POLARISATION SCRAMBLER

PSC-LN series

Low frequencies up to 12 GHz Polarization Scramblers

The PSC-LN series are compact and high speed electro-optic Polarization SCramblers. These integrated-optic devices feature a low-loss single-mode waveguide and are capable of modulating the polarization at frequencies ranging from DC to more than 10 GHz.

They operate over a broad optical bandwidth of around 100 nm.
These devices are based on a phase retarder which is capable of depolarizing light in a fixed, well maintained polarization state with a residual degree of polarization.



The PSC-LN Polarization SCrambler is 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.
The differential TE-TM phase shift is then generated here via the linear electro-optic effect by applying simple sinusoidal or saw-tooth voltages.

Features

- High speed scrambling
- Low insertion loss
- Very low scrambling voltage
- PMD mitigation
- Compact design

Applications

- Quantum Key Distribution (QKD)
- Compact PHB in the EDFA
- Optical communication networks
- Fiber sensor systems
- High-speed test equipment

Options

- Other modulation frequencies

Related Equipments

- Exail RF amplifiers

Low Bandwidth Polarization Scrambler - Highlights

Parameter	PSC-LN-0.1
Operating wavelength	1530 nm - 1625 nm
Electro-optical bandwidth	150 MHz
TE-TM Halfware voltage	6 V
Insertion loss	3.5 dB

Specifications given at 25 °C, 1550 nm

Wide Bandwidth Polarization Scrambler - Highlights

Parameter	PSC-LN-10
Operating wavelength	1530 nm - 1625 nm
Electro-optical bandwidth	12 GHz
TE-TM Halfware voltage	6 V
Insertion loss	2.5 dB

Specifications given at 25 °C, 1550 nm

PSC-LN-0.1

200 MHz Polarization Scrambler

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	-	150	200	-	MHz
TE-TM halfwave voltage	$V\pi_{RF\ 50\ kHz}$	$1 \times V\pi_{RF\ 50\ kHz}$	-	6	7	V
RF input impedance	Z_{in-RF}	-	-	10 000	-	Ω

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1625	nm
Insertion loss	IL	Without optical connectors[1]	-	3.5	4	dB
Polarization dependent loss	PDL	-	-	-	1	dB
Optical return loss	ORL	-	-40	-45	-	dB

All specifications given at 25 °C, 1550 nm, unless differently specified.
[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

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

PSC-LN-10

12 GHz Polarization Scrambler

Electrical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electro-optical bandwidth	S_{21}	From 2 GHz	10	12	-	GHz
Ripple S_{21}	ΔS_{21}	-	-	0.5	1	dB
Electrical return loss	S_{11}	-	-	-17	-14	dB
TE-TM halfwave voltage	$V\pi_{RF}$	1 x $V\pi_{RF\ 50\ kHz}$	-	6	7	V
Impedance matching	Z_{in-RF}	-	-	50	-	Ω

Optical Characteristics

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Crystal	-	-	Lithium Niobate X-Cut Y-Prop			
Waveguide process	-	-	Ti diffusion			
Operating wavelength	λ	-	1530	1550	1625	nm
Insertion loss	IL	Without optical connectors [1]	-	2.5	3.5	dB
Polarization dependent loss	PDL	-	-	-	1	dB
Optical return loss	ORL	-	-40	-45	-	dB

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[1] Consider an extra-loss up to 0.25 dB for each FC/APC optical connector

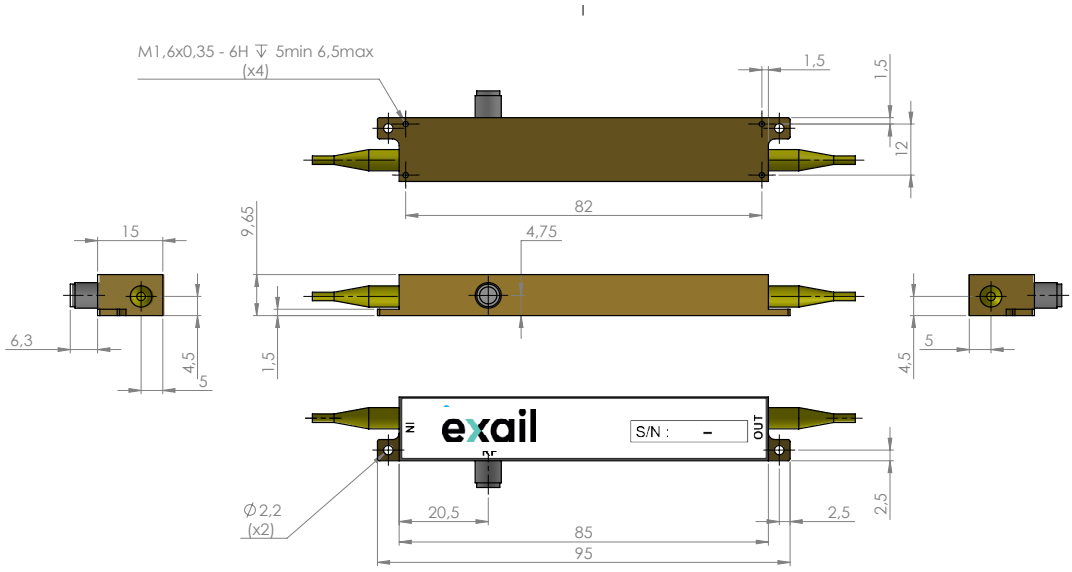
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Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm
Optical input power	OP_{in}	-	20	dBm
Operating temperature	OT	0	+70	°C
Storage temperature	ST	-40	+85	°C

Mechanical Diagram and Pinout

All measurements in mm



Port	Function	Note
IN	Optical input port	Polarization maintaining 1550 nm Corning PM 15-U40D Length: 1.5 meter, buffer diameter: 900 µm
OUT	Optical output port	Single mode fiber SMF 28 Length: 1.5 meter, buffer diameter: 900 µm
RF	RF input port	Female K (SMA compatible)

Ordering information

PSC-LN-□-□-□-□-□

Bandwidth : **0.1** (150 MHz), **10** (10 GHz)

Input fiber: **P** Polarization maintaining

Output fiber: **S** Standard single mode

Input connector: **00** (bare fiber), **FA** (FC/APC)

Output connector: **00** (bare fiber), **FA** (FC/APC)

Note: optical connectors are Senko with narrow key or equivalent

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