

Agilent N7781B/N7781BD Polarization Analyzer Data Sheet



Agilent N7781B



Agilent N7781BD

Key features

- Measurement of Stokes parameter (SOP)
- Measurement of degree of polarization (DOP)
- High-speed operation (> 1 MSamples/s)
- Analog output ports for DOP/SOP data
- Robust, no moving parts

Introduction

The Agilent N7781B is a compact high-speed polarization analyzer that provides comprehensive capabilities for analyzing polarization properties of optical signals. This includes representation of the state of polarization (SOP) on the Poincaré sphere (Stokes parameter). The on-board algorithms together with the on-board calibration data ensure highly accurate operation across a broad wavelength range. The Agilent N7781BD also contains a windows based computer unit which allows operation independent from external PCs.

Due to its real time measurement capability (1 MSamples/s), the instrument is well suited for analyzing disturbed and fluctuating signals as well as for control applications requiring real time feedback of polarization information.

Analog data output ports are provided, for example for support of control loops in automated manufacturing test systems.

The provided analysis software allows a comprehensive analysis of the obtained measurement data.



Applications

- Monitoring / measurement of:
 - State of polarization (SOP)
 - Stokes parameter
 - Degree of polarization (DOP)
- High-speed analysis of SOP/DOP of signals in recirculating loop setups
- Analysis of PM-fiber extinction ratio
- Performance analysis of polarization scramblers
- Intrusion detection

N7781B/BD instrument setup and application examples

The instrument setup of the N7781B/BD polarization analyzer is shown in Figure 1. It consists of a unique polarimeter optics and a high-speed sampling subsystem. The measurement principle is based on splitting the light into four sub beams which are filtered through different polarization filters. The resulting four power levels are evaluated using on-board calibration data to obtain an accurate SOP- and DOP-measurement.

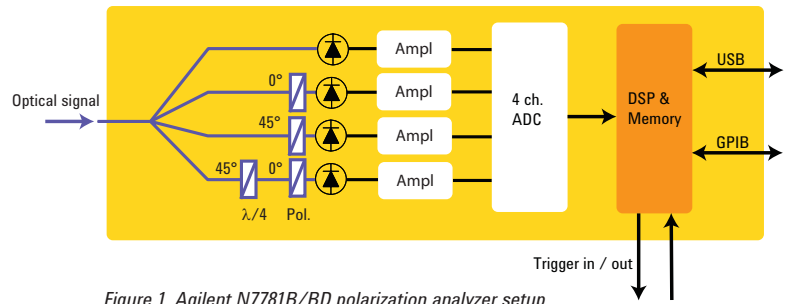


Figure 1. Agilent N7781B/BD polarization analyzer setup

Alignment of polarization maintaining fibers

Accurate alignment of the polarization axis of polarization maintaining fibers is crucial for the performance of a large range of optical components. The N7781B/BD allows, due to its high-speed capability, real time feedback regarding the currently achieved polarization extinction ratio (PER). See also N7783B for automated PER measurements.

Recirculating loop experiments

Managing the polarization properties of the fiber loop is mandatory for successfully conducting experiments with such structures. The N7781B/BD high speed polarization analyzer allows an analysis of the SOP and the DOP of the circulating signal. The high sampling rate and the trigger capabilities of the instrument, allow detailed analysis of the evolution of the SOP and the DOP along each revolution.

