ODM Module

Optical Dispersion Measurement Module

User Manual

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User Manual

VIAVI Solutions
1-844-GO-VIAVI
www.viavisolutions.com

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Manual

This guide is a product of VIAVI's Technical Information Development Department. This manual gives you the main information to install, start and use the ODM module.

WEEE Directive Compliance

VIAVI has established processes in compliance with the Waste Electrical and Electronic Equipment (WEEE) Directive, 2002/96/EC, and the Battery Directive, 2006/66/EC.

This product, and the batteries used to power the product, should not be disposed of as unsorted municipal waste and should be collected separately and disposed of according to your national regulations.

In the European Union, all equipment and batteries purchased from VIAVI after 2005-08-13 can be returned for disposal at the end of its useful life. VIAVI will ensure that all waste equipment and batteries returned are reused, recycled, or disposed of in an environmentally friendly manner, and in compliance with all applicable national and international waste legislation.

It is the responsibility of the equipment owner to return equipment and batteries to VIAVI for appropriate disposal. If the equipment or battery was imported by a reseller whose name or logo is marked on the equipment or battery, then the owner should return the equipment or battery directly to the reseller.

Instructions for returning waste equipment and batteries to VIAVI can be found in the Environmental section of VIAVI's web site at www.viavisolutions.com. If you have questions concerning disposal of your equipment or batteries, contact VIAVI's WEEE Program Management team.

Contents

About This Guide

The VIAVI ODM module is a compact, single test port, field test solution combining Chromatic Dispersion (CD), Polarization Mode Dispersion (PMD) and Attenuation Profile (AP) measurements in a single module

The topics discussed in this chapter are as follows:

Purpose and scope

The purpose of this guide is to help you successfully use the equipment features and capabilities. This guide includes task-based instructions that describe how to configure, use, and troubleshoot the equipment with ODM module.

Assumptions

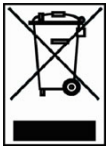
We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication and fiber optic concepts and terminology.

Technical assistance

If you require technical assistance, call 1-844-GO-VIAVI. For the latest TAC information, go to http://www.viavisolutions.com/en/services-and-support/support/technical-assistance.

Recycling Information

VIAVI recommends that customers dispose of their instruments and peripherals in an environmentally sound manner. Potential methods include reuse of parts or whole products and recycling of products components, and/or materials.



Waste Electrical and electronic Equipment (WEEE) Directive

In the European Union, this label indicates that this product should not be disposed of with household waste. Il should be deposited at an appropriate facility to enable recovery and recycling.

Conventions

This guide uses naming conventions and symbols, as described in the following tables.

Table 1 Typographical conventions

Description	Example
User interface actions appear in this **typeface**.	On the Status bar, click **Start**.
Buttons or switches that you press on a unit appear in this **TYPEFACE**.	Press the **ON** switch
Code and output messages appear in this `typeface`.	`All results okay`
Text you must type exactly as shown appears in this **`typeface`**.	Type: **`a:\set.exe`** in the dialog box
Variables appear in this ***typeface***.	Type the new ***hostname***.
Book references appear in this ***typeface***.	Refer to ***Newton's Telecom Dictionary***
A vertical bar | means "or": only one option can appear in a single command.	`platform [a|b|e]`
Square brackets [ ] indicate an optional argument.	`login [platform name]`
Slanted brackets < > group required arguments.	<`password`>

Table 2 Keyboard and menu conventions

Description	Example
A plus sign + indicates simultaneous keystrokes.	Press **Ctrl+s**
A comma indicates consecutive key strokes.	Press **Alt+f,s**
A slanted bracket indicates choosing a submenu from menu.	On the menu bar, click **Start > Program Files**.

Table 3 Symbol conventions

	**This symbol represents a general hazard.**
	**This symbol represents a risk of electrical shock.**
	**NOTE** This symbol represents a Note indicating related information or tip.
	**This symbol, located on the equipment or its packaging indicates that the equipment must not be disposed of in a land-fill site or as municipal waste, and should be disposed of according to your national regulations.**

Table 4 Safety definitions

	**WARNING** Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
	**CAUTION** Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

1

Getting started

This chapter describes how to start using the ODM Module installed into the ONA-800.

The topics discussed in this chapter are as follows:

Precautions related to optical connections

- The normal operating life of an optical connector is usually of the order of a few hundred matings.
- The proper operation of the instrument and its accuracy are dependent on the cleanliness of the optical connectors as well as the care taken in its manipulation.
- The optical connectors must therefore be clean and dust-free. If the optical connection is not being used, protect the connections of the module using the protective caps.

Connecting fiber optic cable

Inspecting and cleaning connector end faces

Always inspect and clean the connector end face of the optical fiber cable and the test port before mating both together.

VIAVI is not responsible for damage and reduced performance caused by bad fiber handling and cleaning.

- Optical connector contamination is the #1 source of performance degradation and test equipment repair
- A single particle mated into the core of a fiber can cause significant back reflection, insertion loss and equipment damage. Visual inspection is the only way to determine if the fiber connectors are truly clean before mating them.

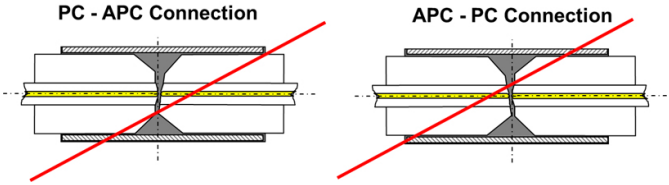
Follow this simple "INSPECT BEFORE YOU CONNECT" process to ensure fiber end faces are clean prior to mating connectors.

Figure 1 "Inspect Before You Connect" process

Caution

Never connect a PC connector into an APC test port or vice versa. This will result in damaging the connector end faces.

Figure 2 PC/APC bad connection



WARNING

VIAVI declines responsibilities of connector damages if a poor quality connector is used or APC to PC connections made. Test port connector repair will be charged

Connecting Fiber optic cable to test port

After ensuring proper cleaning of both end connectors, follow the below steps in order to correctly and safely connect the optical fiber into the test port:

1 Carefully align the connector and test port to prevent the fiber end from touching the outside of the port and scratching the end face.

NOTE

If your connector features a keying mechanism, ensure that it is correctly fitted into the test port's insert.

2 Push the connector to firmly place it inside ensuring physical end face contact.

NOTE

If your connector features a screw-on sleeve, tighten the connector to firmly maintain the fiber in place. Do not over tighten as this will damage the fiber and the test port.

WARNING

Never force the connector ferrule or insert it with an angle into the test port adapter. Mechanical stress may permanently damage the ceramic sleeve of the adapter or the end face of the connector. A new adapter purchase only will get the unit back to operation.

Optical connectors and interchangeable adapters

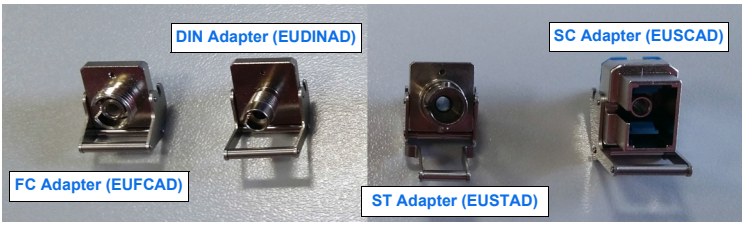
Fiber Optic modules may come equipped with a universal connector and adapter selected at time of order.

Adapter types

VIAVI offers 4 different adapters, all compatible with this connector.

Adapter types supplied are: FC, SC, DIN and ST.

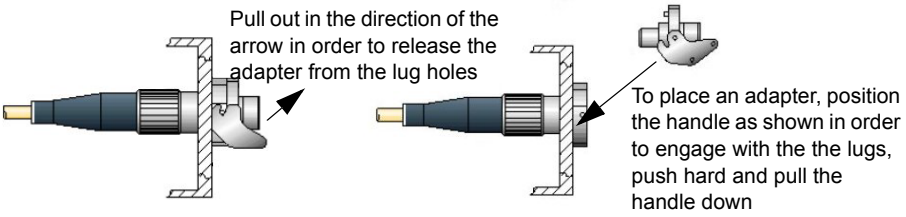
Figure 3 5 different types of adapters may be mounted on the universal connector



Switching adapter type

In order to switch from an adapter to another, proceed as shown.

Figure 4 Removing and refitting an adapter



Cleaning the universal connector

Remove the adapter in order to access the ferrule and clean it using a cotton swab.

2

Polarization Mode Dispersion Measurement

This chapter describes the different steps in carrying out a PMD measurement with a ONA-800 equipped with a ODM Module.

The topics discussed in this chapter are as follows:

It is assumed that you are familiar with the operation of the ONA-800, the OBS-5XX (Optical Broadband Source) or 81BBSxx (BroadBand Source).

Recommended equipment

To perform a PMD measurement, the following equipment is recommended:

- ONA-800 with a module as mentioned above, and associated optical connectors.
- OBS-5XX Optical Broadband Source, or 81BBS2A Optical broadband source modules.
- Fiber inspection scope with associated optical connector tips.
- Cleaning kit.
- Two fiber patchcords with required optical connectors.

NOTE

Method used to measure the Polarization Mode Dispersion (PMD) is described in the Reference Guide to Fiber Optic Testing - Vol2.

NOTE

The PMD value obtained by the fix analyzer method is the mean DGD value, also designated as «PMD value».

PMD Activation and self calibration

1. Press **HOME** > **Test**.
2. Select the ODM and press the **PMD** function 

.
   The PMD results page displays and the auto-calibration starts automatically.
   A bargraph «**self calibration»** informs of the progression status of the calibration at the bottom of the screen. Wait for the calibration to be fully completed before continuing.

Configuring the PMD test

To access the PMD test setup menu, press the **SETUP** button on the ONA-800.

You can choose the default values by pressing the **Auto-set** key or define your own configuration.

Auto-set Configuration

Press **Auto-set** to define the PMD acquisition / analysis with the following parameters:

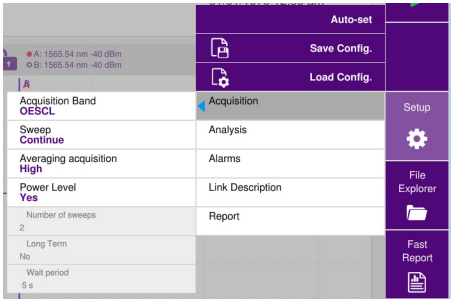
Acquisition	Sweep	Single
	Averaging acquisition	Auto
Link Description	Change Fiber Nbr	Increment
Report	File(s) save in	[Current Dir]
	Filenaming	[Cable_Id][Fiber_Num][Direction]
	Auto store	Yes

In **standard** mode, you can set the parameters below.

Acquisition parameters

In the **Setup** menu, press **Acquisition**.

Figure 5 Acquisition parameters



NOTE

When the power of the input signal is higher than +20 dBm, a warning is displayed and the signal is cut off.

Acquisition band

OESCL Acquisition will be performed on the full band.

SCL Acquisition will only be performed on S, C and L bands.

Sweep

Continue Continuous measurement with a trace refresh and a real-time display of the results.

Single Single measurement with associated results displayed.

Statistics A set of measurements can be performed providing result statistics. This mode also gives access to the following parameters: **Number of sweeps** and **Long Term**.

Averaging acquisition

It enables to improve the dynamic range of the measurement by reducing the noise level. It is recommended to use the Auto mode and configure a manual averaging if needed only.

No No averaging of the acquisition sample.

Low Low averaging (4 samples).

Medium Medium averaging (16 samples).

High High averaging (32 samples).

