MPX / MPZ series
Low frequencies to 32 GHz Phase Modulators

Photline TECHNOLOGIES
Delivering Modulation Solutions

Modulator

Features

- High Bandwidth > 32 GHz
- C & L bands
- Low insertion loss
- Low Vπ

Applications

- Chirping
- Interferometric sensing
- Frequency shifting / broadening
- Quantum key distribution
- High data rate telecommunication

Options

- Hermetic sealing
- 800 nm, 1000 nm, 2.0 μm versions
- Low residual intensity modulation

Related equipments

- Matched RF drivers

The MPX-LN and MPZ-LN series make up the most comprehensive range of electro-optic phase modulators available on the market for the 1550 nm wavelength band.

- The MPZ-LN series are ideally suited for high bandwidth operation at 10 GHz, 20 GHz and up to 40 GHz.
- For lower frequencies up to 05 GHz, the MPX-LN series offers the unparalleled stability of x-cut devices.
- Finally, the MPX-LN-0.1 has a high impedance input optimized for frequencies below 150 MHz.

Designed using state-of-the-art and proven lithium niobate technology, MPX-LN and MPZ-LN phase modulators are easy to operate and to integrate. They offer high performance for all state of the art applications.

MPX-LN series Performance Highlights

Parameter	MPX-LN-0.1	MPX-LN-05
Operating wavelength	1530 nm - 1580 nm	
Electro-optical bandwidth	150 MHz	4 GHz
Vπ RF @50 kHz	3.5	6 V
Insertion loss	3 dB	3.5 dB

Specifications given at 25 °C, 1550 nm

MPZ-LN series Performance Highlights

Parameter	MPZ-LN-10	MPZ-LN-20	MPZ-LN-40
Operating wavelength	1530 nm - 1580 nm		
Electro-optical bandwidth	12 GHz	20 GHz	32 GHz
Vπ RF @50 kHz	5 V	7 V	7 V
Insertion loss	2.5 dB	2.5 dB	2.5 dB

Specifications given at 25 °C, 1550 nm

MPX-LN-0.1
150 MHz Phase modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes	-	150	-	MHz
Vπ RF @50 kHz	$V\pi\ RF_{50\ kHz}$	RF electrodes	-	3.5	4	V
RF input impedance	$Z_{in\text{-}RF}$	-	-	10 000	-	Ω

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			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	3	4	dB
Optical return loss	ORL	-	-40	-45	-	dB

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

MPX-LN-05
5 GHz Phase modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes, from 2 GHz	4	5	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi\ RF_{50\ kHz}$	RF electrodes	-	6	7	V
Vπ RF @5 GHz	$V\pi\ RF_{5\ GHz}$	RF electrodes	-	9	10	V
RF input impedance	$Z_{in\text{-}RF}$	-	-	40	-	Ω

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			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	3.5	4.5	dB
Optical return loss	ORL	-	-40	-45	-	dB

Absolute Maximum Ratings

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

MPZ-LN-10

10 GHz Phase modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes, from 2 GHz	10	12	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi\ RF_{50\ kHz}$	RF electrodes	-	5	6	V
Vπ RF @10 GHz	$V\pi\ RF_{10\ GHz}$	RF electrodes	-	7	8	V
RF input impedance	$Z_{in\text{-}RF}$	-	-	40	-	Ω

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			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	2.5	3.5	dB
Optical return loss	ORL	-	-40	-45	-	dB

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
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

MPZ-LN-20

20 GHz Phase modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes, from 2 GHz	18	20	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi\ RF_{50\ kHz}$	RF electrodes	-	7	8	V
Vπ RF @20 GHz	$V\pi\ RF_{20\ GHz}$	RF electrodes	-	9	10	V
RF input impedance	$Z_{in\text{-}RF}$	-	-	40	-	Ω

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			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	2.5	3.5	dB
Optical return loss	ORL	-	-40	-45	-	dB

