DWDM Analyser v. beta

Users Guide

February 2011

Inometrix Inc.
80 King Street East, Suite 204
Stoney Creek, Ontario, L8G 1K2
Phone: 289-887-6195
Email: sales@inometrix.com
Web Site: www.inometrix.com

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INTRODUCING THE DWDM ANALYSER V. BETA

Congratulations on your purchase of the Inometrix DWDM Analyser v. beta. This manual outlines the installation procedure as well as the use of the instrumentation software. After reading this manual you should find that integrating the system with your tunable laser and using the software is a relatively simple and straightforward process. As always if you do encounter any difficulties we are always here to help so please don't hesitate to contact us.

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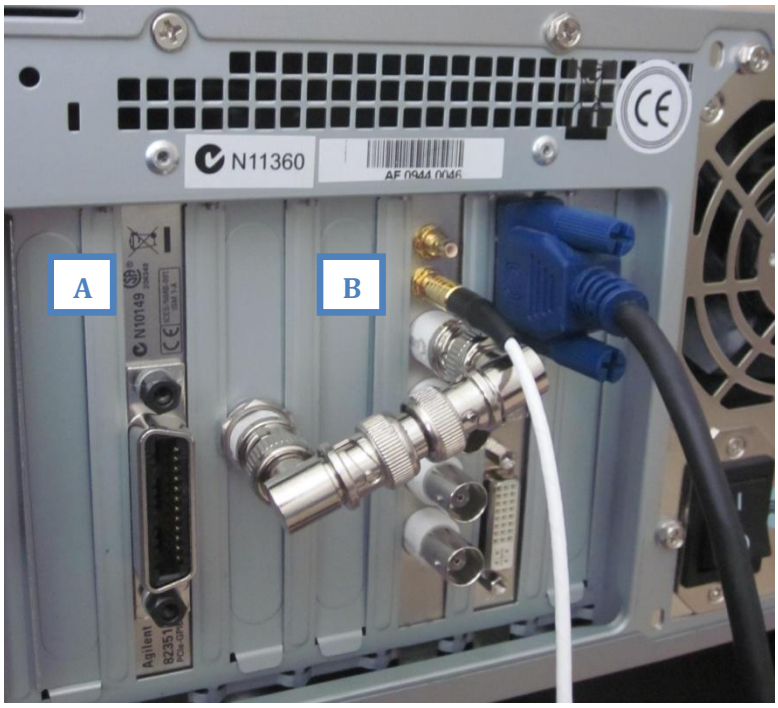
Enjoy your new DWDM Analyser!

STEP 1: CONNECT POWER CABLES & PERIPHERALS

A. **Keyboard**
B. **Mouse**
C. **Monitor (VGA Connection to monitor)**
D. **Power**

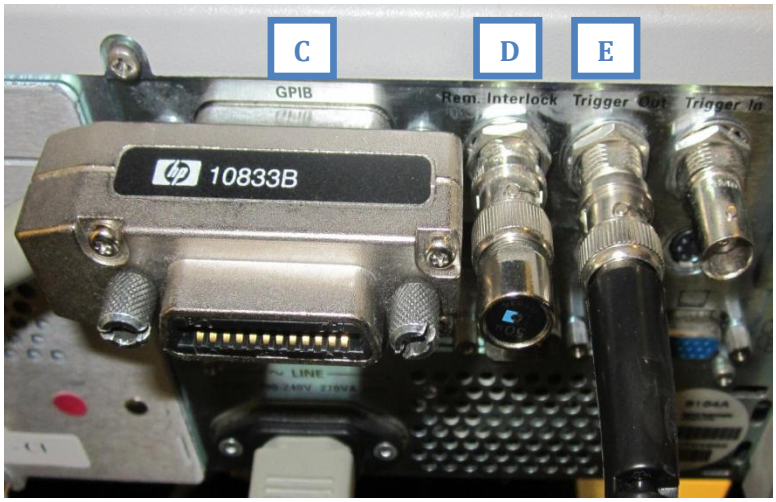
Connect the keyboard, mouse and monitor provided with the system to the connections on the reverse side of the DWDM Analyser.

STEP 2: CONNECT TRIGGER & GPIB CABLES



DWDM Analyser

A. GPIB port
B. Trigger In (SMB side)



Tunable Laser Mainframe (Agilent 8164 A/B)

C. GPIB port
D. Trigger Out (BNC side of cable provided)
E. Remote Interlock Resistor

1. Connect a GPIB cable (not included) to the GPIB port of the DWDM Analyser (A).
2. Connect the other side of the GPIB cable to the GPIB port on Tunable Laser mainframe (C).
3. Connect the SMB side of the SMB-to-BNC connector (provided) to the SMB port of the DWDM Analyser (B).
4. Connect the BNC side of the SMB-to-BNC connector (provided) to the 'Trigger Out' port of the Tunable Laser Mainframe (E).
5. Ensure that the 'Remote Interlock' resistor is connected (D).

STEP 3: CONNECT YOUR TUNABLE LASER SOURCE

A. ***Laser In*** **port of DWDM Analyser**
B. ***Laser Out*** **port of Tunable Laser**

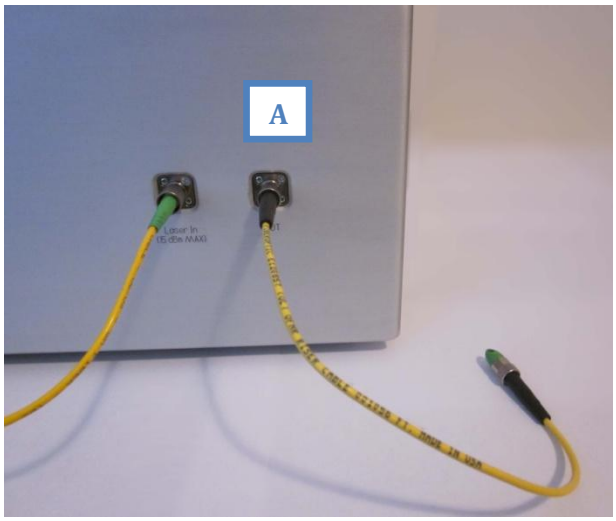
Connect an FC/APC to FC/APC optical patch cord (green connectors on both ends) between the *Laser In* port of the DWDM Analyser and the *Laser Out* port of the Tunable Laser. If you are using an 81600B series Tunable Laser with two output ports use the *'High Power'* output.

