1310/1550 nm High Power Optical Circulator

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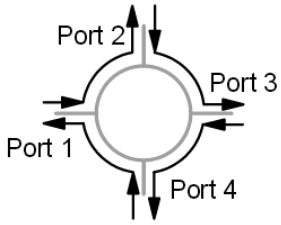
The 1310/1550 nm high power optical circulator is designed for high power applications. This non-reciprocal device redirects light at 1310/1550 nm wavelengths from port-to-port in only one direction while minimizing back reflection and back scattering in the reverse directions for any state of polarization. Employing Agiltron's advanced micro optics design, it features low insertion loss, low polarization sensitivity, high isolation, compact structure and high stability. The excellent characteristics of this product make it an ideal choice for application in fiber amplifier systems, pump laser diodes and optical fiber sensors. This circulator can be made using a variety of fibers including HI980, HI1060, LMA and double cladding fibers.



Applications

- Optical Fiber Amplifier
- Metropolitan Area Network
- Fiber Optic Sensor
- Dispersion Compensation
- Test and Measurement
- Instrumentation

Features

- High Power Handling
- Low Insertion Loss
- Low PDL
- High Channel Isolation
- Compact Package
- High Reliability & Stability
- Cost Effective

Specifications

Parameter			Min	Typical	Max	Unit
Operating Wavelength		1310	1295		1325	nm
		C Band	1530		1570	
		L Band	1570		1610	
		C + L	1525		1610	
Insertion Loss [1]	3-Port	1310		0.6	0.9	dB
		C, L		0.6	0.9	dB
		C + L		0.7	1.0	dB
	4-Port	1310, C, L		0.7	1.0	dB
Isolation (2→1, 3→2, or 4→3) [2]	3-Port	1310		36		dB
		C, L		36		dB
		C + L		30		dB
	4-Port	1310, C, L		36		dB
Directivity (1→3 or 2→4)				> 50		dB
Polarization Dependent Loss (SM)		3-Port		< 0.10		dB
		4-Port		< 0.15		dB
Polarization Mode Dispersion (SM)				< 0.1		ps
Polarization Extinction Ratio			18			dB
Return Loss				> 50		dB
Optical Power Handling				< 5 [3]		W
Operating Temperature Range			0		70	°C
Storage Temperature			-40		85	°C

Notes:

[1] Excluding connectors

[2] @λop, Top, SOP

[3] Continuous operation, for pulse operation call

Note: For a polarized input light version, the isolation is optimized to block the light reflection of the same polarization. Although lights of other polarizations may also be blocked, the extinction may be poor. PM isolators can be specially made to block backward propagating lights of all polarizations. PM isolators can also be made with a light polarizing function.

Rev 09/16/25

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P +1 781-935-1200 E sales@photonwares.com W www.agiltron.com

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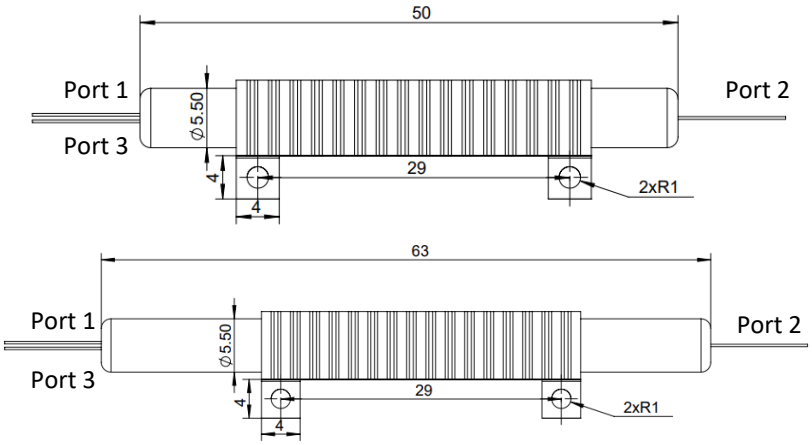
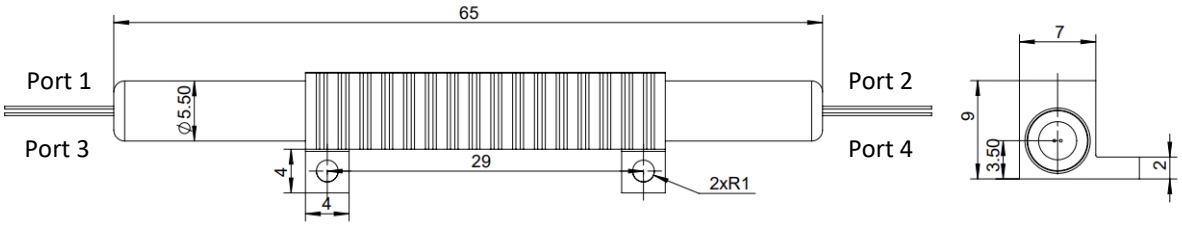
Mechanical Dimensions (mm)

3-Port Circulator



4-Port Circulator



*Product dimensions may change without notice. This is sometimes required for non-standard specifications.