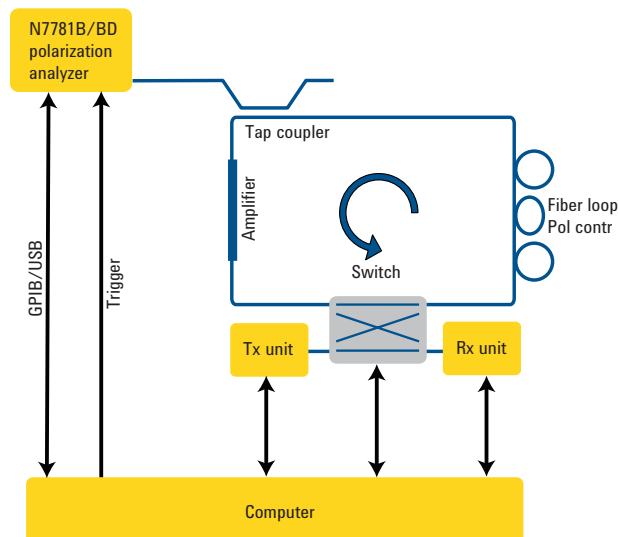


Figure 2. Recirculating loop experiments

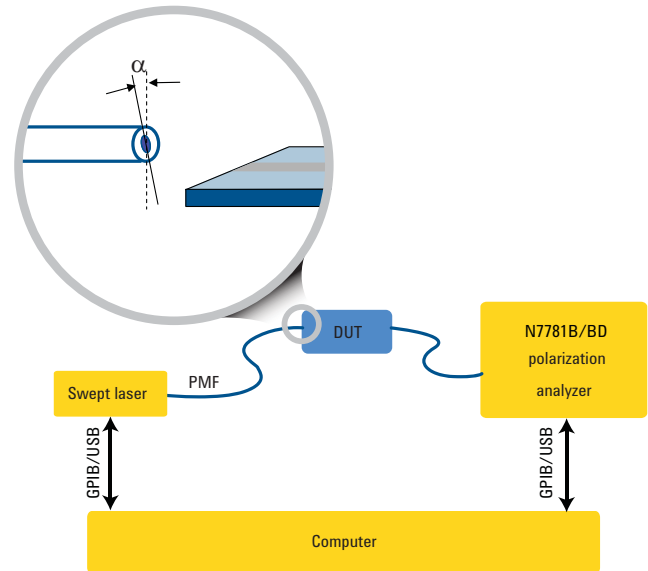


Figure 3. Alignment of polarization maintaining fibers

Event trigger

Advanced communication systems are sensitive to rapid polarization changes (“events”) on fiber links. Such events may be caused for example by trains passing by or by vibrations on bridges. The speed of the polarization events are of concern for system integrators and network operators. The event trigger function of the N7781B/BD allows detecting and recording such events.

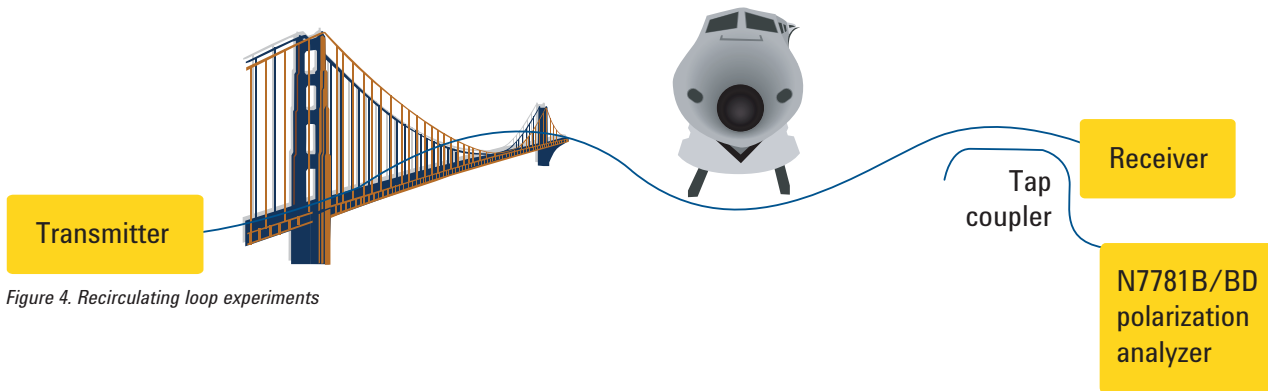


Figure 4. Recirculating loop experiments

Table 1. Specifications¹⁾ - N7781B/BD Polarization Analyzer

Wavelength	
Specification wavelength range	1270 nm ... 1375 nm (Opt 300, O-Band) 1270 nm ... 1375 nm, 1460 nm ... 1620 nm (Opt 400, O/C/L-Band) 1460 nm ... 1620 nm (Opt 500, C/L-Band)
Operating wavelength range ²⁾	1260 nm ... 1640 nm
Polarization Analysis	
SOP uncertainty (typical) ^{3),4)}	1.5°
DOP uncertainty ³⁾	± 2.0 %
DOP uncertainty after user calibration (typical) ^{3),5)}	± 0.5 %
Maximum sampling rate	1 MHz
Optical Power Measurement	
Relative Power Uncertainty ³⁾	C/L-Band: ± 30 mdB (± 20 mdB typ.) O-Band: ± 70 mdB (± 40 mdB typ.)
Input power range	-50 dBm ... +7 dBm
Maximum safe optical input power	12 dBm

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

2) SOP/DOP measurements are possible outside the specification wavelength range if the user performs a manual calibration.

3) Input power > -30 dBm

4) DOP > 95%

5) User calibration requires a source with DOP = 100%.



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