Notes:

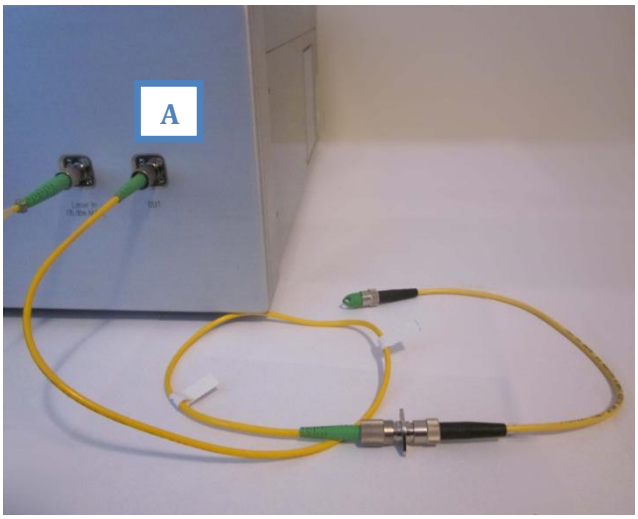
1. ***Use only FC/APC to FC/APC patch cords between ports A and B.***
2. ***Be careful not to turn the connectors too tightly as this will damage the FC/APC connector inside the system.***

STEP 4: CONNECT THE DEVICE UNDER TEST

Configuration A



Configuration B



Connect the Device Under Test (DUT) to the ***DUT port*** of the DWDM Analyser (A).

Configuration A: Connecting the device under test directly to the DUT port
Configuration B: Connecting an FC/APC to FC/APC patch cord between the DUT port and the device under test. Note in this image the DUT is a FC/PC patch cord.

We recommend using configuration B *exclusively* as it:

1. Reduces the amount of dust introduced into the DUT port.
2. The FC/APC (green) to FC/PC (black) connection between the patch cord and the DUT can be easily cleaned.
3. The FC/APC patch cord can be brought to the device under test allowing for the testing of remote devices.
4. Prevents damage to the FC/APC connector at the DUT port.

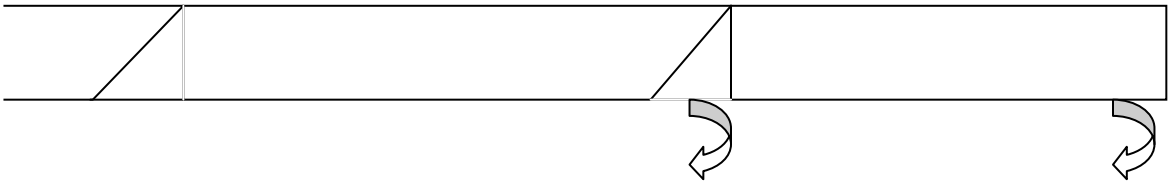
<u>Be careful not to turn the connectors at the FC/PC to FC/APC interface too tightly</u>

Measurement Setup

In order to measure the device under test a cavity must be produced around it. This is done by using the reflections produced by flat FC/PC connectors. FC/APC connectors are used at the interface to ensure only one reflection occurs at the first (second) facet of the device under test since reflections from FC/APC connectors are suppressed.

Configuration A:

DUT Port (APC) FC/APC to FC/APC patch cord (optional) Device under Test



A cavity is formed around the device under test to produce two reflections (from both facets of the cavity).

If the device under test is FC/APC connectorized instead of FC/PC, then the following connections should be used to form a cavity around the device under test.

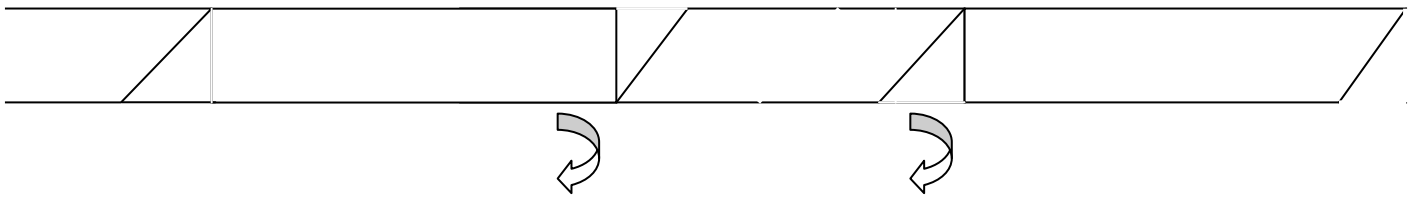
Configuration B:

DUT Port (APC) FC/APC to FC/APC patch cord Device under Test

Configuration C:

If the device under test has FC/APC connectors on both ends, then the following connections should be used to form a cavity around the device under test.

DUT Port (APC) Device under Test

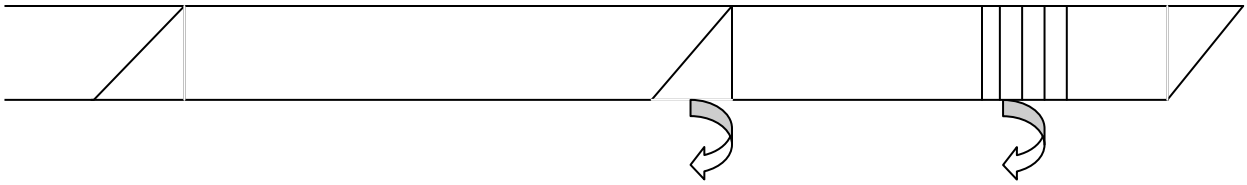


FC/APC to FC/APC patch cord FC/PC to FC APC patch cord

Configuration D:

If the device under test is a bulk reflective element such as a Fiber Bragg Grating then the following configuration is required.

DUT Port (APC) FC/APC to FC/APC patch cord (optional) Device under Test APC



We recommend that the distance between the first and second reflection be between 10 and 20 centimetres.

