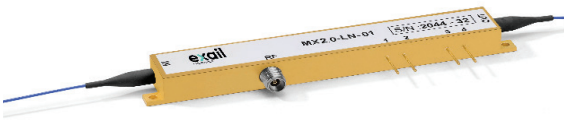
MODULATOR

MX2000-LN series

2 µm band 1 GHz & 10 GHz Intensity Modulators

The MX2000-LN series are intensity modulators especially designed for operations in the 2.0 µm wavelength band at frequencies up to 10 GHz and above.

These Mach-Zehnder modulators offer engineers working at 2.0 µm the intrinsic and unparalleled benefits of $LiNbO_3$ external modulation: high bandwidth, high contrast, ease of use.



The MX2000-LN series are based on a X-cut design that confers them an unparalleled stability. They incorporate 2.0 µm specific waveguide and are pigtailed with 2.0 µm polarization maintaining fibers. applications.

Benefits & Features

- Low insertion loss
- Low Vπ
- 2.0 µm specific design

Applications

- LIDAR
- Gas sensing
- Mid-IR wavelength generation
- Spectroscopy
- Seed source
- Research & development

Options

- 20 GHz version
- Hermetic sealing

Related Equipments

- Choice of RF drivers
- 2.0 µm band Phase modulators
- MBC-DG Automatic Bias Controller

MX2000-LN-01 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	-	2200	nm
Insertion loss	-	4	-	dB
Electro-optical bandwidth	1	2	-	GHz
Vπ RF @50 kHz	-	5.5	-	V

Specifications given at 25 °C, 50 Ω, 2050 nm Specifications given at 25 °C, 50 Ω, 2050 nm

MX2000-LN-10 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1900	-	2200	nm
Insertion loss	-	4	-	dB
Electro-optical bandwidth	10	12	-	GHz
Vπ RF @50 kHz	-	9.5	-	V

Specifications given at 25 °C, 50 Ω, 2050 nm

MX2000-LN-01

1 GHz Intensity Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	RF electrodes, from 500 MHz	1	2	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes, f < 2 GHz	-	0.5	1	dB
Electrical return loss	S_{11}	RF electrodes, f < 2 GHz	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	RF electrodes	-	5.5	6.5	V
Vπ DC electrodes	$V\pi_{DC}$	DC electrodes	-	11.5	13	V
RF input impedance	Z_{in-RF}	-	-	50	-	Ω
DC input impedance	Z_{in-DC}	-	-	1	-	MΩ

50 Ω RF input

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Operating wavelength	λ	-	1900	2050	2200	nm
Insertion loss	IL	Without connectors*	-	4	5.5	dB
DC Extinction ratio	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	-

All specifications given at 25 °C, 2050 nm, unless differently specified.

(*) 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 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

MX2000-LN-10

10 GHz Intensity Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	RF electrodes, from 2 GHz	10	12	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes, f < 2 GHz	-	0.5	1	dB
Electrical return loss	S_{11}	RF electrodes, f < 10 GHz	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	RF electrodes	-	9.5	11	V
Vπ DC electrodes	$V\pi_{DC}$	DC electrodes	-	11	13	V
RF input impedance	Z_{in-RF}	-	-	50	-	Ω
DC input impedance	Z_{in-DC}	-	-	1	-	MΩ

50 Ω RF input

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-		Lithium Niobate X-Cut Y-Prop		
Operating wavelength	λ	-	1900	2050	2200	nm
Insertion loss	IL	Without connectors*	-	4	5.5	dB
DC Extinction ratio	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	-

All specifications given at 25 °C, 2050 nm, unless differently specified.

(*) Consider an extra-loss up to 0.25 dB for each FC/APC optical connector.

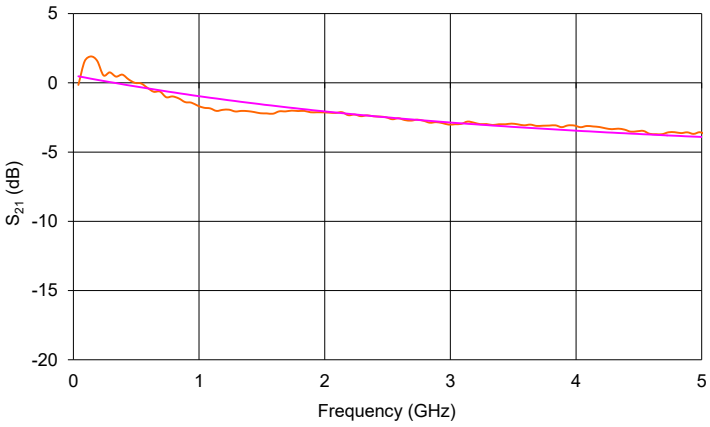
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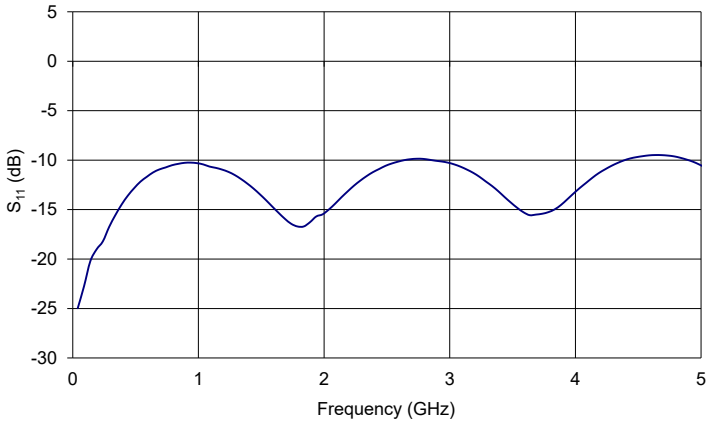
Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm
Bias Voltage	V_{bias}	-20	+20	V
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

