

# Thin-film Lithium Niobate Intensity Modulator

## 1. Description

Lithium niobate on insulation (LNOI) materials inherit the excellent electro-optical properties of bulk lithium niobate materials, offering a new solution for integratable, small-sized, highly modulation-efficient lithium niobate modulator chips. We have developed a broadband, low half-wave voltage thin-film  $\text{LiNbO}_3$  electro-optical modulator based on LNOI material. Our products have excellent characteristics of high stability, low insertion loss, and small size, which are superior to the traditional bulk material lithium niobate modulator, and have a wide range of applications in the fields of high-speed optical communication and microwave photonics.

## 2. Features

- High Bandwidth
- Low Insertion loss
- Low drive voltage
- Small size
- High stability

## 3. Applications

Wideband optical communications, microwave photonics and radar links, etc.

## 4. Ordering information

Symbol	Description	Optional parameter Code
$\lambda$	Operating Wavelength	C (~1550nm), O (~1310nm), L (~1600nm), R (~1064nm)
<b>BW</b>	Bandwidth(3dB)	20 (20GHz), 40 (40GHz), 60 (60GHz)
<b>PD</b>	Photodetector	1(integration), 0(Not integrated)
<b>IF</b>	Input fiber	P (polarization maintaining)
<b>OF</b>	Output fiber	P (polarization maintaining), S (Standard single mode)
<b>S/LV</b>	Device Characteristics	Standard / Low half-wave voltage

## 5. Product specification

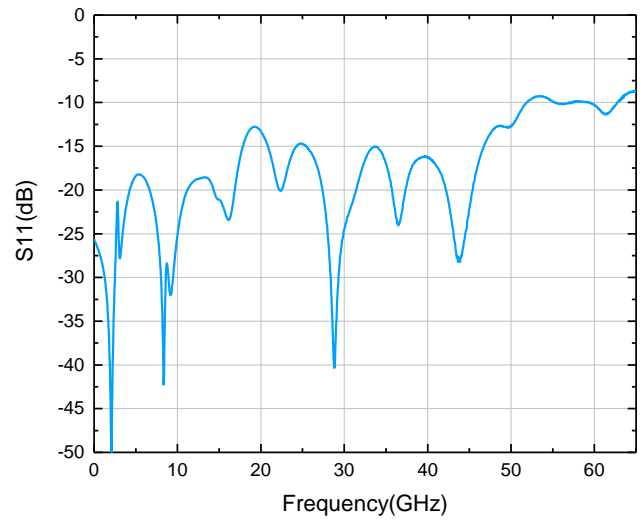
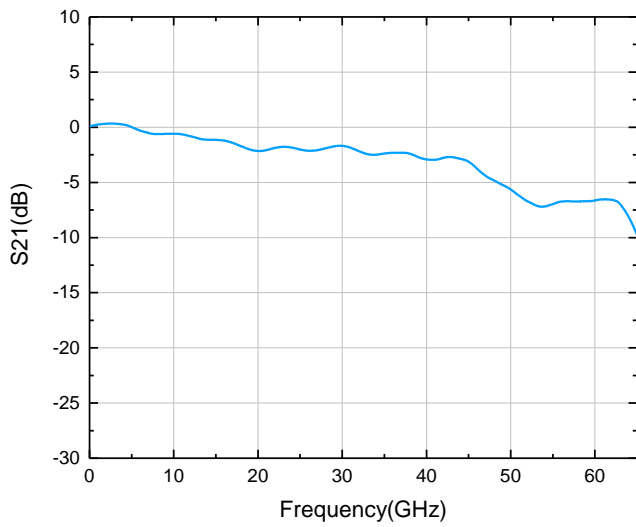
Category	Parameters	Symbol	Performance	Unit
Optical Features	Operating Wavelength	$\lambda$	1530~1565	nm
	Optical Insertion Loss	IL	$\leq 4$	dB
	Optical Extinction Ratio(*)	ER	$\geq 20$	dB
	Optical Return Loss	RL	$\leq -26$	dB
	Optical Input Power	$P_{in}$	$\leq 200$	mW
Electrical Features	Bandwidth (3dB)	BW	20/40/60	GHz
	RF Half-wave Voltage@1GHz	$V_{\pi}$	$\leq 3$	V
	RF Return Loss	$S_{11}$	$\leq -10$	dB
	RF Input Power	$S_{in}$	$\leq 23$	dBm

	Heater Bias Half-wave Power	$P_{\pi}$	50	mW
	Heater Bias Voltage	$U_{heater}$	< 8	V
Work Condition	Operating Temperature	$T_o$	-20~50	°C
	Storage Temperature	$T_s$	-40~80	°C

