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AUTOMATIC POLARIZATION EXTINCTION RATIO MEASUREMENT TEST SET FOR MPO/MTP® PM FIBER PATCHCORDS AND V-GROOVE ASSEMBLIES

PRELIMINARY

Features

- Turnkey Automatic ER measurement for MPO/MTP® patchcords and V-groove assemblies
- Measures up to 35 dB extinction ratio
- Multi-channel PER measurement
- Selectable pitch steps: 125 µm, 250 µm etc.
- Intuitive Graphical User interface

Applications

- Fiber optic component manufacturing
- Optical Communication and data centers
- High Speed and Coherent Communications
- Photonic Integrated Circuits (PIC)
- Fiber Sensing and photonic system
- Component or system troubleshooting
- Research and development

Automatic Polarization Extinction Ratio Measurement Test Set for MPO/MTP®

Product Description

OZ Optics offers a turnkey semi-automated test measurement setup for testing the polarization properties of MPO/MTP® patchcords, V-Groove arrays and custom fiber arrays. The system is designed to allow quick ER characterization for multi-channel PM fiber with different fiber pitch separation.

The system consists of a polarization extinction ratio meter with built-in motorized stages for automated fiber alignment during testing and a multichannel polarized light source (12, 16 or 24 channels) with individual channel control. The system comes with a Windows based application that allows quick and accurate polarization extinction ratio measurement of PM devices using a user's computer.

Both the meter and source can be configured with customer specified fiber port adaptors.

For our legacy manual polarization extinction ratio measurement test set for V-grooves assemblies and MPO/MTP® patchcords please refer to the following link: https://www.ozoptics.com/ALLNEW_PDF/DTS0068.pdf

Standard Product Specifications for Automatic Extinction Ratio Meters[1]:

Part number: ER-2000-MC-MPO-1290/1650-1-ER=35	
Parameter	**Typical**
Wavelength Range	1290 nm to 1650 nm
Extinction Ratio Range	35 dB for 1290 nm to 1650 nm
Dynamic Range	40 dB
Extinction Ratio Accuracy	±1 dB
Extinction Ratio Resolution	0.02 dB
Angular Accuracy [2]	± 0.5 degrees
Angular Resolution	0.3 degrees
Update Rate (Extinction Ratio)	2.7 Hz
Update Rate (Relative Power)	650 Hz
Standard Travel range[3]	12 mm
Travel resolution	0.1 µm
Input Optical Power	50 µW to 1.0 mW
Communication Interface	USB (no additional driver/controller required)
Input Supply Voltage [4]	Universal 50/60 Hz 110/220V AC/DC adapter
Dimensions	20 x 15.2 x 15.2 cm
Weight	2.5 kg
Operating Temperature	10° to 40°C
Storage Temperature	-40° to +80°C
Storage Humidity	<90% RH non condensing

[1] Tested at 23°C ± 2°C with a 1550 nm linearly polarized source and after a 30 minute warm-up period.
[2] For MPO/MTP style connectors.
[3] Longer travel ranges are available upon request. This might require a longer lead time.
[4] North American power cord provided as standard equipment. Power cords for Europe and the United Kingdom can be ordered separately.

Standard Product Specifications for Multichannel Polarized Sources[1]:

Part number: MCPFOS-01-MPO-16-1550-1-ER=33	
Parameter	**Value**
Laser Type[2]	Fabry-Perot Laser
Central Wavelength [3]	1550 nm ± 20 nm
Extinction Ratio	33 dB
Output Power	0.7 to 1 mW
Polarizer Type	FIX
Spectral Bandwidth (at FWHM)	< 5 nm
Short Term Stability [4]	± 0.1 dB
Long Term Stability [5]	± 0.25 dB
Connector Type	MPO receptacle
Input Voltage	Universal 110/220 Volt AC to DC adapter
Dimensions (LXWXH)	39 X 34.4 X 13.3 cm
Weight	14 kg
Operating Temperature	10 to 40°C
Storage Temperature	-40 to 80°C
Relative Humidity	< 90% RH non condensing

[1] Reference condition: 23°C ambient temperature after 30 minutes warm-up period
[2] DFB and SLED lasers are also available as a custom order.
[3] Depends on laser diode manufacturer and temperature operation.
[4] 15 minutes at constant temperature and after 30 minutes warm-up period
[5] 6 hours at constant temperature and after 30 minutes warm-up period

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 are you using?
2. What is the minimum acceptable polarization extinction ratio for the source?
3. What should be the minimum extinction ratio rating of the polarization extinction ratio meter?
4. What type of connector are you using on the source side?
5. What type of connector are you using on the detector side?
6. Do you need a custom mount?
7. Do you need a removable receptacle adaptor on the meter side?

Description **Part number**

Polarization ER Measurement for PM MPO/MTP: **ER-2000-MC-X-W-P(-ER=ZZ)[1]**

X = Connector Type:
MPO = for MPO
MTP = for MTP

W = Wavelength Range (in nm) Example:
(1290/1650 for the default telecon wavelength, for other wavelength band specify 850 for 850 nm)

ZZ = Extinction Ratio:
None if 30 dB is required.
If an ER > 30 dB is required, enter ER = 35 for ER=35 dB

P = Output Power in mW:
1 = For 1 mW power output

Description **Part number**

Multichannel Polarized Sources: **MCPFOS-01-X-N-W-P(-ER=ZZ)[1]**

X = Connector Type:
MPO = for MPO
MTP = for MTP

N = Number of Channels:
12 = 12 Channels
16 = 16 Channels

W = Wavelength:
1550 = 1550 nm
1310 = 1310 nm

ZZ = Extinction Ratio:
None if 30 dB is required.
If an ER > 30 dB is required, enter ER = 35 for ER=35 dB

P = Output Power in mW:
1 = For 1 mW power output

Consult factory for special connector and ferrule adaptors.

