# OTDR Functions, Options and Software Applications

## OTDR functions, options and software applications for SmartOTDR and T-BERD/ MTS 2000/4000 V2

User Manual

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User Manual

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For the VIAVI position statement on the use of Proposition 65 chemicals in VIAVI products, see the Hazardous Substance Control section of VIAVI's Standards and Policies web page.

## EU WEEE and Battery Directives

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.

VIAVI has established a take-back processes in compliance with the EU Waste Electrical and Electronic Equipment (WEEE) Directive, 2012/19/EU, and the EU Battery Directive, 2006/66/EC.

Instructions for returning waste equipment and batteries to JDSU can be found in the WEEE section of VIAVI's Standards and Policies web page.

If you have questions concerning disposal of your equipment or batteries, contact VIAVI's WEEE Program  Management team at WEEE.EMEA@VIAVISolutions.com.

## EU REACH

Article 33 of EU REACH regulation (EC) No 1907/2006 requires article suppliers to provide information if a listed Substances of Very High Concern (SVHC) is present in an article above a certain threshold.

For information on the presence of REACH SVHCs in VIAVI products, see the Hazardous Substance Control section of VIAVI's Standards and Policies web page.

## EU CE Marking Directives (LV, EMC, RoHS, RE)

This product conforms with all applicable CE marking directives. Please see EU Declaration of Conformity for details.

# Contents

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# About This Guide

The MTS/T-BERD 2000 of VIAVI provides a handheld, modular platform designed for the construction, validation and maintenance of fiber networks.

The topics discussed in this chapter are as follows:

# Purpose and scope

The purpose of this guide is to help you successfully use the MTS/T-BERD 2000 features and capabilities. This guide includes task-based instructions that describe how to install, configure, use, and troubleshoot the MTS/T-BERD 2000 with modules.

# Assumptions

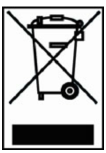
We are assuming that you have basic computer and mouse/track ball experience and are familiar with basic telecommunication and fiber optic concepts and terminology.

# 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**. |

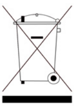
**Table 3** Symbol conventions

**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

# Principle of Measurement

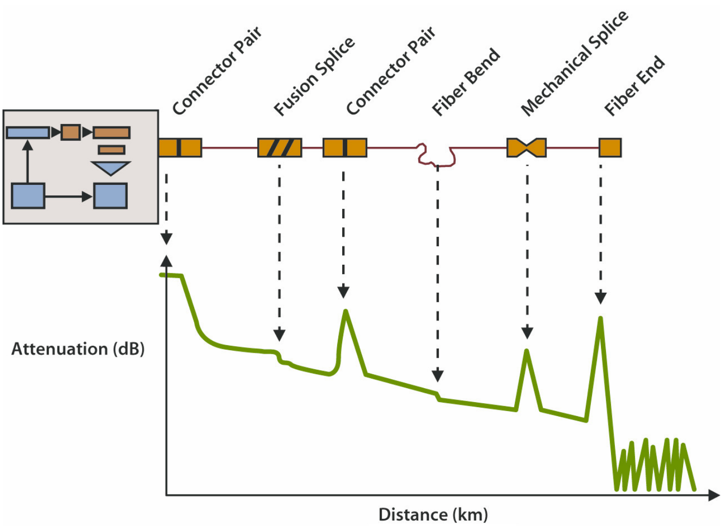
This chapter gives the principles of the measurements made by the optical modules.

The topics discussed in this chapter are as follows:

# Principle of reflectometry measurements

Optical time domain reflectometry consists in injecting a light pulse into one end of the optical fiber to be analyzed and observing, at the same end, the optical intensity passing through the fiber in the opposite direction to the propagation of the pulse.
The signal detected is exponentially diminishing in form, typical of the phenomenon of backscattering, with superimposed peaks due to reflections from the ends of the fiber or other variations in the refractive index.

**Figure 1** Trace showing typical backscattering




## Information yielded by the measurement

From a backscatter trace it is possible, in particular, to determine the position of a section of fiber within a link. The measurement result must reveal:

- the attenuation
- the location of faults, by their distance from a point of origin,
- attenuation with respect to distance (dB/km)
- the reflectance of a reflective event or a link.

> To locate faults, a reflectometer measures only time. Consequently, group velocity must be introduced in order to determine the distance of the location. This is done by introducing the refractive index of the fiber into the instrument.

## Validity of Measurement ITU-T

ITU-T in recommendations G.650, G.651 and G.652, give backscatter measurement as an alternative method for measuring attenuation, the method of reference being the cut fiber.

The field of application of backscatter is not limited, but the conditions for application of this method are nevertheless stipulated:

- injection conditions: Fresnel reflections must be limited at fiber input.
- a high-power source (laser) should be used.
- receiver bandwidth should be chosen to achieve a compromise between pulse rise time and noise level.
- backscatter power should be represented on a logarithmic scale.

## Reflectance

Reflectance is a value with which the coefficient of reflection of a reflecting optical element can be quantified. It is defined as the ratio of the power reflected by the element over the incident power.

These reflections are due to variations in refractive index all along the optical link in certain telecommunications applications. If they are not controlled, they may degrade the performance of the system by perturbing the operation of the emitting laser (especially DFB lasers) or may generate interference noise in the receiver by multiple reflections.

The reflectometer is particularly well suited to the measurement of discrete reflectances on an optical fiber link. To calculate the coefficient of reflection, it is necessary to measure the total amplitude of the Fresnel reflection generated and then to apply a conversion formula to obtain the reflectance value.

This formula takes into account:

- the total amplitude of the reflection measured by the reflectometer.
- the pulse width used to measure the amplitude of the reflection (in nanoseconds)

- the backscatter coefficient of the fiber used:
  - typical values of the backscatter coefficient for a pulse of 1 ns and
  - for a single-mode fiber:-79 dB at 1310 nm
    -81 dB at 1550 nm and 1625 nm
  - for a multi-mode fiber:-70 dB at 850 nm
    -75 dB at 1300 nm

**NOTE**
To measure the widest range of reflection coefficient, it is necessary to insert a variable optical attenuator between the reflectometer and the link to be tested. This attenuator enables the level of the trace to be adjusted so as to avoid saturation of the reflectometer by the reflection to be evaluated.

# Principle of optical power and attenuation measurements

## Power measurements

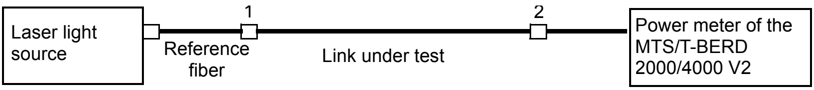
A power meter, is all that is needed to measure emitted or received power:

- to measure emitted power, connect the power meter directly to the output of the optical emitter;
- to measure the power at the input of an optical receiver, the power meter is connected to the end of the fiber, at the point where the optical receiver would be connected.

## Attenuation measurements (optical link loss)

For measurement of the attenuation of power in a complete link or in elements such as sections of fiber, connections or optical components, a light source and a power meter are required.

This attenuation is usually deduced from the measurement of optical power at two points:




Attenuation $A_{(dB)} = P1_{(dBm)} - P2_{(dBm)}$

To perform accurate measurements, the following conditions are necessary

- Use a light source which is stable both in time and as a function of temperature.
- Make sure that all connections and fibers and the receiving cell are perfectly clean.
- Use a reference link between the laser source and the test subject. If several measurements are to be made under identical light injection conditions, this reference fiber must not be disconnected during the period while measurements are taking place.

## Insertion loss method

**1** The power meter is first connected to the laser source via the reference fiber: P1 is measured.

**2** Then the fiber to be tested is inserted between the reference fiber and the power meter: P2 is measured.

The difference between P2 and P1 gives the attenuation of the fiber under test.

It is preferable to use the same type of connector at both ends of the fiber being tested, to ensure the same connection conditions for measuring P1 and P2.

## Accuracy of measurements

- A high degree of accuracy is often required. It is then necessary to perform a preliminary calibration without the fiber under test to eliminate the losses due to connections as far as this is possible. To do this, use the «Reference Value» function.

2

# Starting up

This chapter describes how to start using the MTS/T-BERD or the SmartOTDR.

The topics discussed in this chapter are as follows:

# Unpacking the device - Precautions

We suggest that you keep the original packing material. It is designed for reuse (unless it is damaged during shipping). Using the original packing material ensures that the device is properly protected during shipping.

If another packaging is used (for returning the equipment for example), VIAVI cannot give warranty on good protection of the equipment.

If needed, you can obtain appropriate packing materials by contacting VIAVI Technical Assistance Center.

# Precautions relating to the OTDR Module use

If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be compromised.

Contact authorized, trained and qualified service personnel for all services.

## Fans on OTDR Modules

Take care fans may be present on the side of the OTDR product. Under normal operation, no injury may occur to the user

# Fitting and removing a module (not available with SmartOTDR)

**The MTS/T-BERD must be switched off, and if it is operating on the mains, its supply cable must be unplugged.**

**NOTE**

Refer to MTS/T-BERD user manual to check other pertinent environmental conditions related to the mainframe.

# Fitting a module

1. Turn the instrument face down on the work surface.
2. Set the two notches on the module part **(1a)** into the two holes provided for that purpose on the Base **(1b)**.
3. Make flush the 2 connections **(2a & 2b)**, on module and base.
4. Once positioned, fix the module to the base screwing the 2 screws **(3a)** fixing the receptacle.
5. With a T-BERD/MTS 4000 V2, repeat the process if a small module must be installed at the back of the platform.

**Figure 2** Fixing the module to the 2000 Base-Unit

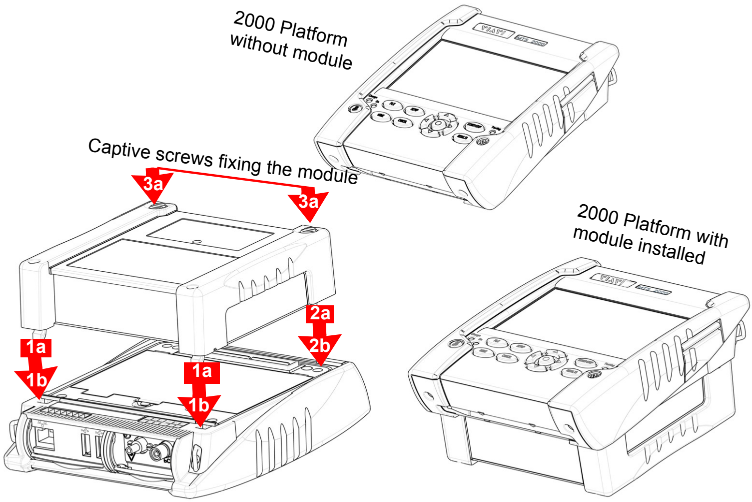
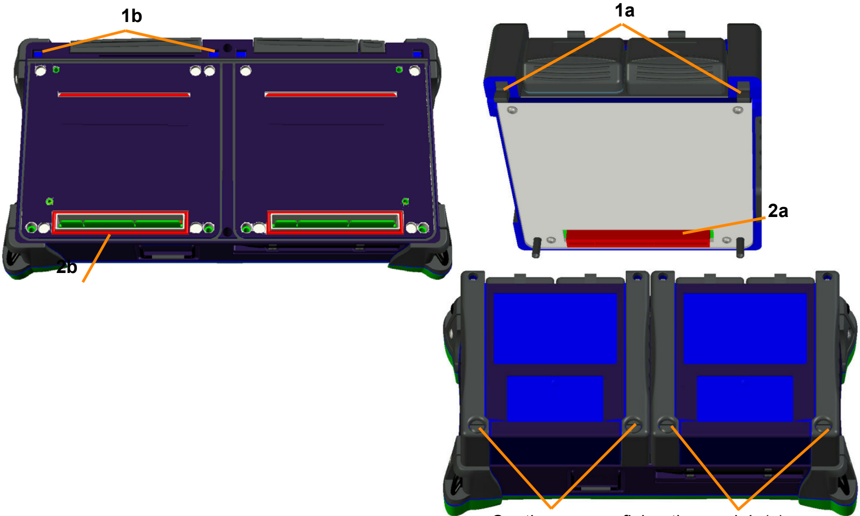


**Figure 3** Fixing the module to the 4000 V2 Base-Unit



Captive screws fixing the module(s)

## Removing a module

1. Unscrew the two captive fixing screws of the module completely (up to the stop).
2. Remove the two slots of the module from their housing onto the base.
3. Carefully remove the module out of its slot.

# Connecting fiber optic cable

## Inspecting and cleaning connector end faces

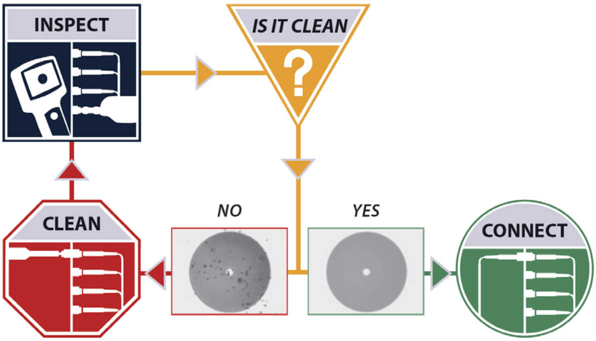
**Always inspect and clean the connector end face of the optical fiber cable and the test port before mating both together.**

**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 4** "Inspect Before You Connect" process




# Optical connector types

There are many optical connectors in the market place. Always ensure to use a high quality connector that meets the international standards.

Two main types of connectors are deployed in the telecommunication industry:

**1** Straight polished connectors, so called PC or UPC

**2** Angled polished connectors, so called APC

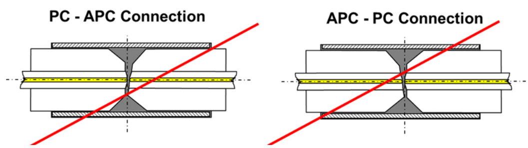
The PC or UPC-type test port is identified by a grey cap with the addition of a "PC" label. The APC-type test port is identified by a green cap with the addition of a "APC" label.

**Figure 5** Modules with APC and PC connector for T-BERD/MTS 2000 & 4000 V2


## Caution

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

**Figure 6** 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

**WARNING**
All the universal connectors are available on the OTDR Modules, except on the LA Module.

## 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

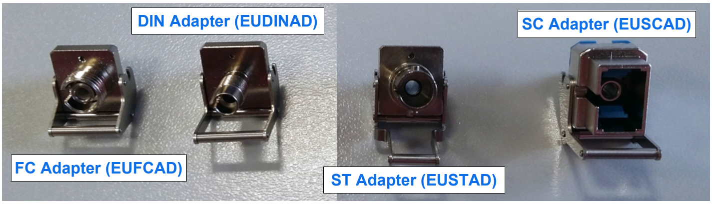
# Optical connectors and interchangeable adapters

Fiber Optic modules will come with a UPC or APC connector.

# Interchangeable adapters

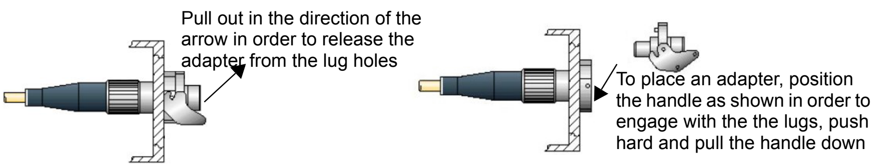
VIAVI offers interchangeable adapters, allowing the user to switch from one adapter to another according to which fiber type he intends to work with.
Adapter types supplied are: FC, SC, DIN and ST.

**Figure 7** 4 different types of adapters may be mounted on the universal connector




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

**Figure 8** Removing and refitting an adapter



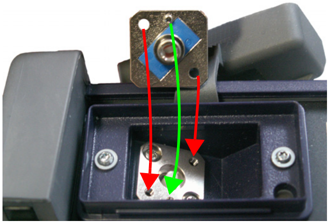

# Switchable Adapters

For the SmartOTDR and some test modules, VIAVI offers switchable adapters (also called screw-type adapters). Adapter types supplied are: FC, SC and LC.

To mount a switchable adapter:

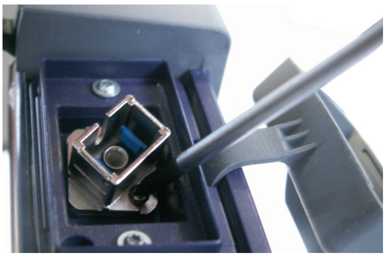
1. Unscrew the two screws of the adapter currently mounted onto the connector.
2. Remove the adapter
3. Set the new adapter vertically on the optical connector, making flush the «mark» on the adapter with the mark on the connector.

**Figure 9** Position of the adapter onto the connector



**4** Fix the adapter with the two screws.

**Figure 10** Fixing the adapter



**NOTE**
It is recommended to use a magnetic screwdriver.

**NOTE**
When changing the optical connector, take caution not to scratch the connector mating surfaces. Carefully align the removable piece and the baseplate ferrule when inserting the adapter part.

Once adapter is mounted, the module is ready to be used onto the Base-Unit.

# Cleaning universal connectors

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

3

# Activating OTDR function

For the T-BERD/MTS, make sure the OTDR module is correctly set onto the equipment.

One the equipment is switched on, the desired OTDR function must be selected before any OTDR configuration, or measurement.

The topics discussed in this chapter are as follows:

# Selecting the Smart Test

## Principle of the Smart Test

The Smart Test is used to perform OTDR acquisitions using a pre-loaded configuration file (no setup required) and access to essential analysis features.

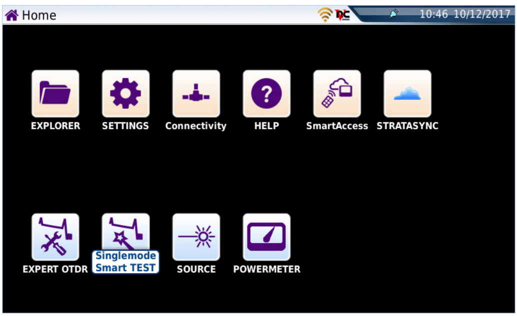
## Selecting Smart Test

The Smart Test function is available whatever is the OTDR module set onto the MTS/T-BERD or whatever is the SmartOTDR used.

To select this function, after the equipment starts:

**1** Press the **HOME** button

**Figure 11** Home page




**2** Select the Smart Test icon.

The icon turns yellow 

.

**3** Press **SETUP** or **RESULTS** button to display the page for the configuration file selection displays (see Figure 13 on page 23).

.

> **NOTE**
> The selection of Smart Test icon automatically deselects the **Expert OTDR** icon and vice-versa.

> **NOTE**
> In the case a Singlemode/Multimode module, one line contains the Multi-mode icons and a second one the Singlemode icons.
> To distinguish both modes, multimode icons contain the MM mark.

# Selecting the OTDR Expert function

## Principle of the OTDR Expert

The OTDR Expert is used to

- perform OTDR acquisitions with full OTDR setup capabilities, and advanced analysis features.
- create configuration files that can be loaded by Smart Test users.

## Selecting OTDR Expert

The OTDR Expert function is available whatever is the OTDR module set onto the MTS/ T-BERD or whatever is the SmartOTDR used.

To select this function, after the equipment start:

1. Press the **HOME** button
2. Select the OTDR Expert icon 
.

   The icon turns yellow 
.
3. Press **SETUP** button to configure the acquisition.

> **NOTE**
> The selection of OTDR Expert icon automatically deselects the Smart Test icon and vice-versa.

> **NOTE**
> In the case a Singlemode/Multimode module, one line contains the Multi-mode icons and a second one the Singlemode icons.
> To distinguish both modes, multimode icons contain the MM mark.

4

# Configuring the reflectometry test

This chapter describes the different stages in configuring a reflectometry measurement using an OTDR module, in Smart Test or Expert OTDR.

The topics discussed in this chapter are as follows:

# Configuring the unit for Smart Test

**1** Once the **Smart Test** icon is validate, press **SETUP** or **RESULTS** button to display the Configuration file selction screen.

## Smart Test standard process

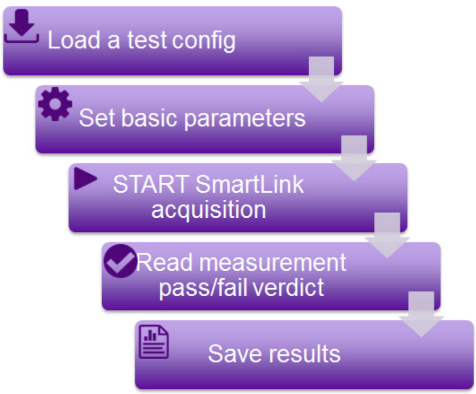
**2** Select the configuration file, which contains all acquisition parameters and file storage setup, and which has been created in Expert mode (see "Saving OTDR configuration in a file" on page 48).

**3** Configure / modify some parameters before starting the test.

**4** Start the acquisition (standard or real time)

**5** Save the results

**Figure 12** Standard Smart Test Process




# Selecting the configuration file

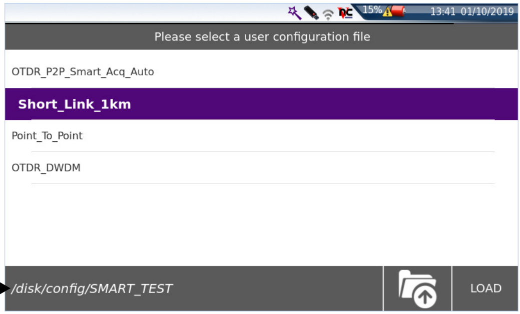
To load the configuration file to be used for Smart Test test:

**1** In the selection file screen, select the configuration file to be used for the acquisition on Smart Test mode.

The file is underlined in purple.

**2** Press **Load** to load the selected file and display the current parameters for this configuration.

**Figure 13** Load file as Smart Test Configuration



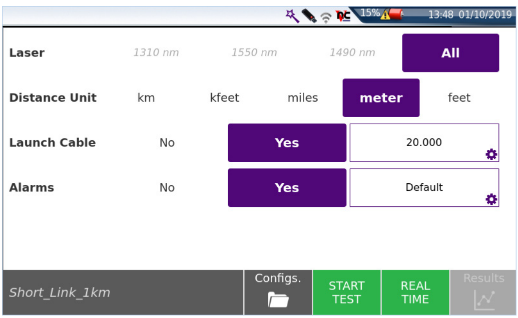

Location of the configuration files for Smart Test

**3** Once loaded, the configuration parameters that can be modified displays.

## Modifying some parameters before the acquisition

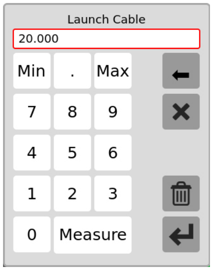
In Smart Test mode, the user have access to 4 parameters he can modified before launching the test.

**Figure 14** Smart Test Setup page

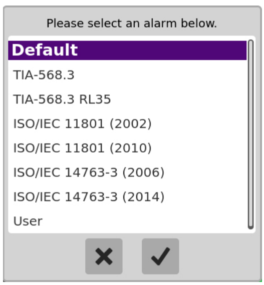



- **Laser** The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

- **Distance unit** select the unit to be used for distance (**km** / **kfeet** / **miles** / **meter** / **feet** / **inch**).
- **Launch cable** Define if the Launch Cable must be taken into account for the acquisition: **No** / **Yes**.
  If **Yes** is selected, set the length clicking on **Set Length** and enter the distance using the numeric keypad. Click on ⏎ to validate (or on × to cancel)




- **Alarms** Define if alarms thresholds must be applied for the acquisition:
  Select **No** if no alarm thresholds must be applied.
  Select **Yes** to define alarms, and press **Alarm Level** to define the pre-defined thresholds for the acquisition.




See Table 1 and Table 2 to get the values for each pre-defined alarm thresholds.

The thresholds can be modified only in Expert mode and saved in a new configuration file.

Once all configuration parameters are correctly defined, the acquisition can be launched.

Press the **Config** key to return to configuration selection screen (see Figure 14 on page 23).

# Configuring the test in Expert OTDR

1 Once the Expert OTDR icon is selected, press the **SETUP** button.
Dialog boxes and menu keys on the same screen enable selection of

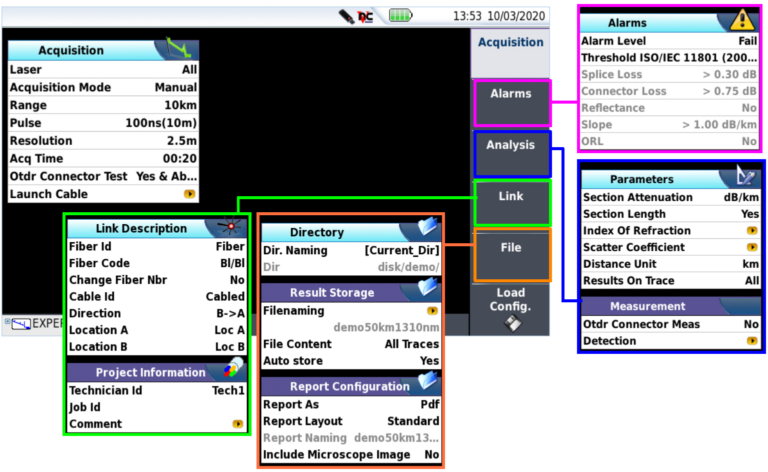
- Acquisition parameters
- Alarms parameters
- Analysis parameters

Used for the OTDR acquisition

- Link parameters
- File parameters

Used for the OTDR results saving

**Figure 15** OTDR setup in Expert OTDR mode




In these windows, the parameter selected is in video inverse.