Auto Averaging automatically selected.

NOTE
An increase of the averaging can improve the dynamic range.

Power Level

No No receive power level indication.

Yes Receive power level is indicated in bar graph.

NOTE
When **Yes** selected, acquisition stops if not enough power is received.

Number of sweeps

Number of acquisitions from 2 to 1000.

Long term

Enables to repeat the measurement defined by the number of sweeps, over a given period and to obtain statistical results:

None	Samples are displayed one after the other;
Manual	Requires the user to press the **Stop Wait** button to start the next sample.
Period	Defines time between 2 samples. To be configured with wait period parameter.

Wait Period

The Wait Period parameter allows to enter a time between 2 acquisition samples (only active if **Long Term** is positioned on **Period**)

- Increments of 5 seconds to 24 hours.

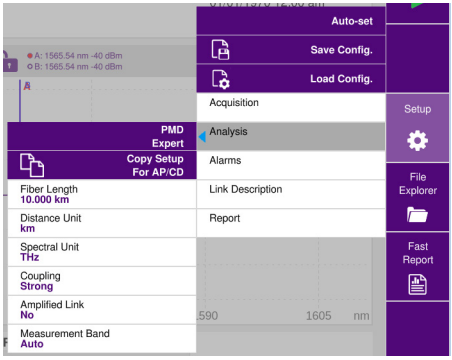
High Dynamic

Auto	The Dynamic range is automatically selected
No	High dynamic mode is not used for measurement
Yes	High dynamic mode is selected for measurement

Analysis parameters

In the **Setup** menu, press **Analysis**.

Figure 6 Analysis parameters



NOTE

The key **Copy Setup For AP/CD**, allows to apply the PMD configuration to the other selected function(s) of the ODM module.

Fiber length

Unknown	If you do not know the fiber length
Distance	Press **Edit Number** to enter fiber distance: Min=0.100 km / Max=20000 km

The fiber length must be set to calculate the PMD coefficient.

Distance Unit

When the fiber length is manually entered, choose the distance unit

Km	Distance unit defined in kilometers.
Kfeet	Distance unit defined in kilofeet.
Miles	Distance unit defined in miles.

Spectral Unit

Select Spectral unit: **THz** or **nm**.

If the softkey **PMD** is set to **Standard** mode, any measurement will be set to the strong mode Coupling and the wavelength range to Auto.

The **Expert** mode is to be used with measurement through EDFA. When selected, the **Expert** mode allows to define the coupling, to define if an amplified link is used and to set the wavelength range.

Coupling

Strong	For standard singlemode fibers
Weak	For polarization-maintained fibers and components.

Amplified link

Select **Yes** when measuring through optical amplifiers

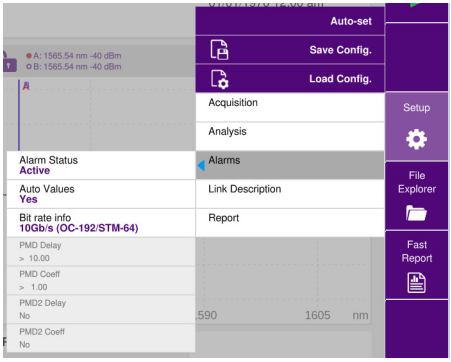
Measurement Band

Auto / **C Band** / **L Band** / **C+ L Band** / **Manual**
When Manual is selected, the **Measurement Start** and **End** must be set (in nm or THz according to the unit defined in **Spectral Unit** parameter).

Alarms parameters

In the **Setup** menu, press **Alarms**.

Figure 7 Alarms parameters



Alarms Status

None No Pass/Fail thresholds selected.

Active Pass/Fail analysis will be made upon defined thresholds: auto values or delay.

Auto Values

No Threshold values entered manually.

Yes Threshold values automatically calculated according to the bit rate info selection.

Bit rate info.

This table provides the PMD thresholds according to the transmission bit rate:

None / **2.5 Gb/s** / **10 Gb/s** / **40 Gb/s** / **10 G Ethernet** / **100 Gb/s**..

Delay / Coeff

PMD Delay Maximum allowable delay.

PMD Coeff. Maximum allowable PMD coefficient.

PMD2 Delay Maximum allowable second order PMD delay (Only if **Coupling** is set to **Strong**)

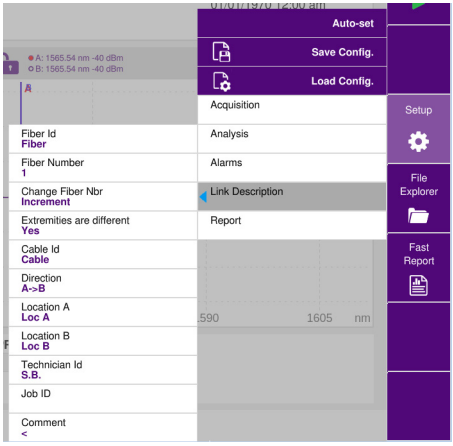
PMD2 Coeff. Maximum allowable second order PMD coefficient (Only if **Coupling** is set to **Strong**)

Delay and coefficient values for PMD and PMD2 can be modified clicking on text box to open the numeric keypad.

Link Description parameters

In the **Setup** menu, press **Link Description**.

Figure 8 Link Description parameters



The information entered in the **Link Description** window concerns the editing and/or the modifications of the cable and fiber parameters. When a trace is recalled without recall of the configuration, the parameters of this trace will be present only in its signature.

Link description parameters are recorded in the results files as they are of use for analytics including post processing.

Fiber Id

Select **Fiber Id** and enter a name for the fiber, using the onscreen keyboard.

Fiber Number

1 Select the parameter **Fiber Number** and modify the parameter using the numeric keypad.

The fiber number can be automatically incremented/decremented at each new file save.

Change Fiber Nbr

Increment the fiber number is automatically incremented at each new file-save.

Decrement the fiber number is automatically decremented at each new file-save

User defined Use **Edit Number** softkey to enter the increment/decrement value for fiber number.

– Note: to decrement the number, enter the sign «-» before the number. Example: -1.

Min: -999 / Max: 999 / Auto: 0

No the Fiber number must not automatically modified.

Extremities are different

No the **Fiber Id**, **Fiber Number**, **Change Fiber Nbr** and **Cable Id** are the same for both direction A'B and B'A

Yes the **Fiber Id**, **Fiber Number**, **Change Fiber Nbr** and **Cable Id** can be different per direction A->B and B->A. Select the **Direction** and change these parameters as wished.

Cable Id

This parameter allows to enter an identification of the cable, using the onscreen keyboard.

Direction

The direction shows if the acquisition has been made from the origin to extremity (**A->B**) or from the extremity to origin (**B->A**). Changing direction in the trace simplifies post-processing e.g. for manual bi-directional analysis.

Location A

The name of the Location A of the link may be entered here, using the onscreen keyboard.

Location B

The name of the Location B of the link may be entered here, using the onscreen keyboard.

Technician Id

The user can set a name here.

Job Id

Enter a job identifier, number or code.

Comment

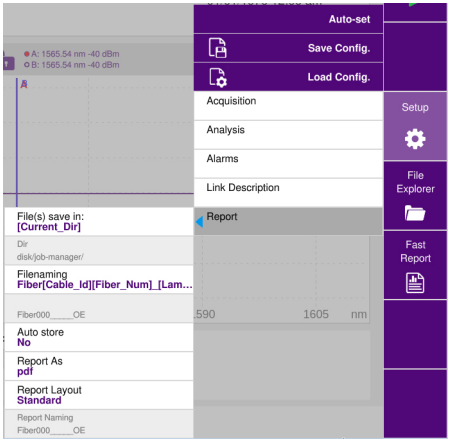
Click on **Comment** text box to enter any additional information relevant to the test.

Report parameters

The Report storage parameters must be also configured, in order to define how and where the results will be saved in the file system of the equipment.

In the **Setup** menu, press **Report**.

Figure 9 Report parameters

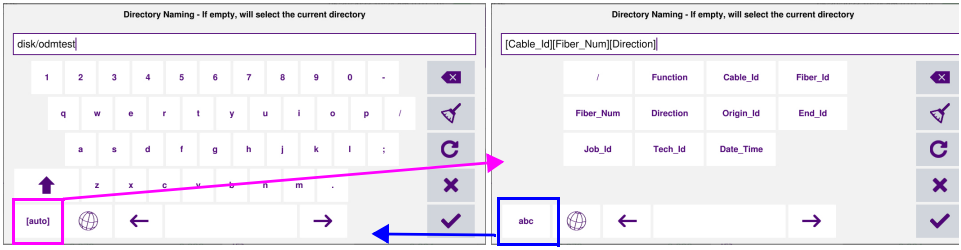


File(s) save in

Click on the text box to display the keyboard and define the directory for files saving

In the on-screen keyboard, select the pre-defined parameters available or, press **abc** key to enter a name manually for the directory.
Then, press ✔ to validate.
Example: `disk/PMD/Test`

Figure 10 Directory - On-screen keyboard



or

Click on ↻ or leave the box empty to select the Current Directory for file saving.

Press ✔ to validate.

Press 🌐 to modify the keyboard language: English / French / German.

Dir

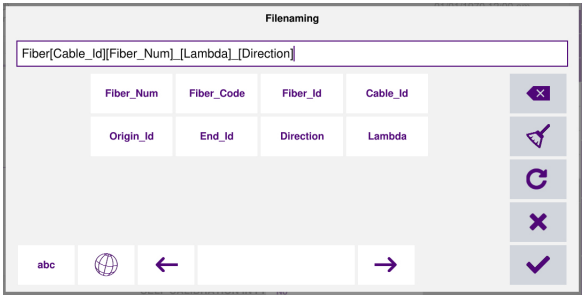
This field displays the directory selected/created into which the file(s) will be saved.

Filenaming

Select **Filenaming** parameter and click on the text box to modify the name of the file for the result trace.

Use the onscreen keyboard to view and select the pre-defined parameters available or, press **abc** key to enter a name manually for the file.

Figure 11 Filenaming - Keyboard (auto)



or

Click on to apply the name by default to the file:

`Fiber[Cable_Id]_[Fiber_Num]_[Lambda]_[Direction]`

Press to validate.

Press to modify the keyboard language: English / French / German.

The name of the file is displayed in grey under **Filenaming** parameter

Auto Store

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenaming rules. If the filename already exists, the user will be prompted to overwrite the "old" result or discard the current result and keep the "old" file

Select **Confirm if alarm = Fail** to display a confirmation dialog box if a value exceeds alarm thresholds, and to be able to choose to save or not the trace.
If no alarm is detected on trace, it is automatically stored.

Report As

Select the report format to be generated:

txt file	select **Yes** to generate a txt file of the results.
pdf file	select **Yes** to generate a report in a pdf file.

If all parameters are defined with **No**, only the .pmd file will be saved.

Report Layout

This parameter allows to define the report page setting and is available exclusively if a **pdf** or **txt file** has been defined in the **Report As** parameter.:

Standard in multi-traces display, one pdf report page is generated for each trace.

Consolidated in multi-traces display, one pdf report page is generated for all traces

Report naming

If **Consolidated** is defined for **Report Layout**, select **Report naming** parameter and click on the text box to modify the name of the report file for the result trace.

Using the on-screen keyboard, enter a name manually for the file and press ✔ to validate.

If no name is entered, the report name by defaut applies: `Report_PMD`.

Saving configuration in a file

Once parameters have been configured, they can be kept in memory and saved in a configuration file.

This file can then be recalled in order to be recalled for future PMD acquisitions.

