



FEATURES

- High speed
- Low insertion loss

APPLICATIONS

- Polarization switching
- Polarization scrambling

OPTIONS

- 1300 nm band versions
- Choice of optical connectors
- Hermetic package

RELATED EQUIPMENTS

- DR-AN and DR-DG RF amplifiers

The Photline Technologies PS-LN Polarization Switches are integrated optics waveguide devices that switch the polarization state of an input light between two linear orthogonal output states at frequencies up to 10 GHz.

Practically, the output light is transmitted on either the fast or slow axis of the output polarization maintaining fiber of the component, operating then as a TE to TM converter.

PS-LN-0.1 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1580	nm
Insertion loss	-	3.5	4	dB
Electro-optical bandwidth	100	150	-	MHz
Switching voltage @50 kHz	-	5	-	V

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

PS-LN-10 Performance Highlights

Parameter	Min	Typ	Max	Unit
Operating wavelength	1530	-	1580	nm
Insertion loss	-	2.5	3.5	dB
Electro-optical bandwidth	10	12	-	GHz
Switching voltage @50 kHz	-	7	-	V

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

PS-LN-0.1
 150 MHz Polarization Switch

Electrical Characteristics 50 Ω RF input

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes	100	150	-	MHz
Ripple S21	ΔS_{21}	RF electrodes, $f < 150$ MHz	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes, $f < 150$ MHz	-	-12	-10	dB
Switching voltage @50 kHz	$V_{50\text{ kHz}}$	RF electrodes	-	5	-	V
Switching voltage @150 MHz	$V_{150\text{ MHz}}$	RF electrodes	-	7	-	V
RF input impedance	Z_{in-RF}	-	-	10 000	-	Ω

Optical Characteristics All specifications given at 25°C, 1550 nm, unless differently specified

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Operating wavelength	λ	-	1530	1550	1580	nm
Insertion loss	IL	Without connectors	-	3.5	4	dB
Polarization dependent loss	PDL	-	-	-	1	dB
Polarization extinction ratio	PER	-	18	20	-	dB
Optical return loss	ORL	-	-40	-45	-	dB

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
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

PS-LN-10
 10 GHz Polarization Switch

Electrical Characteristics 50 Ω RF input

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	S_{21}	RF electrodes, from 2 GHz	10	12	-	GHz
Ripple S21	ΔS_{21}	RF electrodes, $f < 10$ GHz	-	0.5	1	dB
Electrical return loss	ES_{11}	RF electrodes, $f < 10$ GHz	-	-12	-10	dB
Switching voltage @50 kHz	$V_{50\text{ kHz}}$	RF electrodes	-	7	-	V
Switching voltage @10 GHz	$V_{10\text{ GHz}}$	RF electrodes	-	10	-	V
RF input impedance	Z_{in-RF}	-	-	40	-	Ω

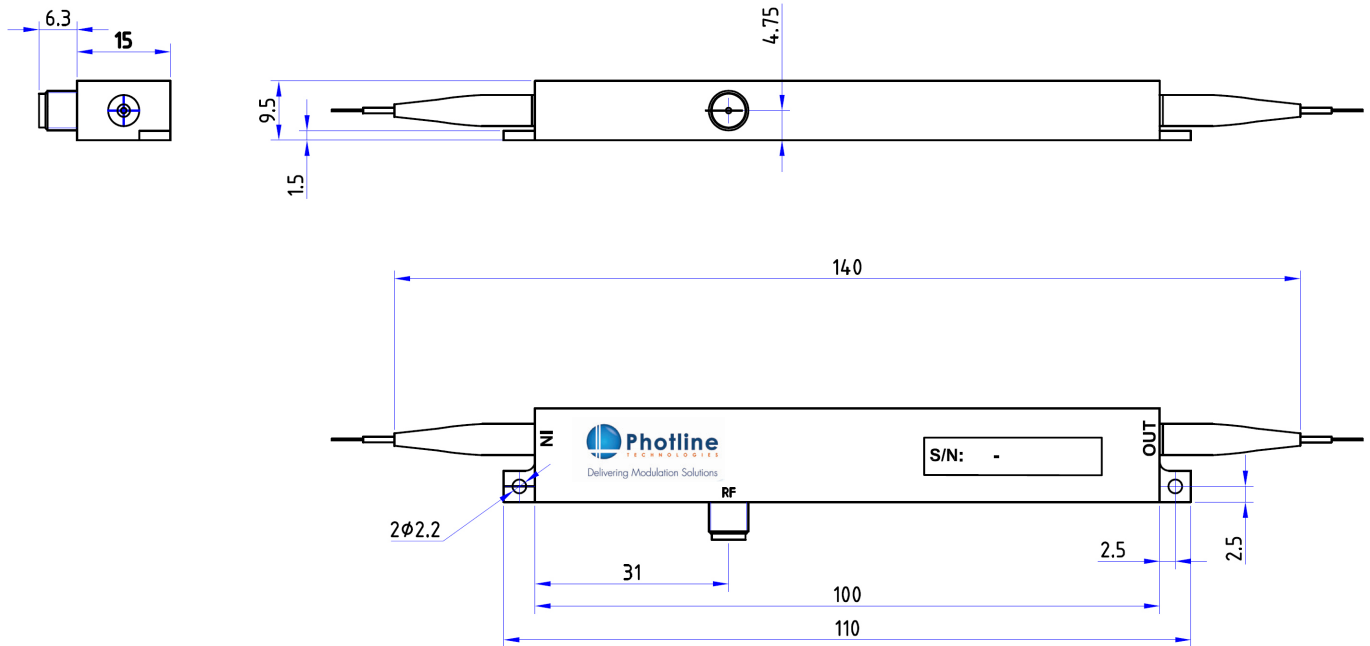
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Mechanical Diagram and pinout All measurements in mm


