



FI- Faraday Optical Isolator

FI- series Faraday optical isolators are built with the superior materials of large Verdet constant, high thermal conductivity, low absorption coefficient Terbium Gallium Garnet (TGG) and low temperature coefficient rare-earth-doped magnets for various applications to protect laser systems from reflection disturbances, especially for high power applications over 1025~1085nm band. Both free-space isolator and fiber-pigtailed versions are available.

Orientated mainly to OEM applications, the free space isolators includes polarization-sensitive and polarization-insensitive versions over 1025-1085nm. A unique optics design enables the substantial compensation of the thermal self-action due to laser absorption in high power operations, resulting in improved isolation rate as well as output light beam quality. Furthermore, the light beams in reverse direction are blocked inside and dumped to heat sinks. This eliminates possible cladding modes induced in input lead fiber protecting a source from instabilities, power spikes and permanent optical damage. The free space isolators over other bands are also available on request.

Besides the free space isolator, fiber pigtailed broadband polarization-insensitive optical isolators are also available over 850nm and 1060nm bands. They are built with a 45° Faraday rotator integrating with a 45° crystal quartz rotator to produce a combined 90° rotation of input light polarization through the isolator. The wavelength dependences of the two rotator materials work against each other to achieve a broadband operation with a flat top isolation profile. These isolators are well-suited for the applications with wideband light sources such as OCT systems.

WL Photonics also provides various other TGG-based optical isolators and Faraday rotators over 500-1080nm for custom applications.

Key Features

- High power handling
- High isolation
- Compact design
- Broadband operation
- Custom solution for OEM applications



Free Space Faraday Isolator & Rotator



Fiber Pigtail Broadband Isolator



Main Specifications:

Typical Specifications of Free-Space Faraday Isolator

Parameter	Polarization-Sensitive Version (FI-PS-)	Polarization-Insensitive Version (FI-PI-)
Operating Wavelength (λ_c)	1025~1085nm	
Operating Bandwidth	$\lambda_c \pm 5\text{nm}$	
Pulsed Damage Threshold	$< 10\text{J}/\text{cm}^2$ at 10ns	
Average Power ¹	30W	
Max. Input Beam Size @ $1/e^2$ Interception	1.6mm in diameter	0.75mm in diameter
Operating Temperature	10-50 °C	
Storage Temperature	0-60 °C	
Isolation @ λ_c and 23°C	$> 30\text{dB}$	
Polarization Dependent Loss (PDL)	N/A	$< 0.20\text{dB}$
Transmission @ λ_c	$> 92\%$	
Isolation over $\lambda_c \pm 5\text{nm}$ and 10-50°C	$> 22\text{dB}$	
Input & Output Light Polarizations ²	In the same plane.	In orthogonal planes
Input & Output Light Beams	Coaxially centered	
Storage Humidity, non-condensing	0-90%	
Dimension	$\Phi 30\text{mm} \times 45\text{mm}$ (L)	$\Phi 30\text{mm} \times 80\text{mm}$ (L)
Free-Space Beam Expander at Isolator Output	Optional: magnification X=6, 7, 8, 9 or 10 available	
RoHS	Compliant	
Notes	¹ It is referenced for forward transmission as standard. Please specify if both forward and backward transmissions are requested. ² In orthogonal planes for FI-PS -series and in the same plane for FI-PI-series are available on request.	