## Configuring the Acquisition parameters

You can choose the OTDR acquisition parameters.

1 Once the **Setup** page is displayed, press **Acquisition** menu key to configure the Acquisition parameters.

The Acquisition Setup page is divided into two parts: the **Acquisition** box and the **Launch cable** box.

If some acquisition parameters are not accessible (not visible or displayed in grey), check in the **Home** page that the Expert OTDR function is selected (see "Selecting the OTDR Expert function" page 19).

# Parameters

## Switch Port (MPO only)

If an MPO Switch Module is installed onto the Platform, select manually the switch port on the parameter **Switch Port**.

## Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

## Acquisition Mode

Select the kind of acquisition to be performed:

**Manual** — The acquisition parameters **Pulse** / **Range** / **Resolution** can be set by user.

**Auto** — The acquisition parameters **Pulse** / **Range** / **Resolution** are defined automatically and cannot be modified.

The **Measurement time** will be set to **Auto**, but can be modified (see "Acq. Time" page 27).

**Smart Acq** — (not available in Multimode) It is a fully automated acquisition process which uses different width of pulses, for a single wavelength, to maximize the events detection. The multiple traces coming from the different acquisition are displayed individually with each one's table of events.

The option of SmartAcq forms a single graph and table of events per wavelength, recombining the most relevant sections of each pulse. It also allows displaying the Smart Link Mapper (SLM) view

## Range

The possible range depends on the pulse length selected. This range is given for each pulse length in the paragraph “Ranges” on page 253. This parameter is exclusively configurable if **Acquisition** parameter is set to **Manual**. It depends on the module/SmartOTDR used.

| | |
|---|---|
| **Auto** | allows to detect automatically the range.The range is selected as a function of the end of the fiber. |

## Pulse

From 3ns to 20µs according to module/SmartOTDR used. Parameter selectable only if **Acquisition** parameter is set to **Manual**.

See "Typical specifications" page 249.

> **NOTE**
> According to the value selected for **Pulse** parameter, the **Range** parameter can be automatically modified, and vice-versa.

## Resolution

This parameter is exclusively configurable if **Acquisition** parameter is set to **Manual**.

| | |
|---|---|
| **Auto** | resolution is selected automatically according to the last two parameters above. |
| **High Resolution** | the highest resolution is applied |
| **High Dynamic** | the highest dynamic is applied |

## Acq. Time

| | |
|---|---|
| **Real time** | the equipment performs up to ten acquisitions per second (see "Performing OTDR acquisitions" page 52). |

> **NOTE**
> Whatever is the acquisition mode selected, an acquisition in real time mode can be launched maintaining the **START/STOP** button pushed for about 2 seconds.

> **NOTE**
> If the **Acquisition** parameter is defined to **Auto**, then the **Time** parameter is defined to **Auto**, but can be modified.

**Manual** Enter the acquisition time desired (from 5 s. to 5 minutes max).

**Predefined** Select one of the acquisition times predefined: 10 seconds / 20 seconds / 30 seconds / 1 minute / 2 minutes / 3 minutes.

### Otdr Connector test

This parameter allows to choose if a test of the front connector must be performed when acquisition is launched.

**No** the OTDR connection is tested with indication Bad/Good.

**Yes & Continue** the OTDR connection is tested, and if the state is not good, the acquisition continues but a warning displays.

**Yes & Abort** the OTDR connection is tested, and if the state is bad, a warning displays and the acquisition stops.

## Launch cable parameters

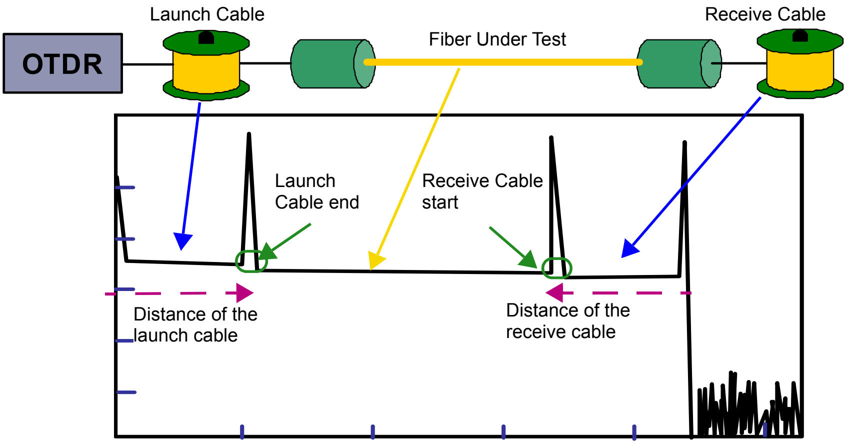
### Launch Cable End / Receive Cable Start

**No** All the results are displayed and referenced on the basis of the board of the module.

**Evt 1, 2, 3** The results relating to the launch cable are eliminated from the table. Attenuation and distances are then measured on the basis of the marker Evt 1, 2 or 3 selected.

**Distance** Use the **Edit Number** key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

**Figure 16** Launch Cable / Receive Cable




## Include Link Start Connector / Include Link End Connector

Defining the **Launch Cable End** parameter with an event number or a distance will automatically activate the corresponding parameter **Include Link Start Connector**. This parameters can be set to **Yes** if the budget must include the connectors loss of the launch cable at end

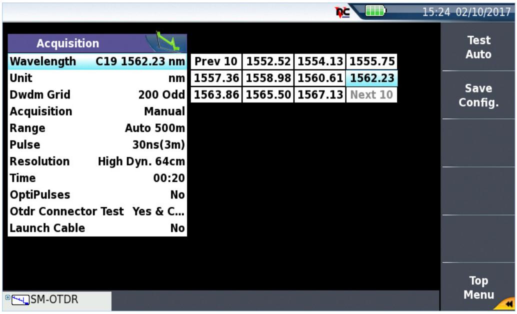
Defining the **Receive Cable Start** parameter with an event number or a distance, will automatically activate the corresponding parameter **Include Link End Connector**. This parameters can be set to **Yes** if the budget must include the connectors loss of the launch cable at start

If those parameters are set to **No**, the budget only displays the connector loss of the fiber.

# Specific Acquisition parameters with DWDM Modules

If a DWDM Module is installed onto the Platform, the **Setup** > **Acquisition** screen allows to configure specific parameters for acquisition on DWDM networks:

**Figure 17** Acquisition parameters with DWDM module




## Wavelength

The acquisition will be carried out on the wavelength selected. Once a wavelength is selected, the Channel is indicated just before to the wavelength.

Click on **Prev10** or **Next10** to display the 10 previous / following wavelengths.

## Unit

Define the wavelength unit to be used for acquisition: **THz** or **nm.**

## Dwdm Grid

Select one of the pre-defined Grid to be used for acquisition: **50 GHz** / **100 GHz** / **200 Even** / **200 Odd**.

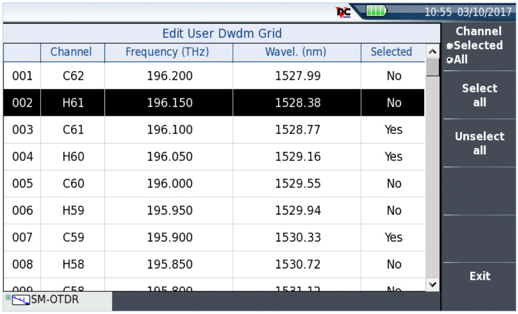
Or

Select **User** and press the **Edit User Dwdm Grid** menu key to define a grid.

## Defining a grid

**1** Once the menu key **Edit User Dwdm Grid** is pressed, a table displays.

**Figure 18** User-defined grid




**2** Click on **Channel** menu key to display either a list of the channels selected, or a list of all channels available.

**3** To configure your own grid, click on one channel (highlighted) and click on **Yes** or **No** to modify the selection.

or

Click on **Select all** or **Unselect all** to select all channels of the table, or to unselect the selected ones.

**4** Once configuration of the grid is completed, press **Exit** to return to Setup screen.

# Configuring the Alarms parameters

In the **Setup** page, press **Alarms** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

Once the **Alarms** page is displayed, configure the parameters for applying thresholds to results displayed.

## Threshold

**None** The alarm function is not active.

**User** Thresholds can be defined for: Splice Loss / Connector Loss / Reflectance / Splitter Alarm / Mux/Demux / Slope / Fiber Length Min and Max / Link Loss Min and Max / ORL.

**TIA-568 3 / TIA-568 3.RL35 / ISO/IEC 11801 2002 or 2010 / ISO/IEC 14763-3 2006 or 2014 / Default / G.697/G.98x PON / G.697/IEEE PON**

Select one of this parameter to configure the alarm thresholds with predefined values:

**Table 1** Singlemode Module

<table>
<tr><th></th><th>Splice Loss</th><th>Connector loss</th><th>Slope[1]</th><th>Reflectance</th><th>ORL</th><th>Mux/ Demux</th></tr>
<tr><td>Default</td><td>> 0.20 dB</td><td>> 0.50 dB</td><td>> 1.00 dB/km</td><td>> - 35 dB</td><td>< 27 dB</td><td>No</td></tr>
<tr><td>TIA-568.3</td><td rowspan="8">> 0.30 dB</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>No</td><td rowspan="4">No</td><td>-</td></tr>
<tr><td>TIA-568.3 RL35</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>> - 35 dB</td><td>-</td></tr>
<tr><td>ISO/IEC 11801 (2002)</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>No</td><td>-</td></tr>
<tr><td>ISO/IEC 11801 (2010)</td><td>> 0.50 dB</td><td>> 0.40 dB/km</td><td>> - 35 dB</td><td>-</td></tr>
<tr><td>G.697/G.98x PON G.697/IEEE PON</td><td>> 0.50 dB</td><td>No</td><td>> - 35 dB</td><td>< 25 dB</td><td>-</td></tr>
<tr><td>ISO/IEC 14763-3 (2006)</td><td>> 0.50 dB</td><td>> 1.00 dB/km</td><td>No</td><td rowspan="2">No</td><td>-</td></tr>
<tr><td>ISO/IEC 14763-3 (2014)</td><td>> 0.75 dB</td><td>> 0.40 dB/km</td><td>No</td><td>-</td></tr>
</table>

1. This parameter is not available in OEO-OTDR configuration

## Splitter alarms for Default and G.697/G.98x PON & G.697/IEEE PON

| Splitter Alarm | Default | G.697/G.98x PON / G.697/IEEE PON |
|---|---|---|
| 1 X 2 | > 5.0 dB | > 4.2 dB |
| 1 X 4 | > 8.0 dB | > 7.8 dB |
| 1 X 8 | > 11.0 dB | > 11.4 dB |
| 1 X 16 | > 14.0 dB | > 15.0 dB |
| 1 X 32 | > 17.0 dB | > 18.6 dB |
| 1 X 64 | > 21.0 dB | > 22.0 dB |

### Link Loss Max for G.697/G.98x PON & G.697/IEEE PON

Select: **No**/ **Manual** or:

- for G.697/G.98x PON: **20 dB (A)** / **25 dB (B)** / **30 dB (C)**
- for G.697/IEEE PON: **23 dB (PX-10)** / **26 dB (PX-20)**

**Table 2** Multimode Modules (not available in SmartOTDR)

| | Default | TIA-568C / ISO/IEC 11801 / ISO/IEC 14763-3 |
|---|---|---|
| Splice Loss | > 0.20 dB | > 0.30 dB |
| Connector Loss | > 0.50 dB | > 0.75 dB<br>>0.50 dB for ISO/IEC 14763-3 standard |
| Slope 850 nm | > 3.50 dB/km | > 3.50 dB/km |
| Slope 1300 nm | > 1.50 dB/km | > 1.50 dB/km |
| Reflectance | > - 35 dB | - |
| ORL | < 27 dB | - |

If results are above those thresholds, they are highlighted in red in the table of results, and the icon appears at the top right of the screen.

If all the results lie within the thresholds (no result is in red or yellow), they are displayed in green in the table and the icon is displayed at the right top of the trace.

## Configuring the Analysis parameters

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

The Analysis Setup page is divided into two parts: the **Parameters** box and the **Measurement** box.

### Parameters

#### Section Attenuation

**dB/km** Displays the section slope in the table of results. When the fiber is too short to measure the slope accurately, no value is displayed (empty field).

**dB** Displays the section Loss in the table of results. With short fiber where the slope cannot be measured with a good accuracy, the loss in dB is approximate and displayed.

**None** The section attenuation and Loss values are not displayed in the table of results.

## Section Length

Define if the distance between the marker of the event and the previous marker must be indicated in the results table: select **Yes** or **No**.

## Index of refraction

Choice of group refraction index of the whole fiber.

**User** Define for each wavelength (1310 SM, 1360-1510 SM, 1550 SM, 1625 SM) a refraction index of 1.30000 to 1.69999. The selection of an index alters the value of the section AB (actual distance between cursors A and B).

or,

If the actual distance between the cursors A and B is known, enter its value under **Section AB** to establish the index of the fiber. Selection of this distance causes the display of the indices. The extreme distance values are given by the index values (1.30000 to 1.70000).

or

You can also enter the **Link Length**, if it is known, using the Numeric keypad.

**Predefined** It is possible to choose one of the predefined values given for certain cables. The corresponding indices given in the table below are repeated on the screen.

**Figure 19** Predefined index values (Single Mode)

| **Wavelength (nm)** | **1310 SM** | **1360 - 1510 SM** | **1550 SM** | **1625 - 1650 SM** |
|---|---|---|---|---|
| Generic G652 G657 | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| Generic G653 G655 | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| ATT SM | 1.46600 | 1.46700 | 1.46700 | 1.46700 |
| Corning SMF-28 | 1.46750 | 1.46810 | 1.46810 | 1.46810 |
| Corning SMF-DS | 1.47180 | 1.47110 | 1.47110 | 1.47110 |
| Corning SMF-LS | 1.47100 | 1.47000 | 1.47000 | 1.47000 |

**Figure 19** Predefined index values (Single Mode)

| **Wavelength (nm)** | **1310 SM** | **1360 - 1510 SM** | **1550 SM** | **1625 - 1650 SM** |
|---|---|---|---|---|
| Corning-Leaf | 1.46890 | 1.46840 | 1.46840 | 1.46900 |
| Draka SMF | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| Draka Longline | 1.46700 | 1.46700 | 1.46710 | 1.46750 |
| Draka Teralight | 1.46820 | 1.46820 | 1.46830 | 1.46850 |
| Draka Benbright | 1.46750 | 1.46750 | 1.46800 | 1.46850 |
| Fitel Furukawa | 1.47000 | 1.47000 | 1.47000 | 1.47000 |
| OFS Lucent Allwave | 1.46750 | 1.46750 | 1.46750 | 1.46850 |
| Lucent Truewave | 1.47100 | 1.47100 | 1.47000 | 1.47000 |
| SpecTran SM | 1.46750 | 1.46810 | 1.46810 | 1.46810 |
| Sterlite | 1.46700 | 1.46700 | 1.46750 | 1.46750 |
| Sumitomo Litespec | 1.46600 | 1.46600 | 1.46700 | 1.47000 |
| Sumitomo Pure | 1.46600 | 1.46600 | 1.46700 | 1.47000 |

**Figure 20** Predefined index values (Multi Mode) - Not available in SmartOTDR

| **Wavelength (nm)** | **850 MM** | **1300 MM** |
|---|---|---|
| Corning 62.5 | 1.50140 | 1.49660 |
| Corning 50 | 1.48970 | 1.48560 |
| SpecTran 62.5 | 1.49600 | 1.49100 |
| Generic 50 | 1.49000 | 1.48600 |
| Generic 62.5 | 1.49000 | 1.48700 |
| Generic OM1-62/125 | 1.49600 | 1.49100 |
| Generic OM2-3- 4 50/125 | 1.48200 | 1.47700 |

## Scatter coefficient

**User** Selects for each wavelength, the backscatter coefficient of -99 dB to -50 dB by increments of 0.1dB. Modification of the backscatter coefficient K changes the measurements of reflectance and ORL.

**Auto** Backscatter coefficients are selected automatically for each wavelength.

In Multimode, two predefined scatter coefficients are available:

| | |
|---|---|
| **Generic 50** | 850 MM - > -66.3 dB |
| | 1300 MM -> -73.7 dB |
| **Generic 62.5** | 850 MM -> -66.1 dB |
| | 1300 MM -> -70.3 dB |

The default values are given in the paragraph "Reflectance" page 3.

### Distance Unit

Define the unit of the distances displayed: km, kfeet, miles, meter, feet, inch.

### Results on trace

| | |
|---|---|
| **None** | the trace alone |
| **All** | the trace with results and markers. |
| **Graphics** | the trace with markers only. |

If **All** or **Graphics** is selected, the reflectometry trace is displayed with a dotted vertical line set on the end of launch cable (if the Launch Cable is defined in the **SETUP** menu) and a dotted vertical line on the end of fiber .

### Event Notes[1]

| | |
|---|---|
| **No** | no display of notes |
| **Notes** | display of notes entered by the user |
| **Uncertainty** | display of indicators of the level of confidence in the measurement result. |

## Measurement

### Otdr Connector Measurement

This parameter allows to choose if a measurement of the front connector must be performed when acquisition is launched.

| | |
|---|---|
| **No** | In the results table, the first line corresponds to the first event detected. |
| **Yes** | In the results, the first result corresponds to the front connector measurement, at 0 meter (estimated value). |

1.Available exclusively if Super Expert license is installed

## Detection

**Splice** Select if a level of detection for splice must be defined.

Press **Edit Number** soft key and select a value:

- Enter a min level of detection, from 0.01 to 1.99 dB
- **No**: no splice detection
- **Auto**: to automatically detect splice

**Reflectance** Select if level of detection for reflectance must be defined.

Press **Edit Number** soft key and select a value:

- Enter a min level of detection, from -98 to -11 dB
- **None**: no reflectance detection
- **All**: all reflectances are detected

**Ghosts** Choice (**Yes** / **No** / **No Analysis**) of whether information relating to ghosts is to be displayed. If ghosts are displayed, the reflection icon in the table of results appears dotted and the reflection value is displayed in brackets on the trace, for example «(R:-50 dB)».

**Fiber end** Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

- **Auto** (recommended): option in which the equipment automatically detects the end of a fiber.
- **> 3 to > 20 dB** (steps of 1 dB): threshold of detection of end of fiber.

**Bend** (not available in Multimode) With any dual or triple-wavelength measurement module, the user will have access to the macro bend detection function in the test setup. Each event of the selected wave-lengths will then be compared.

Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

- **None**: Bend will not be detected.
- **Auto**: Bend will be automatically detected.
- **Define by user:** Enter the bend value (in dB), with direction keys or numeric keypad.

**Mux/Demux** Once parameter is selected, press **Edit Number** key to display the numeric keypad and select the wished value:

- **Auto** (recommended): option in which the T-BERD/MTS automatically detects the mux/demux.
- **> 0.50 to > 4.99 dB**: threshold of detection of mux/demux.
- **None**: no mux/demux available.

### Event After Fiber End[1]

If **Yes**, the events after the end of the link are detected.

### Total Loss[1]

| | |
|---|---|
| **Before evt** | for a given line on table, the total loss result does not include the splice/connector loss of the corresponding line |
| **After evt** | on the table, for a given line, the total loss measurement on the table does include the splice/connector loss of the corresponding line. |

## Configuring the Link parameters

In the **Setup** page, press **Link** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).

**NOTE**

The softkey **Copy File/Link to all** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

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

### Fiber Id

Select the parameter **Fiber Id** and enter a name for the fiber, using the edition keypad.

1.Available exclusively if Super Expert license is installed

## Fiber Number / Fiber Code[1]

The parameter **Fiber Number** becomes **Fiber Code** if, in the **Cable Structure** window, the **Cable Content** parameter is defined on another parameter than **Fiber** (**Ribbon/ Fiber**, **Tube/Fiber** or **Tube/Ribbon/Fiber**). See page 41.

The fiber code corresponds to the fiber number if, in the **Cable Structure**, the parameter **Color coding** is defined on **No**.

The fiber code corresponds to the fiber color if, in the **Cable Structure,** the parameter **Color coding** is defined on **Yes**.

**1** Select the parameter **Fiber Number/Fiber Code** and modify the parameter using the left and right direction keys.
The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the File Setup page (see “Configuring the File parameters” on page 43).

**NOTE**
The Fiber Code and the fiber number concatenated with **Fiber Name** are interdependent: they are incremented or decremented at the same time. However, the fiber number remains a number only, while the fiber code is alphanumerical. Whether it includes a color code or not (see “Cable structure” on page 41), it may be composed of one, two or three parts (see figure Table 21 on page 39).

**Figure 21** Example of incrementation of fiber code

Fiber and cable parameters used in the example:

Fiber Name: ’Fiberx’
Cable Content: ’Tube/Fiber’
Max Tube: 12
Max Fiber: 24
Coding used for the fiber and the tube: TIA

| | **Fiber N** | | **Fiber N+1** | |
|---|---|---|---|---|
| **Color Code** | **Yes** | **No** | **Yes** | **No** |
| **<Fiber Name>** | Fiberx24 | Fiberx24 | Fiberx25 | Fiberx25 |
| **<Fiber Code>** | Bl/Aq- | 1/24 | Gold/Bl | 2/1 |

1.Fiber Code is available exclusively if Super Expert license is installed.

## 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[1]

In some cases, it is interesting to save different information for the origin and the extremity of the cable.

If this option is validated, it is possible, after selecting the extremity to be edited in the **Cable Structure** menu, to modify the values specific to the cable (cable name, color coding, content of the coding), for each of these extremities. See chapter "Cable structure" on page 41)

To display/modify the data specific to the fiber (name and code), it is necessary to change direction temporarily. In the "O->E" direction, the information on the origin can be edited, and in the "E->O" direction, that on the extremity.

## Cable Id

This parameter allows to enter an identification of the cable, using the Edition menu.

## Direction

The direction shows if the acquisition has been made from the origin to the extremity (A->B) or from the extremity to the origin (B->A). Changing direction makes it possible, when different extremities are handled, to see the parameters of the fiber for the other extremity.

## Location A

The name of the Location A of the link may be entered here.

1.Available exclusively if Super Expert license is installed

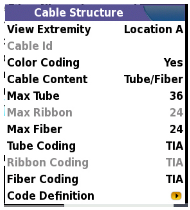
## Location B

The name of the Location B of the link may be entered here.

## Cable structure[1]

This line opens a sub-menu, all the parameters of which can be different for each extremity.

**Figure 22** Cable structure menu




> **NOTE**
> The **Cable Structure** window is specific to an extremity. Each struc-ture keeps its own parameters by default. Modifications made to the one are not automatically applied to the other. Thus, after the values relating to the origin have been modified, it is normal not to find these same values entered for the extremity.

**View extremity** If extremities are declared as different (see “Extremities are different” on page 40), this parameter allows to navigate between the Extremity and Origin parameters.

**Cable Id** If the extremities are different, you can specify the cable identification for the origin and the extremity.

**Color Coding** Choice of whether or not to apply a color coding to the fiber. This choice is made at link level, as all the fibers of a given link, for a given extremity, will be coded the same way. This choice modifies the result of the <Fiber Code> line. See “Fiber Number / Fiber Code” on page 39.

**Cable content** Shows how the color code is to be used (see figure “Cable structure menu” on page 41):

1.Available exclusively if Super Expert license is installed

– Fiber: Only the color code of the fiber is proposed (example: «Gold»)
– Ribbon/Fiber: The color code of the fiber is preceded by that of the ribbon, and separated by a '/' (example: 'Bl/Or')
– Tube/Fiber: The color code of the fiber is preceded by that of the tube, and separated by a '/' (example: 'Br/Or')
– Tube/Ribbon/Fiber: The color code of the fiber is preceded by that of the tube, then by that of the ribbon; the three being separated by a '/' (example: 'Br/Bl/Or'). See "Fiber Number / Fiber Code" on page 39.

**Max tube** Shows the maximum number of tubes in the cable for the extremity selected. This information influences the automatic coding of the fiber. See "Fiber Number / Fiber Code" on page 39.

**Max ribbon** Shows the maximum number of ribbons in the cable for the extremity selected. This information influences the automatic coding of the fiber. See "Fiber Number / Fiber Code" on page 39.

**Max fiber** Shows the maximum number of fibers in the cable for the extremity selected. This information influences the automatic coding of the fiber. See "Fiber Number / Fiber Code" on page 39.