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Ordering Information (Part Number)

	☐☐	☐	☐	☐	☐	☐	☐	☐
Prefix	**Type**	**Wavelength**	**Grade**	**Package**	**Fiber Type**	**Fiber Cover**	**Fiber Length**	**Connector[3]**
OCHP-	3 Port = 30 4 Port = 40 Special = 00	1310 = 3 1550 = 5 C-band = C L-band = L C+L = 2 Special = 0	Standard = 1 Special = 2	5.5 x 50 = 1 5.5 x 63 = 2 5.5 x 65 = 3 Special = 0	SMF-28 = 1 PM1550 = B[1] PM1550 = W[2] Special = 0	Bare fiber = 1 900um loose tube = 3 250um= 4 Special = 0	0.25m= 1 0.5 m = 2 1.0 m = 3 Special =0	None = 1 FC/PC = 2 FC/APC = 3 SC/PC = 4 SC/APC = 5 ST/PC = 6 LC/PC = 7 LC/APC = A LC/UPC = U Special = 0

[1]. Slow axis working, fast axis block.

[2]. Both slow and fast axis working

[3]. The default connector configuration uses fiber with 0.9 mm buffer protection. The connector cannot be installed directly onto bare fiber because the bare fiber is prone to damage during shipping. However, the connector can be assembled on bare fiber if a 3 cm protective loose tube is added for reinforcement. The customer may remove this protective tube after testing. The optical power handling of a standard connector is less than 0.5 W for SMF-28 fiber and decreases further for smaller-core fibers.

* Agiltron provide high power connector, please call.

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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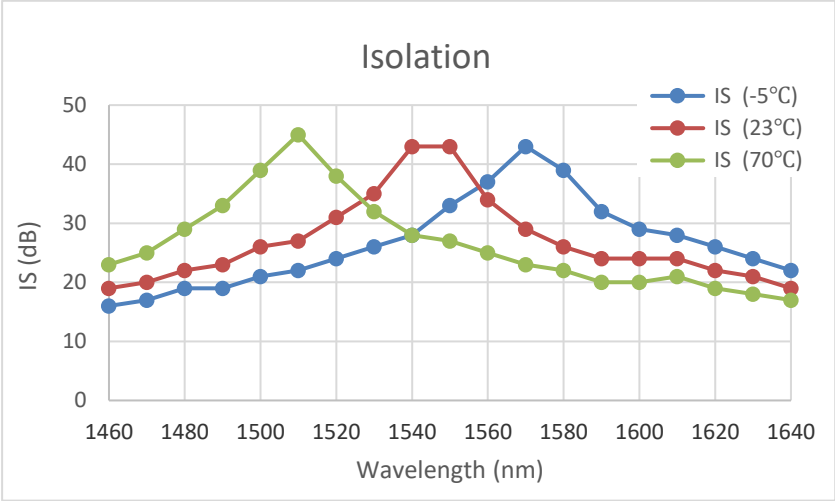
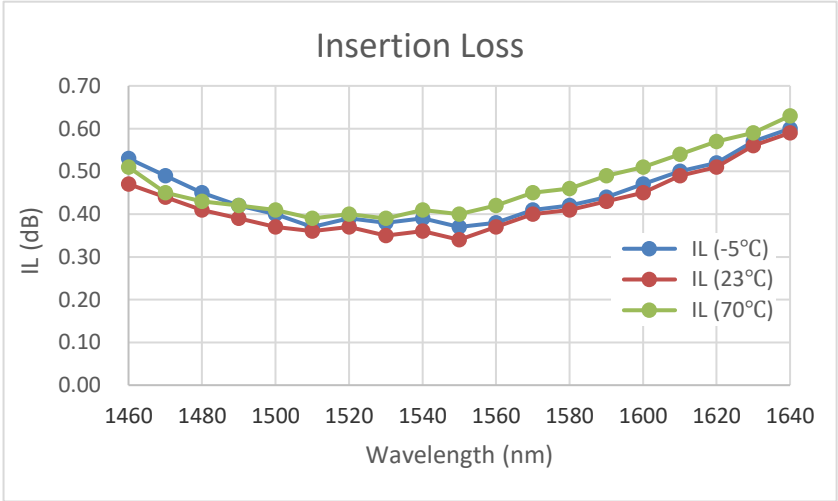
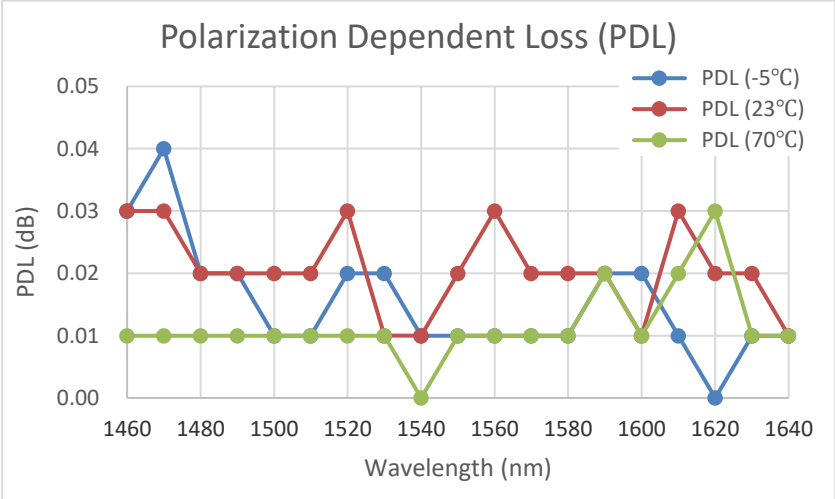
Typical Wavelength Dependence for Single Stage