To save parameters in a configuration file:

1. If necessary, press **SETUP** to return to **Setup** page.
2. Select one parameter in one of the setup page (acquisition, link..)
3. Press **Save Config.** key 

.
4. Enter a name for the configuration file using the edition keypad.

> **NOTE**
> Configuration file is saved in the directory `disk/config/PMD`.

5. Press ✔ to validate.
   A sound is emitted to indicate the file is saved.

The configuration file is saved with the extension ".fo_cfg" (icon ) and can be recalled at any time from the **Explorer** page.

Loading a configuration file

To load the configuration file to be used for PMD test:

1 Press **Setup** key.

2 Press **Load Config.** key 

.

3 In the Explorer, select the desired file configuration and press **Load**.
A beep is emitted to validate the selection of the configuration file.
The software automatically brings you back to setup page.

NOTE
Most of the configuration files are available into the Platform in `disk/config/PMD`.

Performing a PMD measurement

The following modules apply:

- ODM V2 Module

Handheld or module broadband sources can be used to perform PMD measurements:

- OBS-500
- OBS-550
- 81BBS2A

The following procedure considers the use of an OBS-5xx type source.

Remote operator

1 Inspect and clean connectors with appropriate methods as described in IEC 61300-3-35.

2 Connect the fiber under test to the optical connector of the broadband source using required mating solution such as a fiber patchcord.

3 Press the **ON/OFF** button to switch on the OBS-5XX broadband source.

4 Press the "Active" button of the OBS-5x0 to activate the source transmission.

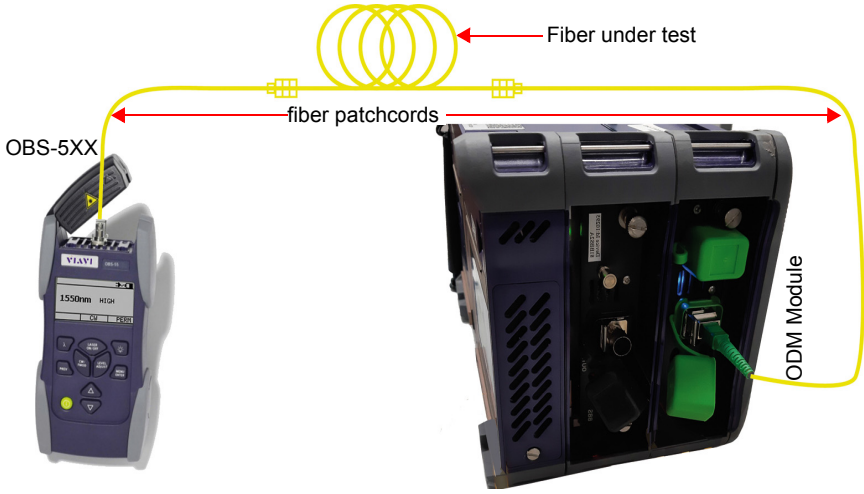
NOTE

Make sure the test mode is set to "PMD" when using the OBS-500 or OBS-550.

Local operator

1. Inspect and clean connectors with appropriate methods as described in IEC 61300-3-35
2. Connect the fiber under test to the optical connector of the test module using required mating solution such as a fiber patchcord, as shown in Figure 12.
3. Select the PMD function in the Instrument Setup menu and wait for the module self calibration (tuning).
4. Press the **Setup** key to access the PMD Test Setup menu.
5. Select the appropriate PMD parameters according to your application as defined earlier in this chapter.
6. Press the **START/STOP** button and wait for the results to be displayed.

Figure 12 PMD measurement with an ODM plug-in



Display of results

Spectrum/FFT key

The key **Spectrum / FFT** enables you to display:

- The spectrum representing the power (in dBm) according to the frequency (in THz) or wavelength (in nm).
- The FFT curve and PMD information (delay & coefficient) according to the Fast Fourier Transform Method. The FFT trace represents the PMD delay in ps.

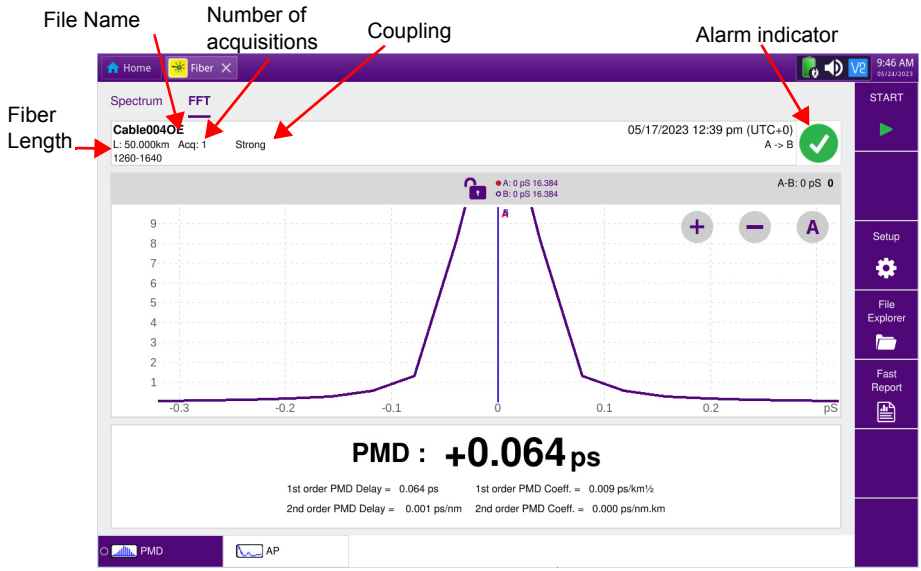
Display of PMD results

The PMD results screen is split in 3 main areas. from top to bottom::

- The information bar with:
  - number of acquisitions used for the statistics (Acq)
  - wavelength range,
  - date and time of acquisition.
  - file name (if result stored in memory)
  - Pass/fail indication
- The FFT curve and its gaussian shape (for strong mode coupling only).
- the table of results: PMD delay and coefficient, second order PMD (PMD2) delay and coefficient. This table is different if statistic measurement is selected (see “Statistics results” on page 24).

The results are displayed in black when no alarm is defined, in green if alarms are within the threshold defined in the **Setup** menu and in red if the alarms exceed the thresholds defined.

Figure 13 Example of PMD result (FFT view)



NOTE

When several acquisitions are performed, the trace resulting from the last acquisition is displayed.

Cursors

To move the cursor(s) on the trace:

1. Double click on one cursor line.
2. Press on trace to position the cursor(s)
   The coordinates of each cursor intersection with the trace are indicated above the trace:

Zoom access

In order to zoom in on the trace:

1 Click on + or − to zoom in or out on trace,
The zoom is made around the selected cursor.
or
Click on A to do an automatic zoom on trace.

Statistics results

Statistics can be performed on a series of samples defined by the number of samples and the time between two consecutive samples (Wait period). Refer to “Acquisition parameters” on page 9 for parameter setup.

To display the statistic results press the **RESULTS** button.

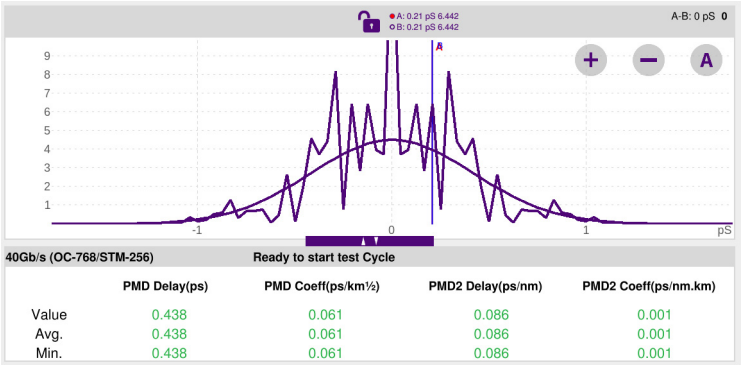
In Spectrum display, the results page gives access to several functions:

- Cursors A/B: see “Cursors” on page 23
- Zoom: see “Zoom access” on page 23

Table of results

Current value, average value, min value, max. value and standard deviation (Sdev) are provided in the table for each of the 4 parameters: PMD delay, PMD coefficient, second order PMD delay and second order PMD coefficient. The statistic results are automatically updated with each acquisition.

Figure 14 Trace and results table in statistics mode



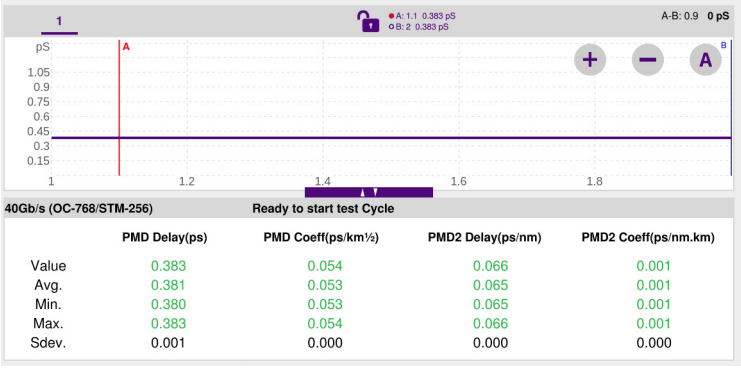
Graphics display

When Statistic mode is selected, the button **Spectrum/FFT** becomes **Spectrum/FFT/ Drift/Barchart**.

This button allows therefore to display alternatively:

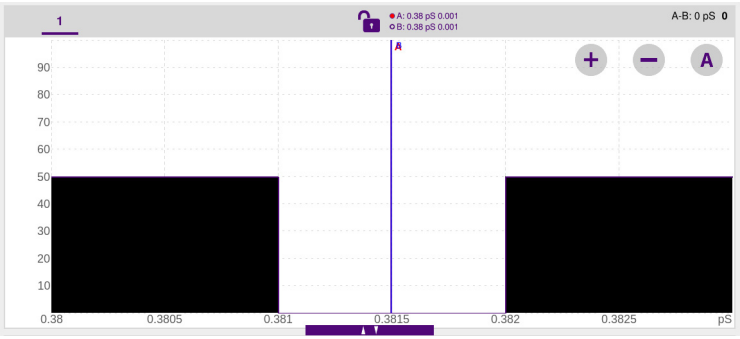
- Delay drift during the acquisition time.

Figure 15 Example of drift



- The bar chart providing the delay value for each acquisition.

Figure 16 Example of bar chart



Information messages

Under the trace, at the right-hand corner a message indicates the current status of the trace or proposes to start next acquisition (by clicking on **Stop wait**).

Signal acquisition

This message indicates that an acquisition is in progress.

To stop an acquisition, whatever the mode is used, press the **START/STOP** button.

Next measurement

After each acquisition in the **Statistic** mode and when **Long term** has bee set on **Period** or **Manual**, this message requests that you select **Stop Wait**. The ONA-800 then displays Signal Acquisition.

Ready to start test Cycle

This message appears after a acquisition cycle is finished, when you are in statistic mode. Press **START/STOP** to start a new cycle.

Ready to start Measurement

The message is displayed after the completion of an acquisition sample or a Reference measurement.

Waiting bar graph

When **Statistic** mode is used and **Long term** is set to **Period**, a bargraph displays the remaining time before the next acquisition.

Saving the trace and generating a report

Once the results page is displayed, the trace can be saved and a report can be generated directly from the results screen.

Saving results and creating a report from results page

Whatever is the view selected, the report will be generated for FTT view.