STEP 5: TURN ON THE INSTRUMENT & START THE PROGRAM

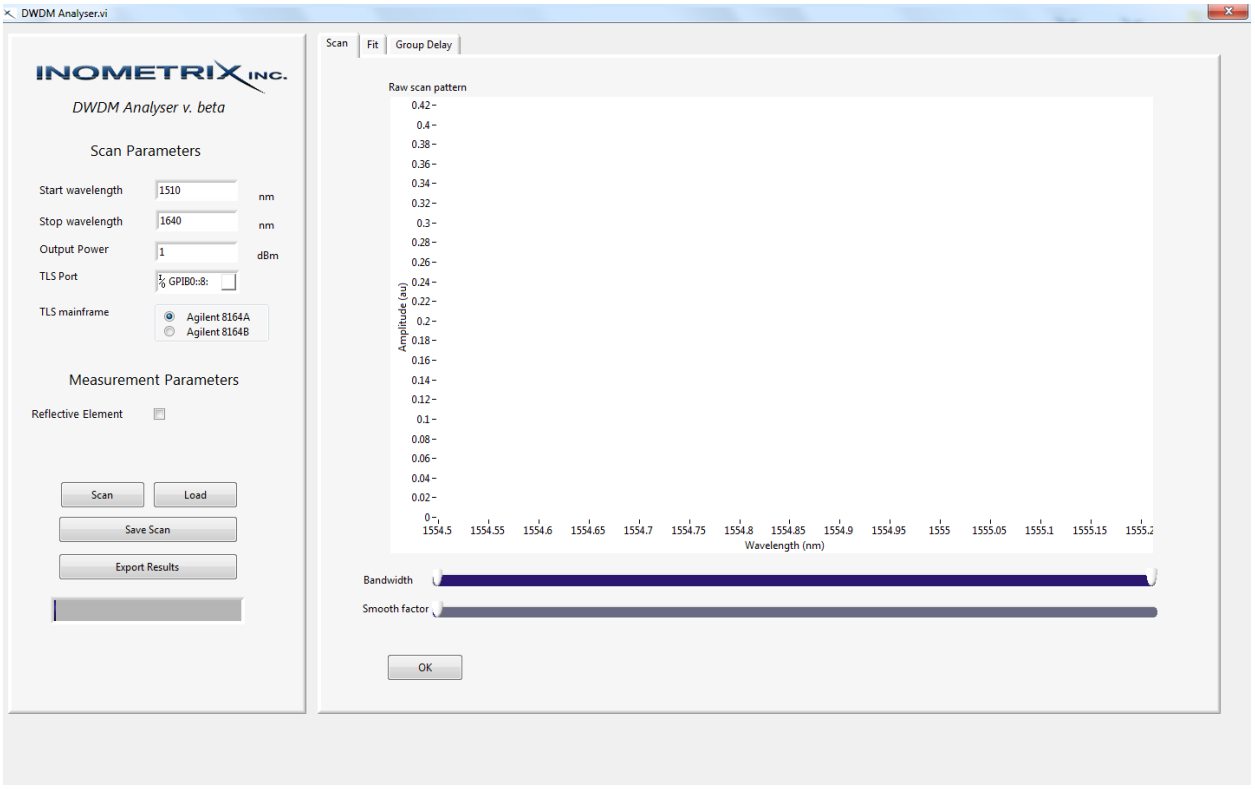
Push the *Power* button on the front panel.

Double click the shortcut to the DWDM Analyser v. beta software.

STEP 6: GET TO KNOW THE FRONT PANEL

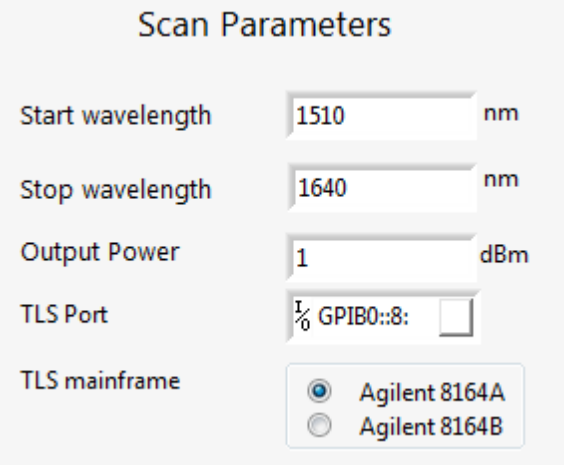
This step will describe the function of the instrument controls. The next step will demonstrate the use of the instrument controls by loading one of the sample scans provided.

Below is an image of the front panel of the DWDM Analyser.



Front Panel of the DWDM Analyser v. beta

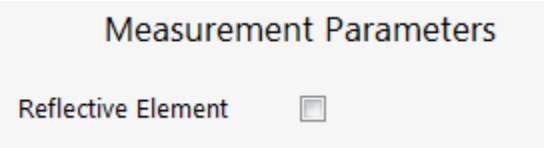
The front panel is divided into two sections (left and right) as shown in the image above. The left section contains controls for the ***Scan Parameters*** and ***Measurement Parameters*** that are set before experiment runtime. The right section contains controls used during experiment runtime.



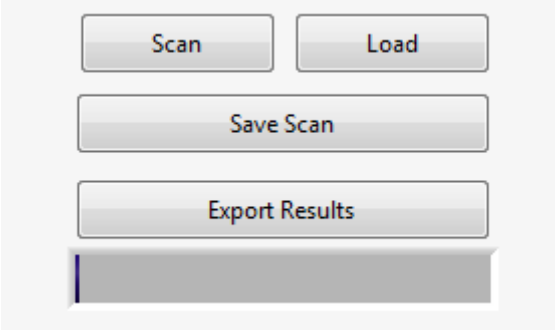
The ***Scan Parameters*** section sets the parameters for controlling the Tunable Laser Source. The controls include the **Start *wavelength, Stop wavelength*** and ***Output Power***. As there are various tunable laser sources that can be used with the system the program does not prevent out of bounds parameters from being input. The user must ensure that the maximum and minimum wavelengths as well as the maximum output power are within the bounds of the particular tunable laser used.

The ***TLS port*** is the GPIB address of the tunable laser mainframe used with the unit. By clicking on the white box the software automatically searches for attached GPIB communication ports.

The ***TLS mainframe*** is the mainframe of the tunable laser source used with the unit. The unit is compatible with both the older Agilent 8164A mainframe as well as the newer 8164B mainframes. The TLS mainframes are the controllers for the 816XXA and 816XXB series tunable laser source families.



The ***Measurement Parameters*** section sets the pre-runtime experiment parameters. Place a check on *Bulk reflective element* if you are using configuration 'D' from step 4.



Pressing the ***Scan*** button starts the tunable laser scan and begins the measurement.

The ***Load*** button imports the scan data from a saved scan.

