MODULATOR

MPX2000 / MPZ2000 series

2 µm band low frequencies to 20 GHz Phase Modulators

The MPX2000, MPZ2000, and MPZ2000 LVP series provide the industry's most comprehensive selection of phase modulators for the 2000 nm wavelength band. These modulators are engineered for efficient electrical to optical conversion and feature intrinsically low Vπ, polarizing optical waveguide, and high optical and RF power handling.



- The MPX2000-LN-0.1 offers a high impedance RF input optimized for modulation from DC up to 300 MHz.
- The MPZ2000-LN-10 is built on proven lithium niobate technology and is well suited for a wide range of classical applications.
- The MPZ2000-LN-10-LVP leverages the LVP platform to deliver a lower Vπ and increased RF input power capability.
- The MPZ2000-LN-10-LVP-POL, the top of the range, combines the advantages of the LVP design with an annealed proton exchange polarizing waveguide, providing the highest optical power handling and overall performance.

Features

- Low insertion loss
- Low Vπ (LVP)
- 2.0 µm specific design

Applications

- LIDAR
- Gas sensing
- Side bands generation
- Spectral Beam Combining (SBC)
- Coherent Beam Combining (CBC)
- Optical Frequency Combs
- Interferometric sensing
- Frequency shifting / broadening
- Pound-Drever-Hall locking (PDH)

Options

- Low Vπ (LVP)
- Low Residual Amplitude modulation
- Space grade version
- High Optical Power input (POL)

Related Equipements

- Matched RF amplifiers
- Coherent Beam Combining ModBox

MPX2000-LN-0.1 - Performance Highlights [1]

Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	2000	2200	nm
Usable electro-optical bandwidth	-	300	-	MHz
Vπ RF @50 kHz	-	4.5	-	V
Insertion loss	-	3.5	-	dB

[1] Specifications given at 25 °C, 2004 nm

MPZ2000-LN-10 - Performance Highlights [1]

Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	2000	2200	nm
Usable electro-optical bandwidth	-	16	-	GHz
Vπ RF @50 kHz	-	6.5	-	V
Insertion loss	-	3	-	dB

[1] Specifications given at 25 °C, 2004 nm

MPZ2000-LN-10-LVP - Performance Highlights [1]

Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	2000	2200	nm
Usable electro-optical bandwidth	-	20	-	GHz
Vπ RF @50 kHz	-	4.5	-	V
Insertion loss	-	2.5	-	dB

[1] Specifications given at 25 °C, 2004 nm

MPZ2000-LN-10-LVP-POL - Performance Highlights [1]

Parameter Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	2000	2200	nm
Usable electro-optical bandwidth	-	20	-	GHz
Vπ RF @50 kHz	-	4.5	-	V
Insertion loss	-	3.5	-	dB

[1] Specifications given at 25 °C, 2004 nm

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MPX2000-LN-0.1

300 MHz Phase Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	-3 dB	100	150	-	MHz
Usable electro-optical bandwidth	S_{21}	-	-	300	-	MHz
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	-	-	4.5	6	V
RF input impedance	Z_{in-RF}	-	-	10	-	kΩ

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1900	2000	2200	nm
Insertion loss	IL	Without optical connectors [1]	-	3.5	5	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 2004 nm, unless differently specified.

[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

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

MPZ2000-LN-10

16 GHz Phase Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	-3 dB, from 2 GHz	10	12	-	GHz
Usable electro-optical bandwidth	S_{21}	-	-	16	-	GHz
Ripple S_{21}	**ΔS_{21}**	**-**	**-**	**0.5**	**1**	**dB**
Electrical return loss	S_{11}	-	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	-	-	6.5	7.5	V
Impedance matching	Z_{in-RF}	-	-	50	-	Ω

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate Z-Cut X-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1900	2000	2200	nm
Insertion loss	IL	Without optical connectors [1]	-	3	4	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 2004 nm, unless differently specified.