> **NOTE**
> Certain parameters are not valid in the configuration selected. Thus, if no tube is selected in **Cable Content**, all the lines relating to the tube concept will be deactivated (grayed out in the menu).

**Tube Coding, Ribbon Coding, Fiber Coding**

The lines Tube Coding, Ribbon Coding and Fiber Coding enable selection of the color coding of the tube, the ribbon and the fiber from 5 different codes described below: TIA, USER 1, USER 2, USER 3 and USER 4.

**Code Definition**

The Code Definition line opens a sub-menu, with which the different color codes possible on the instrument can be displayed and modified.

Five different codes can be managed by the equipment, including a standard code.

The standard code (TIA) may be displayed but it cannot be modified.

The other codes, called by default USER1, USER2, USER3 and USER4, can be entirely personalized.

- Edited code selects the code for display or modification.
- Code name to give a new name to the code selected, press the ▶ key, which calls up the edit menu.
- View codes displays the color codes 1 to 12, 13 to 24 or 25 to 36.
- Code 1...23 Use the arrow ▶ to modify the codes if necessary.

### Project Information

#### Technician Id

Use the arrow ▶ to enter the name of the operator carrying out the measurement.

#### Job Id

Use the arrow ▶ to enter a description of the measurement to be performed.

#### Comment

In contrast to the other data in this menu, the comment is specific to a fiber. This line is thus used to enter a new comment and not to display it. The comment appears at the top of the screen, with the other parameters of the fiber.
This comment will remain available for the next acquisition, unless it is deleted. It is also saved when a trace is saved with a comment.

## Configuring the File parameters

The File storage parameters must be also configured, in order to define how the results traces will be saved onto the equipment.

In the **Setup** page, press **File** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).

**NOTE**

The softkey **Copy File/Link to All** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.

It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications (powermeter, and source).

# Directory

## Dir. Naming

Click on **Current Directory** menu key to select the directory currently selected inthe explorer for files saving

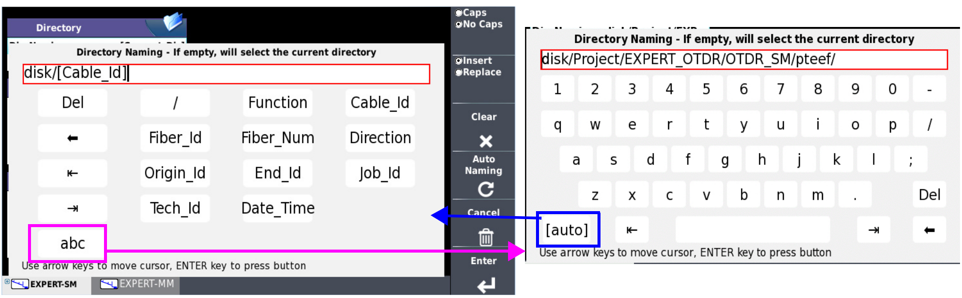
or

Use the arrow ▶ to enter the directory name and path:

In the edition keypad, select the pre-defined parameters available or, press **abc** key to enter a name manually for the directory. Then, press **Enter** to validate.

Example: `disk/OTDR/Test`

**Figure 23** Directory - Edition keypad




or

Press **Auto Naming** to apply the name by default to the directory:

`disk/[Cable_Id]`

Press **Clear** and validate (**Enter** key) in order to define the `[Current directory]` selected as directory for saving measurements.

### Dir

This parameter cannot be configured, and display the directory selected/created by default into which the file(s) will be saved.

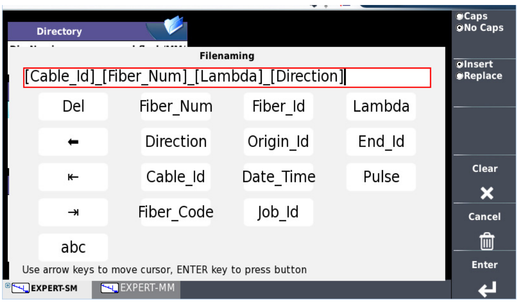
## Result storage

### Filenaming

Select **Filenaming** parameter and press the right arrow key to modify the name of the file for the result trace.

In the edition keypad, select the pre-defined parameters available or, press **abc** key to enter a name manually for the file. Then, press **Enter** to validate.

**Figure 24** Filenaming - Edition keypad (auto)




or

Press **Default Filename** to apply the name by default to the file:

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

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

### File Content

In this parameter, select the file content for traces saving:

**One Trace** in case of traces in overlay, each trace is saved in a distinct file (.sor extension).

**All Traces** in case of traces in overlay, all traces are saved in one single file (.msor extension).

**One and All Traces**
this option combines the two previous ones: in case of traces in overlay, each trace is saved in a distinct file and all traces are saved in one single file.

## Auto Store

Select **Yes** to store automatically the trace or traces resulting from each acquisition according to the filenaming rules.

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 Configuration

A report can be generated from the OTDR results page at the same time as the trace saving (see “Saving the trace(s) and generating a report” on page 87).

The report configuration is performed form the File Setup page

## Report As

Select the report format to be generated:

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select Yes to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

## Report Layout

This parameter allows to define the report page setting:

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

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

### Report naming

If **Consolidated** is defined for **Report Layout**, select **Report naming** parameter and press the right arrow key to modify the name of the report file for the result trace.

In the edition keypad, enter a name manually for the file and press **Enter** to validate.

If no name is entered, the report name by defaut applies: `Report_SM/MM-OTDR`.

### Include Microscope Image

In the report page, an image of the scope test result can be displayed on the upper part of the report. Select **Yes** to include the scope test result image into the report.

> **NOTE**
> This parameter is available exclusively if the report format selected is a Pdf file.

## Configuration in Test Auto mode

The **Test Auto** key imposes the parameters for acquisition, measurement and display of results defined as default settings in factory.

| | | | |
|---|---|---|---|
| **ACQUISITION** | Acquisition | Laser | **All** |
| | | Acquisition | **Auto** |
| | | Time | **Auto** |
| | | Smart Acq | **No** |
| | | OTDR Connector Test | **Yes & Cont** |
| | | Launch Cable | **No** |
| **ALARMS** | Alarms | Levels | **None** |
| **ANALYSIS** | Parameters | Section Attenuation | **dB/km** |
| | | Section Length | **Yes** |
| | | Index of Refraction | **G652 G657** |
| | | Scatter Coefficient | **Auto** |
| | | Results on trace | **Graphics** |

| | | | |
|---|---|---|---|
| | | Event Notes | **No** |
| | Measurement | OTDR Connector Meas. | **No** |
| | | Splice | **Auto** |
| | | Reflectance | **All** |
| | | Ghost | **No** |
| | | Fiber End | **Auto** |
| | | Bend | **Auto** |
| | | Mux/Demux | **Auto** |
| | | Event After Fiber End | **No** |
| | | Total Loss | **Before evt** |
| **LINK** | Link Description | Change Fiber Nr | **Increment** |
| **FILE** | File configuration | Filenaming | **Auto filenaming** |
| | `Fiber[Cable_Id][Fiber_Num]_[Lambda][Direction]` | | |
| | | Auto Store | **Yes** |

## Saving OTDR configuration in a file

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

This configuration file can then be recalled in two cases:

- in order to be applied when acquisition in Smart Test mode is performed.
- in order to be recalled for future acquisition in Expert OTDR

To save parameters in a configuration file:

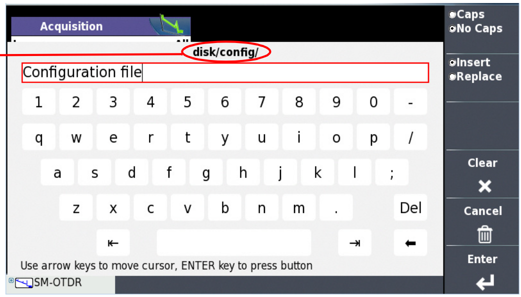
1. If necessary, press **SETUP** to return to **Setup** page.
2. Select one parameter in one of the setup page (acquisition, link..)
3. Press menu key 

.
   An edition keypad displays
4. Enter a name for the configuration file (max. 20 characters).

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

**Figure 25** Save Configuration file - Edition keypad

Directory into which file will be saved




**5** Press **Enter** 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.

It can be selected in Smart Test (see “Selecting the configuration file” on page 22) or loaded for Expert OTDR.

# Loading an existing OTDR configuration

To load a configuration file previously created or available in the T-BERD/MTS/ Smar-tOTDR and apply parameters to new OTDR Expert tests:

## From the File Explorer page

**1** Press **File** hard key

**2** Select the configuration file desired

**3** Press **Load** > **Load Config.**

- Press **Setup** hard key to display the OTDR acquisition parameters saved in the selected configuration file.

You can modify some acquisition or file storage parameters, and save them in a new configuration file (see “Saving OTDR configuration in a file” on page 48).

## From the Setup page

**1** Select one header in either Setup page (Acquisition, Link, File...)

**2** Press **Load Config.** menu key.
The file Explorer page displays

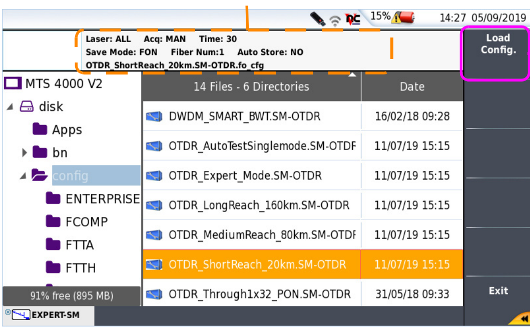
**3** Select the configuration file desired

**4** Press **Load Config.** to load the configuration file for acquisition in OTDR Expert mode.
A sound is emitted to confirm the loading.
The **Setup** screen is displayed again.

> **NOTE**
> Most of the configuration files are available into the equipment, in `disk/config`.

**Figure 26** Loading a configuration file

The main parameters available in the selected configuration file are displayed in the File signature.




Configuration file will be used for Expert OTDR acquisition only

5

# Launching a reflectometry test and displaying results

Once the configuration for acquisition and file storage has been defined, the instrument is ready to launch an OTDR measurement.

Pressing the **START/STOP** key is all that is needed to start or stop an OTDR measurement on the MTS/T-BERD or on the SmartOTDR.

This chapter describes the different stages in a reflectometry measurement. It then describes the functions available on trace(s).

The topics discussed in this chapter are as follows:

# Performing OTDR acquisitions

## Performing an acquisition in Real Time mode

### Principle of the Real time mode

Acquisition in real time must not be used if a precise measurement is required because of the high noise level, but it is sufficient for rapid optimization of a connection and for observing a fiber in process of utilization.

### Performing acquisition in Real Time

To carry out an acquisition in real time:

**1** Hold the **START/STOP** key down for about three seconds, to launch the acquisition in real time, either in Smart Test or Expert OTDR mode, whatever is the acquisition mode selected.

or

If the **Time** parameter is defined with **Real Time** in **Setup** page in Expert OTDR mode, press **START/STOP** hard key.

or

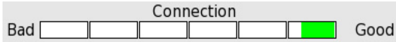
In the **Setup** page of the Smart Test mode, press **Real Time** key 

(see Figure 14 on page 23).

The red **Testing** indicator will go on to show that real time acquisition is in progress. The trace acquired is displayed in real time.

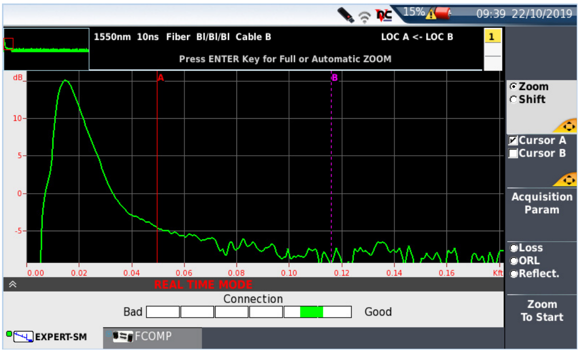
An indicator of the state of the connection (**Good/Bad**) is displayed below the trace:

**Table 3** Connection indicator

| State | <br>Connection |
|---|---|
| Good | The connection is OK |
| Bad | • There are several connectors close to the external connector of the equipment<br>• One of the connectors is dirty or badly connected. Replace the launch cable, make the connection again properly or clean the connector of the OTDR or of the jumper.<br>• No fiber is connected. |

If the state of the connection is bad, it is still possible to carry out a measurement, but the results will not be very reliable.

**Figure 27** Example of acquisition in Real Time (with Expert OTDR)



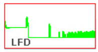

## Traffic detection

Traffic on the fiber under test is automatically detected and reported.

Press the **START/STOP** key to begin the measurement. A message indicates there is traffic on the fiber and asks you if you wish to continue or not:

- If you click on **NO**, the measurement is not launched.
- If you click on **YES**, the measurement is performed, despite the traffic.

> **NOTE**
>
> If the measurement is validated despite the traffic (key **Yes**), the next measurement will be automatically performed, even if traffic is still detected on fiber.
>
> If the measurement is cancelled (key **NO**), and the **START/STOP** pushed another time, the box asking if you wish to continue or not is displayed.

The functioning of Traffic Detection is then indicated in the scaled down representation of trace, on the upper left part of screen 

.

During an acquisition in real time, several actions can be made on results in progress: see "Actions on trace during acquisition" page 58.

## Stopping the real time acquisition

To stop or interrupt an acquisition in real time mode, press the **START/STOP** key at any time.

# Performing a measurement with Smart Test

The acquisition is carried out with the parameters saved in the Configuration file. It may be stopped at any time using the **START/STOP** key.

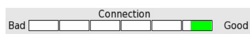
At the end of test, the results page displays.

**1** From the **Setup** page, press **Start Test** key 

to launch measurement (see Figure 14 on page 23).

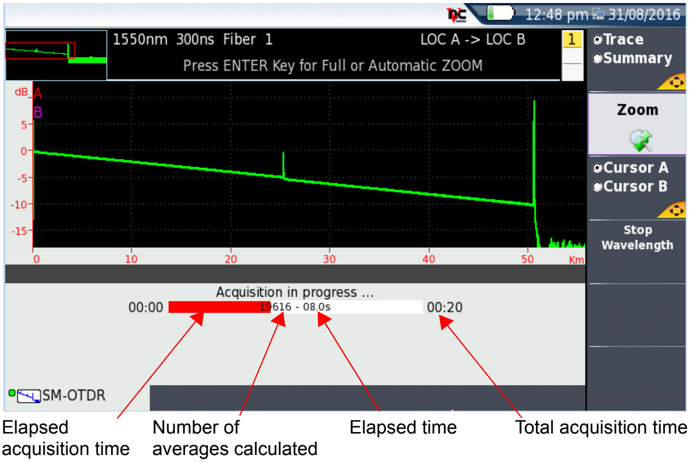
The red **Testing** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.

**2** The quality of the connection is displayed for a few seconds (see Table 3 on page 53)




**3** Then, a bar graph shows elapsed and remaining acquisition time.

**Figure 28** Acquisition in progress in Smart Test




At the end of the acquisition, a beep is emitted, and the measurements are displayed, in SLM view, with a dialog box indicating the pass or fail verdict and asking if results must be saved.

> **NOTE**
> During acquisition, the traffic on fiber is automatically detected (see "Traffic detection" page 53)

# Performing an acquisition with Expert OTDR

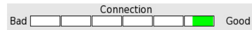
In this mode, the equipment carries out a number of averagings defined as a function of the maximum acquisition time specified in the Acquisition menu, and then terminates the acquisition.

The acquisition is carried out with the parameters previously selected in the **Acquisition** menu. It may be stopped at any time using the **START/STOP** key.

**1** Press the **START/STOP** key to start the acquisition.

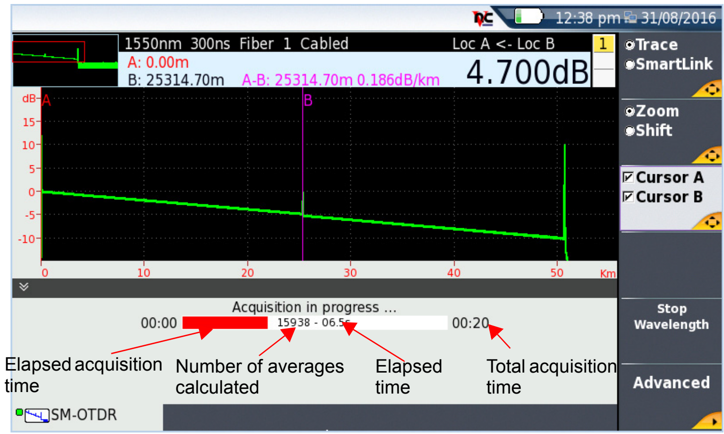
The red indicator goes on to show that the product is in process of acquisition and the screen displays the trace in process of acquisition.

2 The quality of the connection is displayed for a few seconds (see Table 3 on page 53)




3 Then, a bar graph shows elapsed and remaining acquisition time.

**Figure 29** Acquisition in progress with Expert OTDR




At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.

**NOTE**

During acquisition, the traffic on fiber is automatically detected (see "Traffic detection" page 53)

**NOTE**

To stop the acquisition, the **START/STOP** key may be pressed at any time. Then an automatic measurement is carried out, but some events cannot be detected (a manual measurement must then be made).

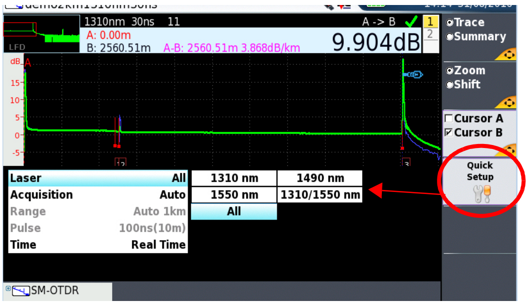
# Performing an acquisition from Results page

Once the results page is displayed, you can perform a new acquisition modifying the main acquisition parameters.

> **Before launching a new OTDR acquisition, make sure the trace(s) displayed have been previously saved if necessary, as the new acquisition will automatically delete the displayed results.**

1 On **Results** page, in Expert OTDR mode, press the softkey **Quick Setup**.
The acquisition parameters that can be modified display under the results trace.

**Figure 30** Results page and Quick Setup menu (Expert OTDR)




2 Modify the acquisition parameters wished in the displayed menu:
Laser / Acquisition / Range / Pulse / Time: See page 26 and page 27.

3 Once configured, launch the new OTDR test pressing the **START/STOP** hard key.

Press again **Quick Setup** menu key to hide the menu under the trace.

# Multi-wavelength acquisition

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

1 In the **SETUP** menu, check in **Laser** line, that several lasers are selected (or select **All** if a module with only one OTDR port is used).

2 Start the acquisition by pressing the **START/STOP** button.

**3** Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.

or

To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

The different traces appear in the same window and can be handled similarly to overlaid traces (see "Overlay trace function" page 83).

# Actions on trace during acquisition

During an acquisition, several actions are available on results in progress.

## Positioning Cursors A and B

**1** Select **Cursor A** or **Cursor B** and:

– Set both cursors A & B to control distance between two points.

– Set one cursor A or B to get the distance from one point.

– Set one cursor A or B to zoom on this cursor

## Zooming on trace

**1** Select **Zoom** function:

– use the menu key 

in Smart Test;

– the key 

in Expert OTDR

**2** Use touchscreen or validation key to zoom in and zoom out on trace (see “Zoom function” on page 72)

## Shifting the trace (Expert OTDR and Real Time only)

In Expert OTDR mode or in Real Time, the trace can be shifted vertically or horizontally during the acquisition:

**1** Select **Shift** function on menu key 


**2** Use touchscreen or direction keys to shift horizontally or vertically the trace (see “Shift function (Expert OTDR only)” on page 74)

## Displaying Trace or Smart Link page

**1** Use the menu key **Trace/Smart Link** to display either:

- the acquisition trace in progress and the bar graph of time
- the Smart Link page with exclusively the bar graph of time.

In the case of measurement on several wavelengths, once a measurement is completed for one wavelength:

- the **Trace** function allows to display the trace and results table for this wavelength: once **Trace** is selected, press validation key ( or **ENTER**) to pass from Trace + results table on 1 line to Trace + results table on 4 lines, and vice-versa,
- the **Smart Link** function allows to display a graphical view of results for this wavelength.

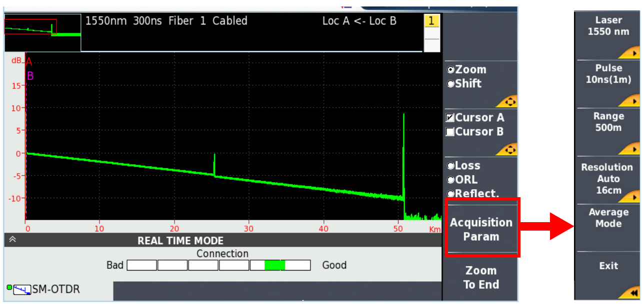
## Modifying acquisition parameters (in Real Time mode only)

You can modify the acquisition parameters without returning to the **SETUP** menu.

1 Press the **Acquisition Param** key.

2 Use displayed keys to scroll through the possible values of the parameters.

**Figure 31** Example of acquisition in Real Time




## Zooming on the fiber end (in Real Time mode only)

During a real time acquisition, you can reach the end of the fiber under test at any time:

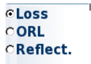
1 Press **Zoom to End** menu key.
The display automatically reaches the end of the fiber under test.
The menu key **Zoom to End** becomes **Zoom to Start**.

Press **Zoom to Start** to display the start of the fiber under test.

### Performing measurements during acquisition (Real Time mode only)

The real time mode allows to make Loss, ORL or Reflectance measurement using the A & B cursors and the key **Loss / ORL / Reflect.**:

1 Position A & B cursors on the trace

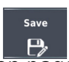
2 Click as many times as necessary on key 

to get the measurement between A & B cursors.

**Figure 32** Example of loss measurement


# Saving results for Smart Test acquisitions

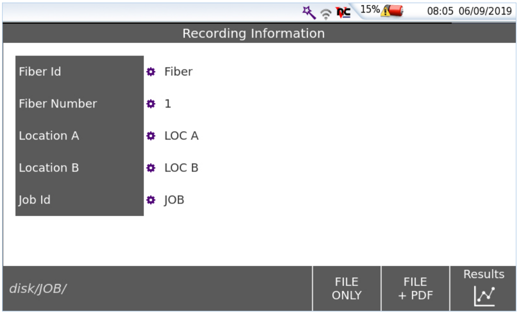
Once the acquisition is completed, the results trace displays, in Smart Link view, with the Save menu keys displayed.

1 Click on **Save** menu key 

to save the results in a file.

The Recording Information page displays

**Figure 33** Save results in Smart Test mode




**2** Click on one parameter configuration (white background) to modify it using the edition or numeric keypad displayed:

– **Fiber Id**: click on the fiber name currently defined to display the edition keypad and enter a new fiber name.

– **Fiber Number**; click on the fiber number currently defined to display the numeric keypad and enter a new fiber number.

– **Location A** / **Location B**: click on the location name currently defined to display the edition keypad and enter a new name.

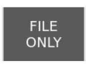
– **Job Id**: click on the Job description currently defined to display the edition keypad and enter a new description.

**NOTE**

The file is saved automatically by default with the **Job Id** parameter.

Example: if the **Job Id** is defined with *Test Fiber 1*, the otdr filename will be *Test Fiber 1*.sor.

**3** Once the recording information are defined as wished, select the saving mode wished:

– Click on **FILE ONLY** 

to save exclusively the results trace to the .sor format

– Click on **FILE + PDF** 

to save the results trace in a .sor file and to generate a pdf report of the results.

– Click on **Results** 

to return to Smart Test result view.

# Results display

The traces acquired or recalled from a memory are displayed on the Results page. According to the mode of acquisition (Expert OTDR or Smart Test), the results page offers similar functions, but also different functions.

The Smart Test mode displays automatically the Smart Link view after an acquisition.

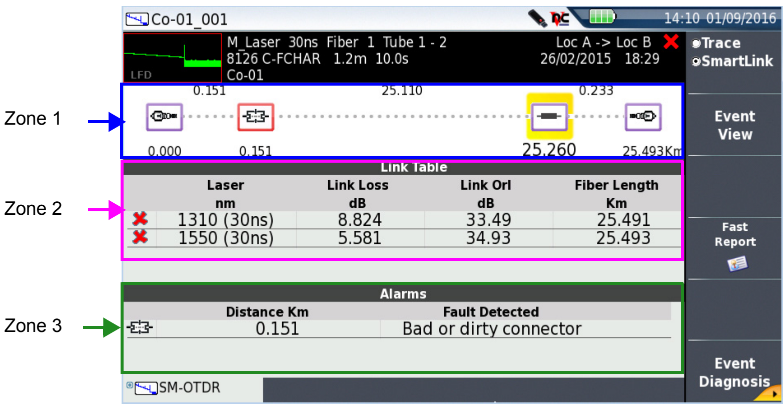
## Smart Link view

Once the results trace is displayed, click on **Trace / Smart Link** menu key to select the Smart Link view.