Port	Function	Note
IN	Optical input port	Polarization maintaining 1550 nm SM-15-P-8/125UV/UV400, length : 1.5 meter, buffer diameter : 900 μ m
OUT	Optical output port	Polarization maintaining 1550 nm SM-15-P-8/125UV/UV400, length : 1.5 meter, buffer diameter : 900 μ m
RF	RF input port	Wiltron female K (SMA compatible)

Ordering information
PS-LN-BW-P-P-AB-CD

BW = Bandwidth : 0.1 150 MHz 10 10 GHz

P = Input fiber : P Polarisation maintaining

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AB = Output connector : 00 bare fiber FA FC/APC FC FC/SPC

CD = Output connector : 00 bare fiber FA FC/APC FC FC/SPC

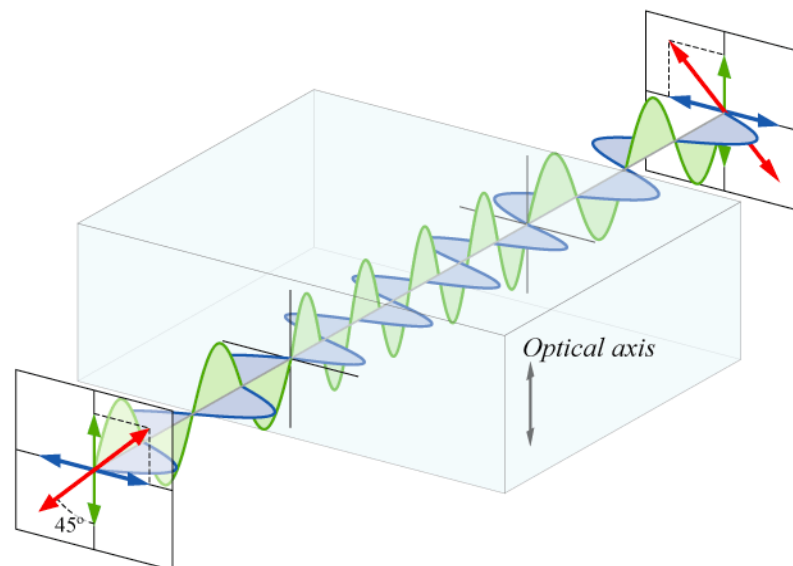
Note : optical connectors are Seikoh-Giken with narrow key or equivalent

Principle

The PS-LN Rotators are based on a birefringent LiNbO_3 phase modulator whose waveguide is illuminated at 45° of its main axis. The input state of polarization (SOP) is thus split up in two orthogonal TE and TM polarization states. When an RF modulation signal is applied via the control electrodes, an optical path difference between the TE and TM components is produced, resulting in a new state of polarization (SOP) for the output light.

The PS-LN acts as a waveplate with user adjustable delay. When a modulation signal with properly selected peak levels is applied to the modulator, the input polarized light is exiting either in an unchanged direction, either rotated by 90° . The two directions are matched with the main axis of the output optical PM fiber and the PS-LN thus operates as a slow/fast axis switch.

Ultimately, the phase modulation signal can be adjusted to provide a highly linear SOP on either axis of the output fiber. This polarization rotation provides an efficient means for high speed Polarization Switching or Polarization Scrambling.



Example of PS-LN acting as a half-wave plate. The linearly polarized light entering the modulator at 45° of the crystal optical axis can be resolved into two waves, parallel (shown as green) and perpendicular (blue). In the LiNbO_3 crystal, the parallel wave propagates slightly slower than the perpendicular one, and the speed is adjusted by the voltage applied to the modulator. At the end side of the crystal, the parallel wave is exactly half of a wavelength delayed relative to the perpendicular wave, and the resulting combination (red) is orthogonally polarized compared to the entrance state.

About us

Photline Technologies is a provider of Fiber Optics Modulation Solutions based on the company LiNbO_3 modulators and high-speed electronics modules. Photline Technologies offers high speed and high data rate modulation solutions for the telecommunication industry and the defense, aerospace, instruments and sensors markets. The products offered by the company include : comprehensive range of intensity and phase modulators (800 nm, 1060 nm, 1300 nm, 1550 nm, 2000 nm), RF drivers and modules, transmitters and modulation units.