Typical Specifications of Fiber Pigtailed Polarization-Insensitive Broadband Isolators

Parameter	Fiber Pigtail Polarization-Insensitive Isolator for 840nm Band (FI-BP-840)	Fiber Pigtail Polarization-Insensitive Isolator for 1060nm Band (FI-BP-1060)
Operating Wavelength (λ_c)	840nm	1060nm
Operating Wavelength Range	$\pm 40\text{nm}$	$\pm 50\text{nm}$
Typical Isolation	30~32dB	
Min. Isolation @ 23°C	25dB	27dB
Max. Polarization-Dependent Loss @ λ_c , 23°C	0.15dB	
Typical Insertion Loss @ λ_c , 23°C	1.0dB	
Max. Insertion Loss @ 23°C	1.7dB over 840nm $\pm 40\text{nm}$	1.5dB over 1060 $\pm 50\text{nm}$
Min. Return Loss	50/50dB	
Max. Input Optical Power (CW) ¹	0.5W	1.0W
Max. Tensile Load	5N	
Pigtail Fiber Type ²	HI780	HI1060
Operating Temperature	0 to 50°C	
Storage Temperature	-10 to 60°C	
Dimension	See below drawings	
RoHS	Compliant	
Notes	¹ Higher power handlings are available on request ² LMA fiber, PM fiber pigtails are also available on request.	

Ordering Information

Part Number: **FI-A-B-C/E-F**

- A. PS is for free space polarization-sensitive version; PI is for free space polarization-insensitive version and BP is for fiber pigtailed polarization-insensitive broadband version.
- B. Center wavelength in nanometer. 1035 is for 1035nm center wavelength, 1060 is for 1060nm center wavelength.
- C. Fiber type: SM is for single mode fiber and PM is for Panda polarization maintaining fiber (only existing for pigtail version).
- D. Pigtail cable diameter in millimeter: 0.25 is for 250 μm OD buffer fiber, 0.9 is for 900 μm OD loose tube and 3.0 is for 3.0mm OD cable (only existing for pigtail version).
- E. Pigtail length in meter: 0.5 is for 0.5m long and 1.0 is for 1M long (only existing for pigtail version).
- F. Connector type of pigtail termination, such as FC/APC, FC/UPC SC/APC or LU/UPC and 00 is for no connector (only existing for pigtail version).