[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

Absolute Maximum Ratings

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

MPZ2000-LN-10-LVP

20 GHz Phase Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	-3 dB, from 2 GHz	10	12	-	GHz
Usable electro-optical bandwidth	S_{21}	-	-	20	-	GHz
Ripple S_{21}	**ΔS_{21}**	**-**	**-**	**0.5**	**1**	**dB**
Electrical return loss	S_{11}	-	-	-13	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	LVP design, housing #B	-	4.5	5	V
Vπ RF @10 GHz	$V\pi_{RF\ 10\ GHz}$	LVP design, housing #B	-	5.5	-	V
Impedance matching	Z_{in-RF}	-	-	50	-	Ω

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate Z-Cut X-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1900	2000	2200	nm
Insertion loss	IL	Without optical connectors [1]	-	2.5	4	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 2004 nm, unless differently specified.
[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

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 High Electrical Power input	HEP_{in}	-	33	dBm
Optical Power input	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C
Vibration	Vib	MIL-STD-883K method 2007.3 - Test condition B		
Mechanical shock	Shock	MIL-STD-883K method 2002.5 - Test condition B		

MPZ2000-LN-10-LVP-POL

20 GHz Phase Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	-3 dB, from 2 GHz	10	12	-	GHz
Usable electro-optical bandwidth	S_{21}	-	-	20	-	GHz
Ripple S_{21}	ΔS_{21}	-	-	0.5	1	dB
Electrical return loss	S_{11}	-	-	-13	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	LVP design, housing #B	-	4.5	5.5	V
Vπ RF @10 GHz	$V\pi_{RF\ 10\ GHz}$	LVP design, housing #B	-	5.5	-	V
Impedance matching	Z_{in-RF}	-	-	50	-	Ω

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate Z-Cut X-Prop			
Waveguide process	-	-	Proton exchange			
Operating wavelength	λ	-	1900	2000	2200	nm
Insertion loss	IL	Without optical connectors [1]	-	3.5	4.5	dB
Polarization Extinction Ratio	PER	Without optical connectors	25	30	-	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 2004 nm, unless differently specified.
[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

Absolute Maximum Ratings

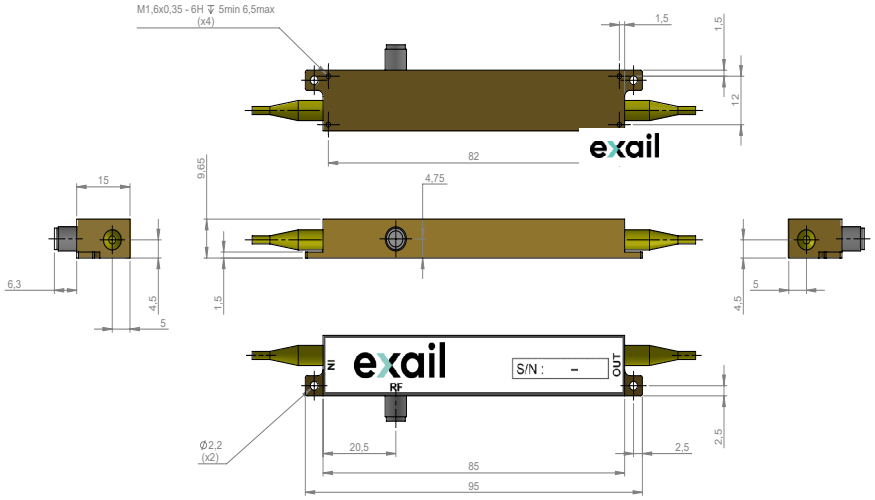
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Parameter	Symbol	Min	Max	Unit
RF High Electrical Power input	HEP_{in}	-	33	dBm
High Optical Power input	HOP_{in}	-	27	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C
Vibration	Vib	MIL-STD-883K method 2007.3 - Test condition B		
Mechanical shock	Shock	MIL-STD-883K method 2002.5 - Test condition B		