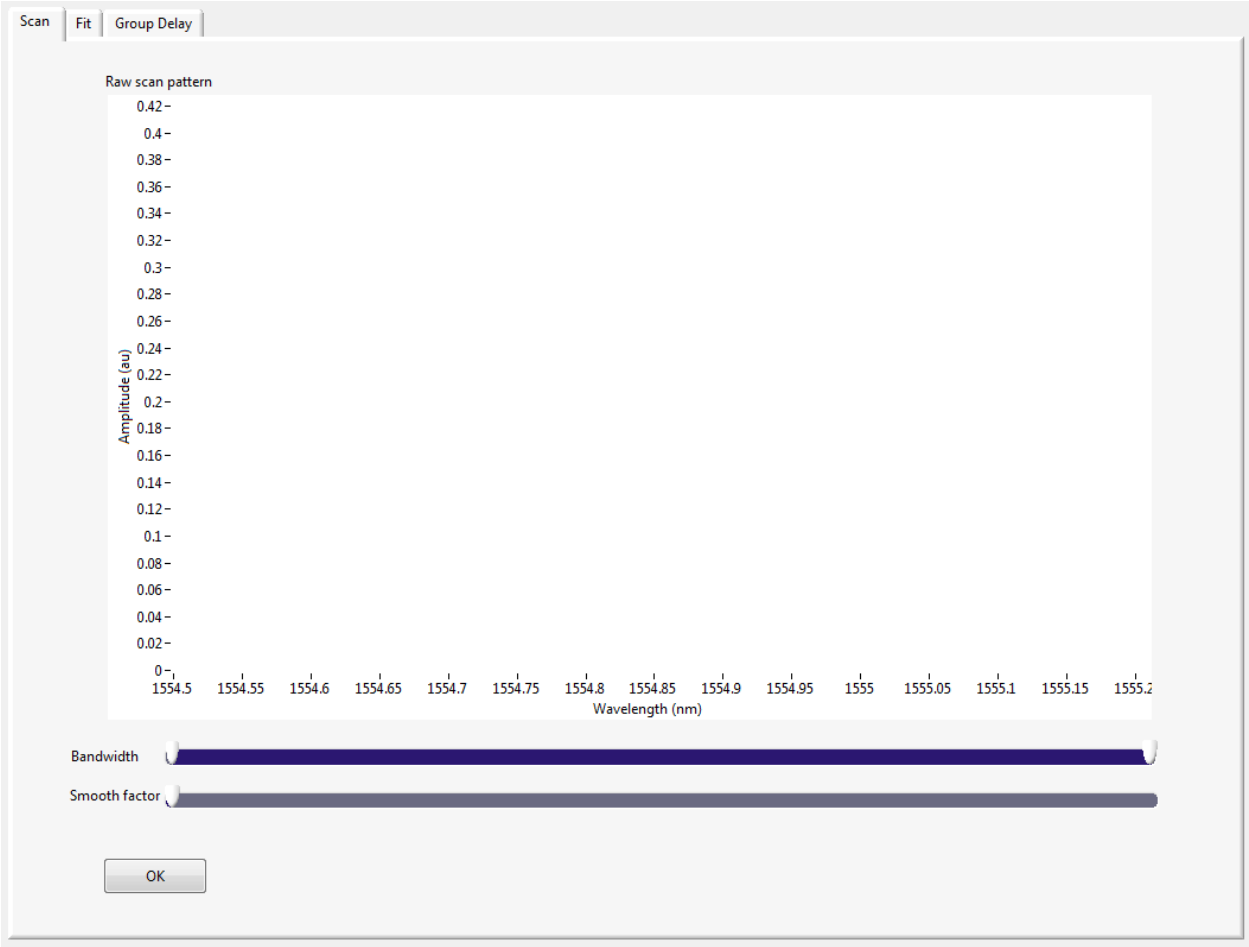
The ***Save Scan*** button saves the raw scan data of the current scan so that it can be loaded again at a later time.

The ***Export Results*** button saves only the measurement results of the current scan.

Note: ***Save Scan*** and ***Export Results*** generate generic data files that can be imported to Excel™, Notepad™ or Matlab™. They can be converted to text files by adding ***.txt*** to the filename.

The right section of the front panel contains tabs for controlling the experiment during runtime. The tabs are automatically selected during run time.

The ***Scan Tab***

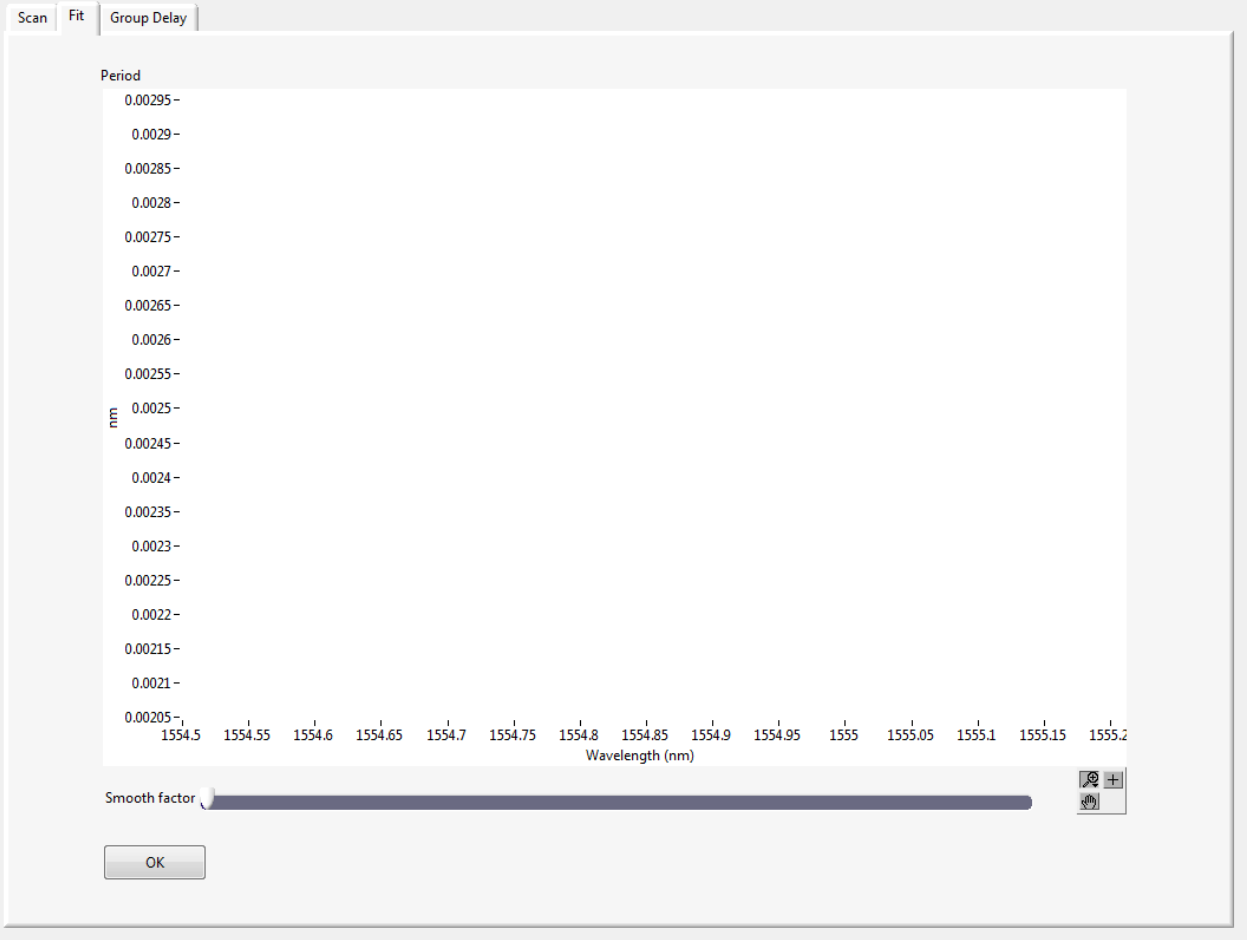


The Scan tab contains two cursors for controlling the fraction of the scan *Bandwidth* to be used in the measurement. Setting the first tab completely to the left and the second tab completely to the right indicates that the entire scan is to be used in the experiment. Moving the first cursor to the right and the second cursor to the left indicates that a subset of the full scan bandwidth is to be used in the measurement.

The *Smooth factor* cursor controls the number of times a windowing filter (3 point moving average) is applied to the Raw scan pattern. It conditions the signal for the next step.