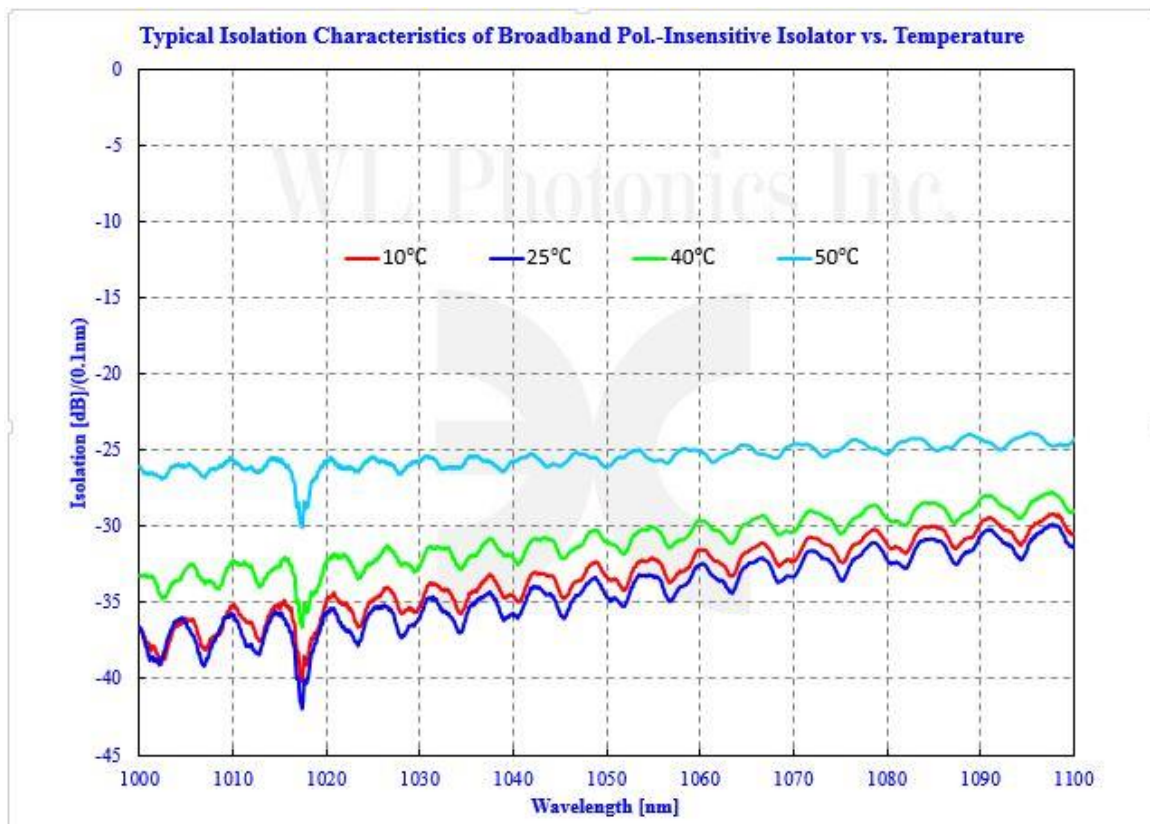
Example 1: FI-PS-1035

Description: Free space high power polarization-sensitive optical isolator for 1035nm.

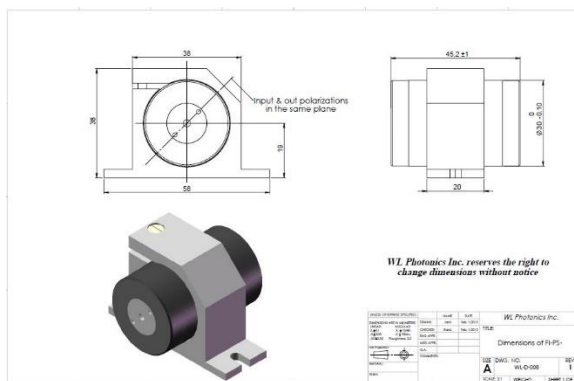
Example 2: FI-BP-1060-SM-3.0/1.5-FC/APC

Description: Fiber optic broadband polarization-insensitive isolator over 1060nm±50nm with 1.5meter long, 3.0mm OD cable HI1060 fiber pigtailed and FC/APC connectors terminated at input and output ends.

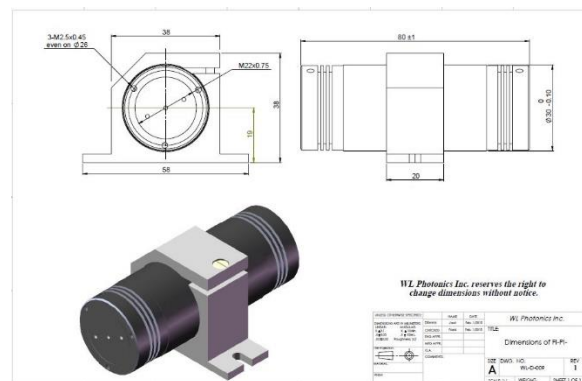
Typical Isolation Spectrum



Dimensions of FI-PS:

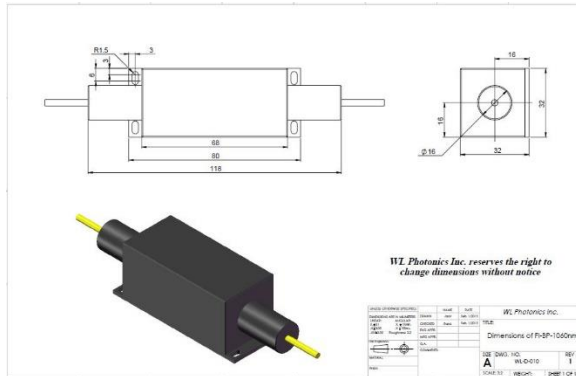


Dimensions of FI-PI:





Dimensions of FI-BP-1060:



Dimensions of FI-BP-840:

