High-Speed Polarization Scrambler/Depolarizer

0.05 to 5MHz, 450 to 2200nm, <1dB optical loss, turn-key module

DATASHEET

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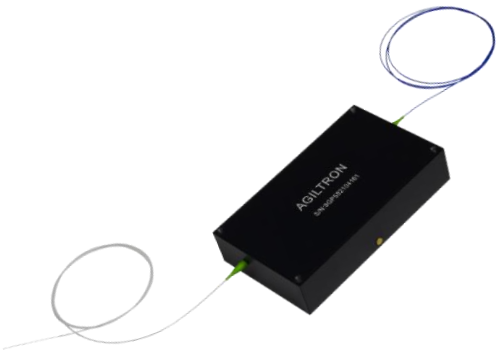

The NOPS Series High-Speed Polarization Scrambler is a non-mechanical, electro-optical device designed for ultra-high-speed polarization randomization with low optical loss and exceptional durability. It features multiple electro-optical crystal-based polarization rotators aligned at 45° intervals, each driven at a unique fixed frequency to achieve rapid scrambling across the entire Poincaré sphere. With configurations of 3 to 6 rotators, the effective wavelength coverage and operating temperature can be tailored to specific needs. Housed in a compact aluminum enclosure, this plug-and-play module requires no adjustments—simply connect the fibers and supply power via the included 12V DC adapter. The bidirectional device is thermally stabilized after a 10-minute warm-up and includes heat dissipation for consistent performance. It is the ultimate solution for applications requiring fast, reliable polarization scrambling with minimal maintenance.

Features

- No Moving Parts
- Ultra-High Speed
- Low Loss
- High Reliability
- Bidirectional
- Space/Mill Qualification

Applications

- Polarization Elimination
- Instruments

Specifications

Parameter		Min	Typical	Max	Unit
Center Wavelength		780		2400	nm
Operating Wavelength Range	3 Rotators		100		nm
	4 Rotators		200		
	6 Rotators		350		
Insertion Loss [1]			0.8	1.8	dB
Return Loss		45	50	55	dB
Degree of Polarization [2]	300kHz		3	4	%
	2MHz		4	5	
	5MHz		8	12	
Three Rotator Frequencies	300kHz	70	210	300	kHz
	2MHz	230	1100	2000	
	5MHz	270	2200	5000	
Optical Power Handling [3]		100		500	mW
Polarization Dependent Loss			0.25	0.5	dB
Operating Temperature		0		60	˚C
Storage Temperature		-40		85	˚C
Power Supply (DC)			12		V
Power Consumption			4		W

Notes:

[1]. Without connectors. Each Connector adds 0.3dB. 0.8 dB is typical for 1550nm. 1.5dB is typical for 780nm

[2]. Tested using Agilent Polarimeter N7781 series with data rate 1MHz

[3]. 500mW for fiber Core >9 μm. 100mW for 750nm

Note: The specifications provided are for general applications with a cost-effective approach. If you need to narrow or expand the tolerance, coverage, limit, or qualifications, please [click this link]:

Rev 12/15/24

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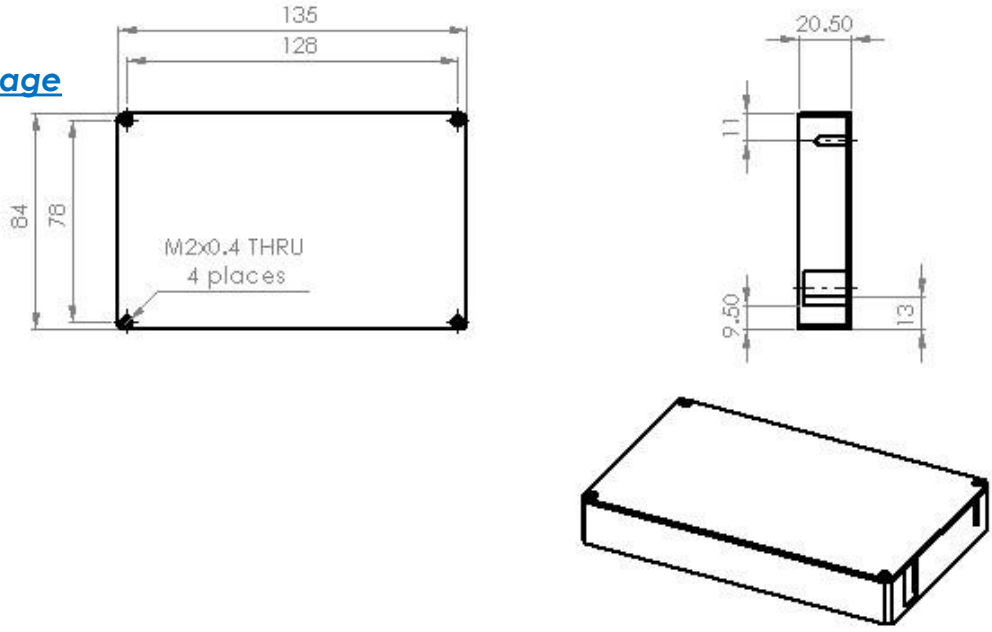
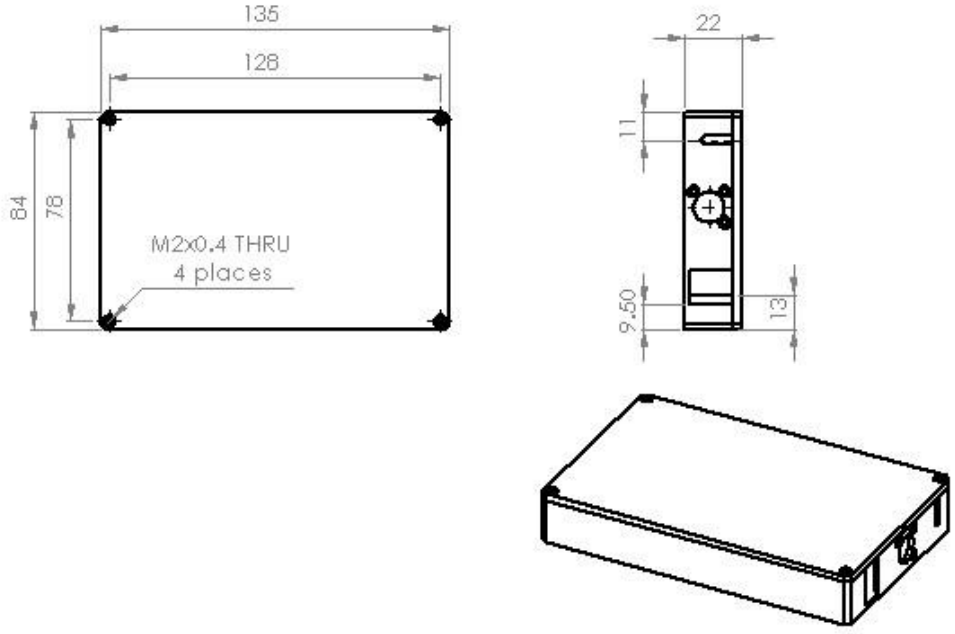
Mechanical Dimensions (mm)

< 3 Element 2MHz Package



> 3 Eelment 2MHz Package



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Ordering Information

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**# Rotator**	**Wavelength**	**Max Frequency**	**Package**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector**
NOPS-	3 = 1N 4 = 4N 6 = 6N	1550nm = 5 1310nm = 3 1060nm = 1 850nm = 8 750nm = 7 2000nm = 2 Special = 0	300kHz = 3 2MHz = 2 5MHz = 5 1kHz = A 500Hz = B	< 2MHz Package = 3 ≥ 2MHz Package = 5 Special = 0	SMF-28 = 1 H1060 = 2 Special = 0	0.9mm tube = 3 Bare = 1 Special = 0	0.25m = 1 0.5m = 2 1.0m = 3 Special = 0	FC/PC = 2 FC/APC = 3 LC/PC = 7 LC/APC = 9 LC/UPC = U Special = 0

Red color for special order

Fiber Core Alignment
Note that the minimum attenuation for these devices depends on excellent core-to-core alignment when the connectors are mated. This is crucial for shorter wavelengths with smaller fiber core diameters that can increase the loss of many decibels above the specification if they are not perfectly aligned. Different vendors' connectors may not mate well with each other, especially for angled APC.

