



## FEATURES

- 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 PS-LN-0.1 Polarization Switch is integrated optics waveguide device that switch the polarization state of an input light between two linear orthogonal output states at frequencies up to 150 MHz.

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-0.1

150 MHz Polarization Switch

### Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optic bandwidth	$S_{21}$	RF electrodes	100	150	-	MHz
Ripple $S_{21}$	$\Delta S_{21}$	RF electrodes, $f < 150$ MHz	-	0.5	1	dB
Electrical return loss	$S_{11}$	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	-	$\Omega$

 50  $\Omega$  RF input

### Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Operating wavelength	$\lambda$	-	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

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

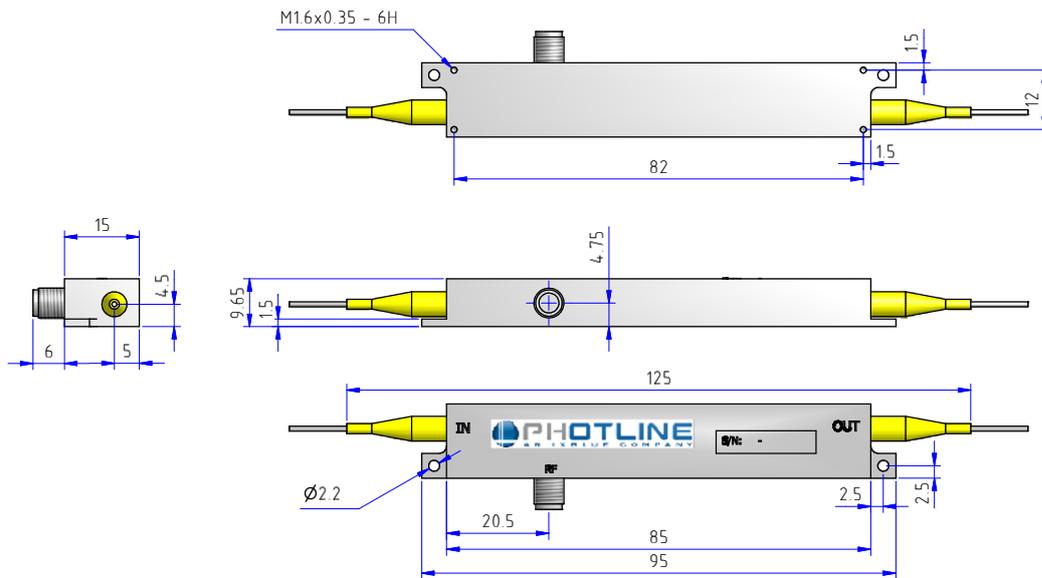
### Absolute Maximum Ratings

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

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

### Ordering information

## PS-LN-0.1-P-P-AB-CD

**P = Input fiber** : P Polarisation maintaining

**P = Output fiber** : P Polarisation maintaining

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

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

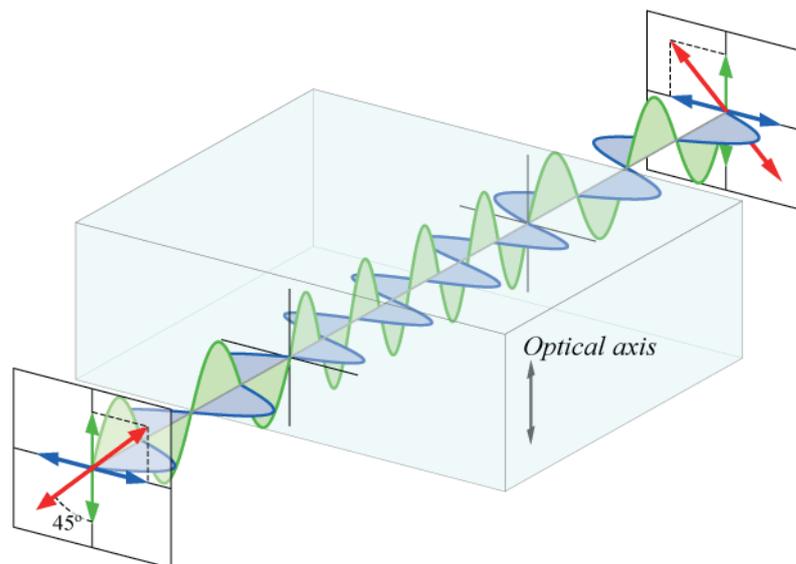
Note : optical connectors are Seikoh-Giken with narrow key or equivalent

## Principle

The PS-LN Rotators are based on a birefringent  $\text{LiNbO}_3$  phase modulator whose waveguide is illuminated at  $45^\circ$  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  $90^\circ$ . 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  $45^\circ$  of the crystal optical axis can be resolved into two waves, parallel (shown as green) and perpendicular (blue). In the  $\text{LiNbO}_3$  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

iXBlue Photonics includes iXBlue iXFiber brand that produces specialty optical fibers and Bragg gratings based fiber optics components and iXBlue Photline brand that provides optical modulation solutions based on the company lithium niobate ( $\text{LiNbO}_3$ ) modulators and RF electronic modules.

iXBlue 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.