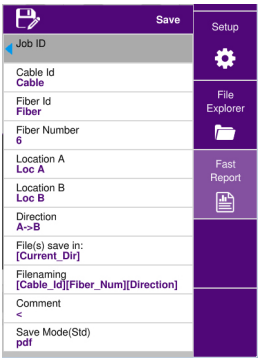
To generate a report:

1 Press **Fast Report** menu key 

.
A menu displays under the trace.

2 In the menu, configure the file saving (and the report).

Figure 17 Fast report configuration



a In the **Job Id** parameter, enter/modify the name for the job in progress.

b In the **Cable Id** parameter, enter/modify the name of the Cable using the edition keypad.

c In the **Fiber Id** parameter, enter/modify the name of the fiber using the edition keypad.

d Modify the **Fiber Number** using the numeric keypad.

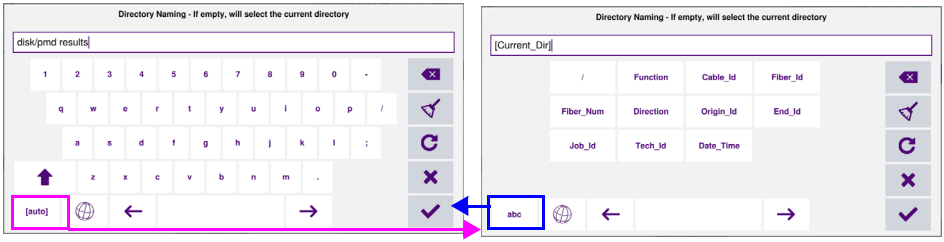
e In the **Location A** and **Location B** parameters, enter/modify the name of Origin and Extremity.

f In the **Direction** parameter, select/modify the direction, to define if the measurement has been performed from Origin to Extremity (**A -> B**) or from Extremity to Origin (**B -> A**)

g In **File(s) save in** parameter, click on the text box to display the keyboard and enter the directory where the measurement results and files will be stored.

In the on-screen keyboard, select the **Auto** pre-defined fields (previously set in the File menu) or, press **abc** key to manually enter directory name and path. Then, press  to validate.

Figure 18 Directory - On-screen keyboard



Click on  or leave the box empty to select the Current Directory for file saving.

Press  to validate.

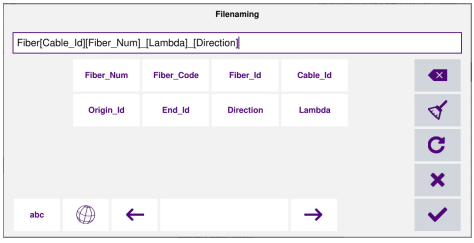
Press  to modify the keyboard language: English / French / German

h The parameter **Dir.** displays the directory selected/created into which the file(s) will be saved.

i Select **Filenaming** parameter and click on the text box to modify the file name convention.

Use the on-screen keyboard to view and select the [Auto] pre-defined fields (previously set in File menu) or, press **abc** key to manually enter a file name. Then, press  to validate.

Figure 19 Filenaming - keyboard (Auto)



or click on  to apply the default file name.

j In the **Comment** parameter, enter a comment for the report, using the edition keyboard.

k In the **Save Mode** parameter, select:

txt file select **Yes** to generate a txt file of the results.

pdf file select **Yes** to generate a report in a pdf file.

3 Once saving is configured as wished, press **Save** menu key

4 Enter a name for the file in the edition keypad

or

Click on  menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see "Filenaming" on page 17).

5 Press  to validate.

NOTE

The pmd file and the txt/pdf file will have the same name.

Once saving is completed, a sound is emitted onto the Platform.

Opening the report

To open the report:

1 In the **Explorer** page, in the directory selected, select the file/report.

For the txt file: *trace file_pmd.txt*

For the pdf file: *trace file.pmd.pdf*.

2 Press **Load**.

The file opens onto the ONA-800.

Figure 20 Example of PMD Report in pdf

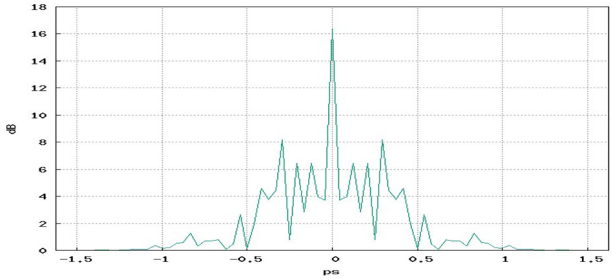
VIAVI

Cable Id : Cable
Location A : Loc A
Job ID :

Fiber Id/Number : Fiber 10
Location B : Loc B
Technician Id : Debug007

ONA-800 (S/N 3610004) | 81LRODM2 (S/N 14) | Calibration date : 04/25/2023 | Date : 05/22/2023 03:29 pm (UTC+0)

Test Setup					
PMD	L: 50.000km Acq: 3/3 Strong	1435-1640	05/22/2023 03:29 pm (UTC+0)		Cable010OE ✓
Alarms					
Thresholds	Bit rate info : 40Gb/s (OC-768/STM-256)	PMD Delay : >2.50	PMD Coeff : >0.35	PMD2 Delay : >2.83	PMD2 Coeff : >0.06



PMD

	PMD Delay	PMD Coeff	PMD2 Delay	PMD2 Coeff
	ps	ps/km½	ps/nm	ps/nm.km
Value	0.438	0.061	0.086	0.001
Avg.	0.438	0.061	0.086	0.001
Min.	0.438	0.061	0.086	0.001
Max.	0.439	0.062	0.087	0.001
Sdev.	0.000	0.000	0.000	0.000

CAUTION

To modify the VIAVI logo, set by default on the header of the pdf report, save your logo in a jpg file called `logo.jpg` and place it to: `disk > logo.jpg`.

Recalling PMD files

Once a PMD file has been stored, it can be recalled using the Explorer:

1. Press **File Explorer** to open the Explorer.
2. Select the directory and then the file to open
3. Press the **Load** soft key.
4. Press **View Trace(s)** or **Load Trace + Config.**
   The selected file is opened.

3

Attenuation profile

This chapter describes the different steps in carrying out a Attenuation Profile (AP) measurement with a ONA-800 equipped with an ODM Module.

The topics discussed in this chapter are as follows:

It is assumed that you are familiar with the operation of the ONA-800 and the Optical Broadband Source you are using.

Recommended equipment

To perform a AP measurement, the following equipment is recommended:

- ONA-800 with a module as referenced above, and required optical connector.
- OBS-5XX or BBS2A with required optical connectors.
- Fiber inspection scope with associated optical connector tips.
- Cleaning kit.
- Two fiber patchcords with required optical connectors.
- One mating adapter.

AP Activation and self calibration

1. Press **HOME** > **Test**.
2. In the list of modules installed, select the ODM and press the **AP** function  .
3. The results page displays with the auto-calibration status. A bar **tuning in progress** informs of the progression status of the calibration at the bottom of the screen. Wait for the calibration to be fully completed before continuing.
4. Press **SETUP** to access to the configuration menu for AP analysis.

Configuring the AP test

To access the AP test setup menu, press the **SETUP** button on the ONA-800.

You can choose the default values by pressing the **Auto-set** key or define your own configuration.

For Link Description and Report parameters, refer to “Link Description parameters” on page 14 and “Report parameters” on page 16.

Auto-set Configuration

Press **Auto-set** to define the AP acquisition / analysis with the following parameters:

Acquisition	Averaging acquisition	No
Analysis	Normalized to km	No
Display	Wavelength	Full

Link Description	Change Fiber Nbr	Increment
Report	File(s) save in	[Current Dir]
	Filenaming	[Cable_Id][Fiber_Num][Direction]
	Auto store	Yes

In **standard** mode, you can set the parameters below.

Reference

Last Reference / BBS Type / BBS Serial Number

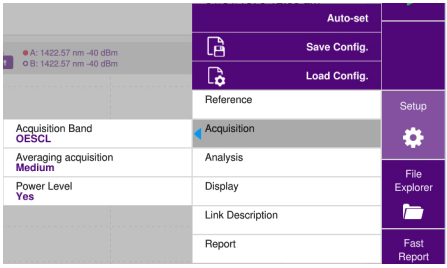
These parameters provide the relevant information related to the Broadband source (BBS) referencing.

These parameters cannot be modified as they are automatically generated after a reference measurement (see “Performing the reference” on page 40)

Acquisition parameters

In the **Setup** menu, press **Acquisition**.

Figure 21 Acquisition parameters



Acquisition band

OESCL measurement performed over the full wavelength range (OESCL bands).

SCL measurement performed over a wavelength range limited to S,C and L bands

NOTE

In case of OBS5xx handheld sources, the measurement will be performed exclusively on SCL band.

Averaging acquisition

It enables to improve the dynamic range of the measurement by reducing the noise level. It is recommended to use the **Auto** mode and configure a manual averaging if needed only:

No	No average of the acquisition sample to be performed.
Low	Low averaging (4 samples).
Medium	Medium averaging (16 samples).
High	High averaging (32 samples).

Power Level

This parameter enables to get a power level indication at the start of an acquisition

No	the received power is not indicated before starting the measurement acquisition.
Yes	the received power is indicated at the beginning of measurement.

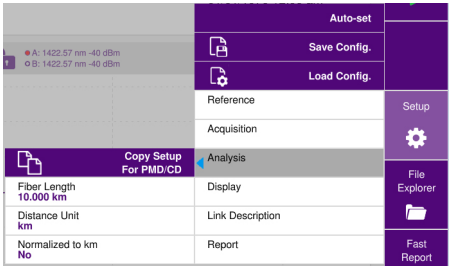
NOTE

If **Yes** is selected, the acquisition stops if not enough power is received.

Analysis parameters

In the **Setup** menu, press **Analysis**.

Figure 22 Analysis parameters



NOTE

The key **Copy Setup For PMD/CD** allows to apply the AP configuration to the other selected function(s) of the ODM module.

Fiber Length

A know fiber length enables to calculate and display the attenuation profile values in dB/km, in the table. (see Figure 28 on page 45).

Unknown If you do not know the fiber length, select **No**.

Yes If you know the fiber length, select **Yes**.

If **Yes** has been selected, click on text box and use the numerical keypad to modify the fiber length (Min = 0.100 km / Max = 300 km).

Distance Unit

Select the distance unit: km / kfeet / miles.

Normalized to km

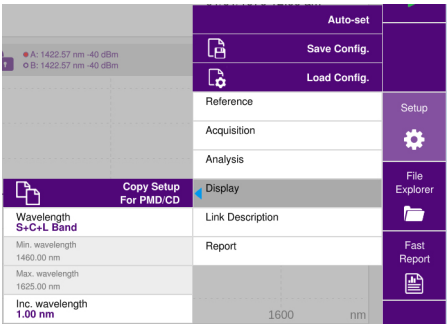
No The AP result is provided in dB only.

Yes The AP result is also provided in dB/km (calculated according to fiber length).

Display parameters

In the **Setup** menu, press **Display**.

Figure 23 Display parameters



Wavelength

It enables to configure the range of wavelengths to be displayed on the graph and in the table of results.

Full	Displays results along the full available wavelength range
S+C+L Band	Displays results along S, C + L bands.
C+L Band	Displays results along C + L bands.
Manual	Displays results between 2 user defined wavelengths. The user must then select the **Min. wavelength** and **Max. wavelength** parameters.
ITUCWDM	Displays the ITU-T G.694.2 CWDM channels exclusively
ITUDWDM	Displays the ITU-T G.694.1 DWDM channels exclusively

Channel spacing can be fixed at: 25 GHz, 50 GHz, 100 GHz or 200 GHz.

Telecom	Displays 4 wavelengths: 1310 / 1480 / 1550 / 1625 nm

Inc.Wavelength

Defines the spacing between 2 consecutive measurement points displayed on the graph and in the table of results.

