



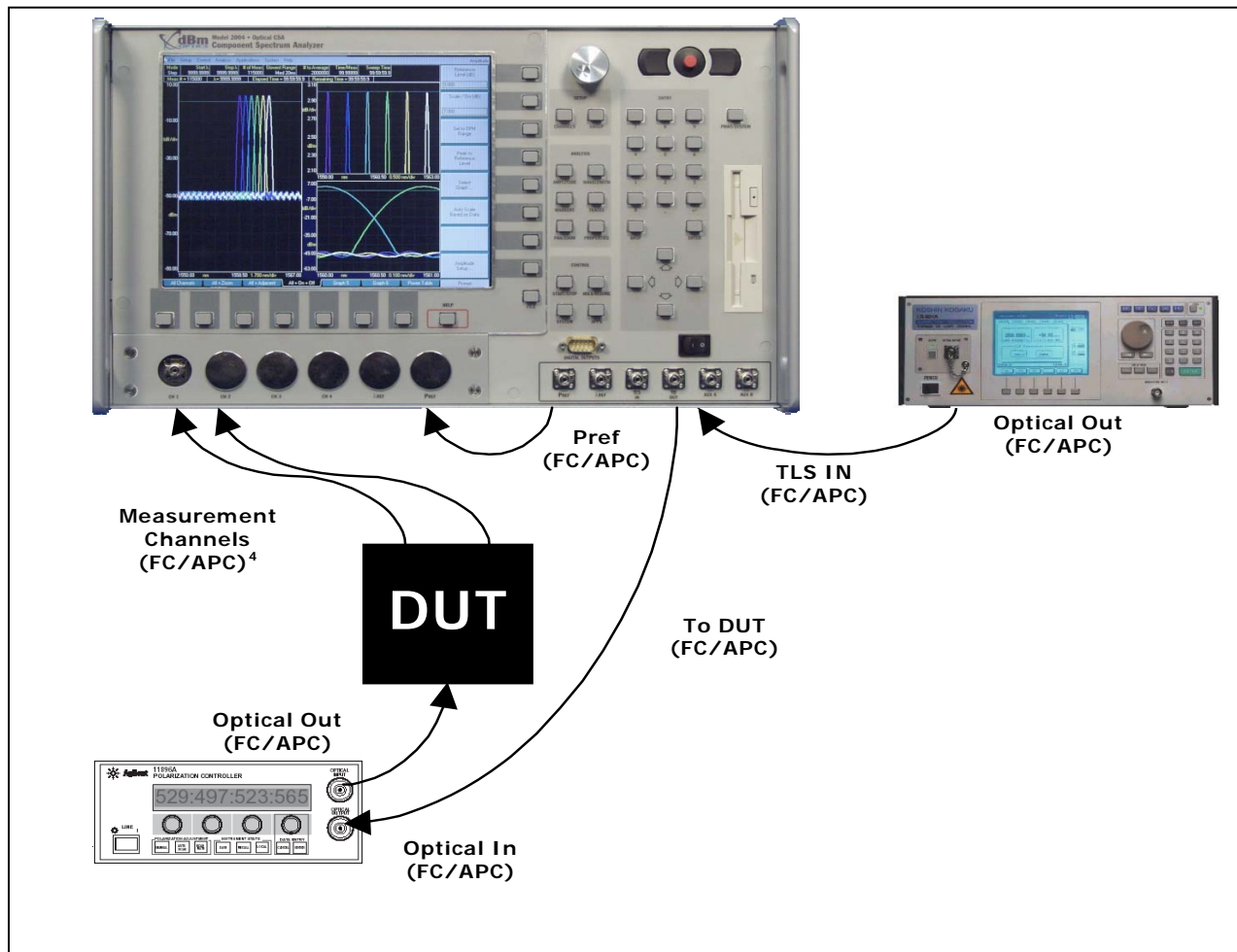
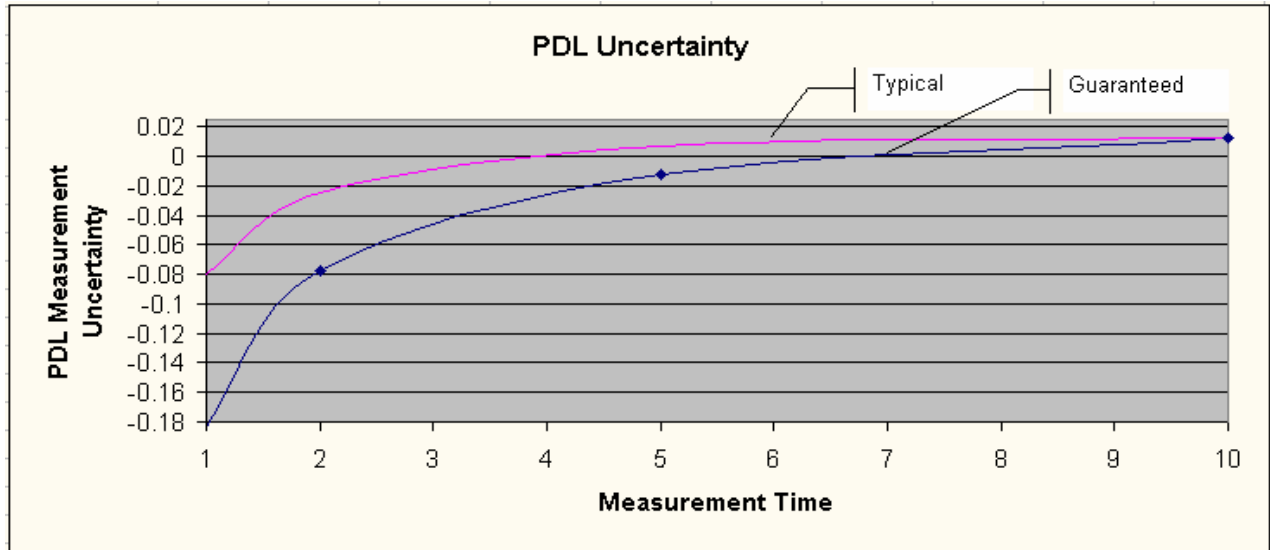
PDL/All States Measurement with the 952 Option

