



## POLARIZED FIBER OPTIC SOURCE

### Features:

- High polarization extinction ratio (up to 40 dB)
- Stable output
- Wide range of available wavelengths
- Rugged and compact design
- Wide range of connector receptacles available
- Optional high power versions
- Optional adjustable output power

### Applications:

- Extinction ratio measurements
- Polarization Dependent Loss (PDL) measurements
- Product manufacturing and quality control

### Product Description:

OZ Optics produces Polarized Fiber Optic Sources (**PFOSS**) in a variety of wavelengths. Sources are available in three versions. A receptacle version is available with the polarization axis aligned with the keyway on the receptacle. A second receptacle style version is available with a rotatable polarizer, allowing one to adjust the polarization axis to any desired angle. Finally, a pigtail style version has a polarization maintaining fiber attached, with the output polarization aligned with the slow axis of the fiber (see the *Fiber Optic Laser Diode Source* data sheet for details).

As an option, OZ Optics can include a blocking style optical attenuator to manually change the output. Unlike electrical systems, this method of power control does not affect the spectral properties of the laser diode output. This ensures more repeatable results.

While the PFOSS design is quite stable for standard measurements, sometimes reflections or temperature changes can affect the output power and wavelength for applications where stability is critical. OZ Optics recommends using angled connectors and receptacles for optimum stability. Highly Stable Polarized Fiber Optic Laser Sources (**HIPFOSS**), using Peltier coolers and isolators are also available. See the *Highly Stable Polarized Source* data sheet for details.

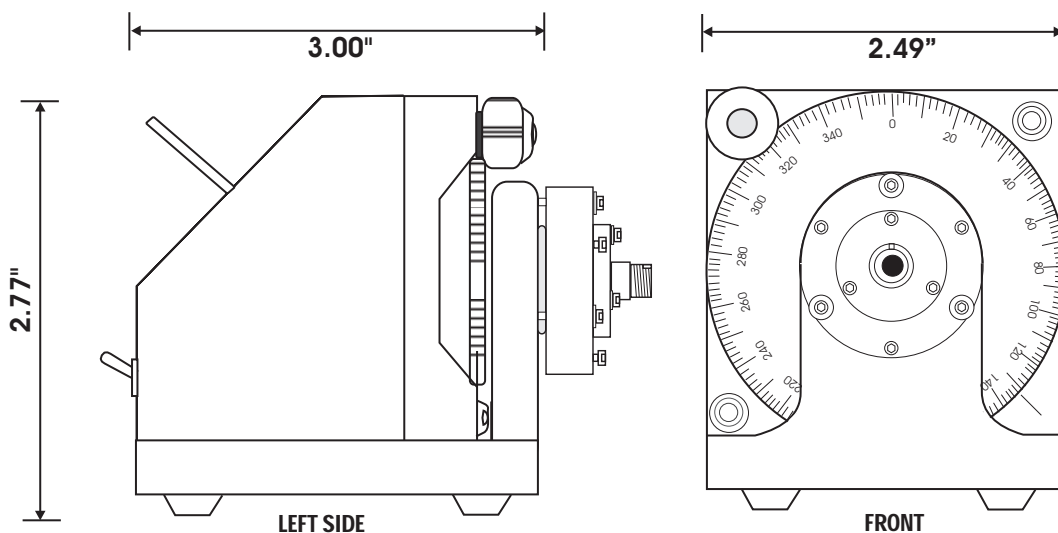


Figure 1: Receptacle Style Polarized Fiber Optic Source With Rotatable Polarizer



## Ordering Information For Standard Parts:

Bar Code	Part Number	Description
8695	PFOSS-02-3-1550-1-ER=35	1550 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra FC receptacle and rotatable polarizer achieving up to 35 dB extinction ratio
11378	PFOSS-02-3-1550-1-ER=40	1550 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra receptacle and rotatable polarizer achieving up to 40 dB extinction ratio
13036	PFOSS-02-3-1310-1-ER=35	1310 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra FC/PC receptacle and rotatable polarizer achieving up to 35 dB extinction ratio
13507	PFOSS-02-3-1310-1-ER=40	1310 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra FC/PC receptacle and rotatable polarizer achieving up to 40 dB extinction ratio
9036	PFOSS-01-3-1550-1-ER=35	1550 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra FC/PC receptacle and fixed polarizer achieving up to 35 dB extinction ratio
2737	POWER CORD - EUROPE	European power cord
2736	POWER CORD - UK	UK power cord
13390	PMJ-3U3U-1550-8/125-1-1-1-ER=30-G	Master patchcord, Ultra FC/PC to Ultra FC/PC, 8/125um PM 1550nm fiber, 0.9mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis, ER=30dB minimum
11998	ER-100-1290/1650-ER=40	Fiber Optic Polarization Extinction Ratio Meter for wavelengths from 1290 nm to 1650 nm. ER = 40dB
13440	ER-23-1290/1650-ER=40	Super/Ultra FC removable receptacle for ER Meter adapted for wavelengths from 1290 nm to 1650 nm. ER = 40dB