MX2000-LN-01 & 10

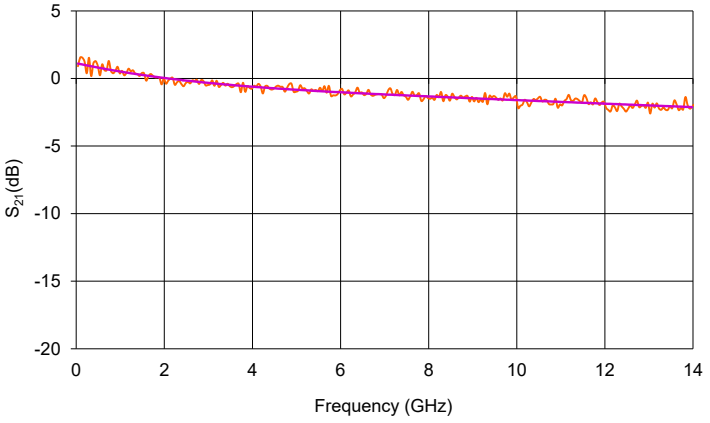
MX2000-LN-01 Typical S_{21} Curve



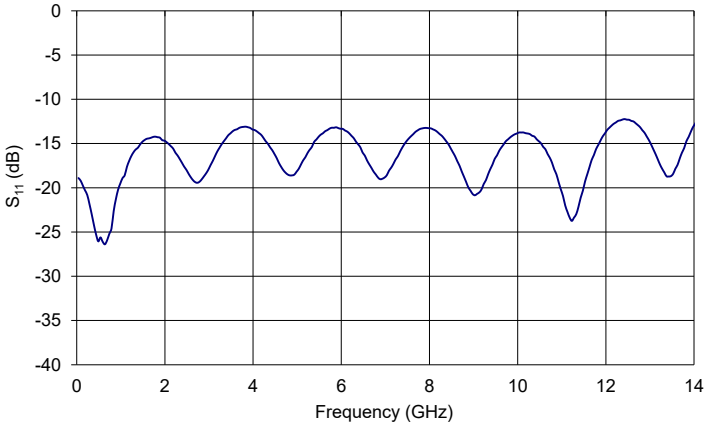
MX2000-LN-01 Typical S_{11} Curve



MX2000-LN-10 Typical S_{21} Curve

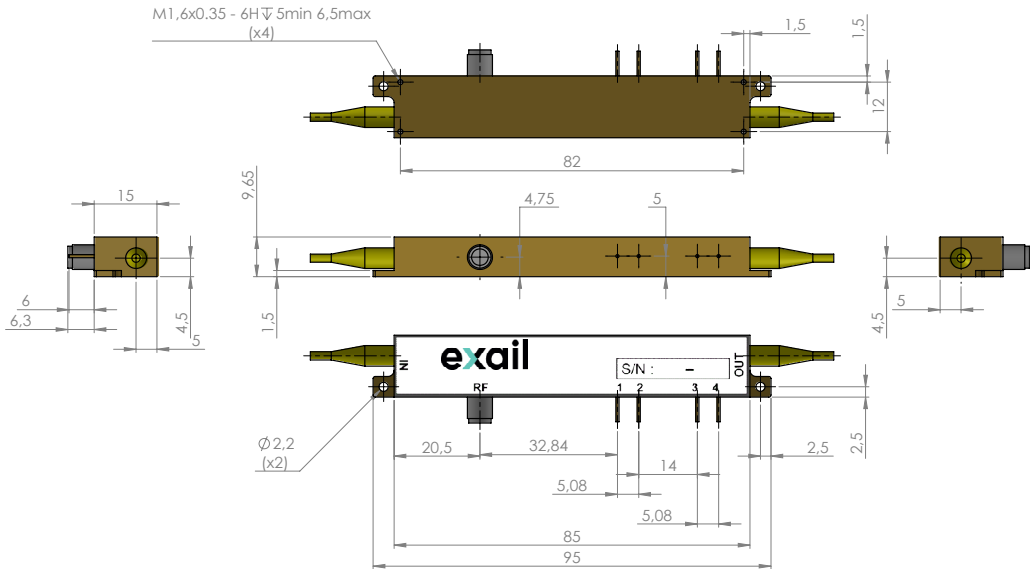


MX2000-LN-10 Typical S_{11} Curve



Mechanical Diagram and Pinout

All measurements in mm



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)
1	Ground	Pin feed through diameter 1.0 mm
2	DC	Pin feed through diameter 1.0 mm
3, 4	Photodiode cathode, anode	Pin feed through diameter 1.0 mm

Ordering Information

MX2000-LN -□-□-□-□-□

- Bandwidth : **01** (1 GHz), **10** (10 GHz)
- Input fiber: P Polarization maintaining
- Output fiber: P Polarization maintaining
- Input connector: **00** (bare fiber), **FA** (FC/APC), **FC** (FC/SPC)
- Output connector: **00** (bare fiber), **FA** (FC/APC), **FC** (FC/SPC)

Note: optical connectors are Senko with narrow key or equivalent

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