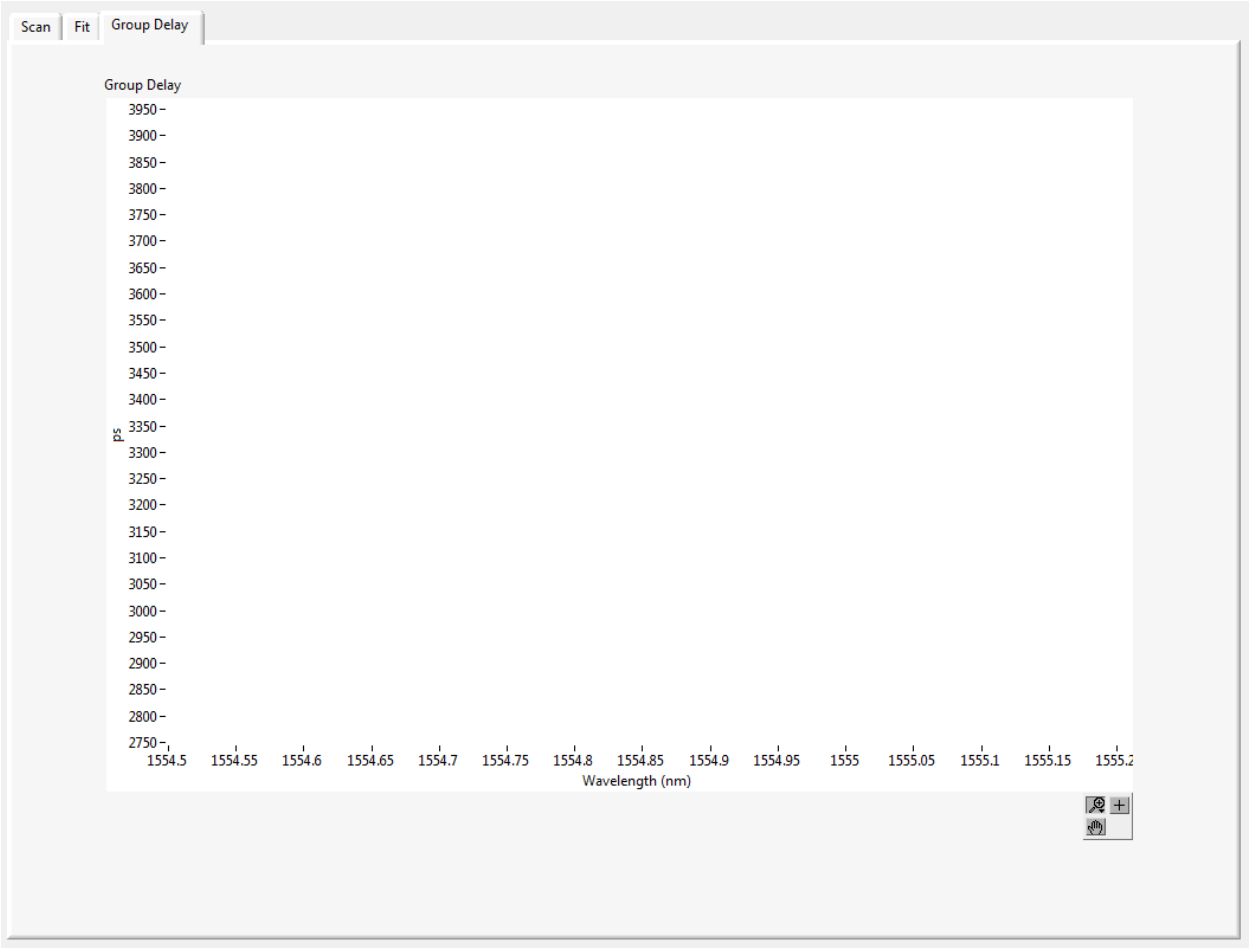
When this section is complete press the ***OK button*** to advance the measurement.

The ***Fit Tab***



The fit tab contains controls to fit the raw data. The raw data is 'fitted' via a moving average 3 point window filter. The Parameter slide controls the number of times this fitting filter is applied to the period data obtained from the scan pattern.

The ***Group Delay Tab***



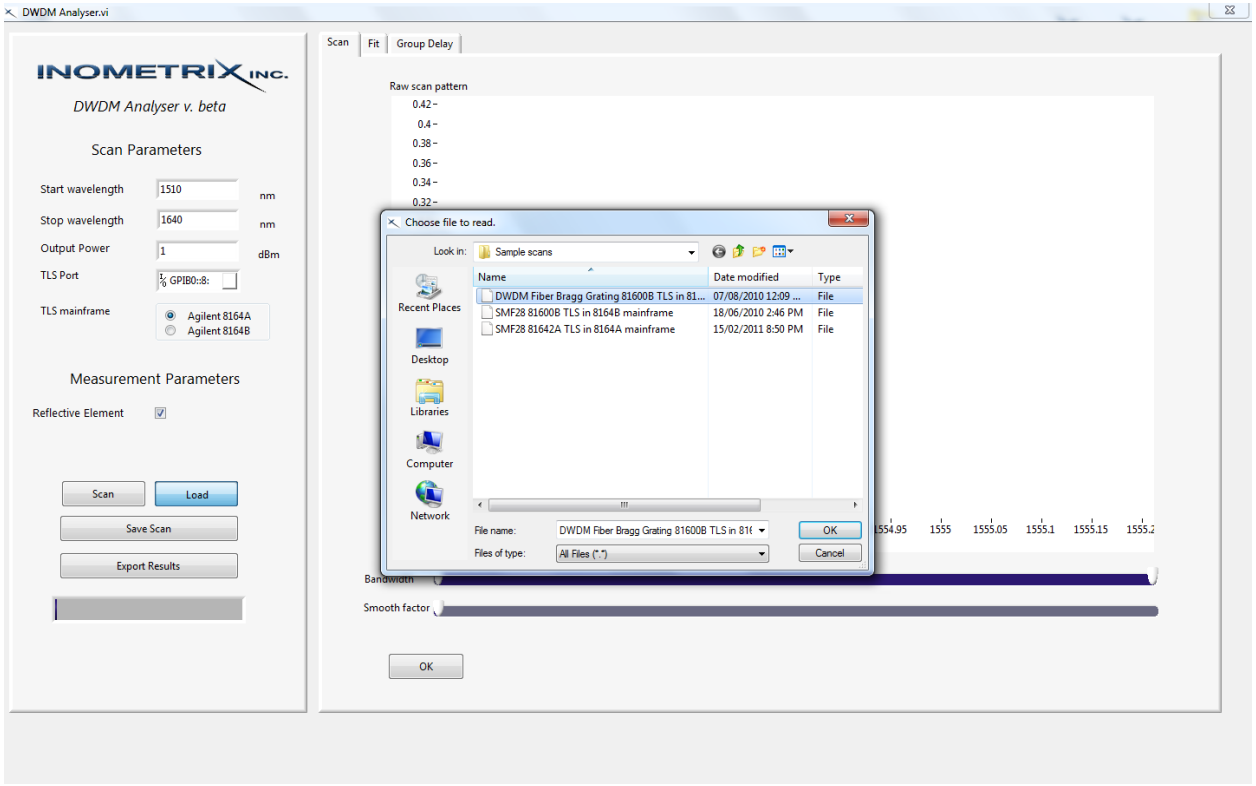
The Group Delay tab provides the results of the measurement.