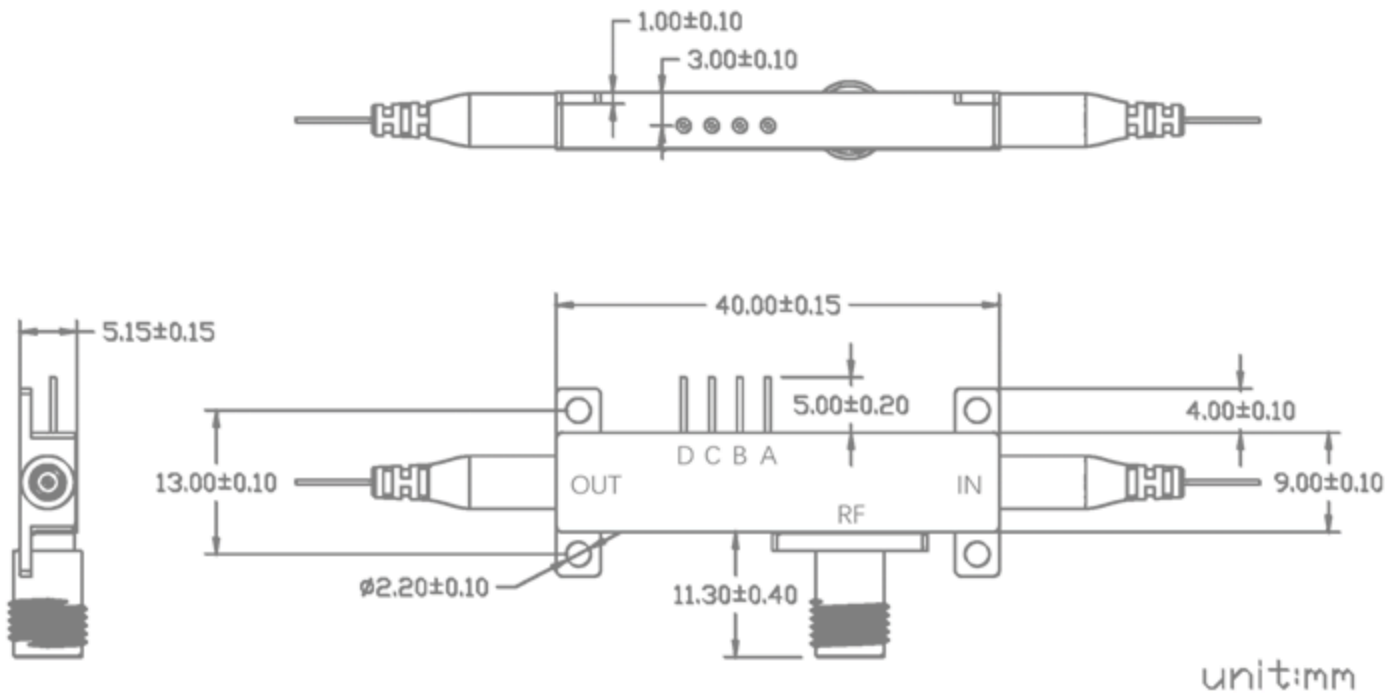
\* Higher ER ( $\geq 28$  dB) is available for customization.

Category	Parameters	Symbol	Performance	Unit
Optical Features	Operating Wavelength	$\lambda$	1530~1565	nm
	Optical Insertion Loss	IL	$\leq 4.5$	dB
	Optical Extinction Ratio	ER	$\geq 20$	dB
	Optical Return Loss	RL	$\leq -26$	dB
	Optical Input Power	$P_{in}$	$\leq 200$	mW
Electrical Features	Bandwidth (3dB)	BW	20	GHz
	RF Half-wave Voltage@1GHz	$V_{\pi}$	$\leq 1.5$	V
	RF Return Loss	$S_{11}$	$\leq -10$	dB
	RF Input Power	$S_{in}$	$\leq 23$	dBm
	Heater Bias Half-wave Power	$P_{\pi}$	50	mW
	Heater Bias Voltage	$U_{heater}$	< 8	V
Work Condition	Operating Temperature	OT	-20~50	°C
	Storage Temperature	ST	-40~80	°C

## 6. $S_{21}$ and $S_{11}$ curves (40GHz)



## 7. Package pins and dimensions



Pins:

Pin	Function	Description
IN	Input Fiber	PM 1550 Polarization-maintaining fibers, length 0.6m
OUT	Output Fiber	SM 1550 Standard single mode fiber, length 0.6m

RF	RF Input Port	1.85mm female
A	DC Pin A	Heater bias electrode, anode
B	DC Pin B	Heater bias electrode, cathode
C	DC Pin C	Spare Heater bias electrode, anode
D	DC Pin D	Spare Heater bias electrode, cathode