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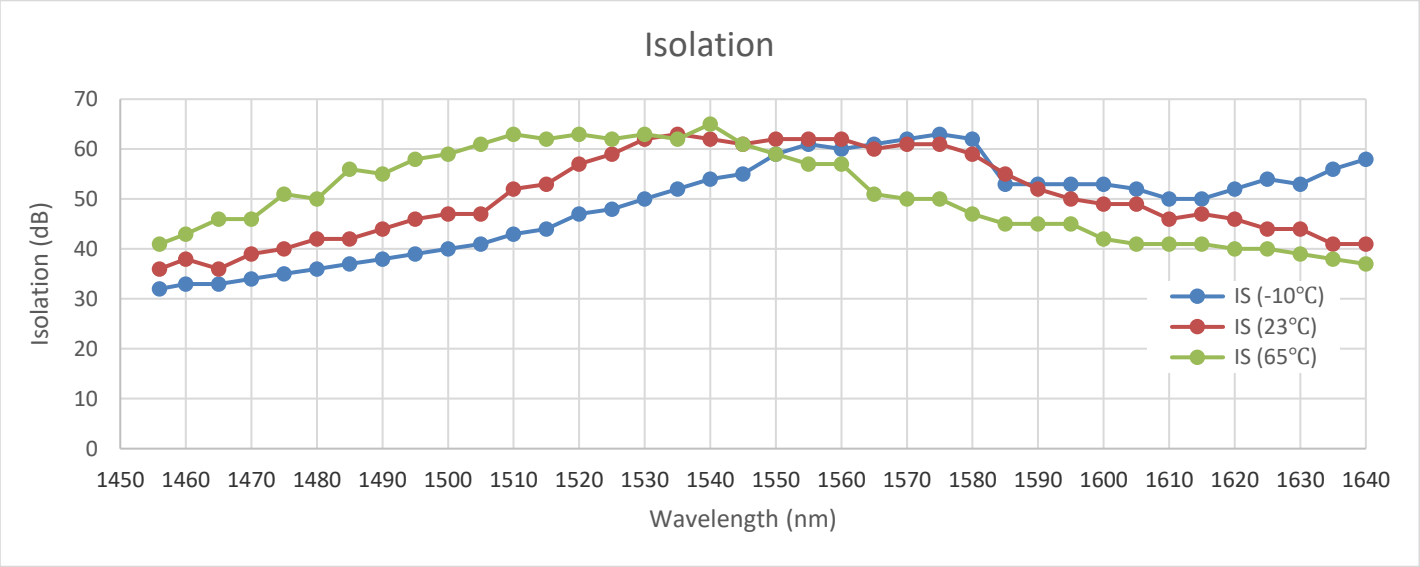
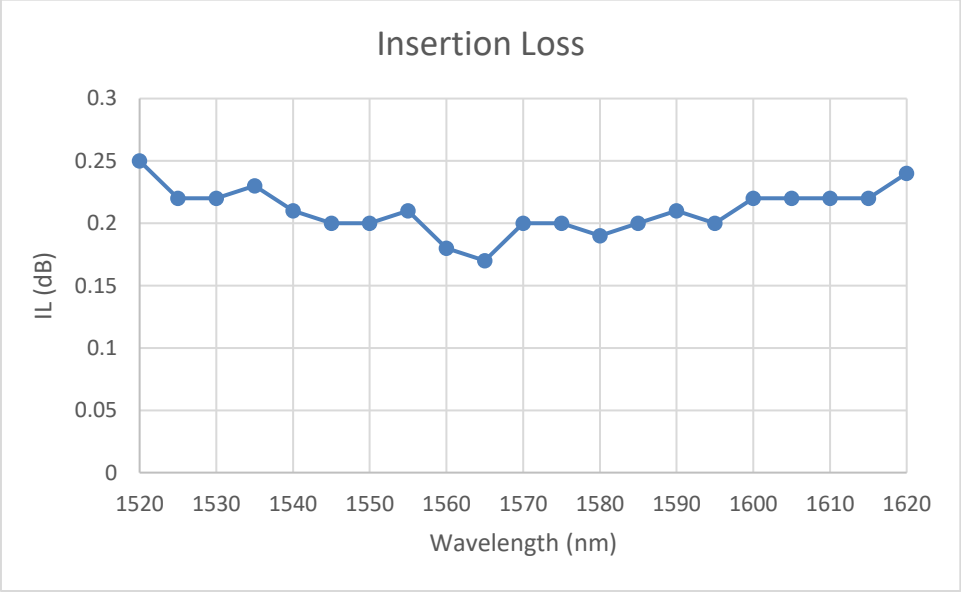
Typical Wavelength Dependence for Dual Stage





