC}$	DCC option, housing #B	-15	-	+15	V
Operating temperature	OT	-	0	-	+70	°C
Storage temperature	ST	-	-40	-	+85	°C

## Mechanical Diagram and Pinout

All measurements in mm



Housing #A: Standard Modulator housing

Housing #B: Modulator housing with DCC

Port	Function	Housing	Note
IN	Optical input port	#A & #B	Polarization maintaining fiber 1310 nm, PM13-U25D, length: 1.5 meter, Buffer diameter: 900 $\mu$ m
OUT	Optical output port	#A & #B	Polarization maintaining fiber 1310 nm, PM13-U25D, length: 1.5 meter, Buffer diameter: 900 $\mu$ m
RF	RF input port	#A & #B	Female K (SMA compatible)
PINS 1 / 2	Ground / DC	#B	Pin feed through diameter 1.0 mm

## Ordering information

Bandwidth : **X-cut: 0.1** (150 MHz)  
**Z-cut: 10** (10 GHz)

Input fiber : P: Single Mode and Polarisation maintaining Fiber

Output fiber : P: Single Mode and Polarisation maintaining Fiber

Input connector : **00** (bare fiber), **FA** (FC/APC)

Output connector : **00** (bare fiber), **FA** (FC/APC)

HEP: High Electrical Power option  
DCC: DC Coupled option

MPX1300-LN-0.1-00-□-□-□-□-□-□-□  
MPZ1300-LN-10-00-□-□-□-□-□-□-□

## About us

iXblue Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate (LiNbO<sub>3</sub>) modulators and RF electronic modules.

iXblue Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.

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