> **NOTE**
> The Smart Link view is displayed by default after an acquisition in Smart Test.

A screen as the following one is displayed:

**Figure 34** SmartLink function




The screen is divided into three zones:

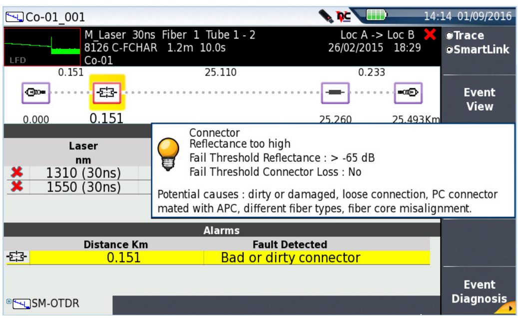
- **Zone 1**: Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2**: Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3**: Alarms table (if any)

## Show the detailed information of one event

The information concerning the event, its type and the alarm thresholds defined for this event, can be displayed from the SmartLink screen.

1 Select the event for which information must be displayed, on the graphic using the touchscreen or direction keys.
The event is highlighted in yellow once selected. 
2 Click on the **Event Diagnosis** menu key.
A small window displays. It describes:
   – the event type
   – the value above which it is on defect

**Figure 35** Event Diagnosis

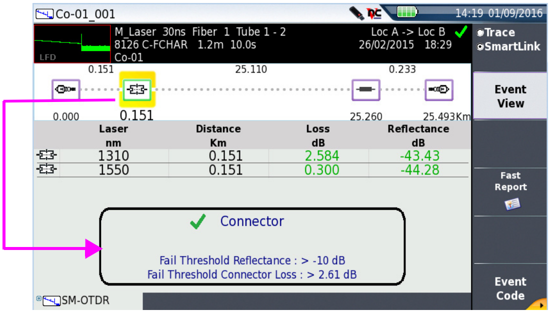



## Event View

1 Click on **Event View** menu key to display a detailed description of one event detected on trace.
2 Select the event to be described on graphic (highlighted in yellow).

The corresponding event description is displayed on the Zone 3, with a recall of alarm threshold for this event:

**Figure 36** SmartLink: Event View




**3** Click on **View Trace** to display the selected event in the results table and zoomed on trace.

> **NOTE**
> The event is framed in red if it is above the alarm thresholds defined in the setup menu.
> It is framed in green if it lies within the thresholds.
> It is framed in grey if no alarm has been defined in the Setup menu

## Changing the type of an event

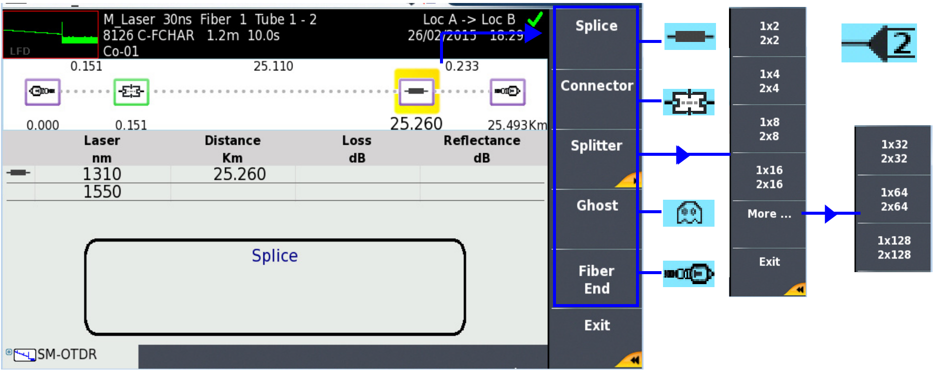
Once the **Event View** is displayed, the type of event can be modified:

**1** Select the event to be modified (framed in yellow)

**2** Press **Event Code** menu key

**3** Click on the event type to be applied to the selected event:

**Figure 37** Event Code




4 Click on **Exit** to return to **Event View**.

5 Click back on **Event View** menu key to return to Summary screen
or
Click on **Trace View** menu key to return to trace (and table) results screen.

> **NOTE**
> The event modification is automatically applied on trace and in the results table.

## Splitter sub-menus

The **Splitter** icon is different according to the menu key pressed in the Splitter sub-menus.

Example:

If the menu key 

is pressed, the icon 

is displayed

If the menu key 

is pressed, the icon 

is displayed.

Moreover, the icon and splitter configuration is different according to the number of «clicks» on one menu key.

Example with the menu key 

:

- Click once: the icon is 

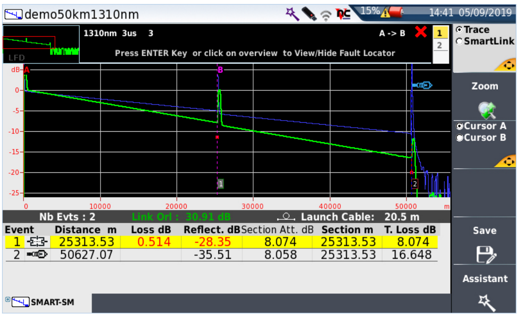
- Click twice: the icon is 2
- Click three times: the icon is 2 2
- Click four times: the icon is 2 2

Click a sixth time to reset the event by default.

# Trace View

To display the trace and results table, click on **Trace / Smart Link** menu key to select Trace.

**Figure 38** Example of results trace with Smart Test




Click on **Assistant** softkey to return to Setup Information page.

**Figure 39** Example of results trace with Expert OTDR


- On the upper right side, the alarm icon is displayed (if some alarm thresholds are defined in the pre loaded configuration file).

**Table 4** Alarms display

| | | |
|---|---|---|
| ✗ | Fail | Indicates that at least one result exceeds the alarm thresholds defined in the configuration file used for acquisition<br>Results are displayed in red in table. |
| ✓ | Valid | Indicates that all the results lie within the thresholds (no result in red/yellow)<br>Results are displayed in green in the table. |

# Common functions on Trace View

## Display of events on the trace

Each event detected is referenced under the trace by a serial number. The reflectometry trace is displayed with a dotted vertical line set on the start of launch cable (if the **Launch Cable End** parameter is defined in the **SETUP** menu)

The trace can also be displayed with a dotted vertical line on the end of fiber .

The icon is displayed on trace if the **Receive Cable Start** parameter has been defined in the Setup menu.

The results of the measurements of attenuation, reflectance and slope can be marked on the trace.

The reflectance of a ghost event is displayed in brackets on the trace.

## Criteria for display of an event

An event will be displayed if its attenuation or its reflectance exceeds the corresponding threshold selected in the **SETUP** menu (see "Configuring the test in Expert OTDR" page 25). Attenuation and reflectance results for an event will be displayed if they can be calculated

The reflectance of an event is always measured except when the event causes a saturated Fresnel peak or if it is drowned out by noise. In this case, the T-BERD/MTS displays **>** to show that the actual reflectance exceeds the value displayed.

## Results table

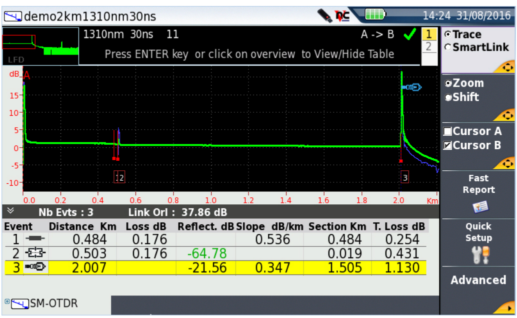
Under the trace is displayed the results table with all the events detected during acquisition.

In ExpertOTDR only, once **Trace** is selected, press validation key ( or **ENTER**) to pass from Trace + results table on 1 line to Trace + results table on 4 lines, and vice-versa

The table with one line displayed under the trace gives the type and characteristics of the event nearest to the cursor.

The 4 lines table gives the type and the characteristics of all the events detected during the measurement: the 4 first lines displayed correspond to the 4 first events nearest to the cursor. The line corresponding to the event nearest to the cursor is highlighted. This highlighting moves if the cursor is moved.

**Figure 40** Example of trace and 4 lines table (Expert OTDR)



At the top of the table, a line shows the generic parameters of the fiber: numbers of events present, total ORL of the link and, in ExpertOTDR mode, reference trace icon (if trace is the reference trace - see “Reference Trace function” on page 86).

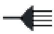
Each event is referenced under the trace by a number which is repeated in the first column of the table. The table then shows:

- icon symbolizing the type of the event:

 Receive cable Start

 Launch cable End: the attenuation and distances are measured on the basis of the corresponding marker.

 Non-reflective attenuation (e.g. splice).

 Splitter.

 Mux/Demux

 Reflective event. (e.g. connector)

 Ghost reflection

 Slope of the fiber (when no fault follows the slope).

 End of fiber

 OTDR connector

 Merged Connectors Loss

  – Total group loss = loss on last connector
  – Loss connector N-1 = 0 dB)

 Bend on connector

 Event marker when a measurement cannot be carried out. If the event to be added is too close to an existing event, the icon appears on the trace and the table, but no measurement is carried out: to obtain the results for this event, a manual measurement is necessary.

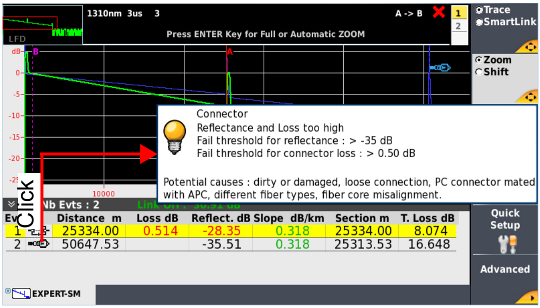
The event underlined in yellow is the one the nearest of the cursor set on trace. To visualize an event, click on this event on the table to set the cursor on it onto the trace.

## Detailed description of an event

Click on one event icon in the results table to display the event type and the alarm threshold defined for this event (if Alarms have been defined in the Setup page).

If the value of the event selected exceeds the defined threshold, then the possible causes for this alarm are described in the window:

**Figure 41** Event description




The following columns are then displayed next to each event icon:

| | |
|---|---|
| **Distance** | The distance of the event from the beginning of the fiber, in meters (or miles) |
| **Loss** | The attenuation due to the event, in dB |
| **Reflect.** | The reflectance of the event, in dB |
| **Slope (Expert OTDR only)** | The slope before the event, in dB/km (or dB/kft) if it can be measured |
| **Section (Expert OTDR only)** | The length of the section = the distance between the marker of the event and the previous marker. |
| **T. Loss** | The total attenuation of the fiber (total loss), in dB |

## Cursors

The cursors A and B are represented by vertical lines of different colors:

- in a solid line if the cursor is selected.
- in a dotted line if the cursor is not selected.

### Positioning the cursor

1 Press the key  to active the cursor.

**2** Touch the screen on the required location on trace where the active cursor must be set.

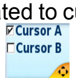
You can also use the direction keys ◀ and ▶ to move the selected cursor along the trace

Above the trace is shown the 2-points loss measurement between the two cursors, together with the distance between the two cursors.

**The cursors data are displayed exclusively if the Cursor menu key is active. If another key is active, the display shows help tooltips, different according to the selected function.**

When the cursor function is selected, the keys ▲ and ▼ move the trace vertically.

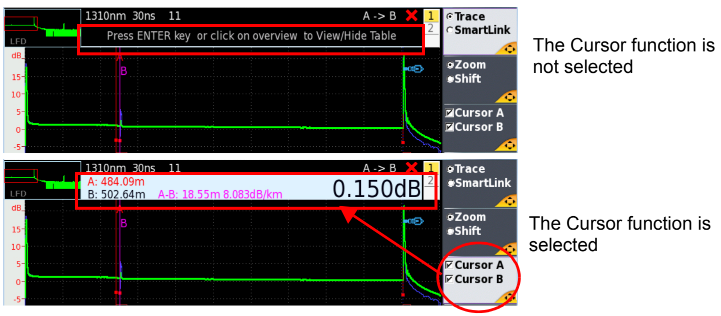
## Cursors information

The information related to cursors are displayed exclusively when the Cursor function is selected (menu key 

selected).

Above the trace are shown the co-ordinates of the points of intersection of the cursors A and B with the trace, together with the distance between the two points.

**Figure 42** Cursors information




**NOTE**

The cursors information are displayed in the report when the Cursor function is selected (active key). If the cursors values must not be displayed in the report, select another softkey than the Cursor one before performing the report (softkey Trace or Zoom for example).

## Cursor and Zoom

If the **Cursor** key is selected, press the validation button ( or **ENTER**) to perform an automatic zoom until the fiber end or until the end of the range (**Range** parameter defined in the configuration screen).

This will modify the cursors position, which will be positioned automatically at the beginning and at the end of the link (taking into account the possible launch cables).

If another key than the key **Cursor A / Cursor B** is activated when the validation key is pressed (**Trace** or **Zoom**), the cursors' position is unchanged.

## Cursor function not selected

When Cursor menu key is not selected, the upper banner displays information, different according to the menu key selected:

- If the **Trace/Smart Link** key is selected, with **Trace** function valid, the upper banner indicates that to change the displayed trace, you can click on the banner or on the right arrow key
- If the **Zoom/Shift** key is selected, and the **Zoom** function valid, the upper banner indicates that to get an automatic or full zoom, you must press validation key ( or **ENTER**).

# Zoom function

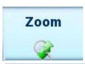
The Zoom function is used to analyze part of the trace in greater detail.

<u>The zoom is centered on the active cursor</u>.

The position of the section of trace displayed with respect to the complete trace is represented by a red rectangle on the mini-trace at the top left-hand corner of the screen.

## Defining a zoom on the trace using the touchscreen or screen deported on PC

**1** Press **Zoom** or **Zoom/Shift** softkey to activate the zoom function

– menu key 

in Smart Test

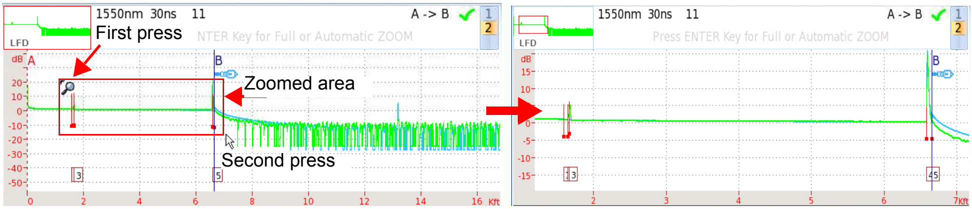
– menu key 

in Expert OTDR

**2** Press once in one location on the screen, which will represent the upper left corner of the zoomed area.
The icon  is displayed on the screen.

**3** Press another time on the location which will represent the lower right corner of the zoom.

**Figure 43** Zoom on trace using touchscreen




## Defining a zoom level on the trace using direction keys

**4** Select **Cursor A** or **B** and center it on the zone to be examined

**5** Press **Zoom** softkey.

**6** Use the ▶ or ◀ key to increase or reduce the zoom factor, keeping the selected cursor centered on screen.

## Swapping from an automatic zoom to full trace and vice-versa

The automatic zoom allows to get an optimized display of the trace.

To apply an automatic or entire zoom on the trace:

**1** Press **Zoom** softkey.

**2** Press validation key ( or **ENTER**) to apply an auto zoom on trace.
Press again validation key ( or **ENTER**) to display the trace in full screen.

## Specific functions of the zoom with a touchscreen

With the touchscreen, once the **Zoom** function is selected on menu key **Zoom**, you can:

- maintain your finger pressed on screen and shift the traces horizontally or vertically
- position your finger on a cursor and move it on trace maintaining your finger pressed and moving it toward left or right
- once a zoom is performed, double click on the zoomed zone to undo the zoom

## Zooming on the different events in succession

**1** Set the cursor on one event

**2** Define a zoom on this event.

**3** Click on another event in the results table.

The cursor is automatically positioned on this event, which is always centered on the screen, keeping the zoom level selected.

## Shift function (Expert OTDR only)

The Shift function is used to displace the displayed section of the trace by pressing the direction keys or directly clicking on the touchscreen.

The horizontal shift is performed maintaining the point of intersection between the trace and the selected cursor at the same level, scrolling the trace horizontally while following it vertically, so that it never goes off the screen.

To use this function:

**1** Select the zoom factor as described above.

**2** Choose cursor A and cursor B position.

**3** On the **Zoom/Shift** key, select **Shift**.

**4** Displace trace manually on touchscreen toward left/right or upward/backward.

or

Use the direction keys to shift the trace in the desired direction.

## Display of traces in overlay

- The traces are shown in different colors (the active trace is green).
- The mains acquisition parameters are displayed at the top of the screen.

**Figure 44** Traces in overlay

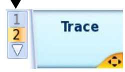

## Selecting one trace from overlaid traces

To make actions on a trace in overlay (move on events, set a cursor...), it must first be swapped with the active trace. To do this:

1 Press the **Trace** key

2 Press the direction keys ◀ and ▶, as many times as necessary, until the active trace is displayed in green.
or
Click on the trace numbers in the upper right side of the result page until the trace desired is selected.
or
Click on the upper part, in Trace information zone to scroll the traces

traces numbers

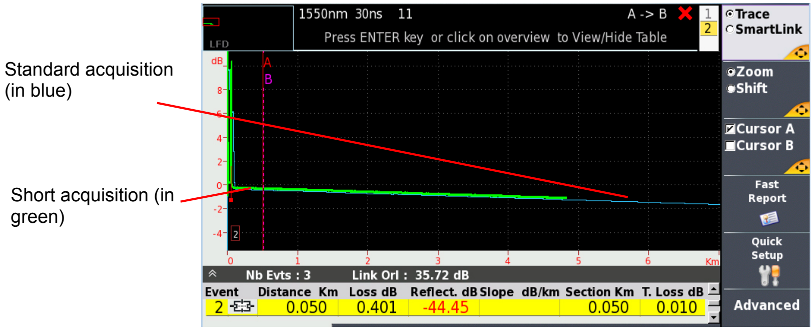



> **NOTE**
> Actions relative to traces (move cursors, move on events...) are exclusively done on the active trace (in green), not on the other ones.

## Traces display in double acquisition mode

When a double acquisition has been performed, i.e. a short acquisition preceding a standard one (see “Acquisition Mode” on page 26), two traces are displayed in the same window.

**Figure 45** Traces display in double acquisition mode




The short trace is the one resulting from the short acquisition and stops while the standard one continues until the end of measurement.

# Advanced functions in Expert OTDR mode

Several actions on trace displayed can be performed in ExpertOTDR mode only.

## Automatic measurement and detection

If the instrument does not detect all the expected events, additional manual measurements can be carried out.

To delete all the markers:

1 Press the **Advanced** key

2 Press the **Modify meas**.key,

3 Select **Delete.**

4 Press validation key ( ◯ or **ENTER**)

The following procedure is then recommended:

1 By default, the instrument locates the events and proceeds to the measurements.

**2** Addition of events (see “Addition of events” on page 77) in the cases of splices showing low attenuation and of close events. The T-BERD/MTS then automatically measures the slope before and after the markers selected and measures the attenuation of the splice.

**3** Addition of manual measurements if necessary (for deeper analysis). The T-BERD/MTS performs the measurements requested by the user.

To start an automatic measurement while a measurement is already in progress:

**1** Press the **Advanced** key.

**2** Press the **Modify meas**.key

**3** Select **Delete** and press validation key ( or **ENTER**).

**4** Select **Auto Meas.** and press validation key ( or **ENTER**).

# Addition of events

You can also manually place markers in addition to those positioned automatically during automatic measurement.

## Representation of the events

The events are represented by the symbol : if they are set during a measurement.

The events are represented by the symbol if they are set manually in **Advanced** mode.

To add markers of events:

**1** Select a cursor (A or B).

**2** Use the direction keys or touchscreen to move the cursor to the place where you want to position a marker.

**3** Press the keys: **Advanced** > **Set Event**.

**4** An event marker is displayed at the position of the cursor and a measurement is carried out on the event.

Measurement of slope before the marker starts just after the previous event (or at the end of the dead zone at the beginning of the fiber); measurement of slope after the marker stops just before the next marker or at the end of the fiber.

## Hints on the positioning of markers

- Do not add markers (with the **Set Event** key) after a manual measurement, as all the results will be recalculated automatically by the instrument.
- If two markers are too close together, they will appear on the trace and the table but no measurement will be carried out on the second marker: to obtain results for this marker, a manual measurement is necessary.
- If you press the **Set Event** key when the cursor is very close to a marker, the latter will be deleted.

## Deleting events

To delete an event, move the cursor onto the event and press the **Set Event** key. The event selected will be deleted and a complete measurement, without this event, is carried out.

Deletion of events can cause incorrect measurement results.

# Manual measurements

As soon as you have made an acquisition, with or without automatic measurement, you can make manual measurements on any event on the trace by means of the cursors A and B, in association with the functions of slope, detection of splice and calculation of ORL.

**1** The manual measurements are accessible in the **Results** page, after pressing the keys: **Advanced**, **Modify meas**, then **Manual Measurement**.

## Measurements of slope

To make a manual measurement of slope, press the **RESULTS** button to call up the trace and then:

1. Place the cursor A at the beginning of the section of the trace where the slope is to be measured.
2. Place the cursor B at the end of this section.
3. Press the **Advanced** key
4. Press the **Modify Meas**. key
5. Press the **Manual** key, then select **Slope**.

**6** Press validation key ( or **ENTER**) : the slope of the specified trace section is displayed.

**Figure 46** Manual Measurement results


## Result of slope measurement

The result is displayed on the screen between the two slope indicators [ and ].

The measurement results are also available in the table:

**1** Press **Exit** to return to the initial results page.

**2** Select **Trace** using **Trace/Smart Link** soft key

**3** Press validation key ( or **ENTER**) to display results table under the trace.

"Distance" shows the distance between the beginning of the trace and the end of the slope;

If no result is displayed in the table, this means that the distance between the cursors A and B is too small.

## Deleting a slope measurement

To delete a particular slope measurement result:

**1** Superimpose the cursors A and B on the slope concerned

**2** Select **Slope** (after, if necessary, pressing **Advanced** > **Modify Meas**.> **Manual Meas.**).

**3** Press validation key ( or **ENTER**) : the slope of the specified trace section is deleted.

# Measurement of ORL

It is possible to carry out an ORL measurement on a part of the fiber.

Follow the following procedure to measure a part of the fiber:

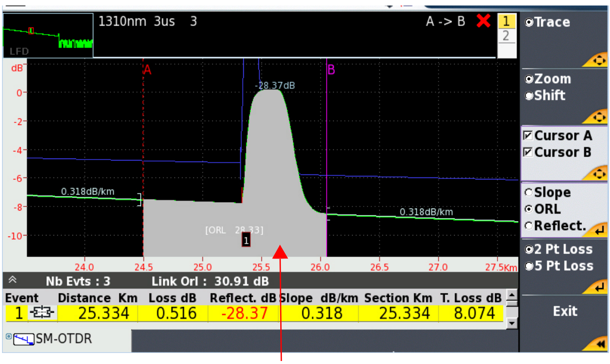
**1** Position the cursors A and B to delimit the section that you wish to measure.

**2** Press the **Advanced** > **Modify Meas**.> **Manual Meas.**, then select **ORL**.

**3** Press validation key ( or **ENTER**) .

The ORL is measured for the section of trace defined.

**Figure 47** Result of ORL measurement




## ORL on a saturated trace

If saturation occurs during an ORL measurement, the result is given with the sign **<**. This means that the actual ORL value is less than the value displayed.

# Measurement of Reflectance

It is possible to carry out a reflectance measurement of a Fresnel for a reflective event.

Follow the following procedure to measure the reflectance:

**1** Position the cursor A at the base of the peak

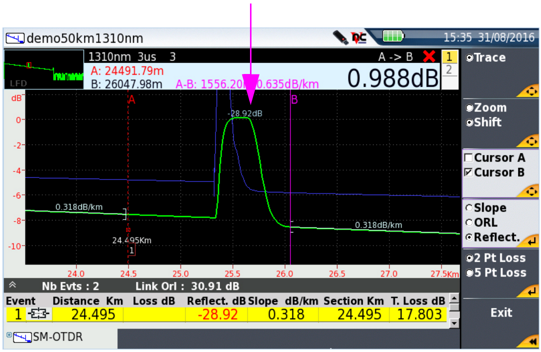
**2** Position the cursor B at the top of the peak of the required Fresnel, or after the peak to calculate automatically the maximum reflectance.

**3** Press the **Advanced** > **Modify Meas**.> **Manual Meas.**, then select **Reflec.**.

**4** Press validation key ( ◯ or ENTER) .

The Reflectance value is defined in dB, and displayed in the trace in purple.

**Figure 48** Reflectance measurement



## Splice measurements

There are two methods of carrying out manual measurements of splices on the trace: the two-cursor method and the five-cursor method.

