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 $LiNbO_3$ 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

Long-distance coherent communication, microwave photonics, etc.

4. Ordering information

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

5. Product specification

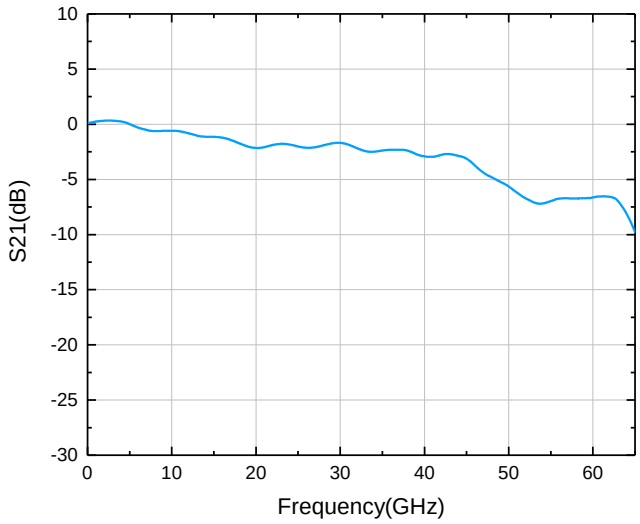
Category	Parameters	Symbol	Performance	Unit
Optical Features	Operating Wavelength	λ	1530~1565	nm
	Optical Insertion Loss	IL	≤ 4.5	dB
	Optical Extinction Ratio(*)	ER	≥ 20	dB
	Optical Return Loss	RL	≤ -26	dB
	Optical Input Power	P_{in}	≤ 200	mW
Electrical Features	Bandwidth (3dB)	BW	20/40/60	GHz
	RF Half-wave Voltage@1GHz	V_{π}	≤ 3	V
	RF Return Loss	S_{11}	≤ -10	dB
	RF Input Power	S_{in}	≤ 23	dBm

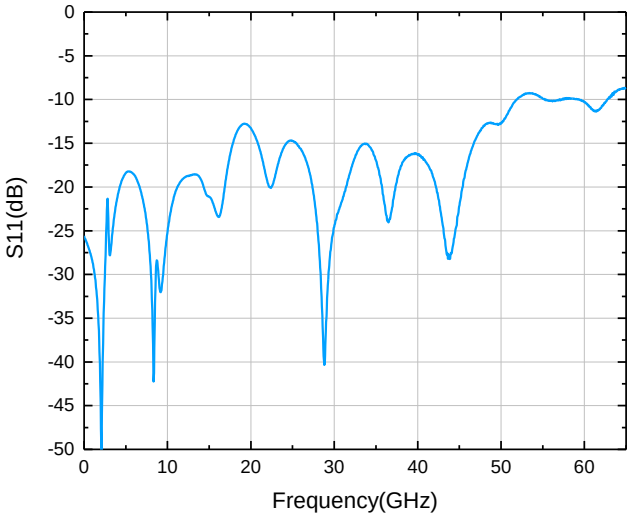
	Heater Bias Half-wave Power	P_{π}	50	mW
	Heater Bias Voltage	U_{heater}	< 8	V
Work Condition	Operating Temperature	T_O	-20~50	℃
	Storage Temperature	T_S	-40~80	℃

* Higher ER (≥28 dB) is available for customization.