## Standard Product Specifications<sup>1</sup>:

Part number	PFOSS-02-3-1550-1-ER=40	PFOSS-01-3-1550-1-ER=35	PFOSS-02-3-1550-1-ER=35	PFOSS-02-3-1310-1-ER=35
Bar Code #	11378	9036	8695	13036
Laser Type <sup>2</sup>	Fabry-Perot Laser			
Central Wavelength <sup>3</sup>	1550 nm ± 20 nm			1310 nm ± 20 nm
Extinction Ratio	40dB	35dB		
Output Power <sup>4</sup>	1 mW			
Polarizer Type	Rotatable	Fixed	Rotatable	
Spectral Bandwidth <sup>5</sup>	< 5 nm			
Short Term Stability <sup>6</sup>	±0.05 dB			
Long Term Stability <sup>7</sup>	±0.1 dB			
Connector Type	Standard, Super, Ultra NTT-FC/PC receptacle			
Power Variation induced by rotatable polarizer	< 0.25 dB	N/A	< 0.25 dB	
Input Voltage	Universal 110/220 Volt AC to DC adapter			
Dimensions	60 x 90 x 190 mm			
Weight	500 gr			
Operating Temperature	0 to 40°C			
Storage Temperature	-20 to 60°C			
Relative Humidity	< 90% RH non condensing			

<sup>1</sup> Reference condition: 23°C ambient temperature after 30 minutes warm-up period

<sup>2</sup> DFB lasers are also available as a custom order.

<sup>3</sup> Depends on laser diode manufacturer and temperature operation.

<sup>4</sup> For higher output power we recommend ordering a HIPFOSS to improve wavelength and power stability.

<sup>5</sup> Measured at Full Width Half Maximum

<sup>6</sup> 15 minutes at constant temperature and after 30 minutes warm-up period

<sup>7</sup> 6 hours at constant temperature and after 30 minutes warm-up period

### Ordering Examples For Standard Parts:

A European fiber optic manufacturer wants to test the quality of their polarization maintaining jumpers at 1550nm and 1310nm. They need to order the following parts:

Bar Code	Part Number	Description
13507	PFOSS-02-3-1310-1-ER=40	1310 nm, 1 mW Polarized Fiber Optic Source with a Super/Ultra FC/PC receptacle and rotatable polarizer achieving up to 40 dB extinction ratio
8695	PFOSS-02-3-1550-1-ER=40	1550 nm, 1 mW Polarized Fiber Optics Source with a Super/Ultra FC/PC receptacle and rotatable polarizer achieving up to 40 dB extinction ratio
11998	ER-100-1290/1650-ER=40	Fiber Optic Polarization Extinction Ratio Meter. ER= 40dB for 1290 nm to 1650 nm and ER = 30dB for 850 nm to 1290 nm
13440	ER-23-1230/1650-ER-40	Super/Ultra FC removable receptacle for ER meter for wavelengths from 1280 nm to 1650 nm. ER=40.
13390	PMJ-3U3U-1550-8/125-1-1-1-ER=30-G	Master Patchcord, Ultra FC/PC to Ultra FC/PC, 8/125um PM 1550nm fiber, 0.9mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis ER=30dB minimum
2737	POWER CORD - EUROPE	European power cord (order one cord for each source, and for the ER meter (Total = 3 pieces)

### Ordering Information For Custom Parts:

OZ Optics welcomes the opportunity to provide custom designed products to meet your application needs. As with most manufacturers, customized products do take additional effort so please expect some differences in the pricing compared to our standard parts list. In particular, we will need additional time to prepare a comprehensive quotation, and lead times will be longer than normal. In most cases non-recurring engineering (NRE) charges, lot charges, and a 1 piece minimum order will be necessary. These points will be carefully explained in your quotation, so your decision will be as well-informed as possible. We strongly recommend buying our standard products.

