OE-EOM-FPM Series Phase Modulator

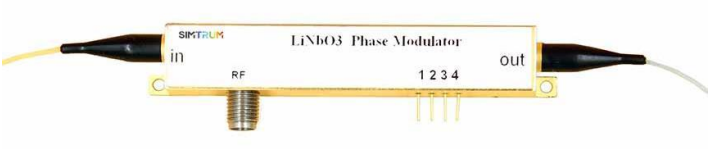
Description

The $LiNbO_3$ phase modulator is widely used in high-speed optical communication systems, laser sensing and ROF systems because of the well electro-optic effect. The FPM series based on Ti-diffused and APE technology has stable physical and chemical characteristics that can meet the requirements of most applications in laboratory experiments and industrial systems.

● **Bandwidth:** 300MHz ,10GHz, 20G, 40G ● **Wavelength:** 780nm, 850nm,1060nm,1310nm,1550nm

Features

- Low insertion loss
- Polarization-maintaining
- Low half-wave voltage
- Dual-polarization option



Applications

- Optical communication
- Quantum key distribution
- Frequency shifting

Low bandwidth: DC-300MHz

FPM Series	FPM- 10-300M	FPM- 15-300M
Operating wavelength	1030~1100nm	1530~1565nm
3dB Bandwidth	DC~300MHz	DC~300MHz
Insertion Loss	< 3dB	< 3.5dB
V_{π} @RF (50KHz)	< 3V	< 4V

High bandwidth: ~10 / 20 / 40GHz

FPM Series	FPM-07	FPM-08	FPM-10	FPM-13	FPM-15
Operating wavelength	780nm	850nm	1064nm	1310nm	1550nm
3dB Bandwidth	~10GHz	~10GHz	~10GHz	~10GHz	~10/20/40GHz
Insertion Loss	< 3.5 dB	< 3.5 dB	< 3.5dB	< 3.5dB	< 3.5dB
PER	> 20dB	> 20dB	> 20dB	> 20dB	> 20dB
V_{π} @RF (50KHz)	< 3V	< 3V	< 2.0V / <4.0V	< 3V	< 4V

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Ordering information

PM	15	10G	XX	XX
Type: PM---Phase Modulator	Wavelength: 07---780nm 08---850nm 10--- 1060nm 13--- 1310nm 15--- 1550nm	Bandwidth： 300M---300MHz 10G--- 10GHz 20G---20GHz 40G---40GHz	In-Out Fiber type: PP---PM/PM PS---PM/SMF SS---SMF/SMF	Optical connector: FA---FC/APC FP---FC/PC SP---Customization

FPM-10-300M

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1030	1060	1100	nm
Insertion loss		IL		2.5	3	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC、FC/APC Or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}		300		MHz
Half-wave voltage @ 50 kHz		V_{Π}		2.5	3	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	1M			Ω
Electrical interface			3 PIN			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			20
Input DC voltage	Uin	V	-20		20
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-15-300M

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1530	1550	1565	nm
Insertion loss		IL		3	3.5	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC、FC/APC Or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}		300		MHz
Half-wave voltage @ 50 kHz		V_{Π}		3.5	4	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	1M			Ω
Electrical interface			3 PIN			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			20
Input DC voltage	Uin	V	-20		20
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-07-10G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	760	780	800	nm
Insertion loss		IL		2.5	3	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		780 nm PM fiber (125/250 μm)			
	Output port		780 nm PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	8	10		GHz
Half-wave voltage @ 50 kHz		V_{Π}		2.5	3	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power@780 nm	$P_{in, Max}$	dBm			13
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-08-10G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	800	850	870	nm
Insertion loss		IL		2.5	3	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		850 nm PM fiber (125/250 μm)			
	Output port		850 nm PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	8	10		GHz
Half-wave voltage @ 50 kHz		V_{Π}		2.5	3	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power@850 nm	$P_{in, Max}$	dBm			13
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-10-02G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1030	1060	1100	nm
Insertion loss		IL		2.5	3	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		980nm PM fiber (125/250 μ m)			
	output port		980nm PM fiber (125/250 μ m)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (- 3 d B)		S_{21}	2	2.5		GHz
Half-wave voltage @ 50 kHz		V_{Π}		1.6	2.0	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			20
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-10-10G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1030	1060	1100	nm
Insertion loss		IL		3	3.5	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		980nm PM fiber (125/250 μm)			
	Output port		980nm PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	10	12		GHz
Half-wave voltage @50 kHz		V_{Π}		3.5	4.0	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

****For the Low Vpi (<2V) version, please contact us.**

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			20
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-13-10G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1290	1310	133	nm
Insertion loss		IL		3.5	4	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	Output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	8	10		GHz
Half-wave voltage @50 kHz		V_{Π}		2.7	3	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			20
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-15-10G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1530	1550	1565	nm
Insertion loss		IL		3	3.5	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	Output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	10	12		GHz
Half-wave voltage @ 50 kHz		V_{Π}		3	3.5	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

****For the Low Vpi (<2.5V) version, please contact us.**

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			17
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

FPM-15-20G

Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1530	1550	1565	nm
Insertion loss		IL		3	3.5	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	Output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	18	20		GHz
Half-wave voltage @ 50 kHz		V_{Π}		3.5	4	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			17
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