STEP 7: LOAD THE SAMPLE EXPERIMENT SCAN

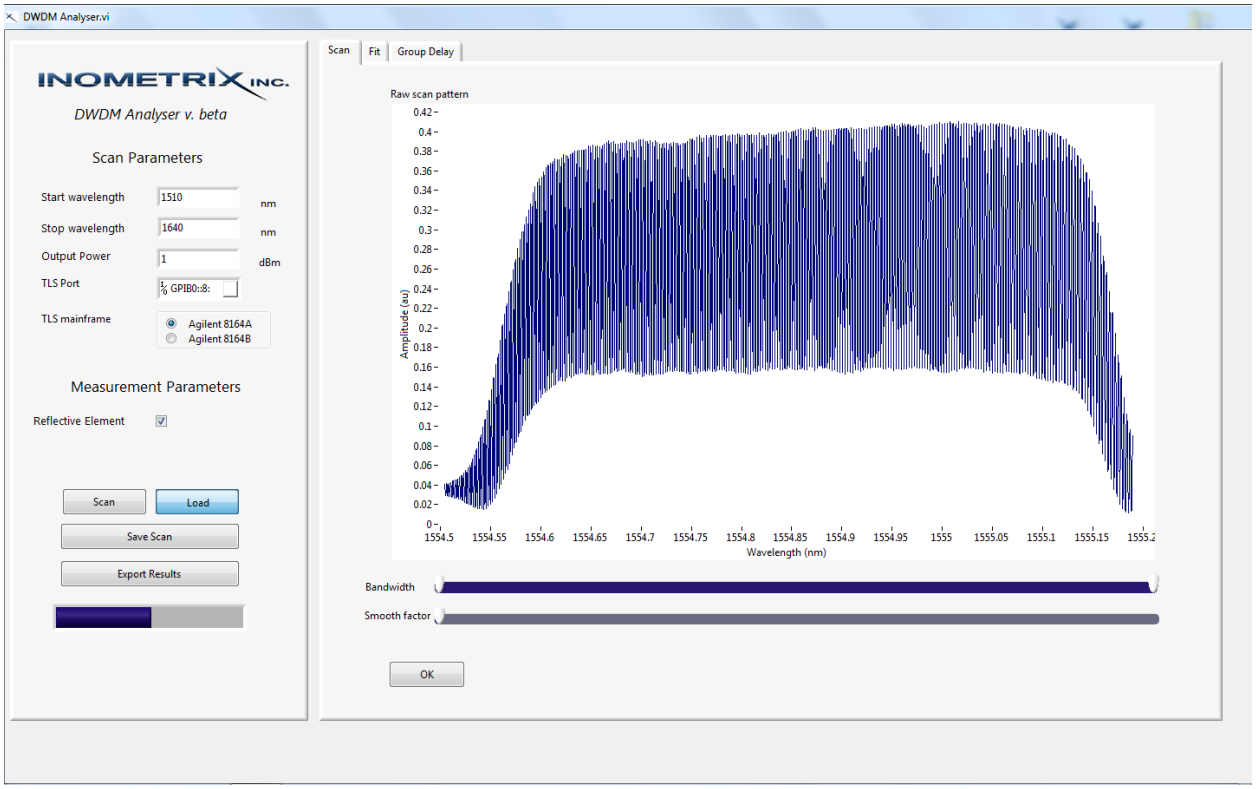
Example #1

Click on the checkbox *Bulk reflective element* as this measurement involves Configuration 'D' from step 4.

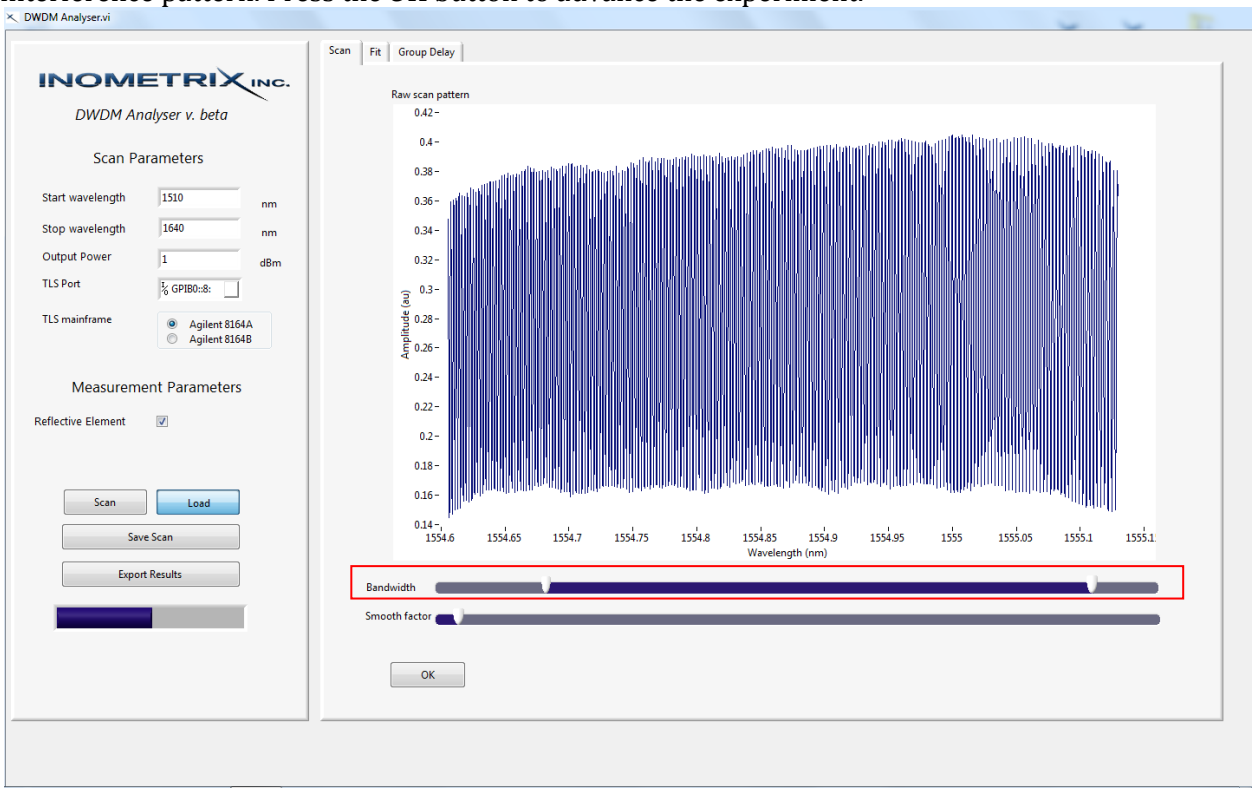
Load scan: ***DWDM Fiber Bragg Grating 81600B TLS in 8164B mainframe.***



Load the interference pattern by pressing ***OK*** in the dialog box.

