

# Agilent N7782B PER Analyzer and N7783B Thermal Cycling Unit

## Data Sheet



Figure 1. N7782B PER analyzer

## Introduction

Agilent's N7782B Series of polarization extinction ratio (PER) Analyzers has been designed for high speed and highly accurate testing of PER in PM fibers. The polarimetric measurement principle guarantees reliable measurements of PER values of up to 50 dB.

The real time measurement capability in combination with automation interfaces makes this unit ideally suited for integration in manufacturing systems, for example pig-tailing stations for laser diodes and planar wave guide components. Analog interfaces are provided for integration of the system in control loop applications.

## Key Benefits

- Accurate PER-measurement up to 50 dB.
- Real-time display.
- Easy-to-use: reliable results independent of operator skill set.
- Swept-wavelength and heating/stretching method available.
- Measurement of the PER versus wavelength.
- Fast/slow axis detection.
- Instruments available for 1260 nm up to 1640 nm.
- Internal fixed wavelength sources available at 1310 nm and 1550 nm.



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## Applications

### Laser diode PMF pig-tailing

Alignment of the PM fiber during the pig-tailing process is supported by real-time display of the PER and the optical power.

### PMF splicing

In order to support the alignment during the splicing process of PM fibers the Agilent N7782B provides real time display of the optical power and of the angular misalignment of the two fibers.

### PM component characterization

Measurement of the PER on PM components like fiber polarizers, PMF couplers, PMF splitters, etc.

### Characterization of PMF cross-coupling

Polarization crosstalk in a PM fiber is measured and displayed as PER.

### PM splice characterization

The angular misalignment of a PM splice can be measured in a non-destructive way. Even multiple splices in a chain can be characterized independently.

Agilent's software package includes drivers for most of the tunable laser sources commonly used in industry.

## N7782B and N7783B application examples

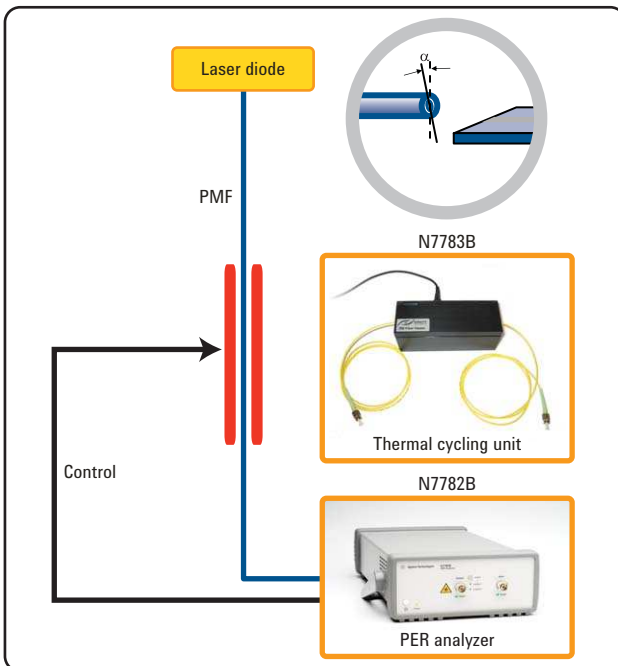


Figure 1. Laser diode pig-tailing using the combination of N7782B and N7783B.

### The heating/stretching method

The heating/stretching method provides accurate measurements of the PER at a single wavelength. This method supports in particular well the measurement using narrow-band laser sources. An optional internal laser source allows stand-alone operation of the system.

Agilent's thermal cycling unit, N7783B, is fully controlled by the N7782B PER analyzer and allows accurate and repeatable cycling of the temperature of the fiber under test. The PER measurement system consisting of the N7782B and the N7783B shows excellent accuracy and repeatability. Ease of use and automation interfaces, such as analog output ports for active alignment, make it particularly useful for production environments.

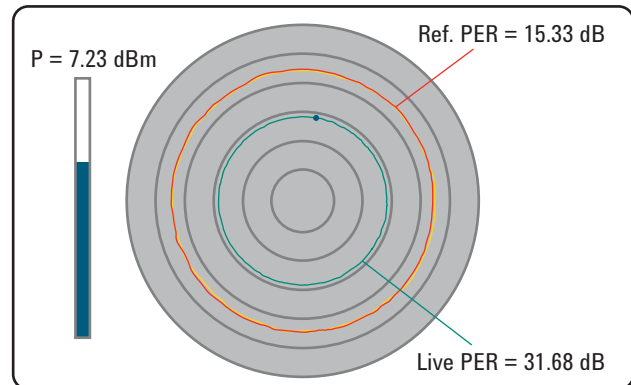


Figure 2.