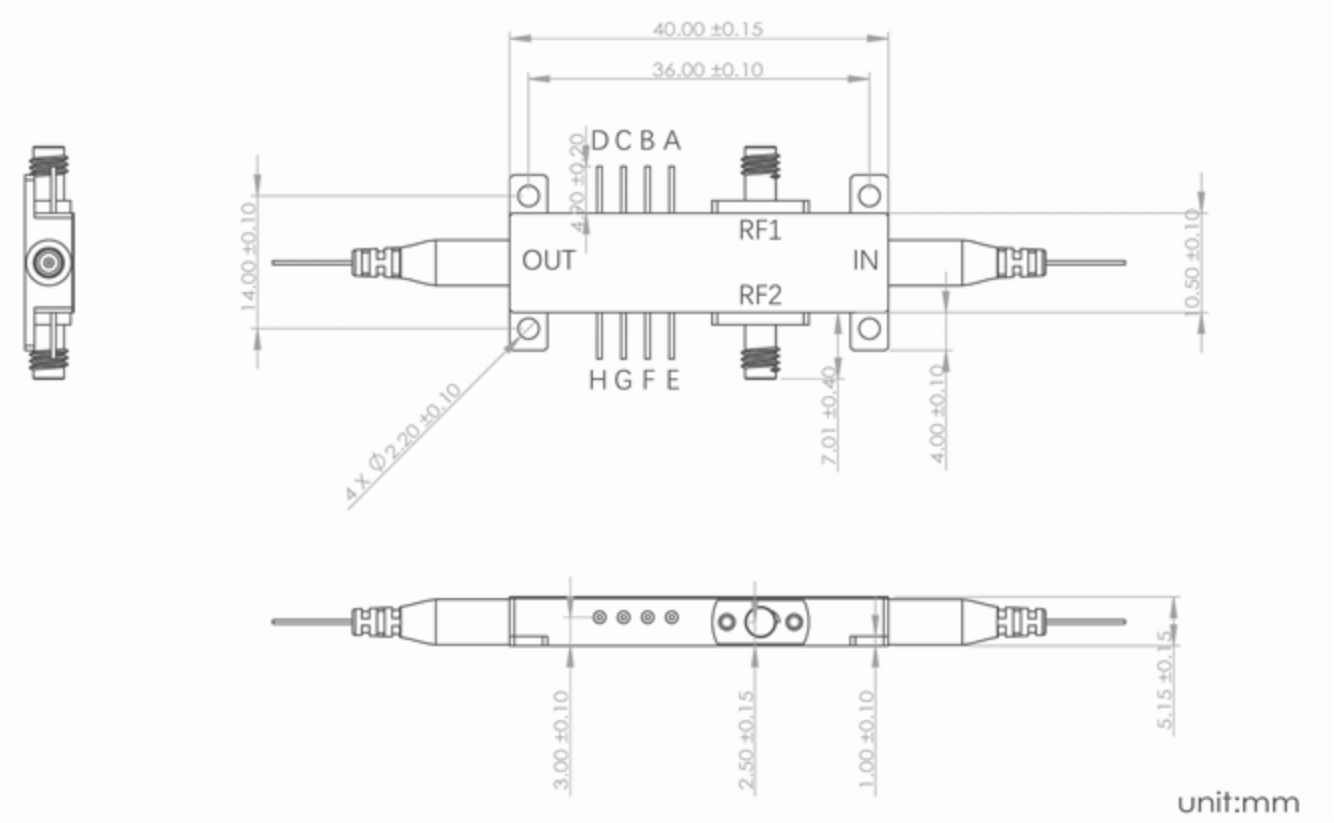
Category	Parameters	Symbol	Performance	Unit
Optical Features	Operating Wavelength	λ	1530~1565	nm
	Optical Insertion Loss	IL	≤ 5	dB
	Optical Extinction Ratio	ER	≥ 20	dB
	Optical Return Loss	RL	≤ -26	dB
	Optical Input Power	P_{in}	≤ 200	mW
Electrical Features	Bandwidth (3dB)	BW	20	GHz
	RF Half-wave Voltage@1GHz	V_{π}	≤ 1.5	V
	RF Return Loss	S_{11}	≤ -10	dB
	RF Input Power	S_{in}	≤ 23	dBm
	Heater Bias Half-wave Power	P_{π}	50	mW
	Heater Bias Voltage	U_{heater}	< 8	V
Work Condition	Operating Temperature	OT	-20~50	℃
	Storage Temperature	ST	-40~80	℃

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
RF1/2	RF1/2 Input Port	1.85mm female
A	DC Pin A	Heater bias electrode, anode (I branch)
B	DC Pin B	Heater bias electrode, cathode (I branch)
C	DC Pin C	Heater bias electrode, anode (Main MZM)
D	DC Pin D	Heater bias electrode, cathode (Main MZM)
E	DC Pin E	Heater bias electrode, anode (Q branch)
F	DC Pin F	Heater bias electrode, cathode (Qbranch)
G	DC Pin G	Spare Heater bias electrode, anode (Main MZM)
H	DC Pin H	Spare Heater bias electrode, cathode (Main MZM)