### Questionnaire For Custom Parts:

1. What wavelength do you need?
2. What connector type are you using?
3. How much optical power do you need launched into your fiber?
4. What should be the minimum polarization extinction ratio of the source?
5. Do you want a fixed or rotatable polarizer?

### Receptacle Style PFOSS:

**PFOSS-0A-X-W-P (-ER=YY)**

**A** = Source type: 1 for fixed polarization  
2 for Rotatable Polarization

**X** = Connector code :

- 3= Standard, Super or Ultra NTT-FC/PC receptacle
- 3A= Angled NTT- FC/PC
- SC=SC
- SCA=Angled SC
- 8=AT&T-ST
- MU=MU type connector
- LC=LC type connector
- 1.25U=Universal Receptacle for 1.25mm OD connector ferrules (LC, MU)
- 2.5U=Universal Receptacle for 2.5mm OD connector ferrules (ST, FC, SC)

**YY** = Extinction ratio. Add this only for ER>30dB. Specify 35 or 40dB. If not specified, the extinction ratio is greater than or equal to 30dB. ER=35dB or 40dB is only available for 980nm, 1064nm, 1290-1625nm.

**P** = Output power, in mW  
1mW is standard

**W** = Wavelength in nm: 635, 650, 685, 780, 830, 850, 980, 1064, 1310,1480,1550,1625, 2050

### Notes:

1. For Highly Stable Polarized Sources (**HIPFOSS**) which include an isolator and Peltier cooler circuit please refer to the *Highly Stable Polarized Source* data sheet
2. Add **-BL** to the part number to have blocking style attenuator added to the PFOSS
3. Add **-ISOL** to the part number for an isolator. For wavelengths less than 1290nm, order a HIPFOSS instead

### Ordering Examples For Custom Parts:

A European manufacturer of fiber optic circulators wants to test the extinction ratio of their polarization maintaining jumpers at 980nm prior to pigtailling them to their integrated waveguides. They need to order the following parts:

Bar Code	Part Number	Description
N/A	PFOSS-02-3A-980-2- ER=40	980 nm, 2 mW Polarized Fiber Optic Source with an angled FC receptacle, rotatable polarizer, achieving over 40dB extinction ratio.
N/A	ER-100-980-ER=40	980 nm, Fiber Optic Polarization Extinction Ratio Meter. ER = 40dB
N/A	ER-23A-980-ER=40	980nm, Angled FC Removable Receptacle for ER Meter. ER = 40dB
N/A	PMJ-3A3A-980-6/125-1-1-1-ER=30-G	Master patchcord, Angle FC/PC to Angle FC/PC, 6/125um PM 980nm fiber, 0.9 mm OD jacketed, 1 meter long with connectors aligned and locked to the slow axis ER=30dB minimum
2737	POWER CORD - EUROPE	European power cord. Order one for the source and one for the meter