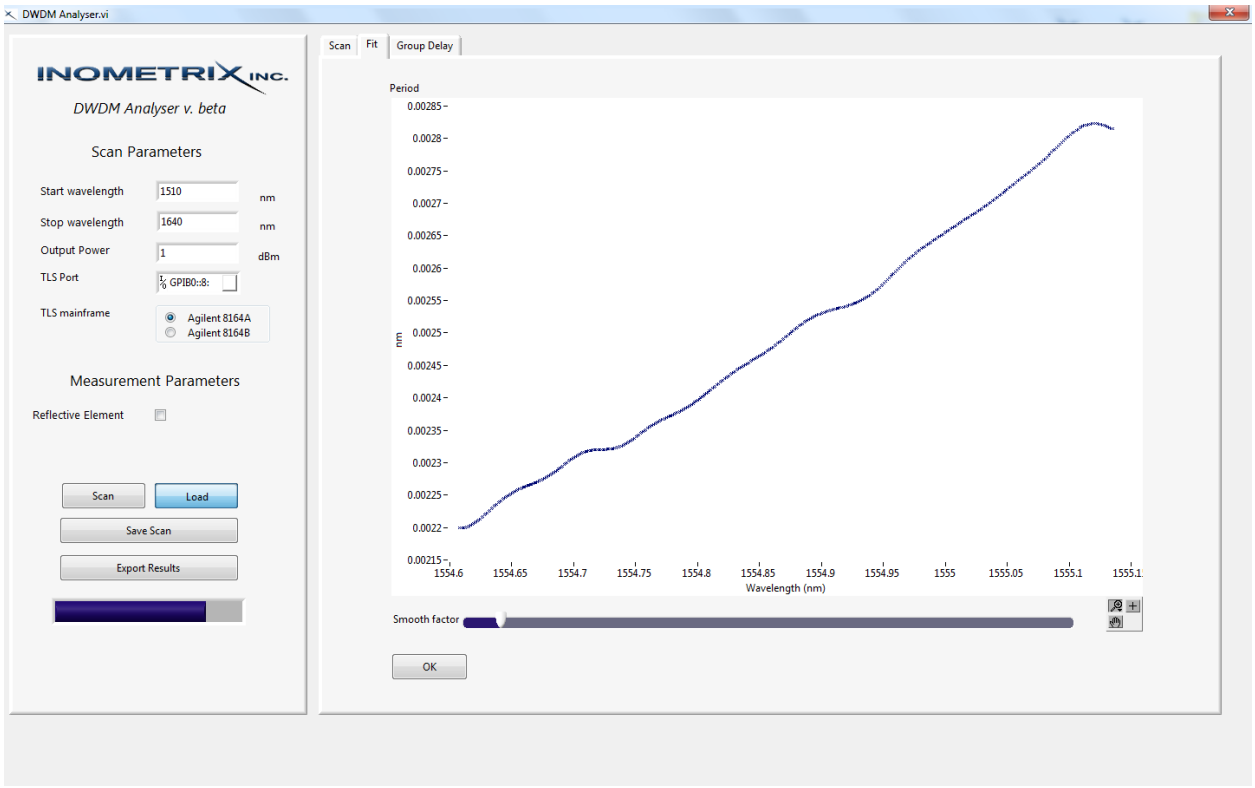


Select the bandwidth only near the peak of the interference pattern and move the Smooth factor slider to clean the spectrum. This ensures a clean measurement of the period data in the interference pattern. Press the ***OK*** button to advance the experiment.

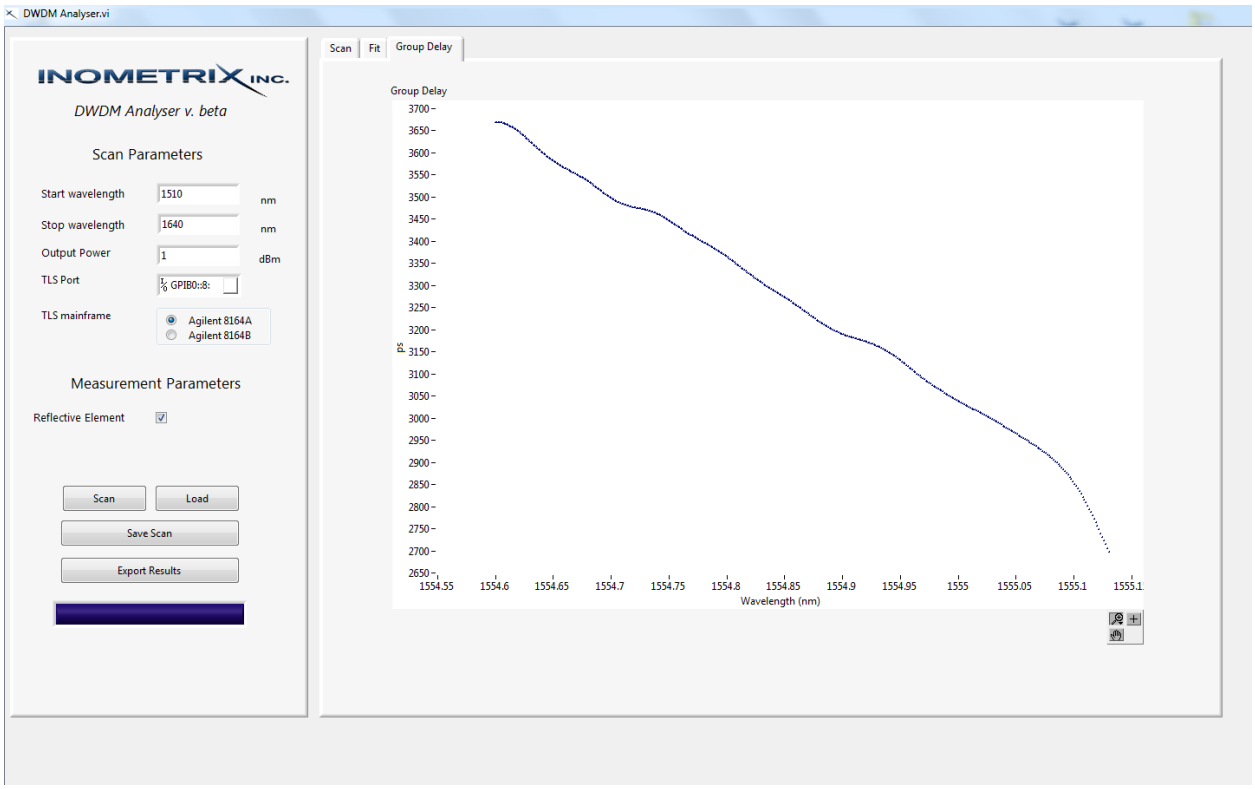


Move the ***Smooth factor slide*** to control the number of iterations of a 3 point moving average window fit that is applied to the period data.