Absolute Maximum Ratings

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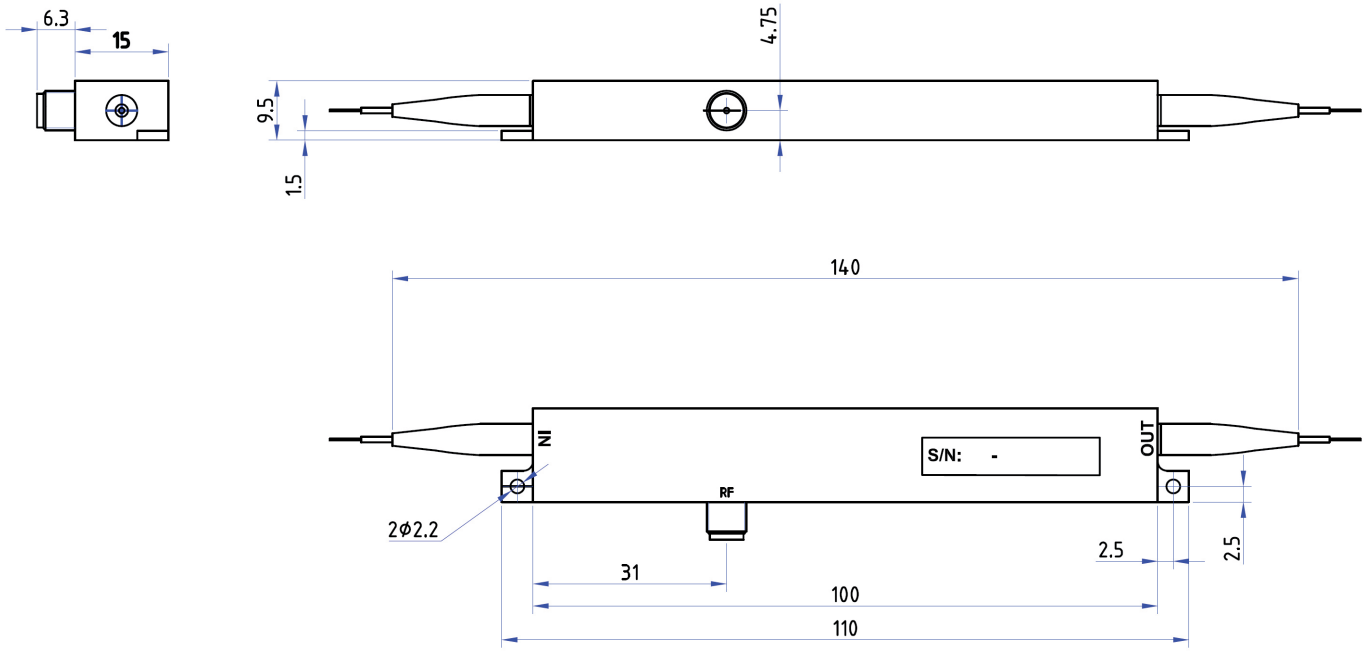
Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

Mechanical Diagram and Pinout All measurements in mm



Port	Function	Note
IN	Optical input port	Polarization maintaining fiber 1550 nm, SM-15-P-8/125UV/UV400, Length 1.5 meter. Buffer diameter 900 µm
OUT	Optical output port	Polarization maintaining fiber 1550 nm, SM-15-P-8/125UV/UV400, Length 1.5 meter. Buffer diameter 900 µm
RF	RF input port	Wiltron female K

Ordering information

MPX-LN-XX-Y-Z-AB-CD MPZ-LN-WW-Y-Z-AB-CD

XX = X-cut Bandwidth : 0.1 150 MHz **05** 5 GHz
WW = Z-cut Bandwidth : 10 10 GHz **20** 20 GHz
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

MPZ-LN-40

40 GHz Phase modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes, from 2 GHz	30	32	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi\ RF_{50\ kHz}$	RF electrodes	-	7	8	V
Vπ RF @30 GHz	$V\pi\ RF_{30\ GHz}$	RF electrodes	-	10	11	V
RF input impedance	$Z_{in\text{-}RF}$	-	-	35	-	Ω

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			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	2.5	3.5	dB
Optical return loss	ORL	-	-40	-45	-	dB

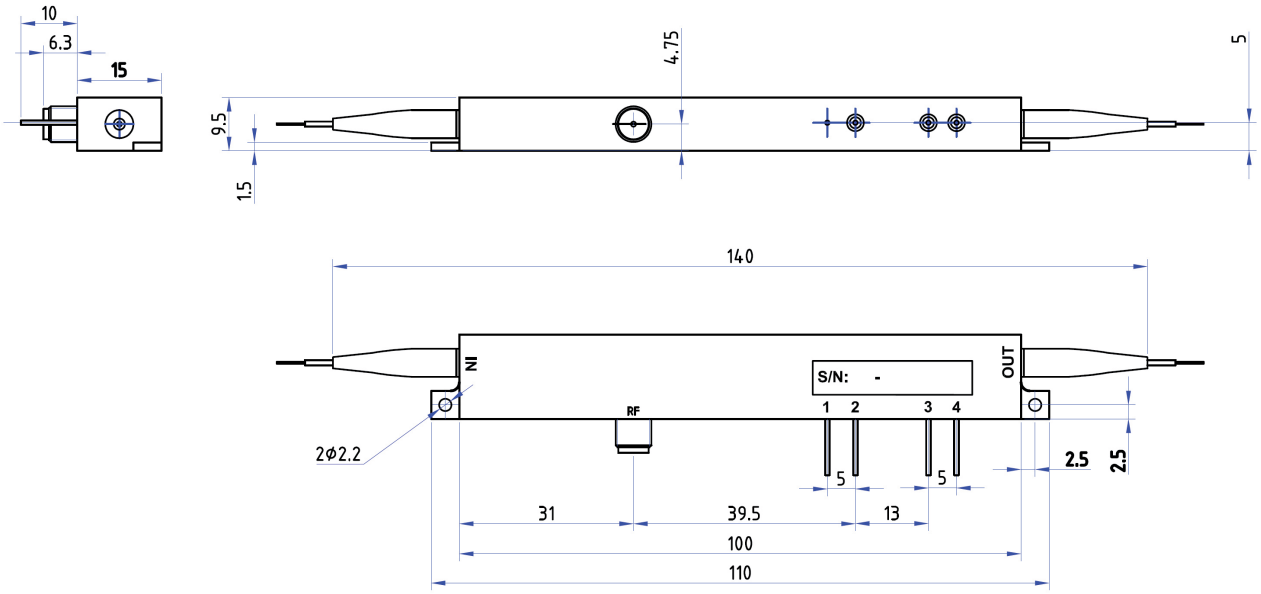
Absolute Maximum Ratings

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
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

MPZ-LN-40 Mechanical Diagram and Pinout

All measurements in mm



Port	Function	Note
IN	Optical input port	Polarization maintaining fiber 1550 nm, SM-15-P-8/125UV/UV400, Length 1.5 meter. Buffer diameter 900 µm
OUT	Optical output port	Polarization maintaining fiber 1550 nm, SM-15-P-8/125UV/UV400, Length 1.5 meter. Buffer diameter 900 µm
RF	RF input port	Wiltron female V (K in option)
1	Not connected	Not applicable
2	Not used	Not applicable
3	Not used	Not applicable
4	Not used	Not applicable

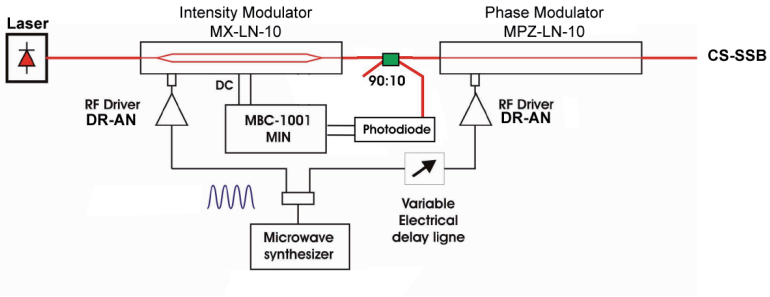
Ordering information

MPZ-LN-40-Y-Z-AB-CD

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

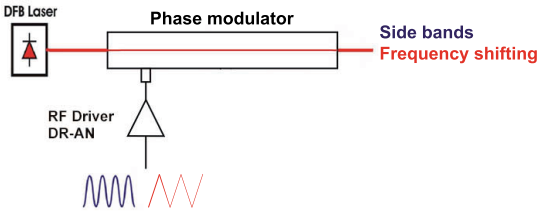
Related equipments & Examples of application

Single Side Band with Carrier Supressed

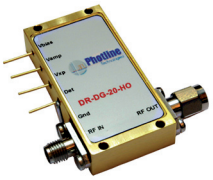


Efficient Single Side Band modulation and Carrier Suppression can be achieved by using a combination of Intensity and Phase modulators properly driven with DR-AN analog RF amplifiers.

Side Bands Generation / Frequency Shifting



DR-AN series amplifiers are high performance analog drivers for MPX-LN and MPZ-LN modulators.



1550 nm ModBoxes are custom designed Modulation Units and Transmitters. They incorporate a complete and dedicated modulation stage with power supply and control electronics and optional laser source and receiver. ModBoxes can be taylored to accomodate a broad variety of applications : pulse generation, pulse picking, spectral broadening, analog modulation, digital communication....

ABOUT US

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company LiNb03 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.

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