Fiber Cleanliness
Fibers with smaller core diameters (<5 μm) must be kept extremely clean, contamination at fiber-fiber interfaces, combined with the high optical power density, can lead to significant optical damage. This type of damage usually requires re-polishing or replacement of the connector.

Maximum Optical Input Power
Due to their small fiber core diameters for short wavelength and high photon energies, the damage thresholds for device is substantially reduced than the common 1550nm fiber. To avoid damage to the exposed fiber end faces and internal components, the optical input power should never exceed 20 mW for wavelengths shorter 650nm. We produce a special version to increase the how handling by expanding the core side at the fiber ends.

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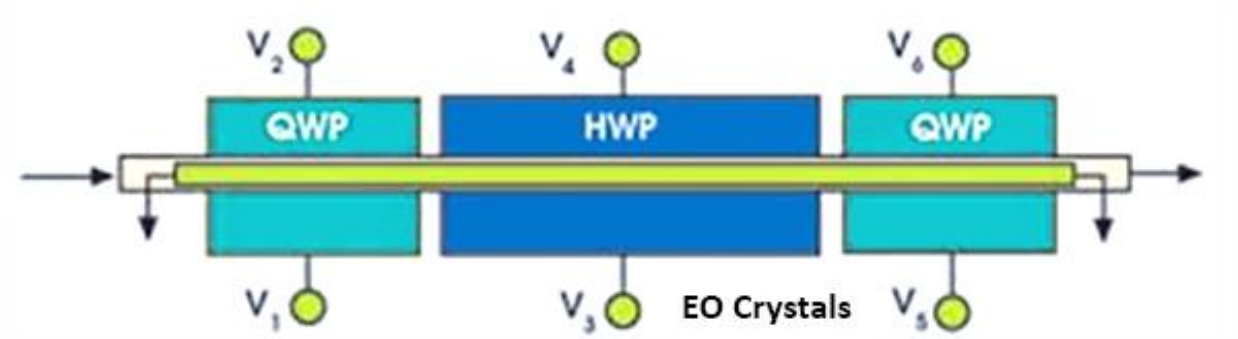
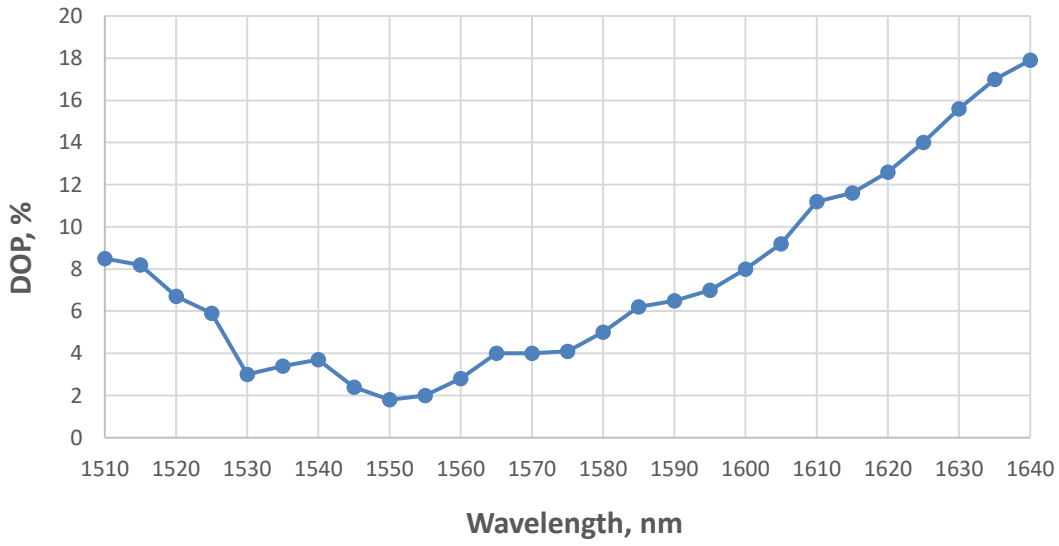
Function Diagram



Typical DOP vs Wavelength (3 element 300K scrambler set at 1550nm)



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