The five-cursor method is the more accurate, as it takes into account the difference of level between the slope before the splice and the slope after the splice. This method should be used whenever possible.

If very close events have created a dead zone preventing the measurement of slope by the five-cursor method, it is possible to use the two-cursor method. This considers the difference in level between the cursors.

Before performing one of these measurements, define in the **Setup** menu the splice detection threshold.

### Two points method

To perform a splice measurement by the "two-points" method, display the **Results** page, then:

1. Place cursor A exactly on the fault, then place cursor B after the splice that you wish to define.
2. Press the **Advanced** key, then **Modify Meas**.> **Manual Meas.**, then select the function **2 Pt Loss**.
3. Press validation key ( or **ENTER**).

   The splice marker is placed at the point defined by the first (left-hand) cursor and the result is displayed on the screen. If the fault is reflective, the reflectance value is also measured and displayed. These results are added to the table of results.

> **NOTE**
> If you try to measure a splice on a slope, the measurement is not carried out and the following error message is displayed: "`Slope found between two cursors`".

## Five points method

To carry out a splice measurement by the "five points" method:

1. Measure the slope preceding the fault to be measured, then the slope following it.
2. Place the cursor on the fault (between the two sections).
3. Press the **Advanced** key, then **Modify Meas**.> **Manual Meas.**, then select **5 Pt Loss**.
4. Press validation key ( or **ENTER**).

   The splice event marker is placed on the cursor and the result is displayed on the trace and in the table of results.

> **NOTE**
> If no result is displayed, it is possible that the display threshold of the attenuation measurement result is higher than the attenuation that you are trying to measure.

> **NOTE**
> If you try to measure a splice on a slope, the measurement is not carried out and the following error message is displayed: `Slope found between two cursors`.

# Memorization of the position of events

To memorize the position of events with a view to repeating the measurements at the same place during a future acquisition or on another trace, press the **Advanced** key, then select **Lock Evts**. The event memorization icon  will appear in the title bar.

The positions memorized will then be used in the subsequent measurements, either at the end of the manual acquisition, or when a stored trace is recalled.

> **NOTE**
> This function memorizes the markers placed on the current trace.

The following procedure is recommended to start a measurement with markers:

**1** Carry out an automatic measurement.

**2** Memorize the position of the events selecting **Lock with the key** in the **Advanced** menu 

.

**3** Add the manual measurements required (keys: **Advanced > Manual Meas.**).

## CAUTION

<u>If an event is added</u> (with the **Set Events** key) <u>after manual measurements have been performed</u>, then all the events on the trace will be converted into AUTO markers and an automatic measurement will be performed using these events. The previous manual measurements will be lost.

Provided the event memorization icon  is displayed, the automatic measurement following the acquisition is carried out using the events which were present before the acquisition.

If you wish to make a measurement without events, deactivate memorization of events by pressing the **Free Events** key.

# Overlay trace function

This very useful function enables up to eight traces to be displayed on the screen at once:

- either to compare traces acquired on a number of different fibers in the same cable,
- or to observe changes over time in traces taken of one and the same fiber.

**Figure 49** Example of overlaid traces


## Overlaying several traces stored in memory

To display up to 8 traces from the memory, deleting the current trace(s) already loaded:

1. Press the **FILE** button.
2. Select the files of the traces for display.
3. Press the **Load key**.
4. Press **View trace(s)**.
5. When loading is complete, the **Results** screen appears: the first trace selected is the active trace (in green), the other traces being overlaid.

## Display of traces in overlay

- The traces are shown in different colors (the active trace is green).
- Their serial numbers are repeated at the top of the screen.
- The OTDR markers are referenced on the active trace by the symbol , and on the other traces by vertical dashes.

## Adding traces in overlay

With one or more traces already displayed, to add further traces to the display (the number of traces displayed cannot exceed 8):

1. Define at least one trace as reference (see “Reference Trace function” on page 86)
2. Press the **FILE** button, and in the Explorer , select the files of the traces to be added.
3. Press **Load** key.
4. Press the **View Trace(s) or Load Trace + Config.**

   When loading is complete, the new traces are displayed in overlay with those that were defined as reference traces (see.“Reference Trace function” on page 86)

> **NOTE**
>
> If the number of files selected exceeds the display capacity, a message gives warning that loading will be incomplete: only the trace or traces selected first will be displayed, up to the permitted limit of 8 traces.

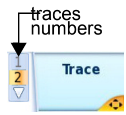
# Swapping overlay traces

Measurements can only be made on the active trace and not on overlaid traces. To make measurements on a trace in overlay, it must first be swapped with the active trace.

1. Press the **Trace** key,
2. Press the ◀ and ▶ direction keys, as many times as necessary, until the active trace is displayed in green.

   or

   Click on the trace numbers in the upper right side of the result page until the trace desired is selected.




# Removing a trace

## Removing the current trace in overlay

It is possible to remove a trace displayed. To do this, first select it (see previous paragraph), then successively press **Advanced** > **Overlay** > **Remove Current Trace**.

## Removing all the traces in overlay

To remove all the traces except the current trace, then successively press **Advanced** > **Overlay** > **Remove Other Traces**.

## Quitting the overlay menu

To quit the overlay menu, press the **Exit** key.

# Reference Trace function

The reference trace function consists in defining trace(s) which will be «blocked» on screen and used as models before acquiring or loading other standard trace(s).

## Use of the reference trace function in the Result page

Once one or several trace(s) is/are displayed, after an acquisition or loaded from the explorer:

1. If several traces are in overlay, check the correct current trace is selected
2. Go in the **Advanced** menu
3. Click on **Overlay**
4. Click on **Set curve As Reference** key.

The active trace becomes the reference trace;

- the icon  appears on the upper right hand part of the results table.

To define all the traces displayed as reference traces, click on **Set All As Reference** key (whatever is the active trace).

### Removing the reference trace(s)

To change one reference trace into a «standard» trace, select it using the **Trace/Event** key, and in the **Advanced > Overlay** menu, click once again on **Reset Reference**.

To change all the reference traces displayed into «standard» traces, whatever is the active trace, go in the **Advanced > Overlay** menu and click on **Set All As Reference**.

### Performing an acquisition once one or several trace(s) is/are defined

Three situations can occur once an acquisition is performed:

- Only reference trace(s) is/are displayed: the trace acquired is added to the reference ones.

- Reference trace(s) and «standard» trace(s) are displayed: the reference trace(s) are «blocked», the standard ones are removed and the new trace acquired is displayed with the reference one(s).
- No reference trace(s) defined: all the «standard» traces are removed and only the new trace acquired is displayed.

## Using the reference trace function in the explorer

A trace stored in memory can be set as reference trace before loading one or several «standard» trace(s).

### To open one or several reference trace(s)

1. Go on the **File Explorer**
2. Select the trace(s) to be defined as reference
3. Click on **Load** and select **Reference = Yes** on the key 

4. Click on **View Trace(s)** or **Load Trace + Config.**

   The icon 

 appears on the upper right part of the results table.

### To open «standard» traces to be added to the reference ones

1. Go back to the **Explorer**
2. Select the trace(s) to be opened in the same screen as the reference traces
3. Click on **Load** and select **Reference = No** on the key 

4. Click on **View Trace(s)** or **Load Trace + Config.**

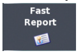
# Saving the trace(s) and generating a report

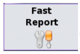
Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen, **in Expert Mode only**.

The traces saving and report generation can have already been performed automatically if the parameter **Auto Store** was defined on **Yes** in the Setup screen (see “Auto Store” on page 46) with the appropriate **Save Mode** (file only or file + txt or + pdf).

# Saving results and creating a report from results page

To save the trace and generate a report:

**1** Press **Fast Report** key 

-> 

.
A menu displays under the trace.

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

**Figure 50** Fast report configuration


**a** Modify the **Fiber Number/Fiber Code** using the key ▶.

In the **Save Mode** parameter, select:**txt file**select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select **Yes** to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

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

**c** 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**)

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

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

**4** Enter a name for the file in the edition keypad.
or
Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see “Filenaming” on page 45)

**5** Press **Enter** to validate

> **NOTE**
> The sor file and the txt or pdf file will have the same name.

The icon  displays during saving process.
Once saving is completed, a sound is emitted onto the Platform.

> **NOTE**
> The file and the report are saved in the last storage media and directory selected.

### Saving and report for traces in overlay

If several traces are displayed in overlay in the results page, one or several file(s)/ report(s) is/are generated:

- If in the File Setup page (**SETUP** > **File**), the parameter **File Content** is defined with **One Trace**, one .sor file and one pdf/txt report will be generated for each trace
  Example: if 3 traces are displayed in overlay, 3 **.sor** files and 3 pdf/txt files will be saved.
- If in the File Setup page (**SETUP** > **File**), the parameter **File Content** is defined with **All Traces**, one single .msor file and one single txt/pdf report will be generated, bringing together all traces.
  Example: if 3 traces are displayed in overlay, one single **.msor** file and one single txt/pdf file (with one trace per page; except if the results table is too long for one page) will be saved.

## Opening a report

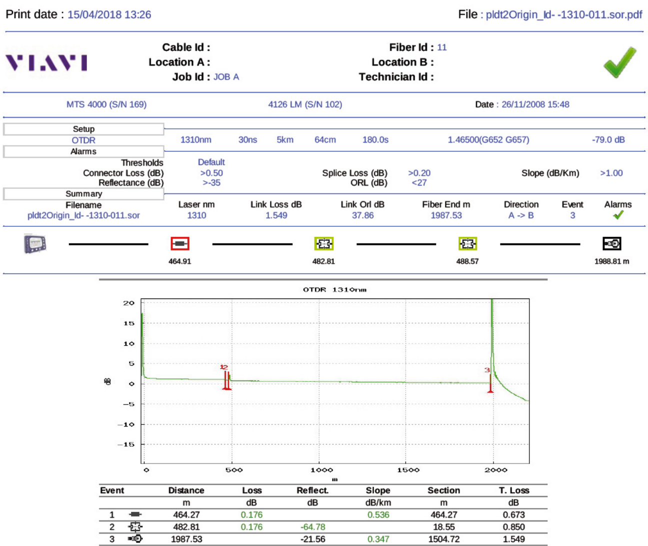
**1** To open the report, press **FILE** hardkey

**2** In the **Explorer** page, in the directory selected, select the file/report.
The file name is:

For the txt file: *trace file_sor.txt*
For the pdf file: *trace file.sor.pdf*

**3** Press **Load**.
The file opens on the equipment.

**Figure 51** PDF report



Print date : 15/04/2018 13:26 File : pldt2Origin_Id- -1310-011.sor.pdf

Cable Id :
Location A :
Job Id : JOB A

Fiber Id : 11
Location B :
Technician Id :

MTS 4000 (S/N 169) 4126 LM (S/N 102) Date : 26/11/2008 15:48

Setup
OTDR 1310nm 30ns 5km 64cm 180.0s 1.46500(G652 G657) -79.0 dB

Alarms
Thresholds Default
Connector Loss (dB) >0.50 Splice Loss (dB) >0.20 Slope (dB/Km) >1.00
Reflectance (dB) >-35 ORL (dB) <27

Summary

| Filename | Laser nm | Link Loss dB | Link Orl dB | Fiber End m | Direction | Event | Alarms |
|---|---|---|---|---|---|---|---|
| pldt2Origin_Id- -1310-011.sor | 1310 | 1.549 | 37.86 | 1987.53 | A -> B | 3 | ✓ |

464.91 482.81 488.57 1988.81 m



| Event | | Distance | Loss | Reflect. | Slope | Section | T. Loss |
|---|---|---|---|---|---|---|---|
| | | m | dB | dB | dB/km | m | dB |
| 1 | | 464.27 | 0.176 | | 0.536 | 464.27 | 0.673 |
| 2 | | 482.81 | 0.176 | -64.78 | | 18.55 | 0.850 |
| 3 | | 1987.53 | | -21.56 | 0.347 | 1504.72 | 1.549 |

## 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 the root of the disk: `disk > logo.jpg`.

## NOTE

A PDF Report can also be generated from the File Explorer page onto the T-BERD/MTS 2000/4000 V2 (see “Generating pdf report(s)” on page 244).

# 6

# Power meter and Source options of the OTDR Modules

A variety of options are available when ordering an OTDR Module.

With the T-BERD/MTS 2000 and T-BERD/MTS 4000 V2:

- E41OTDRPM is the power meter option for the OTDR Modules
- E41OTDRLS is the Light Source option for the OTDR Modules.

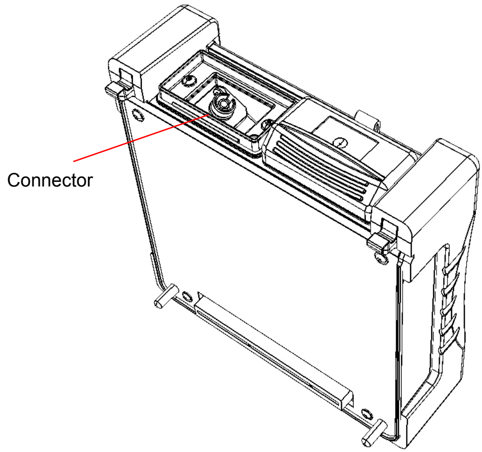
With the SmartOTDR:

- E10PM is the built-in powermeter option

The topics discussed in this chapter are as follows:

# Connection to the power meter

**Figure 52** Optical connector for the Powermeter or Source on the OTDR Module (T-BERD/MTS 2000/4000 V2)




The type of optical connector used for the power meter is the same as the OTDR port.

With 2 OTDR ports, select the port of connection according to the wavelength available at each port (a label gives information at the back of the OTDR module).

**It is not possible to use simultaneously the Source function and the Power meter function, when both options are set onto the OTDR module, as they use the same connector.**

# Configuring the Power meter

For T-BERD/MTS 2000/4000 V2, the power meter function is an option chosen at the time of order and incorporated into the OTDR module in the factory.

To activate the function:

**1** Press the **HOME** button

**2** Select the power meter icon in the section of the OTDR Module

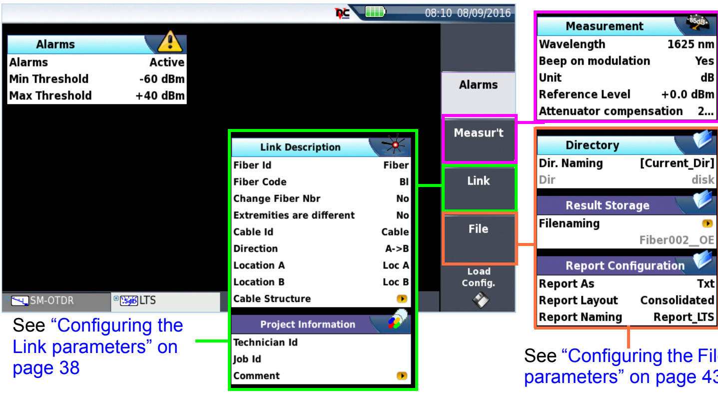
The icon turns yellow  .


The effect of this action will to be to bring the power meter into use.

> The Powermeter icons of the singlemode port and the one of the Multimode port cannot be selected at the same time. When one is selected, it automatically deselects the other one.

The measurement parameters can be accessed with the **SETUP** key.

**Figure 53** Configuration of power measurement




# Configuring the alarm parameters

- **Alarm** Activation of the Alarm function: any result below the lower threshold or above the upper threshold will be displayed in red on the Results page.
- **Min and max thresholds**
  Choice of lower and upper thresholds for each available wavelength, from -60 to +40 dBm.

> **NOTE**
> To copy one value of the Lower or/and Upper threshold for all wavelengths, select the reference value and click on **Update for All Wavel.**.

> **NOTE**
> A continuous push on direction keys increments the value by 10 dBm.

# Configuring the Measurement parameters

In the **Setup** page, press **Measur't** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Measur't**)

- **Wavelength** Select wavelength:
  **Auto**: the wavelength of the input signal will be automatically detected and selected to perform the measurement:
  **1310, 1490, 1550, 1625 or 1650 nm**: measurement performed at specified wavelength.

> **NOTE**
> Using MP 60 or MP80 power meter, set manually to **Auto** the Lambda to automatically detect the wavelength: in results page, press **Power Config.** > **Wavelength** key multiple times until **Auto** is displayed.

- **Beep on modulation**
  Select if a sound must be heard when a modulation occurs (**Yes** / **No**)
- **Unit** Unit of power displayed:
  **Watt**, **dBm** for displaying absolute power
  **dB** for displaying a result relative to a reference (link loss)
- **Reference level** If dB units were chosen in the previous line, selection of the reference value for the wavelength selected. Using the direction keys, first choose the wavelength, then press the > key to access choice of the value (+XXX.XX), then confirm this value with the ENTER key.This reference is also automatically available, in the **Results** page, using the **Set as Reference** key.

- **Attenuator compensation**
  Choice of level to be applied to the wavelength chosen for measurement to compensate for the loss due to the external attenuator (+XX.XX dB). First use the direction keys to choose the wavelength, then press ▶ to access choice of value, then confirm this value pressing **ENTER.**

> **NOTE**
> To copy a Reference Level/Attenuator Compensator on all wavelengths, select the reference wavelength and click on **Update for All Wavel.**.

# Activating the Source function

The Source function is an option chosen at the time of order and incorporated into the OTDR module in the factory.

To activate the function:

**1** Press the **HOME** button.

**2** Click on the icon **Source** in the OTDR Section.
The icon turns yellow 

.

> **CAUTION**
> The Singlemode and Multimode Source icons cannot be selected at the same time. When one is selected, it automatically deselects the other one.

# Result page

The results page, automatically displayed after the icon selection, gives the information relating to the measurement in progress, results previously saved and the commands available for measurement and saving.

## Result page of the Power meter

The power measured by the power meter is displayed in large characters, in the units selected in the **Setup** menu, together with:

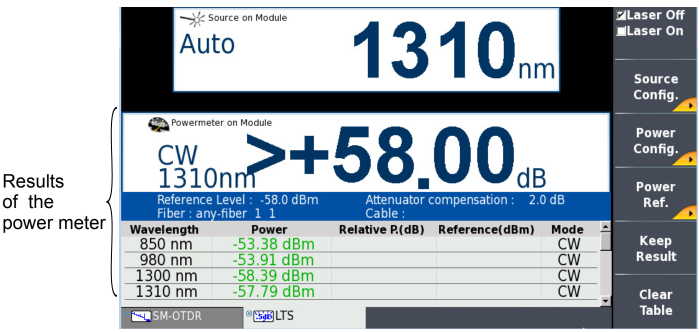
- the mode of transmission of the signal measured: continuous (CW) or modulated to a frequency of 270Hz, 330Hz, 1KHz, or 2KHz.
- the wavelength of the signal measured.
- the reference level expressed in dB.
- the level of Attenuation Compensation.

# Table of results

For one and the same fiber, the power meter displays a table of 9 results corresponding to the different possible wavelengths. The table shows the power measured in dBm, the relative power (in dB) and the reference level in dBm (if units = dB), together with the mode.

- A measurement result is displayed in the table when the **Keep Result** softkey is pressed.
- The **Clear Table** softkey orders deletion of all the results displayed in the table.
- If the Alarm function has been activated, any result that exceeds the selected thresholds appears in red in the table. Otherwise, results are shown in the table in green.
- When the instrument is switched off, results present in the table are saved.

**Figure 54** Results and commands of the power meter




# Commands of the power meter parameters

When the Powermeter function is selected, the following softkeys are available on the results page.
The different configuration buttons are displayed:

**Wavelength** selection of the wavelength

**Unit** choice of the unit

**Zero** adjustment of the Zero value when the power meter's optical input is closed with a plug (a validation is required).

On the results page, the following actions are available:

**Set as Reference** Selects the current result as reference value to measure the attenuation of a link. This reference is displayed under the measurement result until a new reference value is chosen.

**Keep Result** Saves the result on the corresponding line of the table.

**Clear Table** Deletes all the results recorded in the table.

If the Source function is selected (either on this Platform, on the base Unit or on an OTDR module, or on another Platform), the Power meter results page is different:

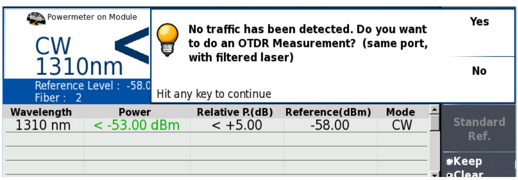
- The **Wavelength**, **Unit** and **Zero** menu keys are accessible via the menu key **Power Config.**
- The **Power Ref.** menu key allows to reach the **Standard Ref** menu key. It also allows to reach the **Jumper Ref** menu key if Power meter function is associated with Source function onto another unit (see "Carrying out the reference in loop-back mode" on page 102).

# Combo PM/OTDR

If the ExpertOTDR mode is activated at the same time as the Powermeter, a menu key **Combo PM/OTDR** is displayed in the powermeter page.

It allows to launch an OTDR acquisition on the same port as the powermeter, clicking on **Yes** in the dialog box displayed.

**Figure 55** Combo Powermeter / OTDR



> **CAUTION**
>
> Only the following Modules used in combination with the powermeter, have the Combo PM/OTDR function:
>
> - For T-BERD/MTS 2000/4000 V2: E4136RMAx, E4136RMPx, E4136RMP, Exx1xRMAx and Exx1xRMPx.
>
> - For SmartOTDR: E117FA65PPM-PC, E117FA65PPM-APC, E136FB-PC and E136FB-APC.

# Result page of the Source

Once the source icon is selected, the results page displays and the Source can be configured.

**Figure 56** Source result page


- **Laser On / Laser Off**

  Activation or shut-down of the laser (same function as the **START/STOP** button)

  When the laser is **on**, the icon is displayed.

  The parameters of the source can be accessed directly on the result screen:

**Wavelength** To change the wavelength when a multi-wavelength source is present (depending on option).

The wavelength value is displayed.

**Mode** To vary the mode of emission of the source. Possible modulation values are:

- 270 Hz / 330 Hz / 1 kHz / 2 kHz
- **Auto** (the sources emit on determined frequencies to enable the power meter to detect the wavelength used automatically)
- **TwinTest** (cyclical emission on all available wavelengths for a few seconds on each wavelength), compatible with the VIAVI OLP 34/35/38.
- **CW** (continuous emission)

The mode used is displayed, above the icon  .

**Standard Reference**

To perform a side by side reference measurement (see “Carrying out the side by side reference” on page 100).

If the power meter function is selected onto the equipment (either on Base-Unit or on OTDR module) the menu keys are different on screen:

**Source Config**: allows to display the **Wavelength** and **Mode** menu keys

The **Source Reference** menu key allows to open a sub-menu with the following keys:

**Standard Ref** to perform a reference in side by side mode (see “Carrying out the side by side reference” on page 100).

**Jumper Ref**: to perform a reference measurement in loopback mode (see “Carrying out the reference in loopback mode” on page 102).

# Performing the power level measurement

The power meter is started up as soon as the function 

is activated in the **HOME** page.

**It is not possible to use simultaneously the Source function and the Powermeter function, when both options are set onto the OTDR module, as they use the same connector.**

Power measurement is automatically updated in consequence. The value «<-50 dBm» is displayed when the laser is switched off and if the source output is looped on to the power meter input.

1 Connect the light source to be tested to the rear connector (see "Connection to the power meter" page 92).

2 In the **SETUP** menu, choose the units dBm or Watts.

3 Press the **START/STOP** key to start the measurement.

The result will appear in the results page and can be memorized in the table (see "Table of results" page 96).

4 Press the **START/STOP** key to stop the measurement.

# Performing the insertion loss measurement

Using light source and power meter options, an insertion loss measurement can be performed, having previously carried out a reference measurement.

## Setting the zero value of the power meter

**1** Fix the plug over the optical input of the power meter so that no light can reach the photodiode of the power meter. If the zero adjustment is made without this plug, an error message may be displayed, as the photodiode will detect too much light.

**2** In the **Results** page, press **Powermeter config. > Zero** soft key and validate.

> It is important to set the zero of the power meter before making any measurements where accuracy is required, as the noise from the germanium photodiode fluctuates over time and with variations in temperature.

## Carrying out the reference

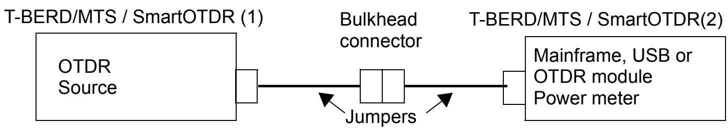
Using two T-BERD/MTS platforms or two SmartOTDR, with an OTDR module including a laser source option and a Power meter option, an insertion loss measurement in continuous wave can be performed.

Two types of reference are available: referencing in side by side mode and referencing in loopback mode.

### Carrying out the side by side reference

This reference can be carried out when both units are connected together meaning they have to be at the same location.

**Figure 57** Side by side reference



> **NOTE**
> The reference can be performed with one T-BERD/MTS 2000 at one side and one T-BERD/MTS-4000 V2 at the other side.