Press ***OK*** to generate the Group Delay.



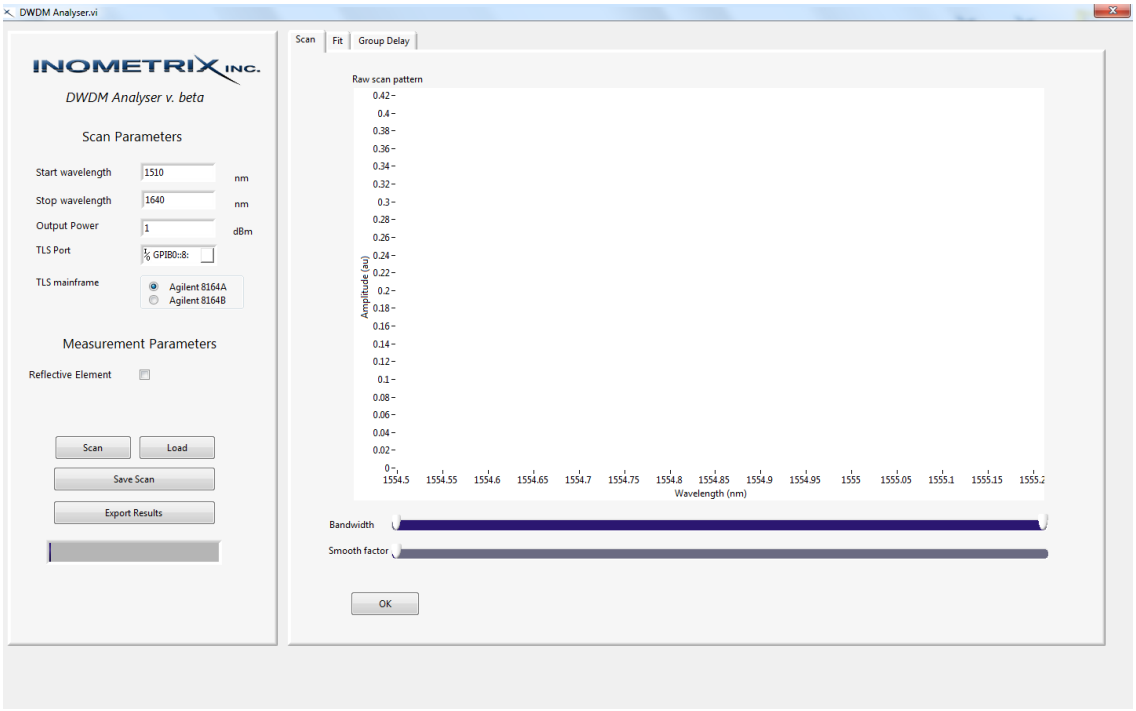
View the ***Group Delay tab***



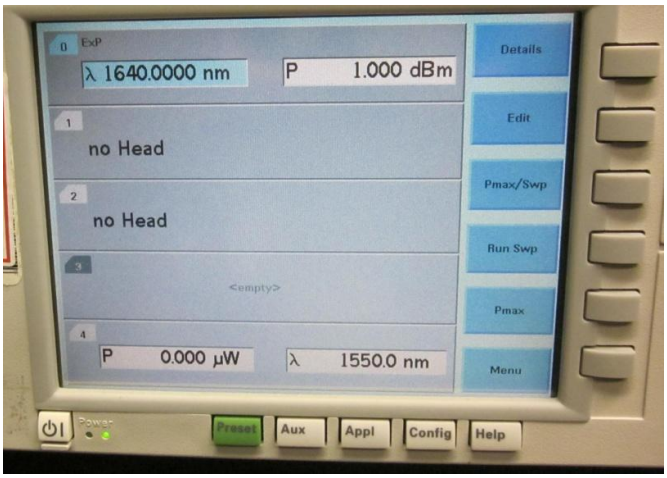
STEP 8: SCAN THE SAMPLE DUT PROVIDED

In this step, the use of the system to measure a known sample is introduced. The sample provided with the DWDM Analyser is a short length FC/PC to FC/PC patch cord cable (***see Step 4 Configuration A***).

Press the **Scan button** on the front (left) panel.



You should see the laser start to sweep between the ***Start wavelength*** and the ***Stop wavelength*** at the set power level. Please consult the owner's manual for the particular tunable laser used for the minimum and maximum wavelength/power. In order to allow for the use of multiple tunable lasers, we do not limit these values.



Bandwidth Range Adjustments:

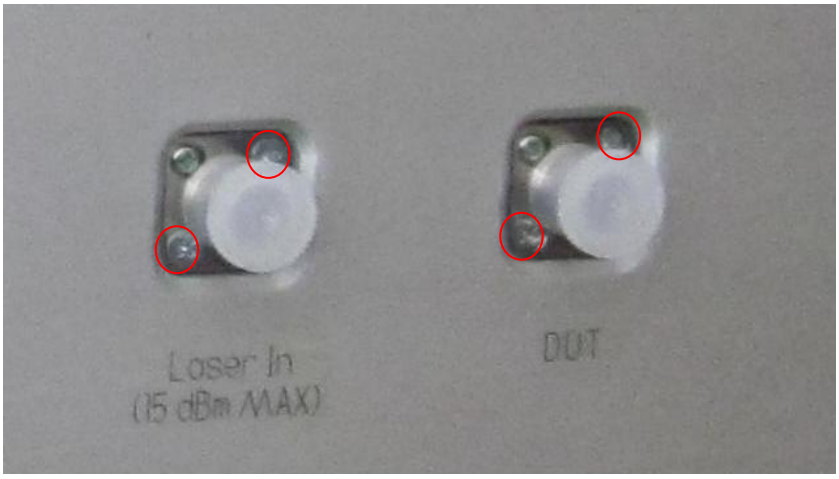
The circulator provided with the standard system configuration has a bandwidth in the C and L band. If you would like to measure outside the C & L band please contact us to order a circulator for the wavelength region of interest to you and for instructions on how to install the new circulator.

Power Level Adjustments:

The optical power from the tunable laser can be adjusted programmatically from the ***Scan Parameters***. However, if the measurements are 'clipped' (produce values greater than 1 in the raw scan pattern) and the power cannot be further reduced, the detector gain can be manually reduced by manually adjusting the gain of the detector. Please contact us for special instructions if you encounter this situation

Cleaning the connector inputs:

The connectors at the ***Laser in*** and ***DUT*** ports may occasionally require cleaning. To do this, use a screwdriver to remove the screws highlighted in red in the picture below. Pull out the connector and a short length of the fiber cable attached. Remove the connector to clean the fiber. When cleaning is complete, reconnect the fiber and connector and screw the ports back to the front panel as shown below.



When the system is not in use please use the white caps provided with the system to prevent dust from entering the optical ports on the front panel.