Saving configuration in a file

Once parameters have been configured, they can be kept in memory and saved in a configuration file.

This configuration file can then be recalled in order to be recalled for future AP acquisitions.

To save parameters in a configuration file:

To save parameters in a configuration file:

1. If necessary, press **Setup** to open the Setup menu.
2. Select one parameter in one of the setup page (acquisition, link..)
3. Press **Save Config.** key 

.
4. Enter a name for the configuration file using the edition keypad.

NOTE
Configuration file is saved in the directory `disk/config/AP`.

5. Press  to validate.
A sound is emitted to indicate the file is saved.

The configuration file is saved with the extension ".fo_cfg" (icon ) and can be recalled at any time from the **Explorer** page.

Loading a configuration file

To load the configuration file to be used for AP test:

1. Press **Setup** key.
2. Press **Load Config.** key 

.
3. In the Explorer, select the desired file configuration and press **Load**.
A beep is emitted to validate the selection of the configuration file.
The software automatically brings you back to setup page.

NOTE
Most of the configuration files are available into the Platform in `disk/config/AP`.

AP Reference Measurement

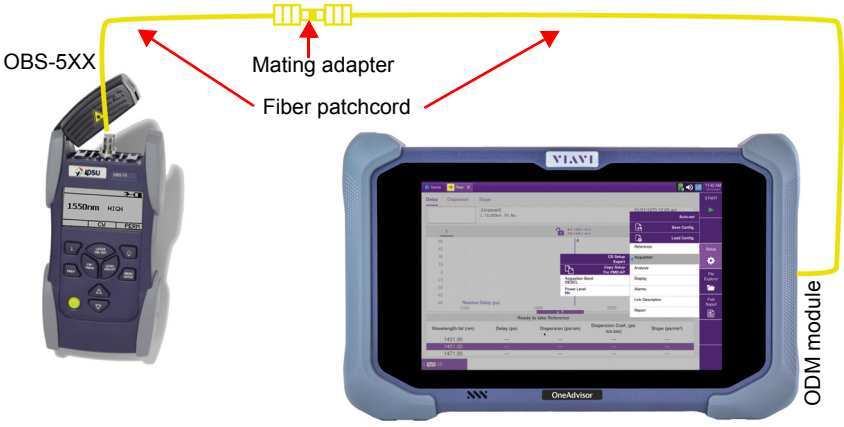
On the measurement examples below, only the OBS-5XX is described. However, it can be replaced by E81BBS2A.

Performing the reference

It is mandatory to perform a broadband source referencing once a day or each time the fiber patchcord has to be changed.

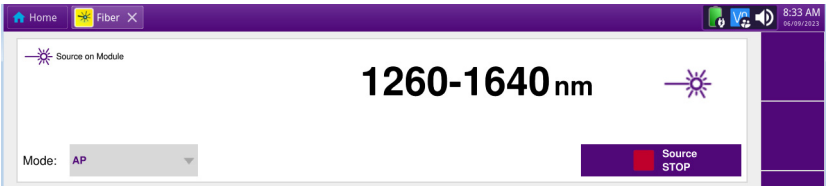
To make a reference, connect your OBS-5XX or BBS to the test module just like shown on figure below.

Figure 24 Reference measurement setup witn an OBS-5XX



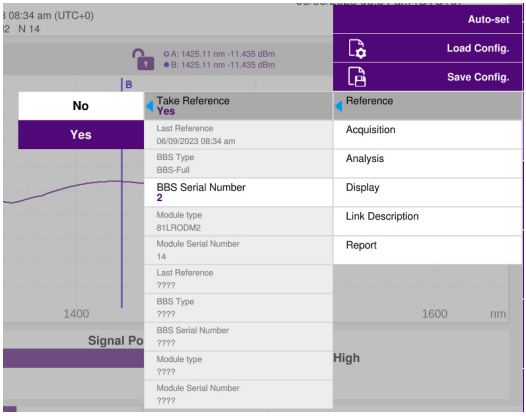
1 Activate the source on the distant OBS and select **AP** function.
If a BBS Module is used, press **Source START** Source START and enter the password `4877` to activate the Source.

Figure 25 BBS Activation for AP Reference



2 In the AP Setup page, press **Reference**.

Figure 26 AP Reference Setup



3 In **Take Reference**, select **Yes**

The line **BBS Serial Number** turns active.

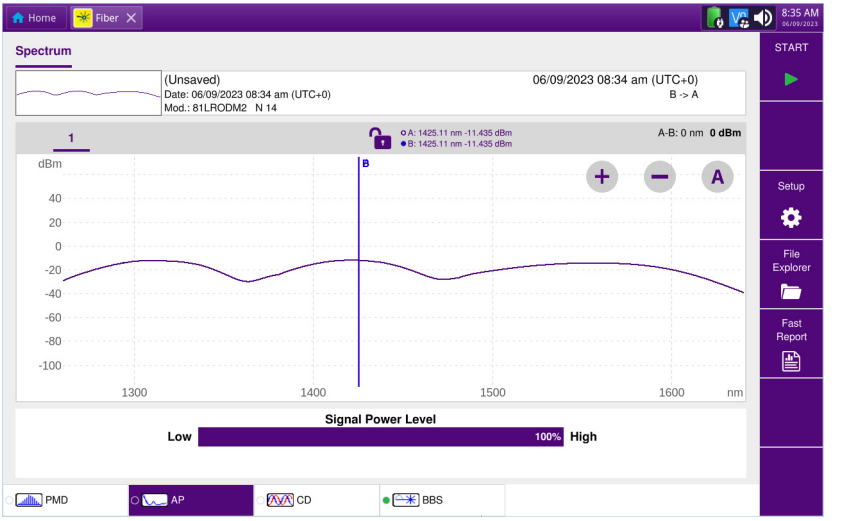
4 Enter a serial number for the broadband source used.

5 Press the button **START** to start the reference of the broadband source.

6 Press **Yes** in the dialog box to start reference and wait for the end of reference measurement.

Once the reference is correct, the message "ready to start Measurement" appears in the blue bar.

Figure 27 Example of a reference for a broadband source



A bargraph indicates the signal power level

If the reference measurement does not provide a correct result, check the following potential causes:

Error message	Possible problem	Possible solution
Acquisition impossible Hit any key to continue	Auto-calibration is not completed	Wait for the calibration to be terminated

Error message	Possible problem	Possible solution
Signal level too low! Check source and connections. Hit any key to continue.	The OBS-5XX (or other source) is not switched on	Press the **ON/OFF** button to switch on the source, verify if <Make reference> is still set to <Yes>, then repeat step 5
	The OBS-5XX (or other source) battery is too low	Check if the **LOW-BATT** red led is lighted. If yes, then recharge the battery.
	Defective connections	Check that the cables are properly connected, and the notches on the connectors are correctly aligned.

Saving a reference measurement

The reference measurement can be stored in the test set, so that it can be recalled later.. Proceed as follow:

1. Click on the **Fast Report** button
2. Press **Save** button.
3. Enter a filename for this reference, or click on **Default Filename**.

   The file has the extension ".AP", but differs from the AP measurement result files as it only contains the reference points (the information on the upper part of the screen are different). See “Saving the trace and generating a report” on page 47).

Loading existing reference

The last reference performed with the Base Unit may be different than the reference used by the current results.

The test set reference can be replaced by the reference associated to a stored results. to do so press the action key:

- **Load Ref From Trace**: the reference which has been used for the curve actually open will be used for the next acquisitions.
- The reference of a stored result can be updated using the reference stored in the test set. Measurement will then be updated accordingly. To do so press the action key: **Update Trace With Ref.**: apply the acquisition reference parameters to the loaded curve.

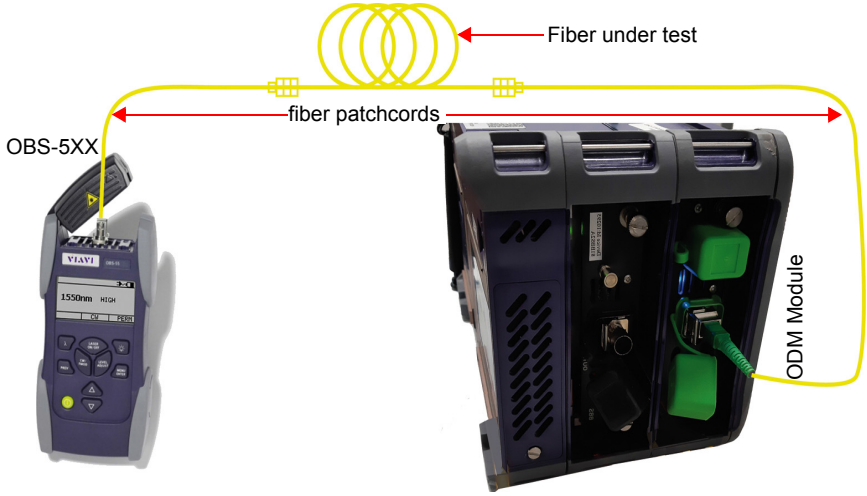
Performing a AP measurement

When the reference measurement of the broadband source has been completed, use the following procedure to make a measurement:

1. Disconnect the mating adapter and connect each fiber patchcord to the end of the fiber under test.
2. Press the **SETUP** button to access the configuration menu.
3. Select the appropriate AP test setup according to your application as earlier defined in “AP Activation and self calibration” on page 34.
4. Press the **START/STOP** button to perform the measurement.
5. Repeat step 1 to 4 for every fiber to be tested.

NOTE

When the composite power of the input signal is higher than +20 dBm, a warning is displayed and the signal is cut off.



NOTE

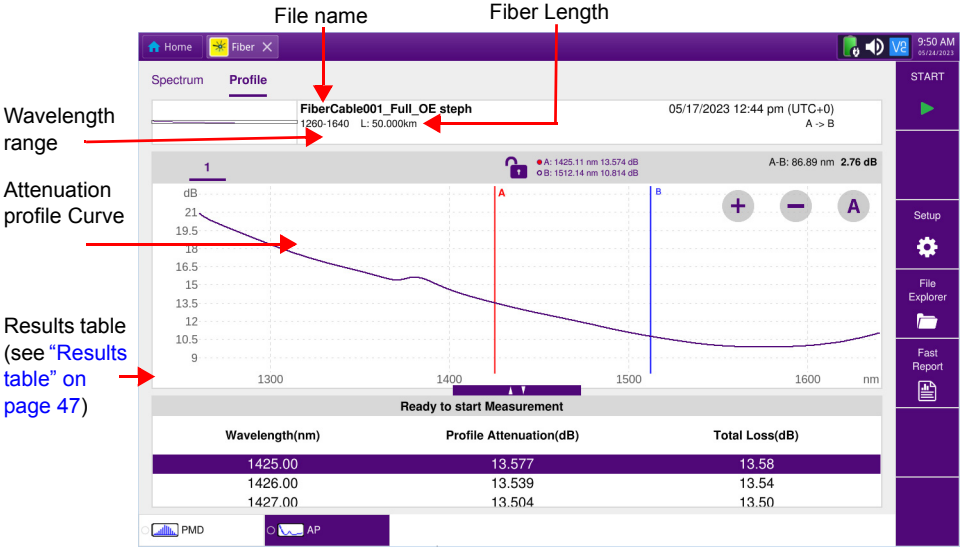
You can modify the fiber length without performing a measurement again. The AP results (dB/km) will be recalculated automatically.

Display of AP results

The AP results screen presents different zones (see: "Example of a AP result" on page 45).