1. Before connecting fiber/jumper, use appropriate cleaning tool to clean connector end-faces.
2. Connect the two jumpers together via a bulkhead connector.
3. Set, on equipment (1), the OTDR light source as "**Standard Ref**"
   - a. Press the **Home** key
   - b. Use the arrow keys or touchscreen to select the Source function on **Home** page 

.
   - c. Press **Results** key
   - d. In the Results page, press **Source Config**.> **Source Reference** > **Standard Ref**
   - e. Press **Exit** and go back to the result Page
   - f. Select the **Twintest** mode by skipping through the different modes
   - g. Press **Laser On** key to activate the source
4. Set, on equipment (2), the power meter (from OTDR module, from the Base-unit or from USB) as "**Standard Ref**"
   - a. Press the **Home** key
   - b. Use the arrow keys or touchscreen to select the Powermeter function in **Home** page 

.
   - c. Press **Results** key.
   - d. In the **Results** page, press **Pow.Reference** > **Standard Ref.**
     The actual power level is set as the new reference level for the selected wavelength. Then, the displayed value is around 00.00 dB.
   - e. Press **Exit** and go back to the **Results** page.

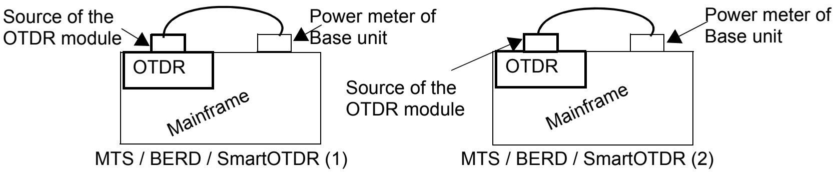
The reference levels are stored into the unit, and have been automatically filled into the setup.

# Carrying out the reference in loopback mode

This reference can be carried out when the units are separated, at different locations. It is made using the OTDR source and the power meter built-in the platform.

> **NOTE**
> Each platform must be equipped with a power meter set onto the base-unit.

**Figure 58** Reference in loopback mode




**1** To reference the OTDR light source, on equipment (1)

- **a** Select the OTDR Source icon in **Home** page 

, on the OTDR area.
- **b** Press **RESULTS** key
- **c** In the LTS result page, press **Source Config.** > **Source Reference** > **Jumper Ref.**.

  A popup message appears
- **d** Connect the jumper from the OTDR source to the mainframe power meter, and then press **OK**.

  The reference measurement is performed automatically.

  A popup message appears when it's done: press any key to continue

**2** To reference the mainframe power meter, on equipment (2)

- **a** Select the Optical powermeter icon <u>of the mainframe</u> in **Home** page 

(on the upper part, on the base options line)
- **b** In the LTS result page, press **Pow. Reference** > **Jumper Ref.**.

  A popup message appears
- **c** Connect the jumper from the OTDR port to the mainframe power meter, and then press **OK**

The reference is performed automatically.
A popup message appears once done. Press any key to continue

The reference levels are stored into the unit, and have been automatically filled into the setup.

# Measurements on the fiber under test

Once the references have been performed on both units:

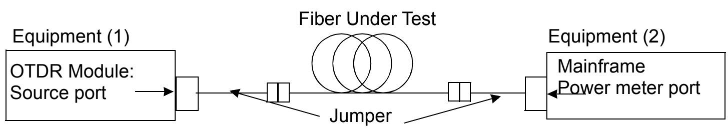
**1** After loopback reference, disconnect the jumper from the powermeter port on the T-BERD/MTS or SmartOTDR (1) and the jumper from the Source port on the T-BERD/MTS or SmartOTDR (2).

After a reference in Side by side mode, disconnect the bulkhead connector and keep the jumpers connected to the Source and Powermeter ports.

**2** Connect the jumpers to the fiber under test using the appropriate method (ex. keying mechanism for FC/PC types).

**3** On MTS / T-BERD or SmartOTDR (1) select **Laser On** to activate the light source.

**Figure 59** Measurement of the fiber under test




## Measurement using a mode conditioner

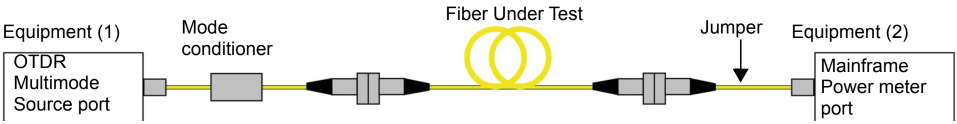
To perform an Insertion Loss measurement with a Source that is compliant to IEC 61280-4-1 Ed2 Standard on encircled flux, it is recommended to use a mode conditioner after the OTDR Source port.
Once the Source on T-BERD/MTS or SmartOTDR (1) and the Powermeter on T-BERD/MTS or SmartOTDR (2) are referenced in loopback or side-by-side mode:

**1** Connect the Multimode source (1) to the mode conditioner

**2** Connect the Powermeter port (2) to the jumper

**3** Connect extremities of the mode conditioner and jumper to the fiber under test using the appropriate method (ex. keying mechanism for FC/PC types).

**Figure 60** Measurement of the Insertion Loss with a mode conditioner




**4** On equipment (1) select **Laser On** to activate the light source.

# Storing and reloading results

## File Setup

Click on the button **FILE** to access the **File** setup. See "Description of the explorer" page 236 for a complete description of all parameters, options and the explorer.

## Storing results

In order to save the results of a measurement, click on **FILE** and select **Store trace**. Two files are being saved:

- The first file is to be used with the product and allows to retrieve all measurement results. It is saved with the extension .Lts.
- The second file is a text file using tabulations to separate values.
  It is saved with the extension «.txt» and can be opened by the Platform via the Web Browser. It has been designed to be used with a spreadsheet program on a PC where it allows to retrieve all measurement results and format them in a nice customized table.

## Loading results

In order to load the results of a measurement, select a file  with the extension «.Lts» in the file explorer (see Chapter 13), click on **Load** > **View trace**.

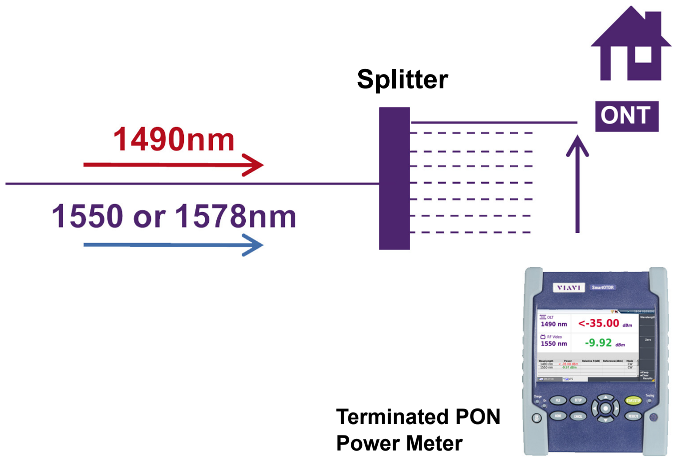
The LTS tab is displayed with the loaded results in the table.

# Terminated PON Powermeter (SmartOTDR only)

The SmartOTDR referenced E118FA65PPM offers a Terminated PON powermeter.

This Powermeter allows to perform PON Power Measurement at the premises to check the presence of signal(s) and verify power level(s).

**Figure 61** Signals measurement with Terminated PON powermeter




The SmartOTDR Terminated PON Power Meter measures simultaneously 1490 & 1550 nm or 1490 & 1578 nm downstream signals.

## Configuring the powermeter

To activate the function:

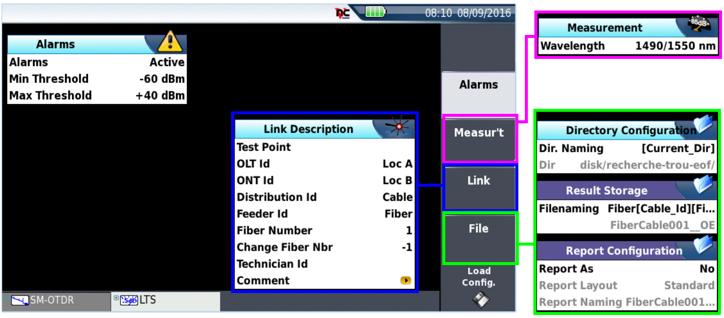
1. Press the **HOME** button
2. Select the PON power meter icon in the section of the OTDR Module

   The icon turns yellow .
   

   The effect of this action will to be to bring the power meter into use.

The measurement parameters can be accessed with the **SETUP** key.

**Figure 62** Configuration of power measurement




See OTDR chapter: "Configuring the File parameters" on page 43

## Configuring the alarm parameters

- **Alarm** Activation of the Alarm function: any result below the lower threshold or above the upper threshold will be displayed in red on the Results page.
- **Min and max thresholds**
  Choice of lower and upper thresholds for each available wavelength, from -60 to +40 dBm.

> **NOTE**
> To copy one value of the Lower or/and Upper threshold for all wavelengths, select the reference value and click on **Update for All Wavel.**.

## Configuring the Measurement parameters

In the **Setup** page, press **Measur't** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Measur't**)

- **Lambda** click to toggle between **1490/1550 nm** and **1490/1578 nm**.

## Configuring the Link parameters

In the **Setup** page, press **Link** soft key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).

> **NOTE**
>
> The softkey **Copy File/Link To all** is displayed when one parameter is selected in the Link or File Setup page and when the Powermeter or Source function is active.
>
> It allows to apply the Link and File configuration parameters of the current applications to all the other active Fiber Optic applications).

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.

## Test Point / OLT Id / ONT Id / Distribution Id / Feeder Id

Those parameters allow to enter an identification for each element of the network (test point, OLT, ONT...) using the Edition menu.

## Fiber Number

Select the parameter **Fiber Number** and modify the parameter using the left and right direction keys.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the following parameter.

## 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.

## Technician Id

Use the arrow ▶ to enter the name of the operator carrying out the measurement.

## Comment

In contrast to the other data in this menu, the comment is specific to a fiber. This line is thus used to enter a new comment and not to display it. The comment appears at the

top of the screen, with the other parameters of the fiber.
This comment will remain available for the next acquisition, unless it is deleted. It is also saved when a trace is saved with a comment.

# Setting the zero value of the power meter

**1** Fix the plug over the optical input of the power meter so that no light can reach the photodiode of the power meter. If the zero adjustment is made without this plug, an error message may be displayed, as the photodiode will detect too much light.

**2** In the **Results** page, press **Zero** soft key and validate.

> It is important to set the zero of the power meter before making any measurements where accuracy is required, as the noise from the germanium photodiode fluctuates over time and with variations in temperature.

**3** Wait until the dialog box `Dark current calibration completed` displays.

**4** Hit any key to continue

# Measuring the signals

To perform the measurement:

**1** Connect the fiber to a source and to the PON Powermeter of the SmartOTDR.

**2** Activate the source.

**3** In the results page of the powermeter, check the value for each wavelength.

**Figure 63** Terminated PON Powermeter results


For each wavelength, the power value is displayed in green if it does not exceed the alarm thresholds defined in the setup menu, and in red if it exceeds the thresholds.

The results are displayed in blue if no alarm is defined.

4 Press **Keep results** to keep the current results in the table.

5 Press **Wavelength** to toggle between **1490 / 1550 nm** (for video) & **1490 / 1578 nm** (for XGPON network)

## Combo PM/OTDR

**If the ExpertOTDR mode is activated at the same time as the PON Powermeter**, a menu key **Combo PM/OTDR** is displayed in the powermeter page.
It allows to save the powermeter results and launch an OTDR acquisition on the same port as the powermeter, clicking on **Yes** in the dialog box displayed.

**CAUTION**

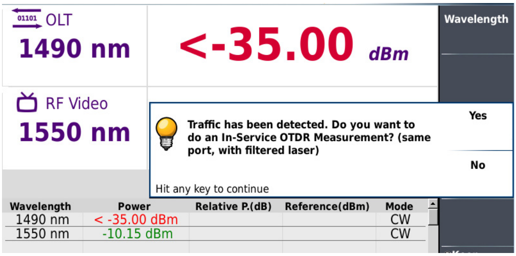
Only the following OTDR modules or SmartOTDR models  used in combina-tion with the powerme-ter, have the Combo PM/OTDR function;

- SmartOTDR: E117FA65PPM-PC, E117FA65PPM-APC, E136FB-PC and E136FB-APC.

- Modules for 4000 V2 and 2000 Platforms: E4136RMAx, E4136RMPx, E4136RMP, Exx1xRMAx et Exx1xRMPx.

The report will contain both results (.sor and power meter results) in the .sor and/or .pdf file.

**Figure 64** In-Service OTDR




# Storing results

In order to save the results of a measurement, click on **FILE** and select **Store** > **Save**.

The file is saved with the extension .Lts, and is represented by the icon .

7

# FTTA-SLM Software option

This chapter describes the use of the FTTA-SLM option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

# Principle of FTTA-SLM

FTTA-SLM is an OTDR software application that is delivered as an option of the OTDR module (see references in the ordering information section), and is installed onto the mainframe as a license key (see the 2000/4000 V2 base-unit user manual for the instructions on license files installation).

FTTA-SLM simplifies OTDR testing for cell-tower technicians and eliminates complexities of result interpretation.

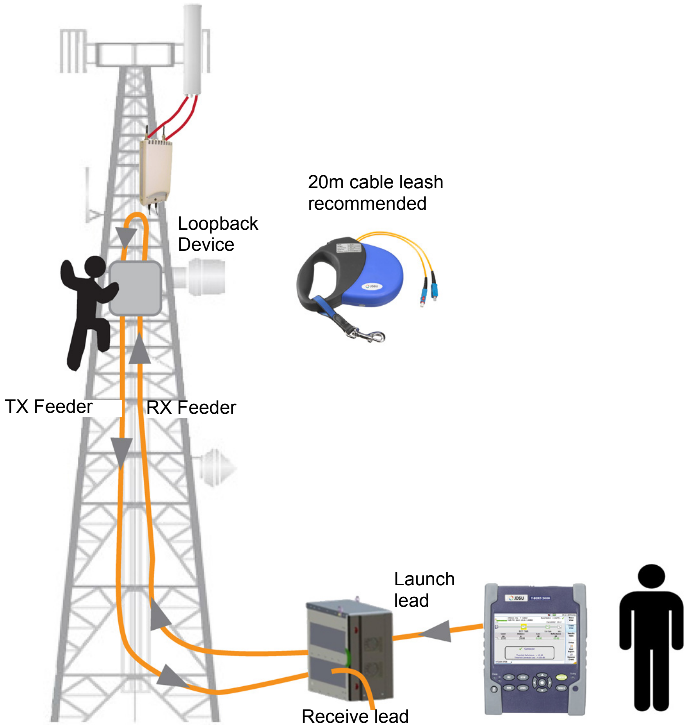
In a FTTA environment, the OTDR module, associated with the FTTA-SLM application, allows to:

- Characterize and measure the fiber link loss, measure the loss and reflectance of each passive element, and provide the position for each one: **Acceptance Testing**
- Locate and identify causes of failure on a fiber link: **Troubleshooting / Maintenance**.

## Acceptance Testing

One way to judge installation quality is to use a loopback device (a retractible/expandable fiber leash cable or a patchcord) on duplex fiber to test at the junction box or RRU location and shoot with an OTDR from the BBU or fiber-patch panel location to qualify the entire fiber channel.

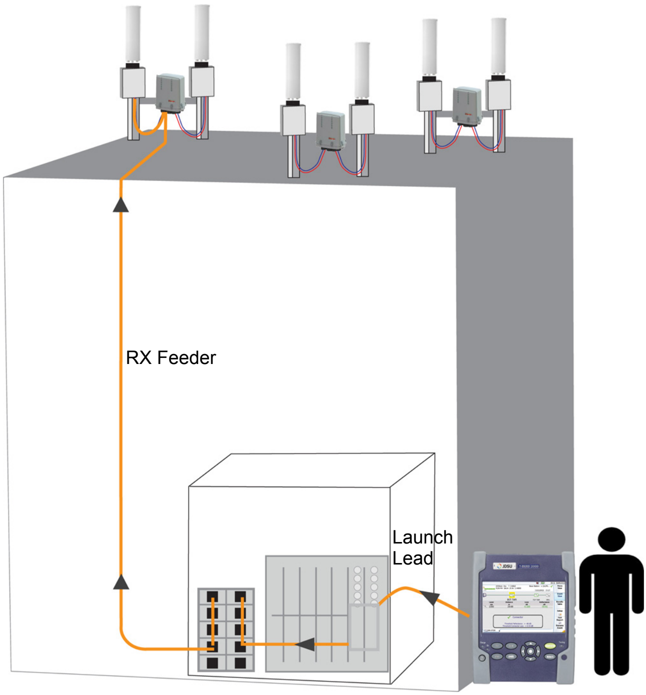
**Figure 65** Acceptance Testing




# Troubleshooting Testing

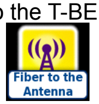
An OTDR from the BBU or fiber patch panel location will troubleshoot the fiber link up to the RRU/RRH. Before performing the OTDR measurement, make sure that the fiber being tested has no signal and the equipment is shut down.

**Figure 66** Troubleshooting Testing




# Configuring the Reflectometry test for FTTA network

Once the OTDR module is set into the T-BERD/MTS, and the FTTA-SLM license installed:

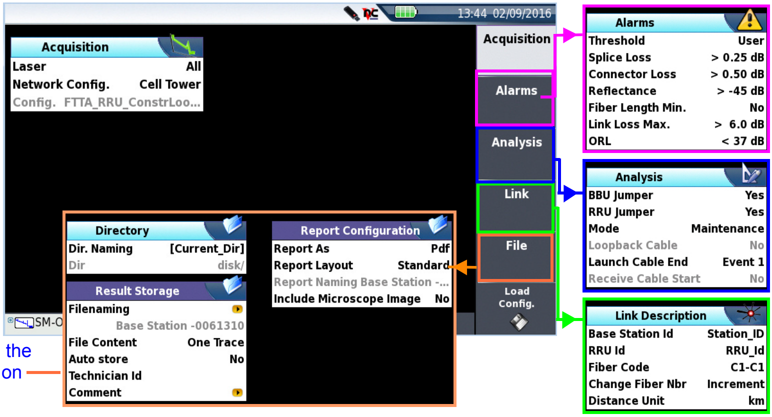
**1** Select the FTTA-OTDR icon 

.

The results page automatically displays.

**2** Press **SETUP** hard key to display the OTDR configuration screen for FTTA network.

**Figure 67** FTTA OTDR Setup




See “Configuring the File parameters” on page 43[1]

1 From the Link Setup page of the OTDR function, for **Technician Id** parameter, see “Technician Id” on page 43 and for **Comment** parameter, see “Comment” on page 43

# Acquisition (FTTA)

In the first screen, configure the following parameters:

## Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

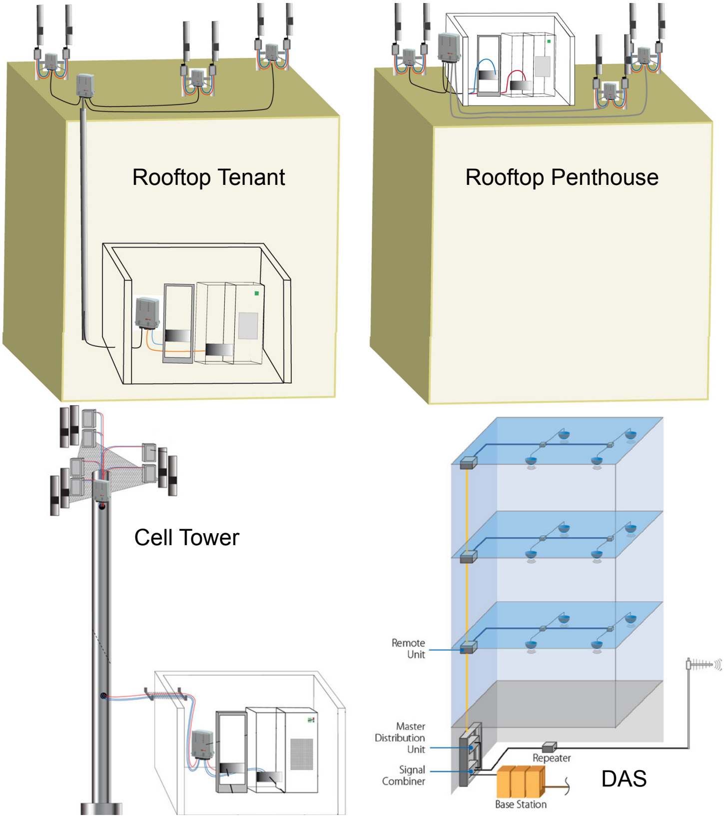
## Network Config.[1]

This parameter is used to identify the network type:

| | |
|---|---|
| **Cell Tower** | Typical macro cell tower topology |
| **Rooftop Tenant** | Rooftop topology |
| **Rooftop Penthouse** | Rooftop topology |
| **Das** | Distributed Antenna System |

1.Active exclusively if the License «FTTA Extended» is installed

**Figure 68** Network configurations




## Config.

This parameter displays the last configuration file loaded and cannot be modified unless a new configuration file is loaded.

# Alarms

In the **Setup** page, press the **Alarm** menu key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

### Alarms > Threshold

- **None** The alarm function is not active.
- **User** Define your own thresholds values for one or several elements: Splice Loss / Connector Loss / Reflectance / Fiber Length Min / Link Loss Max / ORL
- **TIA-568 3 / TIA-568 3.RL35 / ISO/IEC 11801 2002 or 2010 / ISO/IEC 14763-3 2006 or 2014 / Default / G.697/G.98x PON / G.697/IEEE PON**

  Select one of this parameter to configure the alarm thresholds with predefined values:

**Table 5** Singlemode Module

<table>
<tr><th></th><th>Splice Loss</th><th>Connector loss</th><th>Slope</th><th>Reflectance</th><th>ORL</th></tr>
<tr><td>Default</td><td>> 0.20 dB</td><td>> 0.50 dB</td><td>> 1.00 dB/km</td><td>> - 35 dB</td><td>< 27 dB</td></tr>
<tr><td>TIA-568.3</td><td rowspan="6">> 0.30 dB</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>No</td><td rowspan="4">No</td></tr>
<tr><td>TIA-568.3 RL35</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>> - 35 dB</td></tr>
<tr><td>ISO/IEC 11801 (2002)</td><td>> 0.75 dB</td><td>> 1.00 dB/km</td><td>No</td></tr>
<tr><td>ISO/IEC 11801 (2010)</td><td>> 0.50 dB</td><td>> 0.40 dB/km</td><td>> - 35 dB</td></tr>
<tr><td>ISO/IEC 14763-3 (2006)</td><td>> 0.50 dB</td><td>> 1.00 dB/km</td><td>No</td><td rowspan="2">No</td></tr>
<tr><td>ISO/IEC 14763-3 (2014)</td><td>> 0.75 dB</td><td>> 0.40 dB/km</td><td>No</td></tr>
</table>

If results are above the thresholds, they will be highlighted in red in the table of results, and the icon will appear at the top right of the screen.

If all the results lie within the thresholds (no result is in red), results are displayed in green in the table and the icon is .

## Analysis

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

This screen allows to configure the network:

### BBU Jumper

Test from the patchcord that will be plugged into BBU.
(not applicable for DAS networks)

### RRU Jumper

Test from the patchcord that will be plugged into RRU.
(not applicable for DAS networks)

### Mode

Select the kind of acquisition to be performed:

- **Construction** Select this mode to perform the OTDR acquisition in the case of an Acceptance Testing (see “Acceptance Testing” on page 112).
- **Maintenance** Select this mode to perform the OTDR acquisition in the case of Troubleshooting (see “Troubleshooting Testing” on page 113).

### Loopback Cable

Select if a loopback cable is used (parameter available exclusively in **Construction** mode).

### Launch Cable End / Receive Cable Start (not available in Maintenance mode)

**No** All the results are displayed and referenced on the basis of the board of the module.

**Evt 1, 2, 3** The results relating to the launch cable are eliminated from the table. Attenuation and distances are then measured on the basis of the marker Evt 1, 2 or 3 selected.

**Distance** Use the **Edit Number** key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

## Link

In the **Setup** page, press **Link** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Link**).

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.

## Base Station Id or Headend Id (in case of DAS)

If known, enter the name of the Base Station using the edition keypad, displayed pressing the right arrow key.

**NOTE**
The name of Location A entered in ExpertOTDR configuration is displayed by default in this parameter (see "Location A" on page 40).

## RRU Id or Remote End Id (in case of DAS)

If known, enter the name of the RRU/RRH (Remote Radio Unit / Head) using the edition keypad, displayed pressing the right arrow key.

**NOTE**
The name of Location B entered in ExpertOTDR configuration is displayed by default in this parameter (see "Location B" on page 41).

## Fiber Code / Fiber Num

To use the Fiber Code convention, with Rx/Tx labeling, choose between the following config files: *FTTA_Rx_Tx.SM-OTDR* or *FTTA_Rx_Tx.MM-OTDR*.

