

# Insertion Loss Measurements for Polarization Sensitive Devices

MT9820  
All Band Optical Component Tester

## Introduction

The MT9820 has been developed as a fast and versatile measurement instrument using internal wavelength and power referencing through standard optical components. The MT9820 does not integrate PM components, however controlling the polarization states is possible with a simple set-up, described here, allowing to perform an accurate characterization of polarization sensitive devices.

## Background

The MT9820A is an optical test system designed to perform rapid insertion loss measurements on any fiber or bulk optical component over the entire telecom band, from 1250nm to 1650nm.

To enhance a high accuracy on the full wavelength range, none of the internal optical connections use PM components. It is nevertheless possible to test polarization sensitive devices, easily and quickly, applying the simple procedure described hereafter.

## Measurement with PM fibers

### *Set up description*

A simple set up is described in fig. 1.

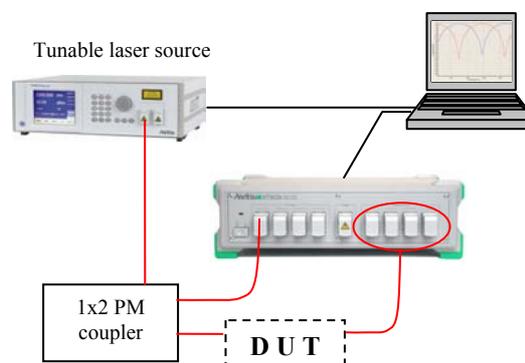


Figure 1: Set up for PM measurement

The TLS is connected to the DUT with a 1x2 PM coupler which leaves the polarization unchanged. A 50/50 coupler should be a fair choice. The total power entering the MT9820 should fit with the instrument specifications.

Part of the light is directed toward the MT9820 for referencing purpose (it does not need to be PM). This connection will guarantee accuracy better than 5pm on the displayed transfer function.

The MT9820 is connected to the PC driver as usual through the USB cable. The instrument is synchronized with the acquisition through GPIB connection with the PC or through a BNC connection with the MT9820.

*Calibration phase*

This configuration by itself could not be used directly to measure the transfer function through the DUT as the power information detected by the MT9820 is not similar to the one entering the DUT.

To identify correctly the power losses through the DUT, a power referencing is first required. The set up for this referencing is straightforward, replacing the DUT by a lossless direct optical connection:

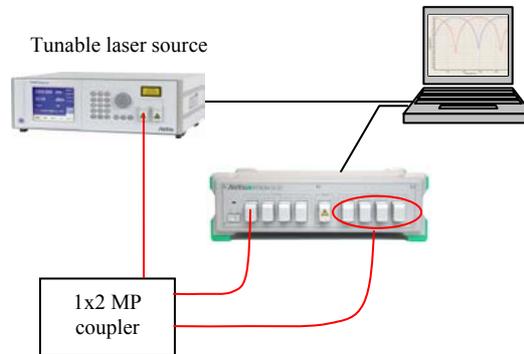


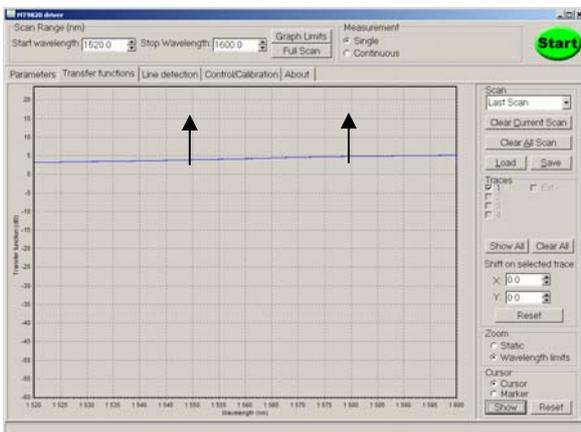
Figure 2: Calibration set up

Each detector which needs to be used in that configuration has to be recalibrated independently.

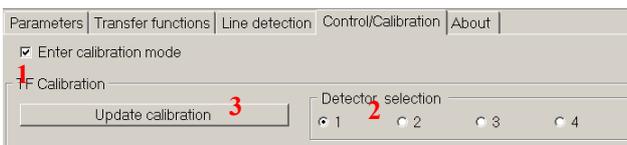
Run now the software driver of the MT9820:

The parameters describing the tunable laser source are entered in the parameter window as for any measurement. The whole TLS accessible bandwidth **must** be used for this auto calibration.

A single run is performed, using a low sampling resolution (64pm should always fit), which provides a faked transfer function for the coupler. Its value could be weird (positive values may appeared as in the example below) as it uses the external signal instead of the one flowing from the MT9820 output (which is referenced internally). The curve obtained is only an indication and is solely used for this calibration purpose.



Activate the “Control/Calibration” tab to perform the auto referencing:



1. Click on “Enter the calibration mode”.
2. Select the detector considered (each detector must be calibrated independently) if the single run has been properly performed.
3. Click on “Update calibration” and “ok” on the message box. The auto calibration is done and the new values are in the calibration file.

The calibration file lies in the PC disk which means that:

- It does not affect the instrument memory,

- A reset will restore the initial factory configuration,
- The new calibration is PC dependant.

The calibration relevance could be validated by running a new scan on the whole range. A 0dB constant curve should appear.

The initial factory calibration may be easily restored by clicking on “Reset calibration” in the same window.

### *Measurement*

Once the new calibration has been performed, the measurement set up is operational, keeping the set up untouched for the coupler part.

The source may differs from the one used for the calibration as the calibration concerns power ratios, not power by itself.

The DUT must be positioned between the coupler output and the calibrated detector in the MT9820, as shown in fig. 1. The whole link between the source and the detector could then be with PM optical component, at the convenience of the user.

The characterization of polarization sensitive device can now be started, with the same velocity and high accuracy as for standard optical components, on the wavelength range provided by the chosen Tunable Laser Source.

### **Conclusion**

This application note has shown that even if the polarization states of an incoming light are not maintained in the MT9820, it is nevertheless possible to take profit of the high accuracy of this instrument to measure the insertion loss of polarization sensitive devices, with a simple set-up and procedure.

### **More Information**

Visit the MT9820 Product Page at [www.anritsu.com](http://www.anritsu.com)



Specifications are subject to change without notice.

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