Trace display

Figure 28 Example of a AP result



Spectrum/Profile

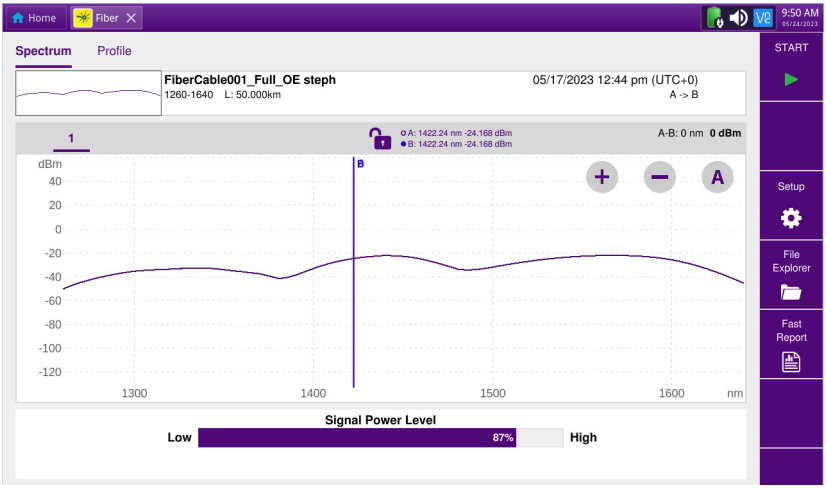
For a reference measurement, only the spectrum is available.

For a AP measurement, two different graphs may be displayed.

You may switch from the «Profile» view to the final «Spectrum» view using the upper tabs.

- **Spectrum**: displays the final spectrum.

Figure 29 Example of a spectrum view after a measurement



- **Profile**: it provides the difference between the final spectrum and the reference spectrum of the broadband source- that's the resulting attenuation profile (see figure "Example of a AP result" on page 45).

Cursor and Zoom functions

Position the cursor

- To move the cursors on the trace, grab and and move it on trace

  or

  Click on one results in the table to position the cursor on the trace at the desired value.

The coordinates of cursor intersection with the trace are indicated above the trace.

Zooming on trace

- In order to zoom in/out on, click on + or − to zoom in or out and click on the trace area to be zoomed.
  or
  Press A to do an automatic zoom on trace.

Results table

The results table provides, for each wavelength (calculated using the wavelength range and the incrementation parameter as seen in "Wavelength" on page 38), the attenuation profile in dB/km and the total loss in dB.

Saving the trace and generating a report

Once the measurement has been performed, the trace can be saved and a report can be generated.

Saving results and creating a report

This function is available exclusively in Profile view, in the results page.

To generate a report:

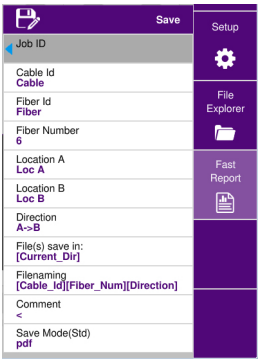
1 Select **Profile** view tab.

2 Press **Fast Report** menu key 

.

3 In the menu, configure the file saving (and the report)

Figure 30 Fast report configuration



See page 27 for a description of the parameters available for file saving and report.

4 Once saving is configured as desired, press **Save** key

5 Enter a name for the file in the edition keypad

or

Click on to apply the default filename (see “Filenaming” on page 17)

6 Press to validate.

NOTE

The ats file and the txt or pdf file will have the same name.

Once saving is completed, a sound is emitted onto the Platform.

NOTE

The file and the report are saved in the directory defined under the "File save in" field.

Recalling AP files

Once an AP file is stored, use the Explorer to reload it:

1. Press **File** to open the Explore**r**.
2. Select the directory and then the file to open.
3. Click on **Load**.
4. Click on **View Trace(s)** or **Load Trace + Config.**
   The selected file is opened.

4

CD measurements using phase shift method

The Chromatic Dispersion analyzer function using phase shift method is described in this chapter.

Topics discussed in this chapter are as follows:

CD activation and self calibration

1 Press **HOME** > **Test**.

2 In the list of modules installed, select the ODM and press the **CD** function 

3 The results page displays, with the self-calibration status.

A bargraph **self calibration in progress** informs of the progression status of the calibration. Wait for the calibration to be fully completed before continuing.

Configuring the CD test

To configure a chromatic dispersion test, press **Setup**. The different measurement parameters are displayed.

NOTE

The key **Copy Setup For PMD/AP** allows to apply the CD configuration to the other selected function(s) of the ODM module.

Auto-set Configuration

Press **Auto-set** to define the CD analysis with the following parameters:

Analysis	Approx. formula*	Auto
	Amplified Link*	No
Display	Measurement Points*	No
	Show approximation formula*	No
Link Description	Change Fiber Nbr	Increment
Report	File(s) save in	[Current Dir]
	Filenaming	[Cable_Id][Fiber_Num][Direction]
	Auto store	Yes

*: parameters available in CD Expert mode only

In **standard** mode, you can set the parameters below.

Reference

Last Reference / BBS Type / BBS Serial Number

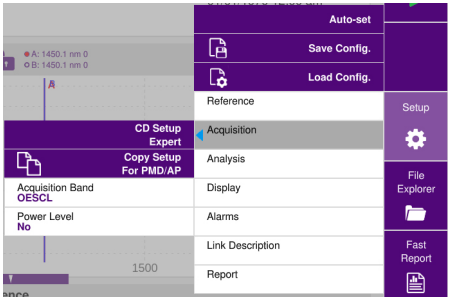
These parameters provide the relevant information related to the Broadband source (BBS) referencing.

These parameters cannot be modified as they are automatically generated after a reference measurement (see “CD Reference measurement” on page 59).

Acquisition parameters

In the **Setup** menu, press **Acquisition**.

Figure 31 CD Acquisition parameters



Acquisition band

OESCL measurement performed over the full wavelength range (OESCL bands).

SCL measurement performed over a wavelength range limited to S,C and L bands.

NOTE

In case of OBS5xx handheld sources, the measurement will be performed exclusively on SCL band.

Power Level

This parameter enables to get a power level indication at the start of an acquisition.

No	the received power is not indicated before starting the measurement acquisition.
Yes	the received power is indicated at the beginning of measurement.

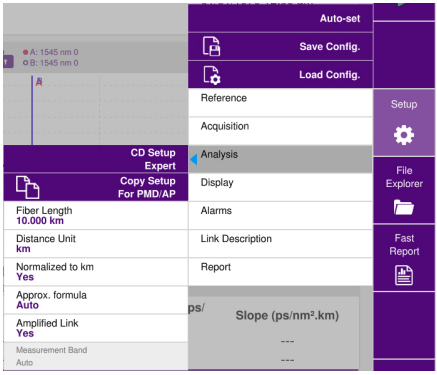
NOTE

If **Yes** is selected, the acquisition stops if not enough power is received.

Analysis parameters

In the **Setup** menu, press **Analysis**.

Figure 32 CD Analysis parameters



Fiber Length

Unknown	If you do not know the fiber length
Distance	Press **Edit Number** to enter fiber distance: Min=1km / Max=20000 kmDispersion coefficients (normalized values) will be calculated accordingly.

Distance Unit

When the fiber length is set manually, choose the distance unit: km / kfeet / miles.

Normalized to km

No Only Dispersion results of the link are displayed, in ps/nm.

Yes In addition to dispersion results, dispersion coefficient are calculated according to the fiber length and listed in the table.

CD Setup Expert

Press CD Setup Standard to switch to **Expert** mode CD Setup Expert and access additional parameters to be configured:

Approx. formula

Select the approximation formula to be used for the calculation of the delay, dispersion and slope curves:

Please refer to ITU-T G.650.1 or IEC 60793 1-42 for further information.

Quadratic $A+B\lambda+C\lambda^{2}$.

3T Sellmeier $A+B\lambda^{2}+C\lambda^{-2}$.

5T Sellmeier $A+B\lambda^{2}+C\lambda^{-2}+D\lambda^{4}+E\lambda^{-4}$.

Lambda Log $A+B\lambda+C\lambda\ \ln(\lambda)$.

You can also let the product to configure automatically the approximation formula to be used by selecting **Auto**.

It is recommended to select the quadratic formula when the ODM Module is used with an OBS-5XX or a 81BBS2A, in SCL mode.

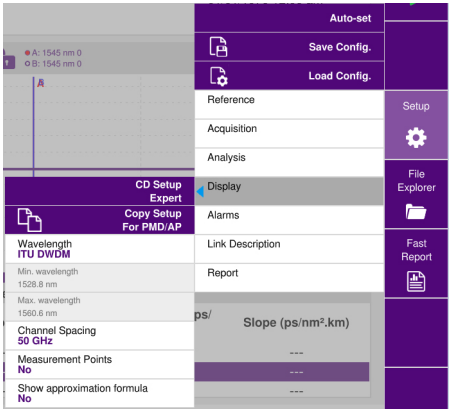
Amplified link

Select **Yes** when measuring through optical amplifiers (see “Performing a CD measurement through amplifiers” on page 64).

Display parameters

In the **Setup** menu, press **Display**.

Figure 33 CD Display parameters



Wavelength

This parameter enables to set the displayed wavelength range.

Full Displays results along the full available wavelength range

S+C+L Band Displays results along S, C + L bands..

C+L Band Displays results along C + L bands.

C Band Displays results along C band

ITUCWDM Displays the ITU-T G.694.2 CWDM channels exclusively

ITUDWDM Displays the ITU-T G.694.1 DWDM channels exclusively

Channel spacing can be fixed at: 25 GHz, 50 GHz, 100 GHz or 200 GHz.

Manual Displays results between 2 user defined wavelengths. The user must then select the inf. wavelength to "start" with and the sup. wavelength to "end" with.

Inc.Wavelength

Defines the spacing between 2 consecutive measurement points displayed on the graph and in the table of results.

CD Setup Expert

Press CD Setup Standard to switch to **Expert** mode CD Setup Expert and access additional parameters to be configured:

Measurement Points

Displays the acquisition points on the Delay curve (represented by black crosses).

Yes All the acquisition points are displayed.

No No acquisition points visible

Show approximation formula

Displays the resulting approximation equation and the correlation coefficient on the upper left side of the trace.

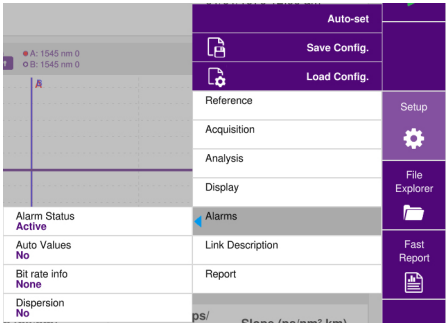
Yes Equation is displayed.

No Equation is not visible.

Alarms parameters

In the **Setup** menu, press **Alarms**.

Figure 34 CD Alarms parameters



Alarm Status

None No alarm management.

Active Enable the Pass/Fail evaluation according to the defined thresholds (see below).

The maximum dispersion tolerance is automatically set according to the bit rate information.

Bit rate info.

List all relevant data rates.

Dispersion

Threshold value is entered manually: select the maximum dispersion threshold (ps/nm), from >1 to > 10000 ps/nm.

NOTE
Max. dispersion threshold is always considered for non normalized dispersion values.

The Pass/Fail indication is provided in the results table.

Saving configuration in a file

Once parameters have been configured, they can be kept in memory and saved in a configuration file.

This configuration file can then be recalled for future CD acquisitions.