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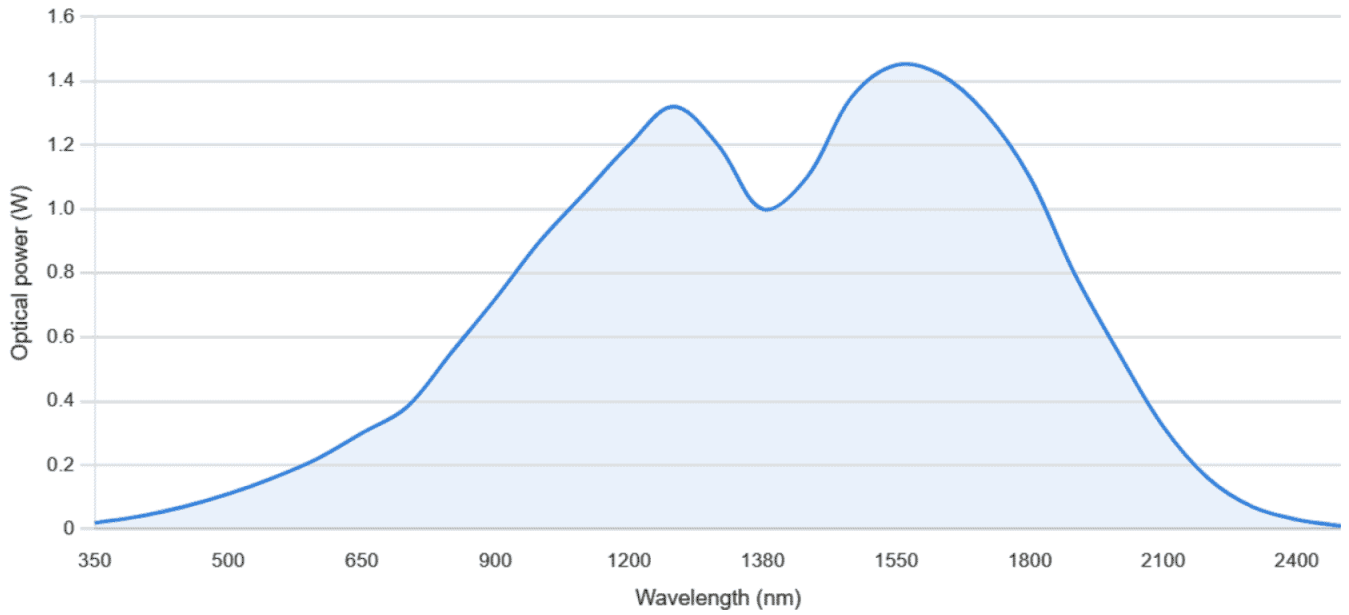
Regular Single Mode / Polarization Maintaining Fiber Optical Power Handing vs Wavelength



Single mode fiber optical power is limited by nonlinear effects in addition to absorption that increase loss and generate heat. The curve shows the approximate safe CW power envelope for standard single-mode fiber. Actual limits depend on fiber design, core size, length, and laser characteristics. Specialty fibers can significantly increase the power limit.

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