MODULATOR

MXAN-LN series

1550 nm band Analog Intensity Modulators

The MXAN-LN series are high bandwidth intensity modulators specially designed for the transmission of analog signals over optical fibers.

The MXAN-LN's performance parameters meet the requirement of the most demanding analog transmission links for military and civil applications: the x-cut design offers an unmatched stability, the low insertion loss optimizes links gain and the high linearity preserves the signal quality. They are specially suitable for microwave links and remoted antennas.

Features

- High linearity
- Bandwidth 10 GHz, 20 GHz, 40 GHz
- High stability
- Low insertion loss
- Operation in C and L bands

Applications

- RoF
- Antenna remoting
- Microwave and radar links
- Space and defence systems

Options

- 1300 nm, 1000 nm, 800 nm versions
- Hermetic sealing
- Space qualified

Related Equipments

- DR-AN RF amplifiers
- MBC ditherless Bias Controllers
- Turn-key ModBox systems

MXAN-LN-10 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1625	nm
Insertion loss	-	3.5	-	dB
Insertion loss (with low IL option)	-	2.7	3	dB
Electro-optical bandwidth	10	12	-	GHz
Vπ RF @50 kHz	-	5.5	-	V

Specifications given at 25 °C, 50 Ω, 1550 nm

MXAN-LN-20 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1625	nm
Insertion loss	-	3.5	-	dB
Electro-optical bandwidth	20	25	-	GHz
Vπ RF @50 kHz	-	5	-	V
2nd Harmonic suppression ratio	-	60	-	dB

Specifications given at 25 °C, 50 Ω, 1550 nm

MXAN-LN-40 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1625	nm
Insertion loss	-	3.5	-	dB
Usable EO bandwidth	-	40	50	GHz
Vπ RF @50 kHz	-	5	-	V
2nd Harmonic suppression ratio	-	60	-	dB

Specifications given at 25 °C, 50 Ω, 1550 nm

Ordering Information:

XSoptix
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Guilford, CT 06437
Ph: 203-401-8093
Email orders to: sales@xsoptix.com
Fax orders to: 800-878-7282

MXAN-LN-10

10 GHz Analog 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 < 10 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	-	5.5	6	V
Vπ RF @10 GHz	$V\pi_{RF\ 10\ GHz}$	RF electrodes	-	6.5	7	V
Vπ DC electrodes	$V\pi_{DC}$	DC electrodes	-	6.5	7	V
2nd Harmonic suppression ratio	$H_1 - H_2$	Measured @5 GHz	-	70	-	dB
Input 3rd order intercept	IIP3	Measured @5 GHz	28	30	-	dBm
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	-	1530	1550	1625	nm
Insertion loss	IL	Without optical connectors*	-	3.5	4.5	dB
Insertion loss (with low IL option)	LIL	Without optical connectors*	-	2.7	3	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, 1550 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

MXAN-LN-20

20 GHz Analog Intensity Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	RF electrodes, from 2 GHz	20	25	-	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes, f < 20 GHz	-	0.5	1	dB
Electrical return loss	S_{11}	RF electrodes, f < 20 GHz	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	RF electrodes	-	5	5.5	V
Vπ RF @20 GHz	$V\pi_{RF\ 20\ GHz}$	RF electrodes	-	7	8	V
Vπ DC electrodes	$V\pi_{DC}$	DC electrodes	-	6.5	7	V
2nd Harmonic suppression ratio	$H_1 - H_2$	Measured @5 GHz, RF_{IN} = 0 dBm	-	60	-	dB
Input 3rd order intercept	IIP3	Measured @5 GHz	28	30	-	dBm
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	-	1530	1550	1625	nm
Insertion loss	IL	Without optical connectors*	-	3.5	4.5	dB
DC Extinction ratio	ER	Measured with narrow source linewidth < 200 MHz	20	25	-	dB
Optical return loss	ORL	-	-40	-45	-	dB
Chirp	α	-	-0.1	0	0.1	-

All specifications given at 25 °C, 1550 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

MXAN-LN-40

40 GHz Analog Intensity Modulator

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	RF electrodes, from 2 GHz	28	30	-	GHz
Usable EO bandwidth	S_{21}	RF electrodes, from 2 GHz	-	40	50	GHz
Ripple S_{21}	ΔS_{21}	RF electrodes, f < 30 GHz	-	0.5	1	dB
Electrical return loss	S_{11}	RF electrodes, f < 30 GHz	-	-12	-10	dB
Vπ RF @50 kHz	$V\pi_{RF\ 50\ kHz}$	RF electrodes	-	5	6	V
Vπ RF @20 GHz	$V\pi_{RF\ 20\ GHz}$	RF electrodes	-	7	8	V
Vπ DC electrodes	$V\pi_{DC}$	DC electrodes	-	6.5	7	V
2nd Harmonic suppression ratio	$H_1 - H_2$	Measured @5 GHz, RF_{IN} = 0 dBm	-	60	-	dB
Input 3rd order intercept	IIP3	Measured @5 GHz	28	30	-	dBm
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	-	1530	1550	1625	nm
Insertion loss	IL	Without optical connectors*	-	3.5	4.5	dB
DC Extinction ratio	ER	Measured with narrow source linewidth < 200 MHz	20	25	-	dB
Optical return loss	ORL	-	-40	-45	-	dB
Chirp	α	-	-0.1	0	0.1	-