To save parameters in a configuration file:

1 Press **Setup** to return to **Setup** page.

2 Press **Save Config.** key 

3 Enter a name for the configuration file using the virtual keyboard (max 20 characters).

NOTE
Configuration file is saved in the directory `disk/config/CD`.

4 Press  to validate.

A sound is emitted to indicate the file is saved.

The configuration file is saved with the extension ".fo_cfg" (icon ) and can be recalled at any time from the **Explorer** page.

Loading a configuration file

To load the configuration file to be used for CD test:

1 Press **Setup** key.

2 Press **Load Config.** key 

.

3 In the Explorer, select the desired file configuration and press **Load**.
A beep is emitted to validate the selection of the configuration file.
The software automatically brings you back to setup page.

NOTE

Most of the configuration files are available into the Platform in `disk/config/CD`.

CD Reference measurement

On the measurement examples below, only the OBS-5XX will be described. However, it can be replaced by E81BBS2A.

Performing the reference

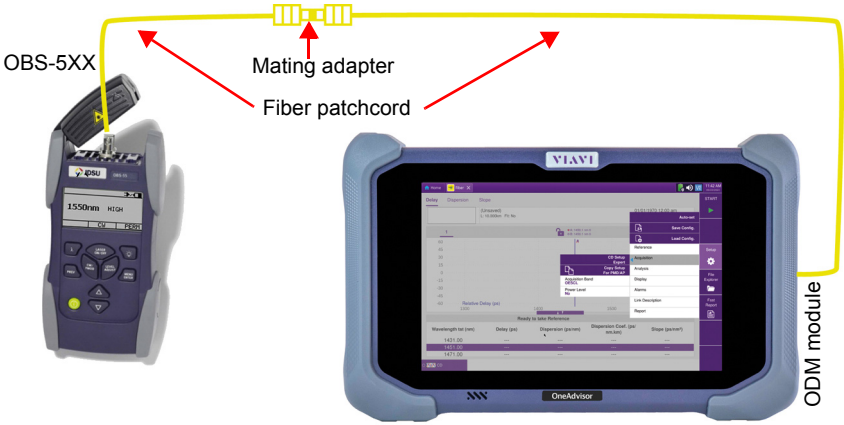
It is recommended performing a CD referencing or each time the fiber patchcord or launch cable has to be replaced.

NOTE

When a reference is performed, acquisition parameters are not taken in account.

To perform a reference, connect your OBS-5XX or BBS to the test module as shown below.

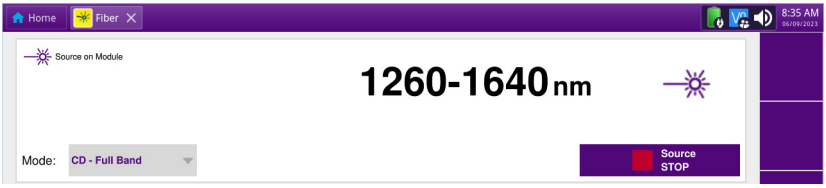
Figure 35 Reference measurement setup witn an OBS-5XX



1 Activate the source on the distant OBS and select **CD** function.
If a BBS Module is used, press **Source START** 

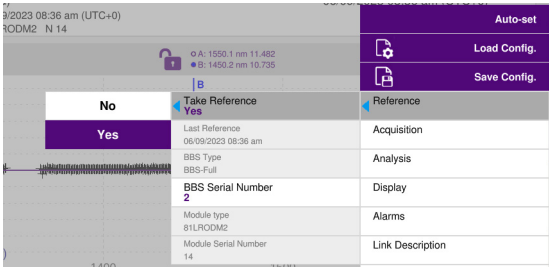
and enter the password `4877` to activate the Source.

Figure 36 BBS Activation for CD Reference



2 In the CD Setup page, press **Reference**.

Figure 37 Setup CD Reference Measurement



3 In **Take Reference**, select **Yes**

The line **BBS Serial Number** turns active.

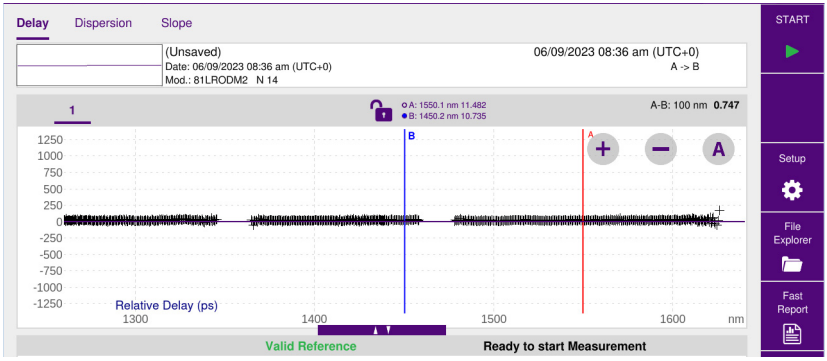
4 Enter a serial number for the broadband source used.

5 Press the button **START/STOP** to start the reference of the broadband source.

A bargraph is displayed until the end of the acquisition.

Once the reference is correct, the message `Valid Reference` is displayed in green, and related information are displayed in the upper blue part of the screen: date and time of reference acquisition / Source type / serial number.

Figure 38 Example of a reference for a broadband source



If the reference measurement does not provide a correct result, check the following potential causes:

Error message	Possible problem	Possible solution
Acquisition impossible Hit any key to continue	Auto-calibration is not completed	Wait for the calibration to be terminated
Signal level too low! Check source and connections. Hit any key to continue.	The OBS-5XX (or other source) is not switched on	Press the **ON/OFF** button to switch on the source, verify if <Make reference> is still set to <Yes>, then repeat step 5
	The OBS-5XX (or other source) battery is too low	Check if the **LOW-BATT** red led is lighted. If yes, then recharge the battery.
	Defective connections	Check that the cables are properly connected, and the notches on the connectors are correctly aligned.

Saving a reference measurement

When the reference measurement of the broadband source has been completed, you can save the result on the disk of the Platform.

Proceed as follow:

1. Click on the **FILE** button
2. Select **Setup**
3. Enter a filename for this reference, or click on **Default Filename**.
   The file has the extension ".OCD", but differs from the CD measurement result files as it only contains the reference points (the information on the upper part of the screen are different). See “Saving results and creating a report” on page 67.

Loading existing reference

The last reference performed with the Base Unit may be different than the reference used by the current results.

The test set reference can be replaced by the reference associated to a stored results. to do so press the action key:

- **Load Ref From Trace**: the reference which has been used for the curve actually open will be used for the next acquisitions.

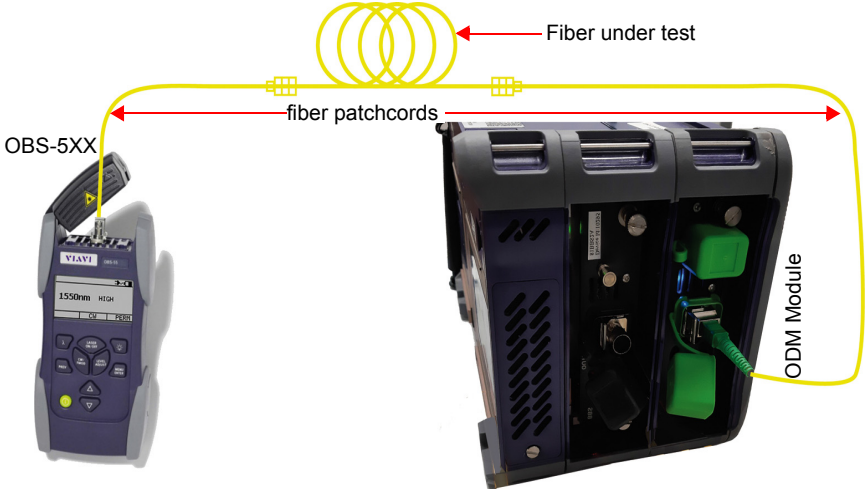
- The reference of a stored result can be updated using the reference stored in the test set. Measurement will then be updated accordingly. To do so press the action key: **Update Trace With Ref.**: apply the acquisition reference parameters to the loaded curve.

Performing a CD Measurement

Once the reference measurement is correctly performed:

1. Disconnect the mating adapter and connect each fiber patchcord to the end of the fiber under test
2. Select the appropriate CD test parameters according to your application (see "CD activation and self calibration" on page 52).
3. Press the **START/STOP** button to see the results within a few seconds.
4. Repeat steps 1 to 4 for every fiber to be tested

Figure 39 Connections for the CD Measurement



NOTE

You can modify the fiber length without performing a measurement again. The CD results (dB/km) will be recalculated automatically.

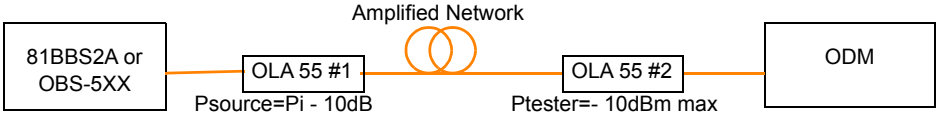
Performing a CD measurement through amplifiers

The CD reference step is not required for measuring through amplifiers:

1 Connect the source and the ODM module at each end of the fiber under test. Optical attenuators (OLA55 1 and OLA55 2) have to be positioned before and after the amplified link.

VIAVI recommends to:

- setup the front attenuator (OLA55 #1) so that the power level received by the amplifier is 10 dB lower than the in-service power level (in normal operation).
- setup the far end attenuator (OLA55 #2) so that the maximum received power level by the CD tester is -10dBm max



2 Press the **SETUP** button to access the CD configuration menu.

3 Select the appropriate CD test setup according to your application as earlier defined in “Configuring the CD test” on page 52.

4 Select **Yes** for **Amplified link** (It will limit the acquisition band from 1530 nm to 1565 nm).

5 Press the **START/STOP** button to perform CD measurement.

NOTE

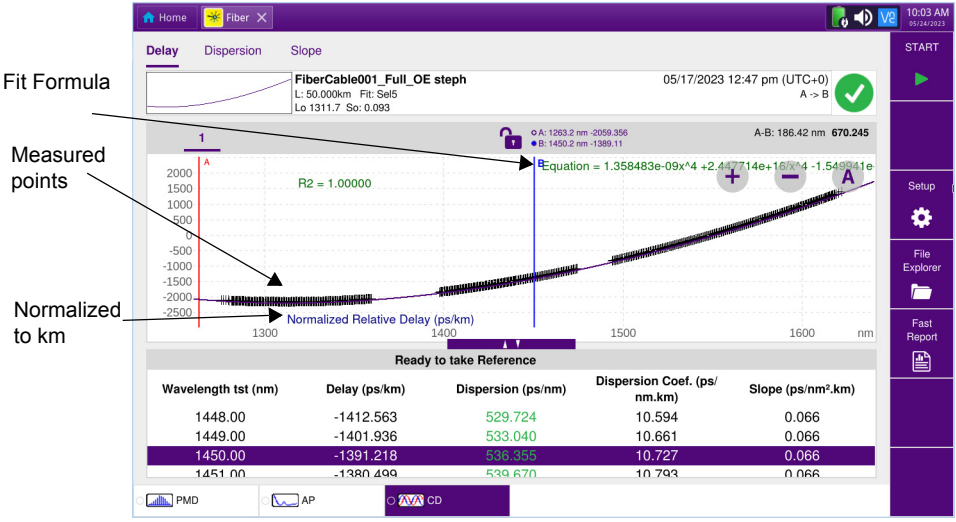
Depending on the amplifier specification, it may be required to adjust the acquisition band to a short wavelength range.

Display of CD results

General display

Once the acquisition is completed, the result curve is automatically displayed. The Delay curve is always displayed first.