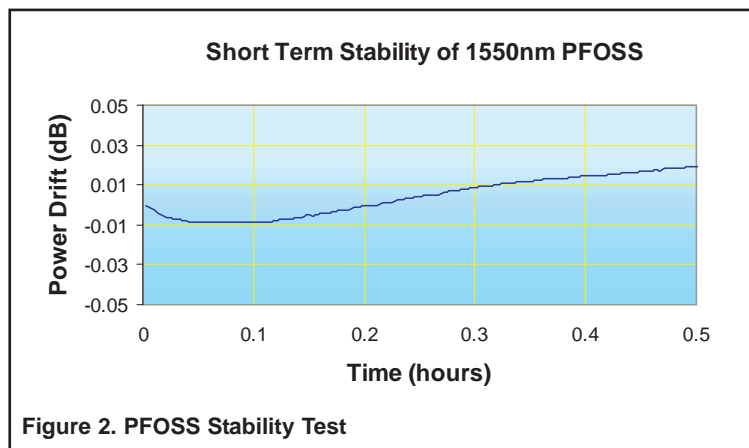


Figure 2. PFOSS Stability Test

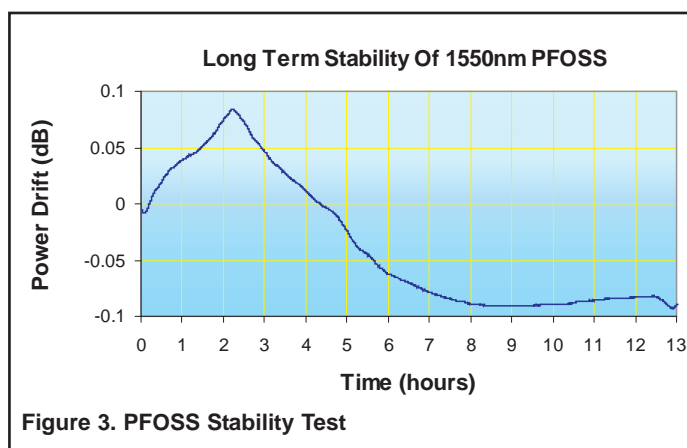


Figure 3. PFOSS Stability Test

### Frequently Asked Questions (FAQs):

**Q:** My source has a receptacle for FC connectors. Will it work with connectors that have either FC/PC finish or FC/APC finish?

**A:** If you connect a fiber with an angled FC (APC) connector to your source, you should expect a significant drop in the output power. This is because the source is designed to focus light to a point in space where the tip of the fiber is supposed to be. A stop inside the receptacle stops the ferrule at the correct distance. However, because the end of the connector ferrule is angled, the fiber will not be located in the correct position. As a result the light will not be correctly focused onto the fiber, and more of the light will go into the cladding instead. While this will reduce the overall power, if the fiber is long enough to attenuate all the cladding modes, the output should remain stable during operation. Short fibers, especially those less than one meter long, will likely transmit some cladding modes, which will show up as an unstable output signal.

**Q:** I purchased a source with a receptacle for FC/APC connectors, and I am using a patchcord with an FC/APC connector on the end, but I still don't seem to get the same power as listed on your test report. Why?

**A:** Not all APC connectors are the same. The angle at which they are polished can vary by  $\pm 0.5$  degrees. The radius at which they are polished can vary from 5 to 12mm. The tip of the connector may be cone shaped, or have straight side walls. Because of these variations, the position of the fiber core within the receptacle may vary from fiber to fiber. This will in turn reduce your coupling efficiency.

**Q:** Do you offer 1.25mm and 2.5mm ID universal adaptors for your sources?

**A:** We can, but we do not recommend them. Universal adaptors do not have a retaining mechanism, so the fiber can fall out if you do not hold it in place. In addition, the lack of a retaining mechanism will cause the coupled power from the source to be unstable. Universal receptacles can be used in applications where you are not concerned with the power stability, such as visible sources for fault location, or PFOSS or HIPFOSS polarized sources for PM fiber patchcords.

**Q:** What is the maximum output power of the PFOSS?

**A:** The maximum output power is 1 mW for the standard PFOSS. For higher power sources, refer to the *Highly Stable Polarized Source* data sheet.

### Frequently Asked Questions (FAQs) Continued:

**Q:** Does OZ Optics use DFB laser diodes in their sources?

**A:** The standard models use a Fabry-Perot (FP) laser diode. Distributed Feedback (DFB) laser diodes feature single wavelength output. These diodes are available as an option. However they are more expensive, and are not offered at all wavelengths.

### Application Notes:

#### Using Bare Fibers With PFOSS And HIPFOSS Sources

In many applications it is necessary to connect fibers that do not have a connector attached (bare fiber) to an optical source. With the receptacle style polarized sources the easiest way to do this is with an FC bare fiber adapter (Part number BARE-03-126, Bar Code #1816). These adaptors are essentially an inexpensive way to temporarily put an FC connector onto the end of a fiber.

To use a bare fiber adapter, one strips, cleans and cleaves the fiber end to be tested, and inserts it into the rear of the adapter. The fiber is pushed in until it is flush with the end of the ferrule, and then a clamp holds the fiber in place. The fiber can then be inserted into the receptacle like a standard FC connector.

Using this technique, expect coupling efficiencies to be somewhat lower. Often coupling efficiencies are only 25% of the optimum value, although this depends somewhat on the skill of the operator. This should not affect extinction ratio measurements. Also, since the fiber is not aligned with respect to the key on the connector, the polarization angle from the source may have to be adjusted to line it up with the fiber.

Finally, never use a bare fiber adaptor to connect one fiber to another fiber, or to connect a fiber to a source or detector that has a fiber stub inside. Doing so will likely scratch or damage the fiber inside the source or detector, leading to expensive repairs.