For a simple labeling of the fiber number (1 to 24), load one of the following config files: *FTTA_Simple.SM-OTDR* or *FTTA_Simple.MM-OTDR*

Example of fiber code in:

- Construction mode (with loopback): from **1-Rx_1-Tx** to **24-Rx_24-Tx**
- Maintenance mode: from **1-Rx** to **24-Rx**

## Change Fiber Nbr

Select if the fiber number must be automatically **Incremented** or **Decremented** at each new file save.

| | |
|---|---|
| **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

### Distance unit

Select the unit to be used for distance (**km** / **kfeet** / **miles** / **meter** / **feet**).

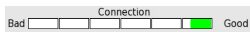
# Launching the acquisition

**Inspect & clean all fiber connections prior connecting fiber cables into the ports (BBU, distribution boxes, OVP and RRU/RRH and SFP ports).**

1. Press **START/STOP** hard key to launch measurement.

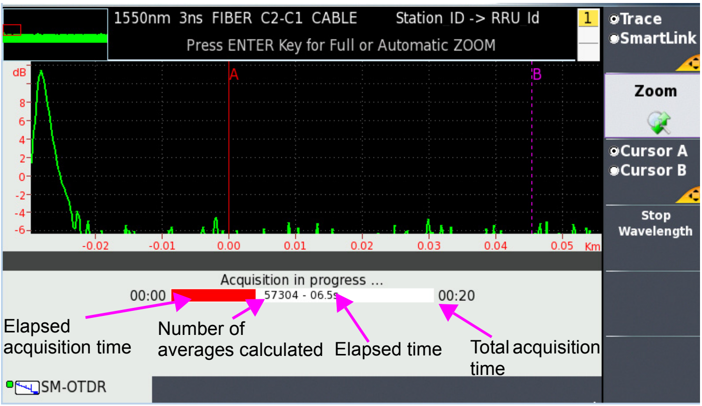
   The red **Test** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.

2. The quality of the connection is displayed for a few seconds (see Table 3 on page 53)




3. Then, a bar graph shows elapsed and remaining acquisition time.

**Figure 69** Acquisition in progress




At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.

**NOTE**
During acquisition, the traffic on fiber is automatically detected (see “Traffic detection” on page 53)

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

1. In the **SETUP** menu, check in **Laser** line, that **several lasers are selected or select All**.
2. Start the acquisition by pressing the **START/STOP** button.
3. Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.

   or

   To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

   A beep is emitted once the acquisitions on all lasers are completed.

The different traces appear in the same window and can be managed as traces in overlay (see “Overlay trace function” on page 83).

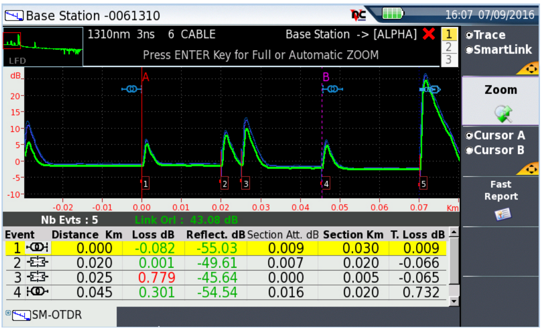
# Results page

The trace(s) acquired or recalled from a memory is/are displayed on the Results page.

## Trace View

The Trace view is displayed by default once OTDR acquisition is completed.

**Figure 70** FTTA OTDR Trace




Once trace is displayed, you can:

- Zoom on trace (see “Zoom function” on page 72).
- Set Cursor A and/or Cursor B (see “Cursors” on page 70).
- Save the traces and launch a report of results (see “Saving the trace(s) and generating a report” on page 127).

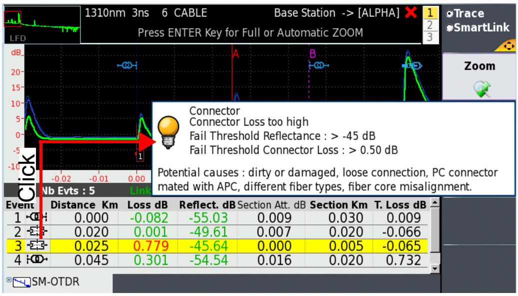
The available event types are similar to the events for OTDR measurement (see “Results table” on page 68) except the Merged Connector Loss  . In FTTA results:

Loss per connector = total group loss / nb of events in the group

## Detailed description of an event

When clicking on one event icon in the results table, a popup window describes the event type and provides a diagnosis to help troubleshoot faulty optical elements (indicated in red).

**Figure 71** Event description




Press **SETUP** hard key to go back to FTTA Setup screen and modify the parameters before launching a new acquisition.

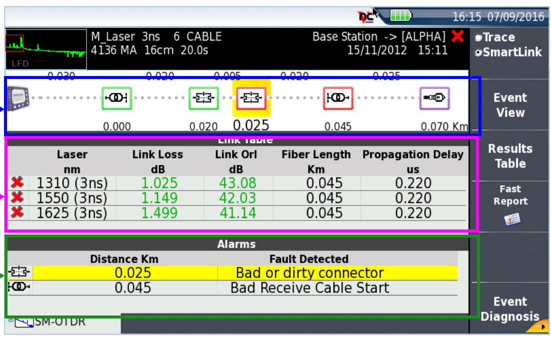
# SmartLink view

**1** Click on the menu key **Trace/SmartLink** to select **SmartLink**.

A screen as the following one is displayed:

**Figure 72** SmartLink function

Zone 1
Zone 2
Zone 3



The screen is divided into three zones:

- **Zone 1**: Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2**: Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3**: Alarms table (if any)

> **If several traces are displayed in overlay, with the same wavelength, then only the Zone 2 is displayed, there is no graphical representation of the link (Zone 1).**

### Merged connectors

When 2 or more connectors are very close to eahc others (in the attenuation dead zone), usually the reflectances can be measured but the loss of the individuals can’t be - the loss of these connectors is "merged" .

The following formula is then applied (only in FTTA mode):

loss per connector = (total group loss) / (nb of connectors in the group)

## Getting a diagnostic of an event

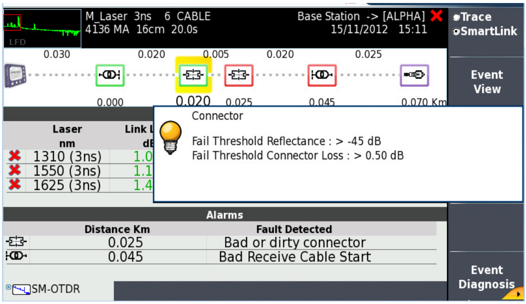
Diagnosis is used to provide further information about events and eventual problems, such as root cause possibilities of a failed optical element.

1. Select the event to be described (underlined in yellow).
2. Click on **Event Diagnostic** soft key

   A new window, on the lower part of the screen, gives the details of the selected event:

   – its type
   – the thresholds applied for this event.
   – the possible causes of the alarm

**Figure 73** Event Detail window



## Results Table

To display exclusively the results table from the SmartLink page, press the **Results Table** softkey.

**Figure 74** FTTA Smart Link: Results Table

Press again the **Results Table** menu key to return to SmartLink display.

# Event View

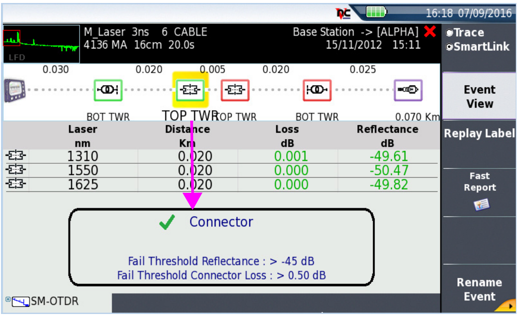
**1** Click on **Event View** menu key to display a detailed description of one event detected on trace.

In this view, an algorithm automatically detects the elements of the FTTA link and label them.

**2** Select the event to be described on the graphic (highlight in yellow).

The corresponding event description is displayed on the Zone 3, with a recall of alarm threshold for this event:

**Figure 75** SmartLink: Event View




**3** Click on **Trace View** to display the selected event in the results table and zoomed on trace.

**NOTE**

The event is framed in red if it is above the alarm thresholds defined in the setup menu.
It is framed in green if it lies within the thresholds.
It is framed in purple if no alarm has been defined for this type of event.

## Changing the name of an event

Once the **SmartLink** screen is displayed, the name of an event can be modified:

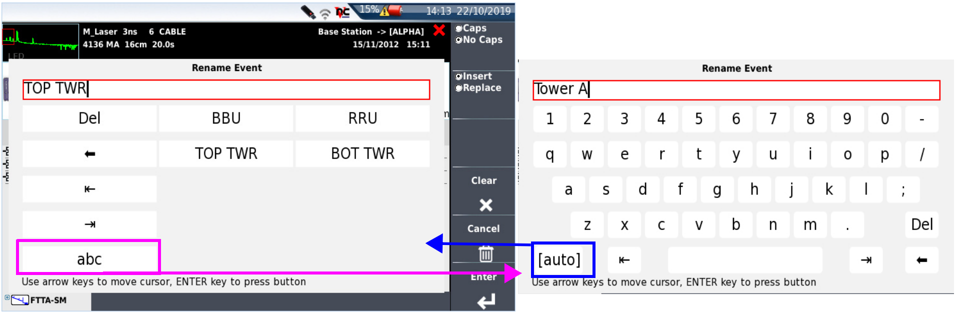
**1** Select the event to be modified (highlighted in yellow)  .



**2** Press **Rename Event** menu key

**3** In the edition keypad, select the pre-defined parameters available or, press **abc** key to enter a name manually for the file. Then, press **Enter** to validate.

**Figure 76** Rename Event




**4** Click on **Enter** to return to **Event View**.

The event name is displayed under the icon, and replaces the previous FTTA label .


Click on **Replay Label** to rename the event as it was previously (at last saving).

# Saving the trace(s) and generating a report

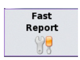
Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen.

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see page 46) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To save the trace and generate a report:

**1** Press **Fast Report** key 

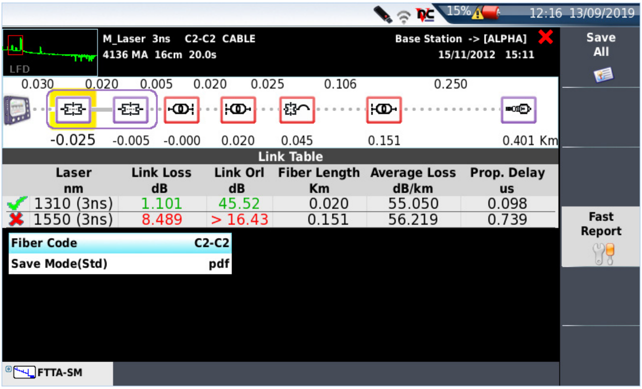
-> 

.

A menu displays under the trace.

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

**Figure 77** Fast report configuration




**a** In the **Fiber Code / Fiber Number** parameter use the left and right direction keys to define the fiber code / fiber number by scrolling the available codes/ numbers.

**Fiber Code**: from **1-Rx_1-Tx** to **24-Rx_24-Tx** if the configuration file selected is *FTTA_Rx_Tx.SM-OTDR* or *FTTA_Rx_Tx.MM-OTDR*.

**Fiber Number**: from **1** to **24** if the configuration file selected is *FTTA_-Simple.SM-OTDR* or *FTTA_Simple.MM-OTDR.*

**b** In the **Save Mode** parameter, select the report format to be generated:

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select **Yes** to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

**3** Once all the parameters are configured, press **Save All** menu key.

**4** Enter a name for the file in the edition keypad.

or

Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see page 45).

**5** Press **Enter** to validate

> **NOTE**
> The sor file and the txt or pdf file will have the same name.

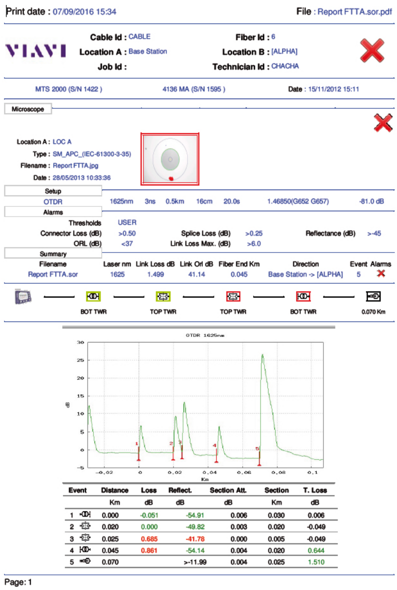
The icon displays during saving process.
Once saving is completed, a sound is emitted onto the Platform.

> **NOTE**
> The file and the report are saved in the last storage media and directory selected.

# Opening a report

1. To open the report, press **FILE** hardkey
2. In the **Explorer** page, in the directory selected, select the file/report.
   The file name is:
   For the txt file: *trace file_sor.txt*
   For the pdf file: *trace file.sor.pdf*
3. Press **Load**.
   The file opens on the T-BERD/MTS.

**Figure 78** Fast Report with FTTA-SLM option



Print date : 07/09/2016 15:34 File : Report FTTA.sor.pdf

Cable Id : CABLE Fiber Id : 6
Location A : Base Station Location B : [ALPHA]
Job Id : Technician Id : CHACHA

MTS 2000 (S/N 1422 ) 4136 MA (S/N 1595 ) Date : 15/11/2012 15:11

Microscope

Location A : LOC A
Type : SM_APC_(IEC-61300-3-35)
Filename : Report FTTA.jpg
Date : 28/05/2013 10:33:36

Setup

OTDR 1625nm 3ns 0.5km 16cm 20.0s 1.46850(G652 G657) -81.0 dB

Alarms

Thresholds USER
Connector Loss (dB) >0.50 Splice Loss (dB) >0.25 Reflectance (dB) >-45
ORL (dB) <37 Link Loss Max. (dB) >6.0

Summary

| Filename | Laser nm | Link Loss dB | Link Orl dB | Fiber End Km | Direction | Event | Alarms |
|---|---|---|---|---|---|---|---|
| Report FTTA.sor | 1625 | 1.499 | 41.14 | 0.045 | Base Station -> [ALPHA] | 5 | |



| Event | Distance | Loss | Reflect. | Section Att. | Section | T. Loss |
|---|---|---|---|---|---|---|
| | Km | dB | dB | dB | Km | dB |
| 1 | 0.000 | -0.051 | -54.91 | 0.006 | 0.030 | 0.006 |
| 2 | 0.020 | 0.000 | -49.82 | 0.003 | 0.020 | -0.049 |
| 3 | 0.025 | 0.685 | -41.78 | 0.000 | 0.005 | -0.049 |
| 4 | 0.045 | 0.861 | -54.14 | 0.004 | 0.020 | 0.644 |
| 5 | 0.070 | | >-11.99 | 0.004 | 0.025 | 1.510 |

Page: 1

**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 the root of the disk: `disk > logo.jpg`.

**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS (see “Generating pdf report(s)” on page 244).

8

# FTTH-SLM Software option

This chapter describes the use of the FTTH option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:



**NOTE**

Patented, as described at www.viavisolutions.com/patents.

# Principle of FTTH

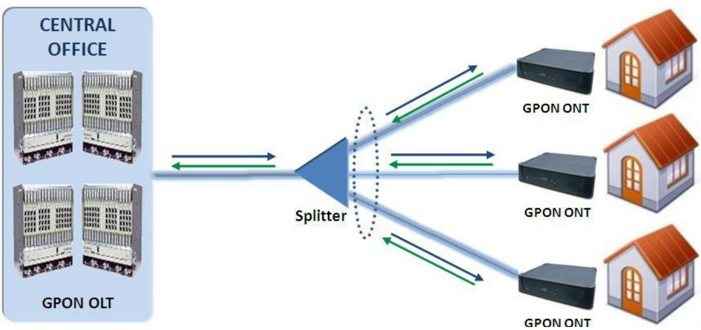
FTTH-SLM is an OTDR software application that is delivered as an option of the OTDR module (see references in the Chapter 15 on page 267), and is installed onto the mainframe as a license key (see the 2000/4000 V2 base-unit user manual for the instructions on license files installation).

FTTH-SLM application brings an FTTH user interface and a specific algorithm for OTDR measurements, especially through PON splitters (Passive Optical Network).

In a FTTH environment, the OTDR module, associated with the FTTH-SLM application:

- Selects optimized test parameters to conduct reliable measurements, especially through optical splitters, and to detect close events near the start (Central Office splices/ connectors) (OptiPulses Automatic Algorithm).
- Automatically identifies all network elements such as PON splitter types/ratios (Discover Mode).
- Iconically displays a map of OTDR trace results (SmartLink View)
- Guarantees measurements with automatic PASS/FAIL analysis to ITU-T/IEEE PON standards or customer-defined specifications.

**Figure 79** FTTH network



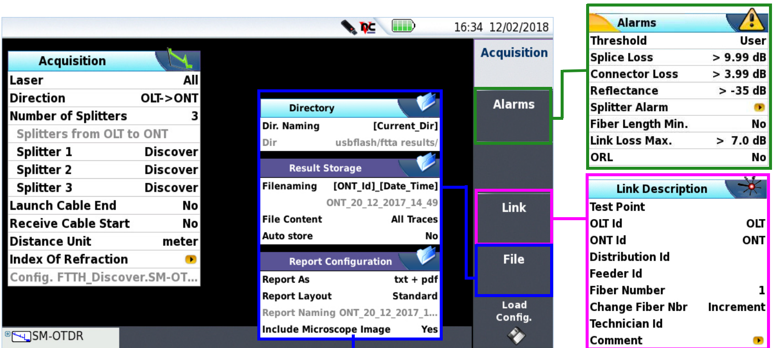
# Configuring the Reflectometry test for FTTH network

Once the OTDR module is set into the T-BERD/MTS, and the FTTH-SLM license installed:

1. Select the FTTH-OTDR icon 

.
   The results page automatically displays.
2. Press **SETUP** hard key to display the OTDR configuration screen for FTTH network.

**Figure 80** FTTH OTDR Setup




See “Configuring the File parameters” on page 43

## FTTH setup

In the first screen, configure the following parameters:

### Acquisition

#### Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

### Direction

- OLT: Optical Line Terminal (switch at the Central Office)
- ONT: Optical Network Terminal (media converter and gateway in the Home)

Select the direction of the measurement:

- Downstream: from OLT to ONT (**OLT -> ONT**)
- Upstream: from ONT to OLT (**ONT -> OLT**)

### Number of Splitters

If known, enter the number of splitters installed in the FTTH network.

**It is preferred to know the number of splitters in order to get Pass/Fail status for the splitters' loss.**

**None**: no splitter is installed

**Discover**: auto-detection and identification of PON splitter types.

**NOTE**
The **Discover** mode does not allow Pass/Fail analysis

**1 / 2 / 3**: select the number of splitters.

This selection opens a sub menu into which the splitters types must be defined for all splitters installed.

## Splitters types

Define the splitter type among the list:

- 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64
- 2x2 / 2x4 / 2x8 / 2x16 / 2x32 / 2x64

### Launch Cable End / Receive Cable Start

**No** All the results are displayed and referenced on the basis of the board of the module.

**Length** Use the **Edit Number** key to enter a distance (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

### Distance Unit

Define the unit of the distances displayed: **km**, **kfeet**, **miles**, **meter**, **feet**.

## Index of refraction

Choice of group refraction index of the whole fiber.

**User** Define for each wavelength (1310 SM, 1360-1510 SM, 1550 SM, 1590 - 1650 SM) a refraction index of 1.30000 to 1.69999. The selection of an index alters the value of the section AB (actual distance between cursors A and B).

or,

If the actual distance between the cursors A and B is known, enter its value under **Section AB** to establish the index of the fiber. Selection of this distance causes the display of the indices. The extreme distance values are given by the index values (1.30000 to 1.70000).
or

You can also enter the **Link Length**, if it is known, using the Numeric keypad.

**Predefined** It is possible to choose one of the predefined values given for certain cables. The corresponding indices given in the table below are repeated on the screen.

**Table 6** Predefined index values (Single Mode)

| **Wavelength (nm)** | **1310 SM** | **1360 - 1510 SM** | **1550 SM** | **1625 - 1650 SM** |
|---|---|---|---|---|
| Generic G652 G657 | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| Generic G653 G655 | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| ATT SM | 1.46600 | 1.46700 | 1.46700 | 1.46700 |
| Corning SMF-28 | 1.46750 | 1.46810 | 1.46810 | 1.46810 |
| Corning SMF-DS | 1.47180 | 1.47110 | 1.47110 | 1.47110 |
| Corning SMF-LS | 1.47100 | 1.47000 | 1.47000 | 1.47000 |
| Corning-Leaf | 1.46890 | 1.46840 | 1.46840 | 1.46900 |
| Draka SMF | 1.46750 | 1.46800 | 1.46800 | 1.46850 |
| Draka Longline | 1.46700 | 1.46700 | 1.46710 | 1.46750 |
| Draka Teralight | 1.46820 | 1.46820 | 1.46830 | 1.46850 |
| Draka Benbright | 1.46750 | 1.46750 | 1.46800 | 1.46850 |
| Fitel Furukawa | 1.47000 | 1.47000 | 1.47000 | 1.47000 |

**Table 6** Predefined index values (Single Mode)

| **Wavelength (nm)** | **1310 SM** | **1360 - 1510 SM** | **1550 SM** | **1625 - 1650 SM** |
|---|---|---|---|---|
| OFS Lucent Allwave | 1.46750 | 1.46750 | 1.46750 | 1.46850 |
| Lucent Truewave | 1.47100 | 1.47100 | 1.47000 | 1.47000 |
| SpecTran SM | 1.46750 | 1.46810 | 1.46810 | 1.46810 |
| Sterlite | 1.46700 | 1.46700 | 1.46750 | 1.46750 |
| Sumitomo Litespec | 1.46600 | 1.46600 | 1.46700 | 1.47000 |
| Sumitomo Pure | 1.46600 | 1.46600 | 1.46700 | 1.47000 |

**Table 7** Predefined index values (MultiMode) - Not available SmartOTDR

| **Wavelength (nm)** | **850 MM** | **1300 MM** |
|---|---|---|
| Corning 62.5 | 1.50140 | 1.49660 |
| Corning 50 | 1.48970 | 1.48560 |
| SpecTran 62.5 | 1.49600 | 1.49100 |
| Generic 50 | 1.49000 | 1.48600 |
| Generic 62.5 | 1.49000 | 1.48700 |
| Generic OM1-62/125 | 1.49600 | 1.49100 |
| Generic OM2-3-4 50/125 | 1.48200 | 1.47700 |

### Config.

This parameter displays the configuration file selected for acquisition, and cannot be modified from Setup page. To modify the configuration file to be used:

1. Click on the menu header **Acquisition**.
2. Click on **Load Config.** menu key
3. Select the file in the Explorer.

## Alarms parameters

Press the **Alarm** menu key (or **Next** key when one parameter of the Setup page is selected) to configure the alarm thresholds for the OTDR measurement.

**None** The alarm function is not active.

**User** Define your own thresholds values for one or several elements: Splice Loss / Connector Loss / Reflectance / Splitter Alarm / Fiber Length Min / Link Loss Max / ORL

### Default / TIA-568 C / ISO/IEC 11801 / G.697/G.98x PON / G.697/IEEE PON

Select one of this parameter to configure the alarm thresholds with predefined values:

**Table 8** Alarms thresholds

| | Default | G.697/G.98x PON & G.697/ IEEE PON | TIA-568C & ISO/ IEC 11801 |
|---|---|---|---|
| Splice Loss | > 0.20 dB | > 0.30 dB | > 0.30 dB |
| Connector Loss | > 0.50 dB | > 0.50 dB | > 0.75 dB |
| Slope | > 1.00 dB/km | - | > 1.00 dB/km |
| Reflectance | > - 35 dB | > - 35 dB | |
| ORL | < 27 dB | < 27 dB | |
| | | | |
| Splitter Alarm | | | |
| Splitter 1x2 | > 5.0 dB | > 4.2 dB | |
| Splitter 1x4 | > 8.0 dB | > 7.8 dB | |
| Splitter 1x8 | > 11.0 dB | > 11.4 dB | |
| Splitter 1x16 | > 14.0 dB | > 15.0 dB | |
| Splitter 1x32 | > 17.0 dB | > 18.6 dB | |
| Splitter 1x64 | > 21.0 dB | > 22.0 dB | |
| Link Loss Max | | Select: **No**, **Manual** or:<br>• for G.697/G.98x PON: **20 dB (A)** / **25 dB (B)** / **30 dB (C)**<br>• for G.697/IEEE PON: **23 dB (PX-10)** / **26 dB (PX-20)** | |

If results are above the thresholds, they will be highlighted in red in the table of results, and the icon will appear at the top right of the screen.

If all the results lie within the thresholds (no result is in red), results are displayed in green in the table and the icon is .