Figure 40 Delay Curve



The information provided with the delay curve may be different depending on to the parameters settings. In the Figure 40, the following parameters have been configured:

- Normalized to km : **Yes**
- Show Measured Points: **Yes**
- Show Fit Formula: **Yes**

NOTE

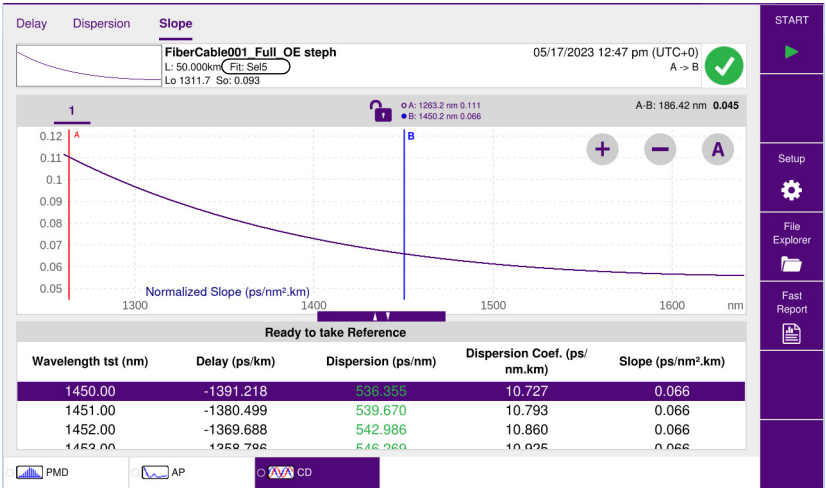
If the parameter **Normalized to km** is set to **No**, the result table will not display the *Dispersion Coef (ps/nm.km)* values.

Functions available

Delay / Dispersion / Slope

Once the delay curve is displayed, you can change to the Dispersion, then the Slope Curve, using the **Delay** / **Dispersion** / **Slope** tabs on top of the screen.

Figure 41 Example of the Slope display



The results table displays the following values for each wavelength (depending on the range and increment defined in the Setup menu):

- Delay
- Total dispersion
- Dispersion Coefficient (if **Normalized to km** is set to **Yes** in the Setup menu. If not, this column is empty).
- Slope

The upper part of the screen, next to the mini trace representation, displays:

- The Bit Rate Info. used for the Pass/Fail indication
- L0: zero dispersion wavelength

- So: Slope at L0

Cursor and Zoom functions

Position the cursor

- To move the cursors on the trace, grab and move it on trace
  or
  Click on one results in the table to position the cursor on the trace at the desired value.

The coordinates of cursor intersection with the trace are indicated above the trace.

Zooming on trace

- In order to zoom in/out on, click on + or − to zoom in or out and click on the trace area to be zoomed.
  or
  Press A to do an automatic zoom on trace.

Saving the trace and generating a report

Once the results page is displayed, the trace can be saved and a report can be generated directly from the results screen.

Saving results and creating a report

To save the trace (and generate a report):

> **NOTE**
> Whatever is the view selected in Results page (**Delay**, **Dispersion** or **Slope**), the report is always generated with the **Dispersion** trace.

1 Press **Fast Report** menu key 

.
A menu displays under the trace.

2 In the menu, configure the file saving (and the report)

See page 27 for a description of the parameters available for file saving and report.

3 Once saving is configured as desired, press **Save** key

4 Enter a name for the file in the edition keypad
or
Click on menu key to apply the default filename (see "Filenaming" on page 17).

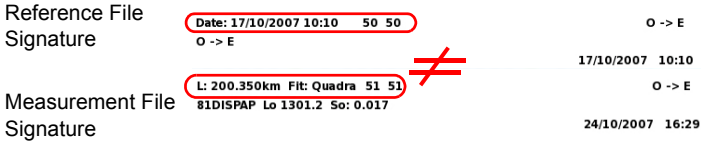
5 Press to validate
Once saving is completed, a sound is emitted onto the Platform.

File Signature

The Chromatic Dispersion results are stored with the extension ".ocd".

The Reference measurement and the CD measurement files have both the extension ".ocd" but can be differentiated by the information displayed in the File signature, on upper part of the screen:

Figure 42 File Signature for Reference and CD measurement



Recalling reference or CD measurement files

Once a CD file is stored, it can be recalled using the Explorer:

1 Open the File Explorer.

2 Select the directory and then the file to open

3 Press **Load**

4 Press **View Trace(s)** or **Load Trace + Config.**
Click on **Load Ref.** to open a reference file.

5

Technical specifications and commercial references

This chapter shows the technical specifications and commercial references of the ODM modules.

The topics discussed in this chapter are as follows:

ODM Modules technical specifications

Typical specifications[1] at 25°C.

Chromatic Dispersion	**Long Range 81LRODM2**		**Medium Range 81MRODM2**	
Measurement method	Phase shift method per IEC 60793-1-42 Method A and TIA-455-175-B			
Wavelength Acquisition Range	1260-1640nm		1435-1640nm	
Wavelength Measurement Range	1260-1650nm		1260-1650nm	
Wavelength Uncertainty	+/-0.1nm			
Minimum length	1km			
Dynamic Range[1]	45dB		30dB	
	55dB [2]		40dB [2]	
	80km G652	**10km G655**	**80km G652**	**10km G655**
Zero dispersion wavelength uncertainty (nm)	+/-1.5		n/a	+/-4.5
Zero dispersion wavelength repeatability[3] (nm)	0.1		n/a	0.4
Dispersion uncertainty[4, 5] (ps/nm.km)	+/- 0.05	+/- 0.1	+/- 0.06	+/- 0.3
Dispersion repeatability[3, 4] (ps/nm.km)	0.007		0.04	
Slope at zero wavelength repeatability[3]	0.5%	0.1%	n/a	
Measurement time	40s to 80s		10s to 30s	
Amplified link measurement	Through multiple EDFAs			

1. with averaging
2. with Handheld broadband source OBS550 in High Dynamic mode
3. repeatability refers to the typical one-sigma standard deviation value, obtained for system cycling over 20 measurements
4. 1530 - 1570 nm band
5. excluding reference fiber uncertainties

1.with Broadband Source module E81BBS2A unless specified

Polarization Mode Dispersion	**Long Range 81LRODM2**	**Medium Range 81MRODM2**
Measurement method	Fixed analyzer method based on FFT per IEC 60793-1-48 Annex A and TIA-455-113	
Dynamic range [1]	58dB	45dB
	65dB [2]	55dB [2]
PMD measurement range [3]	0.08 to 130 ps	
PMD absolute uncertainty [4, 5]	+/- 0.02ps +/- 2% PMD	
PMD repeatability [4, 5]	0.025 ps	
Measurement time [6]	16 seconds, independent of PMD value	8 seconds, independent of PMD value
Amplified link measurement	Throug multiple EDFAs	

1. with averaging
2. with Handheld Broadband Source OBS550 in High Dynamic mode
3. up to 60 ps in strong mode coupling
4. weak mode coupling, between 0.1 ps and 60 ps DGD range
5. up to 35 dB attenuation and METAS standard traceable
6. minimum value without averaging

Attenuation Profile	**Long Range 81LRODM2**	**Medium Range 81MRODM2**
Measurement method	Insertion loss method per IEC 60793-1-40	
Dynamic range [1]	54dB	45dB
	64dB [2]	55 dB
Wavelength Uncertainty	+/-0.1nm	
Measurement uncertainty [3]		
• @ 1310nm	0.006 dB/km	n/a
• @ 1550nm	+/-0.003 dB/km	
• at 1625nm	+/-0.004 dB/km	
Measurement time [4]	6 seconds	3 seconds

1. with averaging
2. with Handheld Broadband Source OBS550 in High Dynamic mode
3. measured with 80 km G.652 fiber
4. minimum value without averaging

ODM Modules references

ODM modules	Reference
Medium range Optical Dispersion Measurement module with APC connector	E81MRODM2-APC
Medium range Optical Dispersion Measurement module with PC connector	E81MRODM2-PC
Long range Optical Dispersion Measurement module with APC connector	E81LRODM2-APC
Long range Optical Dispersion Measurement module with PC connector	E81LRODM2-PC

OBS / BBS modules	References
OBS-550 Optical Broadband Source High Power	2279/32
OBS-500 Opitical Broadband Source 1460 to 1625nm	2279/33
BroadBand Source module for PMD, Long Range CD and ATT Profile measurement, 1260-1640nm	E81BBS2A

A

RoHS Information

This appendix describes the RoHS (Restriction of Hazardous Substances) information, which are mandatory requirements from China.

The RoHS directive consists in the restriction on the use of certain hazardous substances in electrical or electronic equipment sold or used in the European Union, after July 1, 2006. These substances are: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls and polybrominated diphenyl ethers.

The following chapter is described:

- “Declaration of Conformance: China RoHS Material Disclosure” on page 74

Declaration of Conformance: China RoHS Material Disclosure

1445 S Spectrum Blvd, Ste 102
Chandler, AZ 85286, USA

22167860-147 Rev 000

“中国 RoHS”

《电子信息产品污染控制管理办法》（信息产业部，第 39 号）

附录 (Additional Information required for the Chinese Market only)

本附录按照“中国 RoHS”的要求说明了有关电子信息产品环保使用期限的情况，并列出了产品中含有的有毒、有害物质的种类和所在部件。本附录适用于产品主体和所有配件。

产品系列: OPTICAL DISPERSION MEASUREMENT MODULE
(Product Family)

环保使用期限：

本标识标注于产品主体之上，表明该产品或其配件含有有毒、有害物质（详情见下表）。

其中的数字代表在正常操作条件下至少在产品生产日期之后数年内该产品或其配件内含有的有毒、有害物质不会变异或泄漏。该期限不适用于诸如电池等易耗品。

有关正常操作条件，请参见产品用户手册。

产品生产日期请参见产品的原始校准证书。

有毒、有害物质的类型和所在部件

	有毒、有害物质和元素					
元器件 (Component)	铅(Pb)	汞 (Hg)	镉(Cd)	六价铬 (CR^{6+})	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
产品主体 (Main Product)						
印刷电路板组件 (PCB Assemblies)	X	O	O	O	O	O
内部配线 (Internal wiring)	O	O	O	O	O	O
电工零件 (Electro-mechanical parts)	X	O	O	O	O	O
光模块 / 辅助模块 (Optical modules) / (Auxiliary modules)	X	O	O	O	O	O
金属外壳零件和紧扣件 (Metal case parts and fixings)	O	O	O	O	O	O
塑料外壳零件 (Plastic case parts)	O	O	O	O	O	O
标签和胶带 (Labels and tapes)	O	O	O	O	O	O
配件 (Accessories)						
外接电缆和适配器 (External cables and adapters)	O	O	O	O	O	O
手册和其它印刷材料 (Handbooks and other printed material)	O	O	O	O	O	O

本表是按照 SJ / T 11364 的规定编制的:

O：表示该有害物质在该部件所有均质材料中的含量均在 GB/T 26572 规定的限量要求以下。

X：表示该有害物质至少在该部件的某一均质材料中的含量超出 GB/T 26572 规定的限量要求。

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English

VIAVI Solutions

North America:	**1.844.GO VIAVI / 1.844.468.4284**
Latin America	**+52 55 5543 6644**
EMEA	**+49 7121 862273**
APAC	**+1 512 201 6534**
All Other Regions:	**viavisolutions.com/contacts**
email	**TAC@viavisolutions.com**
VIAVI France	**34 rue Necker 42000 Saint-Etienne FRANCE**