Overview

This application note describes how to make “all states” (also referred to as “max-min”) PDL measurements using the dBm Optics 952 option (also applies to the 951 option with a user-supplied Agilent 11896A Polarization Controller). It also specifies performance for polarization-independent insertion loss measurement. In addition, this note outlines the setup for high precision confirmation of a PDL reference, such as the dBm Optics PD-F series standards.

Performance Specifications

Wavelength Operating Range	1250-1630 nominal; extended 1250-1650 with lower specifications
Insertion Loss Uncertainty	
With Power Reference Option	CSA specification with Power Reference
Without Power Reference Option	CSA specification +0.1dB over any 100 nm range without Power Reference
Dynamic Range	+10 to -95 dBm with 202 measurement option; +10 to -73 dBm with 201 measurement option
Polarization Extinction Ratio	>40 dB
Measurement Speed²	PDL measurement in 1 second; higher resolution and accuracy at higher measurement times
PDL Measurement Range	0.005 to 50 dB (for high values of PDL, often termed extinction ratio, contact dBm Optics Applications for special high-accuracy Extinction Ratio measurement)
PDL Measurement Accuracy¹	
Absolute power from device >-30 dBm	((+0.015 dB/-0.005 dB) ± .03% of PDL)
	((+0.010 dB/-0.005 dB) ± .03% of PDL) typical
Absolute power from device <-30dBm	((+0.020 dB/-0.010 dB) ± .15% of PDL)
PDSR Polarization Dependent Split Ratio Accuracy	±(0.005 dB + .03% of PDSR) typical
Polarization-Independent Insertion Loss Measurements	Recommended measurement time 1 second
Option Contents	SCPI and front panel PDL (max-min) capability and PDL offset value, FC/PC-FC/APC patch cord (CSA to polarization controller), and Model A11896A Polarization Controller



Confirming Performance of dBm PDL References

Setup

The test setup is identical to that shown previously. Note the details below.

1. Visually inspect each fiber face prior to connection. Include the connections in the bulkhead adapters of the CSA. This step is critical to accurate PDL measurement. Even a small spec of dust on a connector can generate >0.1 dB of PDL.
2. Use tape to secure every fiber. Ensure no fiber loops with diameter <2.5". Wait for 30 minutes after fibers are secured for fiber to relax.
3. Set the Tunable laser source for:
 - a. Maximum power
 - b. Coherence control on (or low frequency modulation of 230 KHz, maximum level)
 - c. Automatic power control on or off, not important
 - d. Wavelength to test wavelength
4. Set the Polarization Controller for:
 - a. Rate 8
 - b. Manual
5. Set the CSA for
 - a. Time Sweep
 - i. $\lambda = \lambda(\text{test})$
 - ii. 2000 readings
 - iii. 500 samples to average
 - iv. Amplitude, Auto Reference level ON
 - b. Channels to
 - i. Range Fast 10 dB
 - ii. Channel Filter ON
 - iii. Relative measurement mode, Splitter cal on.

Verify Setup

1. Run one sweep.
 - a. Ensure ΔP on channel 5 (max-min at top of display when trace 5 is selected) is < 0.010 dB
 - b. Ensure Power on channel 5 is no more than 8 dB below the TLS power
 - c. Ensure the Relative power on channel 1 (assumed to be the DUT channel for this procedure) is no less than 3 dB
2. Run 10 sweeps. Record the PDL (max-min on channel 1) for each sweep. Ensure the PDL of each sweep is within ± 0.01 dB of the expected PDL.

Notes:

- ¹ Accuracy specification for measurement time 10 seconds. For faster measurement time, see speed vs. PDL uncertainty chart.
- ² PDL measurement setup: Readings to average 400, Readings per sweep = [Desired Measurement Time in Seconds * 250], Power Reference ON, Filter setting not important, Channel range = fixed range just above maximum absolute measurement value.
- ³ Note: All connections must be very clean (visual microscope inspection recommended) to maintain accuracy.
- ⁴ Using FC/APC connectors on the DUT output will add ~0.017 dB PDL typical.

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