Application Notes:

Comparison of the OZ ER measurement system with results from a polarimeter

A common alternate technique used in polarization analysis is through the use of a polarimeter. These devices work by mathematically mapping the output polarization from a source onto what is known as a Poincaré sphere. By monitoring the variation of the polarization over time on this Poincaré sphere, one can calculate the variation in the polarization and presumably the degree of polarization itself.

There are two principle drawbacks with this technique. The first is that to map the polarization onto the Poincaré sphere, polarimeters subtract any randomly polarized light from the signal. Thus any calculation of the polarization extinction ratio using a polarimeter ignores this signal. This results in reported values that are more optimistic than that given by the OZ Extinction Ratio Meter. The Extinction Ratio Meter gives a more conservative and more reliable result.

The second drawback is that most fiber optic polarimeters utilize singlemode fiber to transmit light to its internal sensors. The singlemode fiber itself changes the polarization to an arbitrary polarization. Therefore fiber optic polarimeters are only suitable for measuring relative changes. This makes them unsuitable for alignment of polarization maintaining connectors.

General Considerations

OZ Optics Polarization Extinction Ratio Meters, together with OZ Optics Highly Stable Polarized Sources, provide a quick, reliable, and effective means to align, characterize, and QA polarization maintaining components. To ensure that your measurements are as accurate as possible, the following precautions should be taken..

1. Check your reference angle:

The OZ Optics Extinction Ratio Meter provides a reading of the polarization axis orientation compared to the keyway on the receptacle. However, if the receptacle is exchanged or replaced, the orientation might be changed by a few degrees.

To ensure that the angle reading is accurate, OZ Optics supplies master reference patchcords. These patchcords maintain polarization to better than 30 dB, and are aligned to within ±1.5 degrees of the connector keyway. A menu option allows one to adjust the angle reference to any desired value, allowing one to compensate for any offset. Note that a misalignment of ∅ degrees between the source and the fiber will degrade the extinction ratio and the maximum ER that can be achieved will be given by:

$$ER \leq 10 \log (\tan^2 \varnothing)$$

2. Stress the fiber:

When working with a highly coherent source, such as a DFB laser, it is possible to get readings that initially meet specifications, but degrade over time. This degradation of the extinction ratio can take several minutes to occur. This behavior occurs because part of the light within the fiber is traveling along the wrong axis. At the output end of the fiber the light traveling along the slow and fast axes combine to form a unique polarization state. If the two signals are in phase with one another, they will form linearly polarized light However, as the fiber is stressed, the phase relation will change and so will the output polarization.

To check for this behavior, one should stress the fiber while measuring the polarization. The meter has a data logging mode for this function. To use it, activate the logging mode through the menu, then apply stress to the device under test. One common method is to simply wrap the fiber several turns around a mandrel, 40 or 50mm in diameter. Such a mandrel is available from OZ Optics. A second technique is to heat the fiber with a warming plate. After stressing the fiber, stop the logging mode. The meter will then display the worst case extinction ratio, and the variation in the polarization angle. Use these readings as the performance specification. Refer to the manual for further details.

3. Look both ways:

If a device is being used to transmit light in either direction, then it should be inspected in both directions. The performance of a device will depend on the direction in which it is used. This is because stresses and microbends usually occur near the fiber ends. If the microbend is at the output end of the fiber, then the output polarization may be rotated, but otherwise remain static. However if the microbend is at the input end, then the polarization is perturbed before travelling through the fiber, so the polarization will vary.

4. Autoalign components using the computer interface.

The meter reports both power and extinction ratios to a computer control system via an USB interface. This can be used to develop an auto-alignment system. A complete set of application notes, one on polarization measurements (POLARIZATION MAINTAINING MEASUREMENT SYSTEMS), the other on how to use the meter for alignment applications (AUTOMATED POLARIZATION ALIGNMENT) are available from our website (www.ozoptics.com).

5. Measurement limits

The detection circuitry for the ER meter has an overall dynamic range of about 40 dB. When the input signal has a power level within the range of 500 µW to 1 mW (a 3 dB range), this leaves at least a 37 dB range for the ER measurement itself.

Since the extinction ratio is based on the ratio of two values, a minimum and a maximum, the minimum value may approach the noise floor of the instrument if the extinction ratio is really good or the input power is close to 200 µW or below. In such a case, the minimum value may default to the noise floor of the instrument. Under these conditions, the instrument may not be able to provide an accurate reading. However, it will be able to determine a worst case value, which will be indicated to the user as such. By using a higher-powered source, the instrument will be able to provide an improved reading. For example, with a low power signal, the ER meter may indicate that an extinction ratio is >23 dB. If the user needs to know whether the actual value is over 30 dB, then a more powerful source should be used. If the customer source comes with High output power greater than 10 mW, we can provide the ER with a fix attenuator installed.