All specifications given at 25 °C, 1550 nm, unless differently specified.
(*) Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

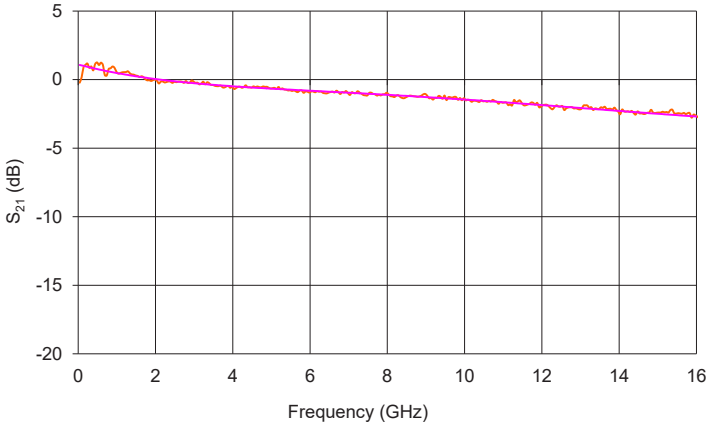
Absolute Maximum Ratings

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.

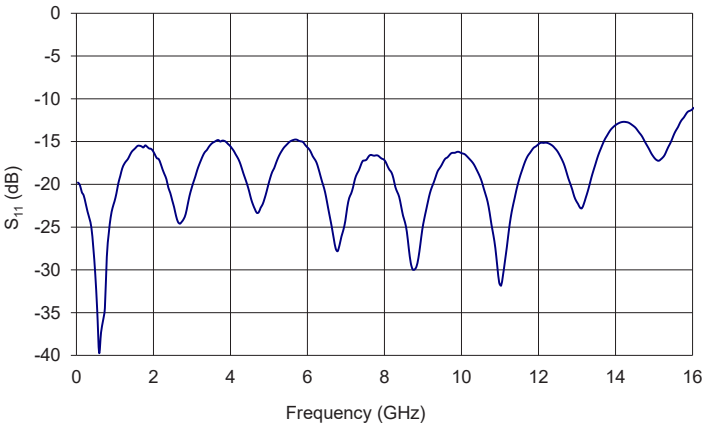
Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm
Bias Voltage	V_{bias}	-20	+20	V
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