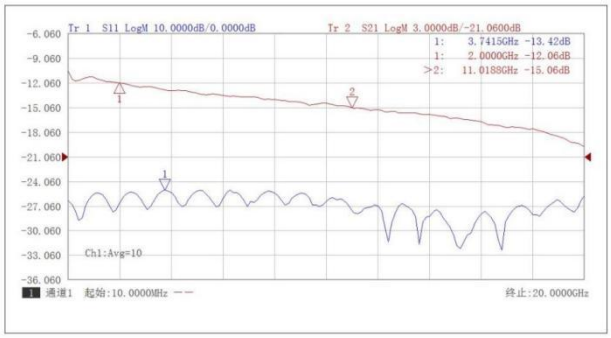
FPM-15-40G

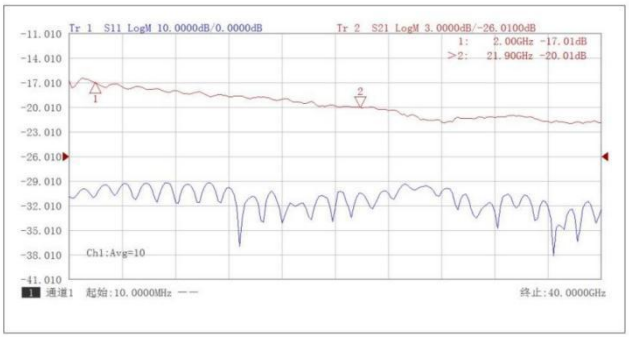
Parameter		Symbol	Min	Typ	Max	Unit
Optical parameters						
Operating wavelength		λ	1530	1550	1565	nm
Insertion loss		IL		3	3.5	dB
Optical return loss		ORL			-45	dB
Polarization extinction ratio		PER	20			dB
Optical fiber	Input port		PM fiber (125/250 μm)			
	Output port		PM fiber (125/250 μm)			
Optical fiber interface			FC/PC, FC/APC or Customization			
Electrical parameters						
Operating bandwidth (-3 dB)		S_{21}	20	25		GHz
Operating bandwidth (-6 dB)		S_{21}		40		GHz
Half-wave voltage @ 50 kHz		V_{Π}		3.5	4	V
Electrical return loss		S_{11}		-12	-10	dB
Input impedance		Z_{RF}	50			Ω
Electrical interface			K(f)			

Limit Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Input optical power	$P_{in, Max}$	dBm			17
Input RF power		dBm			33
Operating temperature	Top	℃	-10		60
Storage temperature	Tst	℃	-40		85
Humidity	RH	%	5		90

S21&S11 Curve

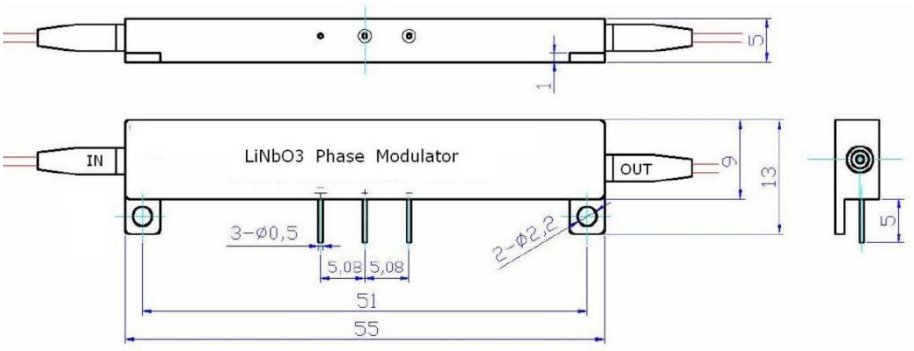




FPM-XX-10G FPM-XX-40G

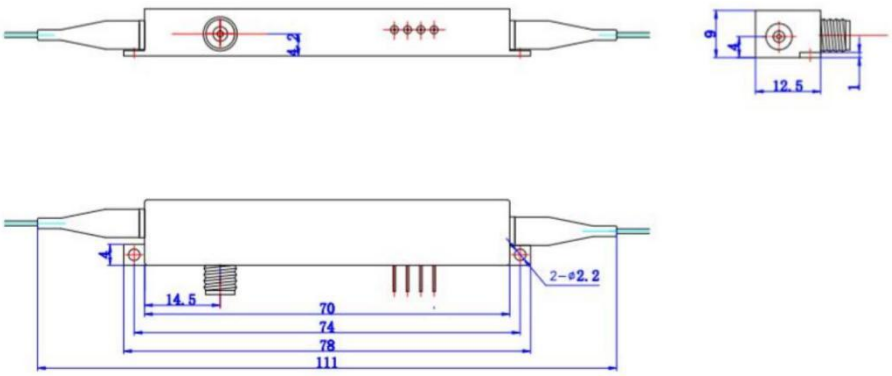
S21&S11 curves of FPM

Mechanical Diagram



DC-300MHz phase modulator

PORT	Symbol	Note
In	Optical input port	PM Fiber and SM Fiber options
Out	Optical output port	PM Fiber and SM Fiber options
DC	Electric input port	3 PIN



High bandwidth (~10 / 20 / 40 GHz) phase modulator

PORT	Symbol	Note
In	Optical input port	PM Fiber and SM Fiber options
Out	Optical output port	PM Fiber and SM Fiber options
RF	RF input port	K(f)
Bias	Bias control port	1,2,3,4-N/C (Bias option)