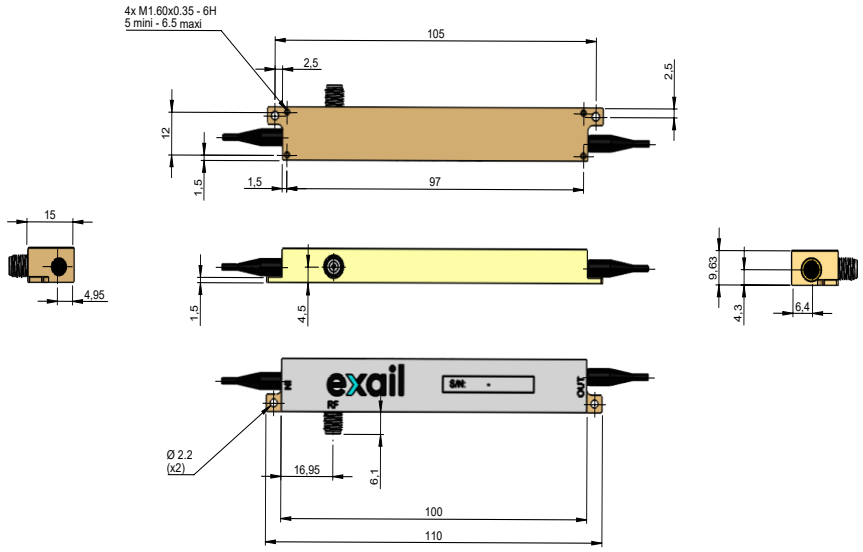
Mechanical Diagram and Pinout

All measurements in mm

Housing #A: Standard Modulator housing

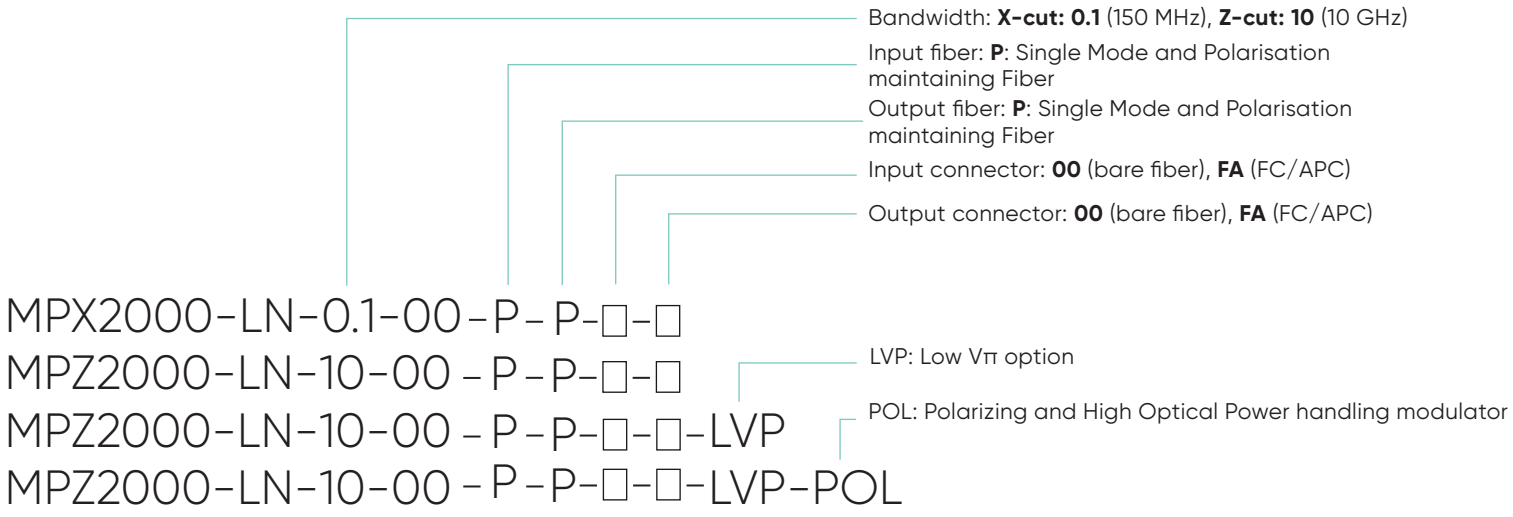


Housing #B: Modulator housing for the MPZ2000-LN-10-LVP & LVP-POL



Port	Function	Note
IN	Optical input port	2000 nm Polarization maintaining fiber EXAIL IXF-PMF-1950-125-P-021
OUT	Optical output port	2000 nm Polarization maintaining fiber EXAIL IXF-PMF-1950-125-P-021
RF	RF input port	Female K (SMA comptatible)

Ordering Information



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