MXAN-LN-10, 20 & 40

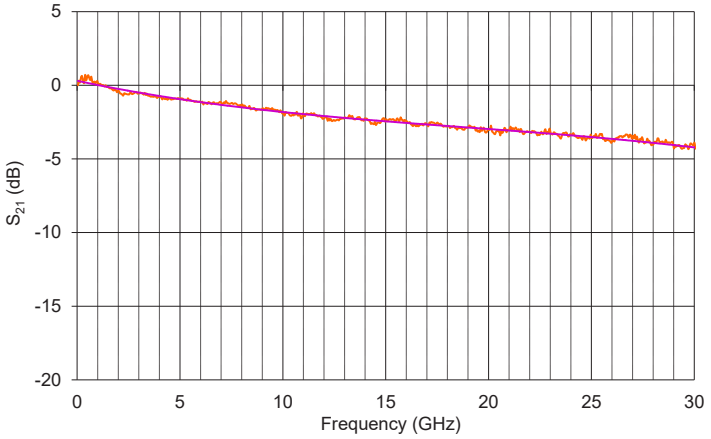
MXAN-LN-10 Typical S_{21} Curve



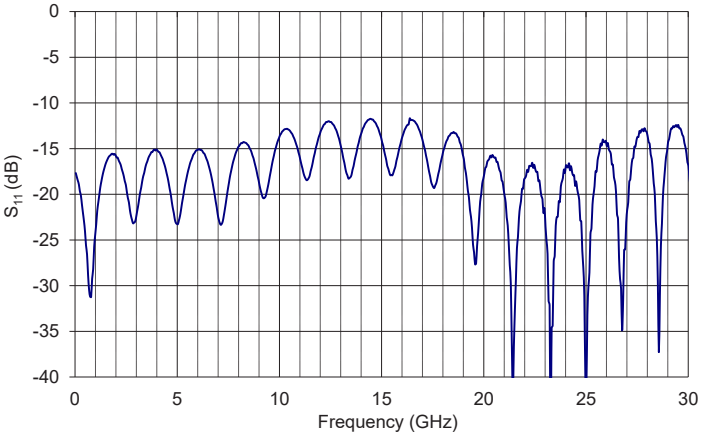
MXAN-LN-10 Typical S_{11} Curve



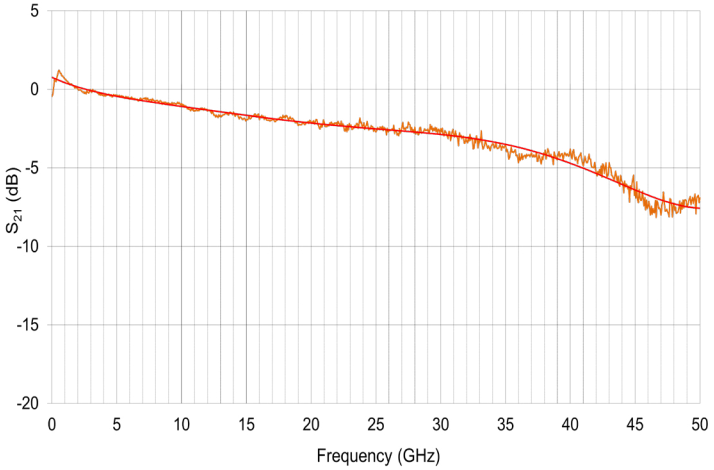
MXAN-LN-20 Typical S_{21} Curve



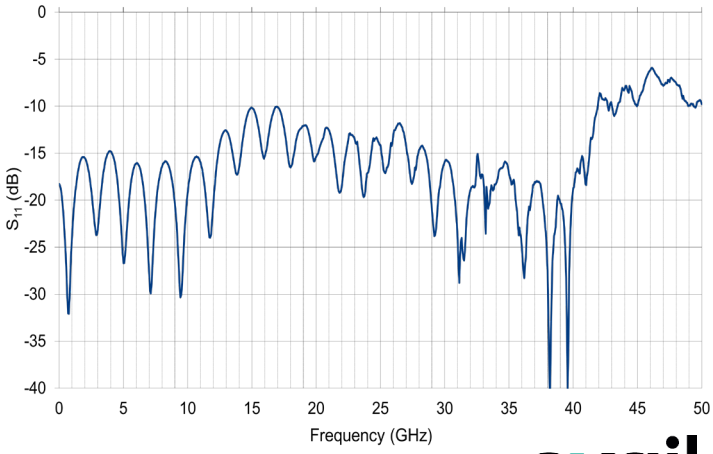
MXAN-LN-20 Typical S_{11} Curve



MXAN-LN-40 Typical S_{21} Curve

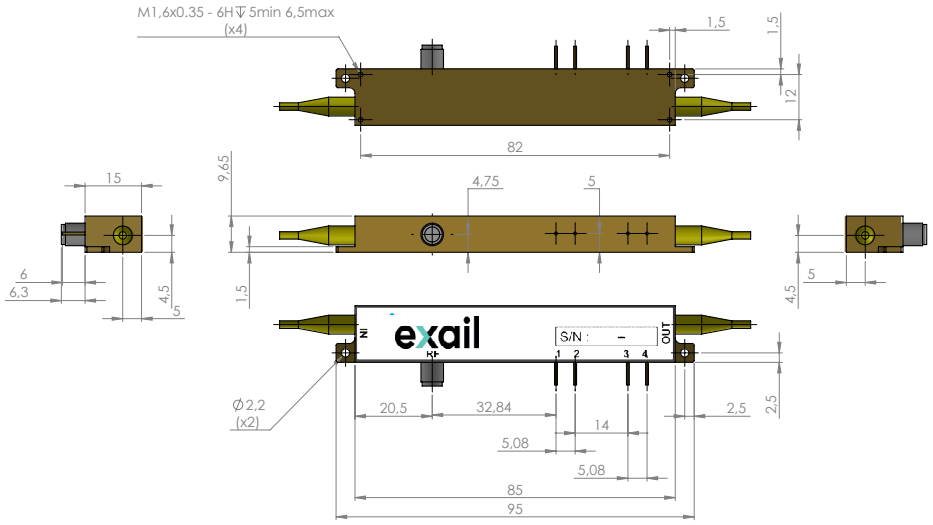


MXAN-LN-40 Typical S_{11} Curve



Mechanical Diagram and Pinout

All measurements in mm



Port	Function	Note
IN	Optical input port	Polarization maintaining fiber Corning PM 15-U25D Length: 1.5 meter, buffer diameter: 900 µm
OUT	Optical output port	Polarization maintaining fiber Corning PM 15-U25D Length: 1.5 meter, buffer diameter: 900 µm
RF	RF input port	MXAN-LN-10: Female K (SMA comptatible) MXAN-LN-20: Female K or 2.4 mm (optional) MXAN-LN-40: 2.4 mm, female, comptatible to mate with V / 1.85 mm connectors (K option)
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

MXAN-LN-□-□-□-□-□-□-□

- Bandwidth : **10** (10 GHz), **20** (20 GHz), **40** (40 GHz)
- Internal photodiode: "PD": integrated, "00": not integrated (by default)
- Input fiber: P Polarization maintaining
- Output fiber: P Polarization maintaining, S Standard single mode
- Input connector: 00 (bare fiber), FA (FC/APC), FC (FC/SPC)
- Output connector: 00 (bare fiber), FA (FC/APC), FC (FC/SPC)
- LIL: Low Insertion Loss option

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

About us

Exail Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate ($LiNbO_3$) modulators and RF electronic modules.
Exail 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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