DATA SHEET

N7781B Polarization Analyzer

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

KEYSIGHT TECHNOLOGIES

Introduction

The Keysight Technologies, Inc. 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.

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 Polarization Navigator software is included and 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 recirculating signal
- Analysis of PM-fiber extinction ratio
- Performance analysis of polarization scramblers
- Intrusion detection

N7781B Instrument Setup And Application Examples

The instrument setup of the N7781B polarization analyzer is shown in Figure 2. 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 polarizers. The resulting four power levels are evaluated using on-board calibration data to obtain an accurate SOP- and DOP-measurement.

Recirculating Loop Experiments

Managing the polarization properties of the fiber loop is mandatory for successfully conducting experiments with such structures. The N7781B 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.

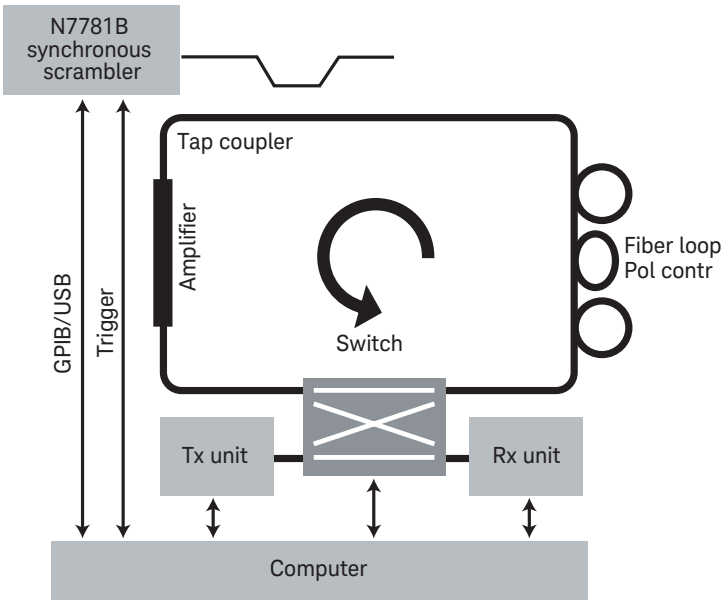

Figure 1. Recirculating loop experiments

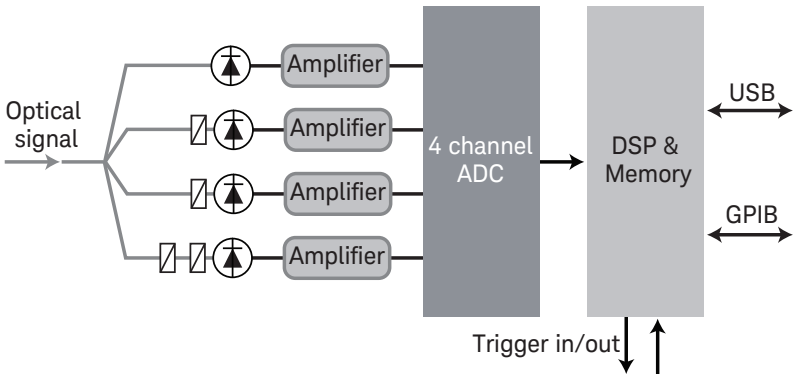

Figure 2. Keysight N7781B polarization analyzer setup

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, with its high-speed capability, delivers real time feedback regarding the currently achieved polarization extinction ratio (PER). It can also be used with the N7783B for automated PER measurements.

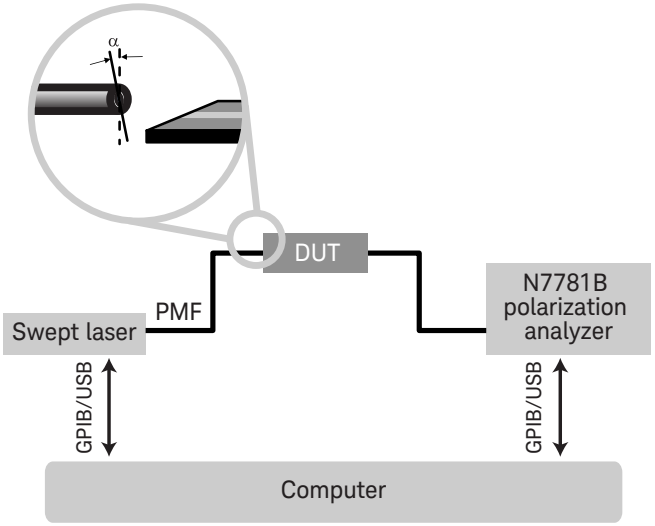

Figure 3. Alignment of polarization maintaining fibers

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 allows detecting and recording such events.

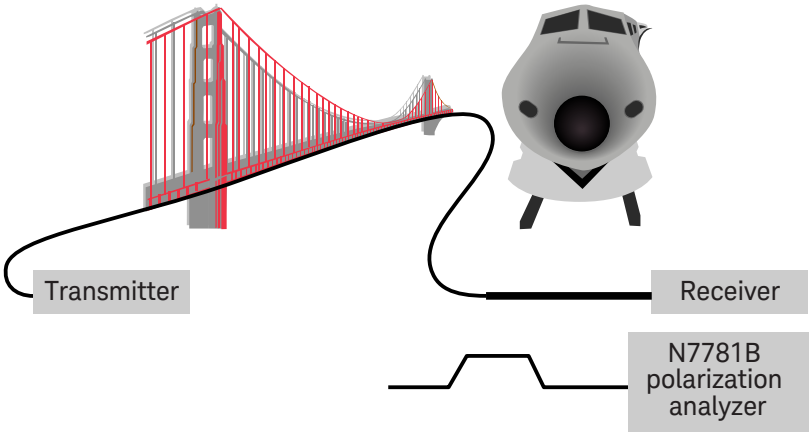

Figure 4. Detecting polarization events

Specifications [1] - N7781B Polarization Analyzer

Wavelength		
Specification wavelength range	Opt 300, O-Band	1270 nm to 1375 nm
	Opt 400, O/C/L-Band	1270 nm to 1375 nm, 1460 nm to 1620 nm
	Opt 500, C/L-Band	1460 nm to 1620 nm
Operating wavelength range [2]	1260 nm to 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	±0.03 dB (±0.02 dB typical)
	O-Band	±0.07 dB (±0.04 dB typical)
Input power range	–50 dBm to +7 dBm	
Maximum safe optical input power	12 dBm	
Ordering instructions		
Optical connector options		
N7781B-021	Straight contact connectors	
N7781B-022	Angled contact connectors	
Wavelength options		
N7781B-300	1270 nm to 1375 nm	
N7781B-400	1270 nm to 1375 nm and 1460 nm to 1620 nm	
N7781B-500	1460 nm to 1620 nm	
Connector interface		
The N7781B should usually be ordered with one 81000xI connector interface, depending on desired connector type. (not included).		

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% and is valid at fixed wavelength.

Specifications [1] - N7781B Polarization Analyzer (continued)

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
Calibration	
Select Keysight calibration plan	
R-50C-011-3	3-year calibration assurance plan (return to Keysight): Priority calibration service covering all calibration costs for 3 years; 15% cheaper than buying stand-alone calibrations.
R-50C-011-5	5-year calibration assurance plan (return to Keysight): Priority calibration service covering all calibration costs for 5 years; 20% cheaper than buying stand-alone calibrations.
General characteristics	
Dimensions (D x W x H)	380 mm x 213 mm x 88 mm (excluding front and back rubber cushions and handle)
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.

Learn more at: www.keysight.com

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