### Splice angle characterization

For characterizing an optical connection between two polarization maintaining fibers (PMFs), such as an optical splice, two thermal cycling units (N7783B) can be used. This eliminates the influence of input polarization or subsequent fibers at the output and isolates the angular misalignment of the connection located between the two thermal cycling units.



Figure 3.

## Specifications <sup>1</sup> N7782B PER Analyzer

### Wavelength

|   |                       |                    |
|---|-----------------------|--------------------|
| Specification wavelength range          | O-Band (Opt. 300)     | 1270 nm to 1375 nm |
|   | O/C/L-Band (Opt. 400) | 1270 nm to 1375 nm |
|   |                       | 1460 nm to 1620 nm |
|   | C/L-Band (Opt. 500)   | 1460 nm to 1620 nm |
| Operating wavelength range <sup>2</sup> | 1260 nm to 1640 nm    |                    |

### PER analysis

|   |                     |         |
|---|---------------------|---------|
| PER range <sup>3,4</sup>                                    | 0 dB to 50 dB       |         |
| PER uncertainty, single-TCU method (typical) <sup>3,4</sup> | PER= 0 dB to 30 dB  | 0.30 dB |
|   | PER= 30 dB to 50 dB | 0.60 dB |

### Splice angle analysis

|  |   |
|--|---|
| Splice angle uncertainty, dual-TCU method (typical) <sup>3,4</sup> | $\pm (0.1^\circ + 4\% \times \text{Angle})$ |
|--|---|

### Optical power

|                   |                   |
|-------------------|-------------------|
| Input power range | -50 dBm to +7 dBm |
|-------------------|-------------------|

### Internal laser source

|                                     |                        |                    |
|-------------------------------------|------------------------|--------------------|
| Wavelength                          | O-Band (Opt. 401)      | 1290 nm to 1360 nm |
|                                     |                        | 1310 nm typical    |
|                                     | C-Band (Opt. 501, 401) | 1510 nm to 1580 nm |
|                                     |                        | 1550 nm typical    |
| Output power (typical) <sup>5</sup> | O-Band (Opt. 401)      | -12 dBm            |
|                                     | C-Band (Opt. 501, 401) | -10 dBm            |

1. Ambient temperature change max.  $\pm 0.5^\circ\text{C}$  since normalization. Specification valid on day of calibration.
2. PER measurements are possible outside the specification wavelength range if the user performs a manual calibration. Note that a fully polarized light source is needed for calibration.
3. Input power > -30 dBm.
4. Narrow-band light source with DOP > 95% needed.
5. At room temperature.

## Specifications <sup>1</sup> N7783B Thermal Cycling Unit

### Temperature

Minimum peak-to-peak temperature tuning range (typical) <sup>2</sup> 50 K

Ambient temperature range 20 °C to 30 °C

### Ordering instructions

#### Optical connector options

N7782B-021 Straight contact connectors

N7782B-022 Angled contact connectors

#### Wavelength and source options

N7782B-400 1270 to 1375 nm and 1460 to 1620 nm

N7782B-401 1270 to 1375 nm and 1460 to 1620 nm with 1300/1550 nm dual VCSEL source

N7782B-500 1460 to 1620 nm

N7782B-501 1460 to 1620 nm with 1550 nm VCSEL source

### Connector interface

The N7782B should usually be ordered with one or two 81000xl connector interfaces, depending on desired connector type and on whether a source option is selected. (not included).

### Accessories

5063-9240 Rack mount kit for 1 unit with filler panel

5063-9212 + 5061-9694 Rack mount parts for 2 units side-by-side

### Warranty

All systems have 1 year warranty

R-51B-001-3C 1 year Return-to-Agilent warranty extended to 3 years

R-51B-001-5C 1 year Return-to-Agilent warranty extended to 5 years

### Calibration

R-50C-011-3 Agilent calibration upfront support plan 3 year coverage

R-50C-011-5 Agilent calibration upfront support plan 5 year coverage

### General characteristics

Dimensions (D x W x H) 380 mm x 213 mm x 88 mm  
(excluding front and back rubber cushions and handle)

For N7783B 160 mm x 57 mm x 62 mm

Weight Approx. 4 kg

Recommended recalibration period 24 month

Operating temperature +5 °C to +40 °C

Operating humidity 0% to 80%, non-condensing

Altitude The maximum operating altitude is 2000 m.

Pollution protection Pollution degree 2.

Warm-up time 20 minutes

Interfaces The instruments can be controlled via USB or GPIB interfaces

Power consumption Line power: AC 100 to 240 V ± 10%, 50/60 Hz, 60 VA max.

For N7783B Line power: AC 100 to 240 V ± 10%, 47 to 63 Hz, 1.0 A max.

1. Ambient temperature change max. ± 0.5 °C since normalization. Specification valid on day of calibration.

2. Measured on the surface of the TEC elements.



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Revised: June 8, 2011

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Published in USA, July 26, 2011  
5989-8111EN