# Link parameters

In the **Setup** page, press **Link** softkey, or press **Next** if one parameter is selected in the current screen until the Link Setup page displays.

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.

## Test Point / OLT Id / ONT Id / Distribution Id / Feeder Id

Those parameters allow to enter an identification for each element of the network (test point, OLT, ONT...) using the Edition menu.

## Fiber Number

**1** Select the parameter **Fiber Number** and modify the number of the fiber to be tested.

The fiber number can be automatically incremented/decremented at each new file save if it has been configured in the **Change Fiber Nbr** parameter (see "Change Fiber Nbr" page 138).

## 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

**No** the Fiber number must not automatically modified.

**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

## Technician Id

Use the arrow ▶ to enter the name of the operator carrying out the measurement.

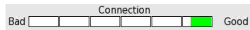
## Comment

Use the arrow ▶ to enter a comment, which will be displayed in the file signature, on the upper part of the screen.

# Launching the acquisition

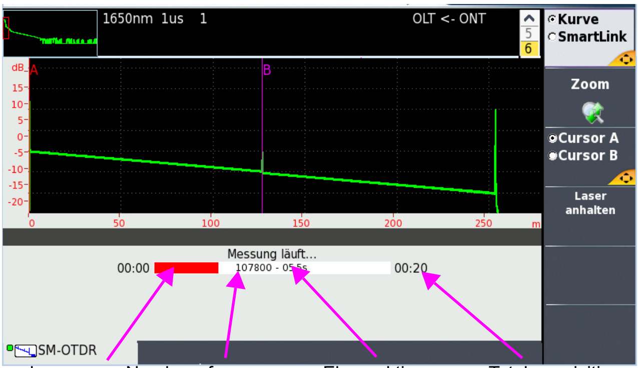
**Inspect & clean all fiber connections prior connecting fiber cables into the ports (patch panels, OLT or ONT...).**

1. Press **START/STOP** hard key to launch measurement.
   The red **Test** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.
2. The quality of the connection is displayed for a few seconds (see Table 3 on page 38)




3. Then, a bar graph shows elapsed and remaining acquisition time.

**Figure 81** Acquisition in progress




Elapsed acquisition time — Number of averages calculated — Elapsed time — Total acquisition time

At the end of the acquisition, a beep is emitted, the trace is displayed and an automatic measurement is started.

**NOTE**
During acquisition, the traffic on fiber is automatically detected (see “Traffic detection” on page 39)

If the module possesses several lasers, to perform successive acquisitions on all the wavelengths:

1. In the **SETUP** menu, check in **Laser** line, that **several lasers are selected or select All**.
2. Start the acquisition by pressing the **START/STOP** button.
3. Once the acquisition for the first wavelength is finished, the acquisition for the following wavelength starts automatically.

   or

   To stop manually the acquisition for current wavelength, click on **Stop Wavelength**. This will allow to automatically start the measurement for the following wavelength.

   A beep is emitted once the acquisitions on all lasers are completed.

The different traces appear in the same window and can be managed as traces in overlay (see "Overlay trace function" on page 63).

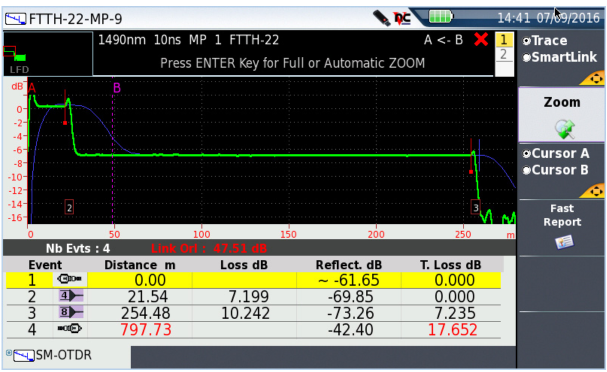
# Results page

The trace(s) acquired or recalled from a memory is/are displayed on the Results page.

## Trace View

The Trace view is displayed by default once OTDR acquisition is completed.

**Figure 82** FTTH OTDR Trace




| Event | Distance m | Loss dB | Reflect. dB | T. Loss dB |
|---|---|---|---|---|
| 1 | 0.00 | | ~ -61.65 | 0.000 |
| 2 | 21.54 | 7.199 | -69.85 | 0.000 |
| 3 | 254.48 | 10.242 | -73.26 | 7.235 |
| 4 | 797.73 | | -42.40 | 17.652 |

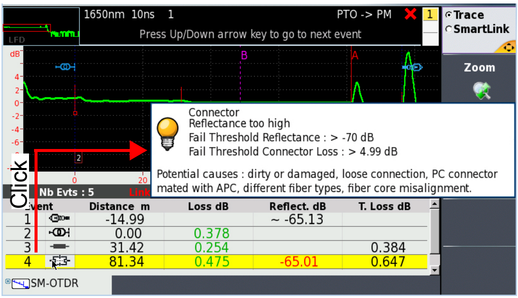
Once trace is displayed, you can:

- Zoom on trace (see “Zoom function” on page 51).
- Set Cursor A and/or Cursor B (see “Cursors” on page 50).
- Save the traces and launch a report of results (see “Saving results for FTTH-SLM Assistant” on page 156)

## Detailed description of an event

When clicking on one event icon in the results table, a popup window describes the event type and provides a diagnosis to help troubleshoot faulty optical elements (indicated in red).

**Figure 83** Event description




Press **SETUP** hard key to go back to FTTH Setup screen and modify the parameters before launching a new acquisition.

## Multi-pulses traces

In case of multi pluses traces, the display is simplified to handle traces: only the “useful” traces and sections (cut section of traces) are displayed.

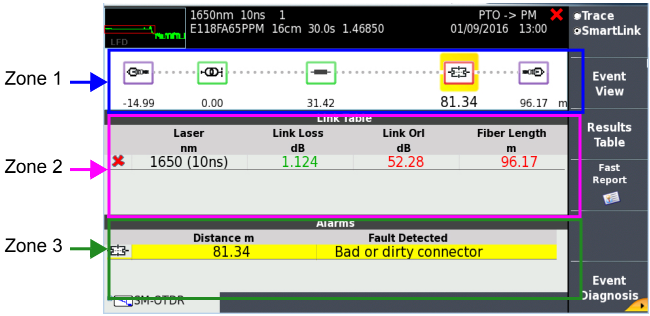
Ex: The 7 events detected in the example below are coming from 3 acquisitions, a **combined trace** is created showing only the 3 useful sections.

**Figure 84** FTTH results traces in multi-pulses


# SmartLink view

**1** Click on the menu key **Trace/SmartLink** to select **SmartLink**.
A screen as the following one is displayed:

**Figure 85** SmartLink function




The screen is divided into three zones:

- **Zone 1**: Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2**: Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3**: Alarms table (if any)

**If several traces are displayed in overlay, with the same wavelength, then the Zone 2 indicates the results for each wavelength. The graphical representation of the Zone 1 is a combination of multiple pulses and wavelengths acquisitions.**

# Getting a diagnostic of an event

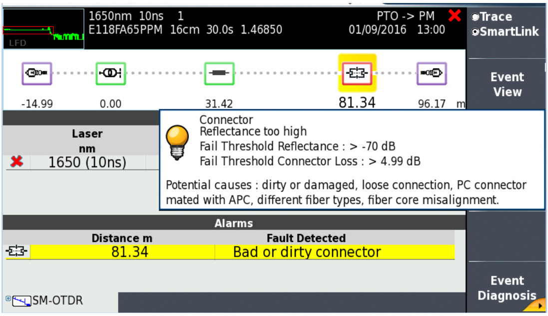
Diagnosis is used to provide further information about events and eventual problems, such as root cause possibilities of a failed optical element.

1. Select the event to be described on the graphic (underlined in yellow).
2. Click on **Event Diagnostis** soft key

   A popup window, on the lower part of the screen, gives the information related to the selected event:

   – its type
   – thresholds applied for this event.
   – possible causes for the fail status of the selected link element

**Figure 86** Event Diagnosis window




# Results Table

To display exclusively the results table, press the **Results Table** softkey.

**Figure 87** FTTH Smart Link: Results Table


Press again the **Results Table** menu key to return to SmartLink display.

# Event View

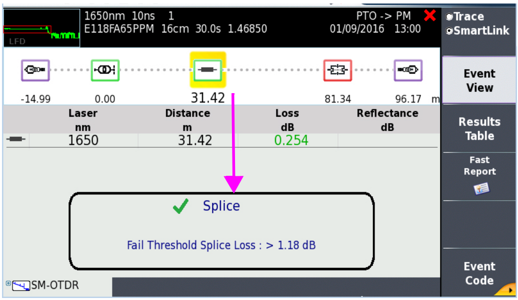
«Event View» provides the possible loss and reflectance of the selected event, per tested wavelengths.

**1** Click on **Event View** menu key.

An algorithm automatically identifies the elements of the link and label them

**2** Select the event to be described on the graphic (highlight in yellow).
The corresponding event description is with a recall of alarm thresholds.

**Figure 88** SmartLink: Event View




**3** Click on **Trace View** to display the selected event in the results table and zoomed on trace.

> **NOTE**
>
> The event is framed in red if it is above the alarm thresholds defined in the setup menu.
> It is framed in green if it lies within the thresholds.
> It is framed in purple if no alarm has been defined for this type of event.

## Changing the type of an event

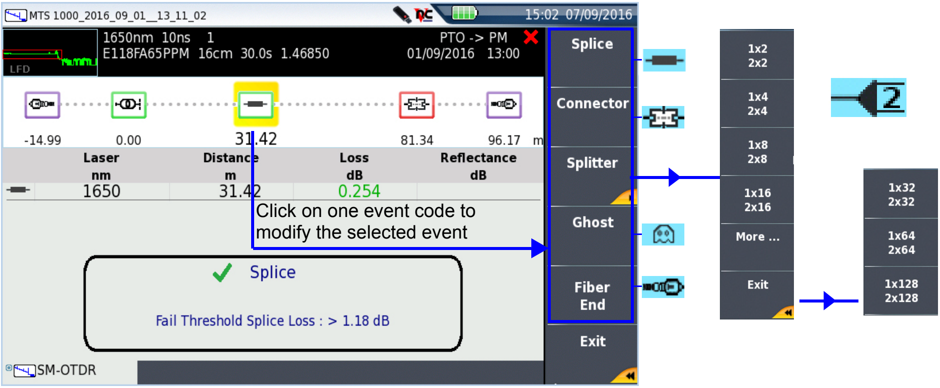
Once the **Event View** is displayed, the type of event can be modified:

**1** Select the event to be modified (highlighted in yellow)

**2** Press **Event Code** menu key

**3** Click on the event type to be applied to the selected event:

**Figure 89** Event Code




**4** Click on **Exit** to return to **Event View**.

**5** Click back on **Event View** menu key to return to Summary screen

or

Click on **Trace View** menu key to return to trace (and table) results screen.

**NOTE**

The event modification is automatically applied on trace and in the results table.

## Splitter sub-menus

The Splitter icon is different according to the menu key pressed in the **Splitter** sub-menus.

Example:

If the menu key 

is pressed, the icon 

is displayed

If the menu key 

is pressed, the icon 

is displayed.

Moreover, the icon and splitter configuration is different according to the number of «clicks» on one menu key.

Example with the menu key 

:

- Click once: the icon is 
- Click twice: the icon is 
- Click three times: the icon is 
- Click four times: the icon is 

Click a fifth time to reset the event by default.

**NOTE**
If the splitters are in cascade mode, update to FTTH-SLM Premium (see “FTTH Premium software option” on page 147).

# FTTH Premium software option

The FTTH-SLM Premium is a fully featured software for the characterization of any FTTH infrastructure.

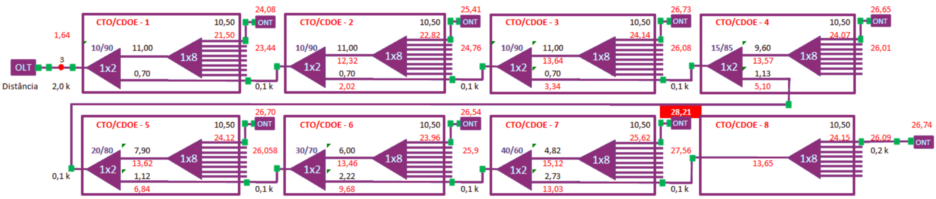
In addition to the auto multi-pulses measurement and PON splitter detection and identification, this option allows:

- the measurement of closely spaced cascaded splitters (< 100m)
- the PON discovery mode
- the management of unbalanced or Tapered splitters
- the compatibility with E2E-SLM (FCOMP).

The Premium software option allows to set the complete cascaded network which includes UNBALANCED or TAPERED optical splitters.
These elements are automatically detected and identified with their respective ratio, and their loss value compared to the setup thresholds.

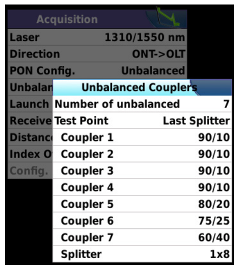
In case of 2 closely spaced splitters, FTTH-SLM can identify a cluster of splitters, as dictated in the PON configuration settings, and applies the correct pass/fail criteria.

**Figure 90** PON Topology




# Configuring the FTTH-SLM optimum option

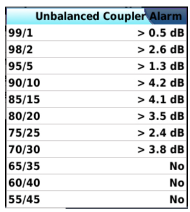
For generic configuration of FTTH measurement, see “Configuring the Reflectometry test for FTTH network” on page 133. With Premium software option, in FTTH Acquisition Setup page:




**1** Define the **PON Config.** parameter to **Unbalanced** in order to configure the unbalanced couplers.

**2** In the **Unbalanced Couplers** parameter:

- **a** Set the **Number of unbalanced** couplers per the plan
  - – Set the ratio for each unbalanced coupler
- **b** Set the last **Splitter** ratio (usually 1x8 or 1x16)
- **c** Set the test point: **Last splitter** or **Coupler 1...9**.




**3** Once all acquisition parameters defined, click on **Alarms** to define the pass/fail loss thresholds for each **Unbalanced coupler**, if Alarm **Threshold** parameter is defined with **User**:

Select **Unbalanced Coupler Alarm** and define each coupler thresholds: click on left and right arrows to modify the value, or click on **Edit Number** and enter the value on the numeric keypad and validate.

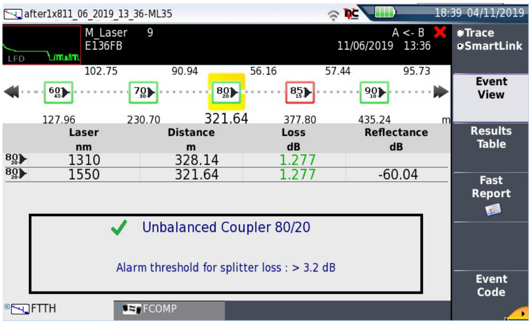
# Launching the test and displaying results

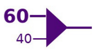
**1** Once all configuration is correctly defined for FTTH measurement with PON network, press **START/STOP** button to launch the acquisition.

**2** Once the acquisition is completed, the SLM results display.

## SLM Results

**Figure 91** SLM View




The unbalanced or tapered optical splitters are identified with their respective ratio, and their loss value compared to the Alarm thresholds defined.

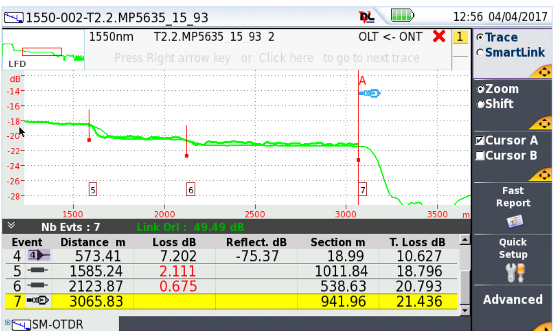
In case of 2 closely spaced splitters, a cluster of splitters is identified, as dictated in the PON configuration settings, and applies the correct pass/fail criteria.

For other SLM functions, see “SmartLink view” on page 142.

## Results Trace

Press **Trace/Smartlink** key to display the FTTH trace.

**Figure 92** FTTH «Premium» results trace



For more information on trace features, see “Results display” on page 62.

# Specific OTDR features with FTTH option

When the FTTH software option is installed (basic or Premium), the ExpertOTDR function allows to perform OTDR acquisitions for different networks.

1 On the Home page, select ExpertOTDR icon.

2 In the **Acquisition** > **Network Config.** parameter, define the network installed:

   – **Point to Point**

   – **PON**

   – **Unbalanced** (only with FTTH Premium option).

   In case of **Point to Point** configuration, the parameters are identical to the ExpertOTDR standard configuration.

   In case of **PON** configuration, the **Number of Splitters** parameter can be defined: see "Number of Splitters" page 134).

   In case of **Unbalanced** configuration, the **Unbalanced Couplers** parameter can be defined: see step 2 on page 148.

The Acquisition and Results page are described in the OTDR chapter: see Chapter 5 on page 51.

# FTTH Assistant

The software option FTTH assistant allows to perform FTTH acquisition with a simple step by step process.

## Selecting the configuration file

1 On the **Home** page, select the FTTH icon

   The configuration file selection screen displays.

2 In the selection file screen, select the configuration file to be used for the acquisition.

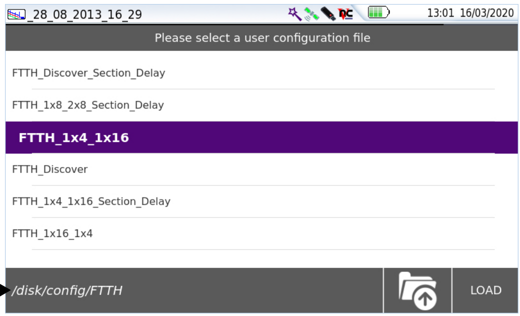
   The file is underlined in purple.

**NOTE**

If necessary click on the key  to reach the upper level of directory.

**3** Press **Load** to load the selected file and display the current parameters for this configuration.

**Figure 93** Load file as FTTH Configuration



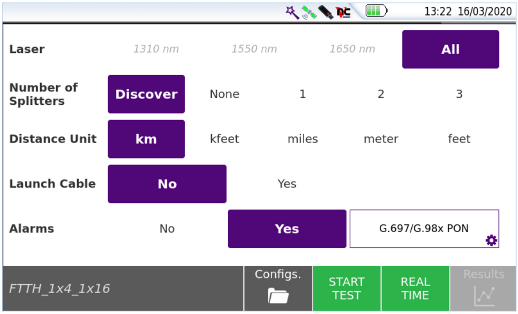

Location of the configuration files for FTTH

**4** Once loaded, the configuration parameters that can be modified displays.

# Modifying some parameters before the acquisition

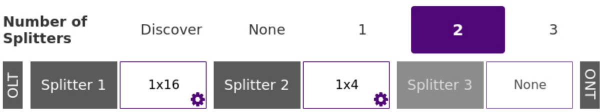
In FTTH Assistant mode, the user have access to 5 parameters he can modified before launching the test.

**Figure 94** FTTH-SLM Assistant Setup page



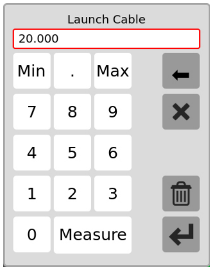

- **Laser** The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.
- **Number of Splitters** see “Number of Splitters” on page 134.

  If at least one Splitter is defined, the Splitter sub-displays and allows to define the type of splitter:

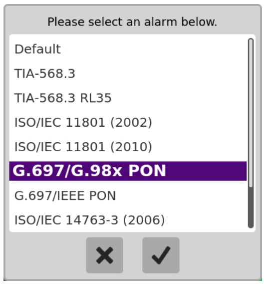



  For Splitter 1: Discover / 1x2 / 1x4 / 1x8 / 1x16 / 1x32 / 1x64 / 2x2 / 2x4 / 2x8 / 2x16 / 2x32

  For Splitter 2 and 3: Discover / 1x2 / 1x4 / 1x8 / 1x16 / 1x32.
- **Distance unit** select the unit to be used for distance (**km** / **kfeet** / **miles** / **meter** / **feet** / **inch**).
- **Launch cable** Define if the Launch Cable must be taken into account for the acquisition: **No** / **Yes**.
  If **Yes** is selected, set the length clicking on the number field and enter the distance using the numeric keypad, or click on Measure to enter the length detected. Click on ⏎ to validate (or on ✕ to cancel)




- **Alarms** Define if alarms thresholds must be applied for the acquisition:
  Select **No** if no alarm thresholds must be applied.
  Select **Yes** to define alarms, and press **Alarm Level** to define the pre-defined thresholds for the acquisition.




See Table 8 to get the values for each pre-defined alarm thresholds.

The thresholds can be modified only in Expert mode and saved in a new configuration file.

Once all configuration parameters are correctly defined, the acquisition can be launched.

Press the **Config** key to return to configuration selection screen (see Figure 94 on page 152).

# Performing a measurement

**1** From the **Setup** page, press **Start Test** key 

to launch measurement (see Figure 94 on page 152).

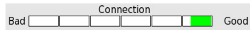
or

From the **Setup** page, press **Real Time** key 

(see Figure 94 on page 152).

The red **Testing** indicator goes on to show that the T-BERD/MTS is in process of acquisition and the screen displays the trace in process of acquisition.

**2** The quality of the connection is displayed for a few seconds (see Table 3 on page 53)




**3** Then, a bar graph shows elapsed and remaining acquisition time.

**Figure 95** Example of acquisition in progress

In «normal» mode, at the end of the acquisition, a beep is emitted, and the measurements are displayed, in SLM view, with a dialog box indicating the pass or fail verdict and asking if results must be saved.

> **NOTE**
> During acquisition, the traffic on fiber is automatically detected (see "Traffic detection" page 53)

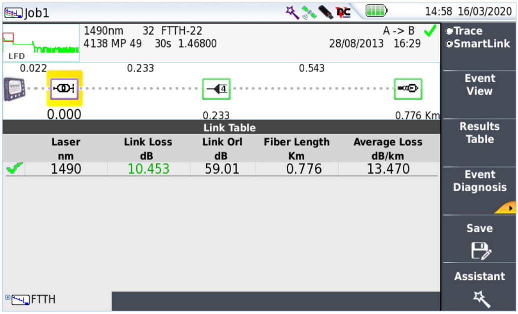
## Real time acquisition specific features

- During an acquisition in real time, several actions can be made on results in progress: see "Actions on trace during acquisition" page 58.
- To stop or interrupt an acquisition in real time mode, press the **START/STOP** key at any time.

# Results display with FTTH-SLM Assistant option

Once the acquisition is completed, the SLM view automatically displays:

**Figure 96** SLM View with FTTH-SLM Assistant

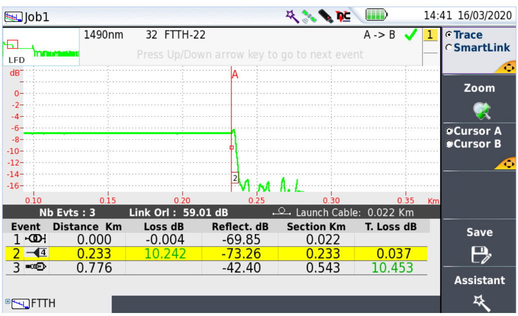



For the menu keys description, refer to the chapter “SmartLink view” on page 142.

Click on **Assistant** to return to configuration screen (see “FTTH-SLM Assistant Setup page” on page 152) and modify some parameters before launching a new acquisition.

Click on **Trace** menu key to display the trace:

**Figure 97** Trace view with FTTH-SLM Assistant




Click on **Save** menu key to return to Recording Information screen (see Figure 98 on page 156).

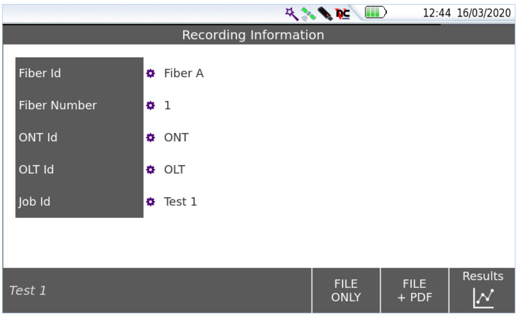
# Saving results for FTTH-SLM Assistant

Once the acquisition is completed, the results trace displays, in Smart Link view, with the Save menu keys displayed.

**1** Click on **Save** menu key 

to save the results in a file.
The Recording Information page displays

**Figure 98** Save results in FTTH-SLM Assistant mode




**2** Click on one parameter configuration (white background) to modify it using the edition or numeric keypad displayed:

– **Fiber Id**: click on the fiber name currently defined to display the edition keypad and enter a new fiber name.

– **Fiber Number**; click on the fiber number currently defined to display the numeric keypad and enter a new fiber number.

– **ONT Id** / **OLT Id**: click on the ONT/OLT name currently defined to display the edition keypad and enter a new name.

– **Job Id**: click on the Job description currently defined to display the edition keypad and enter a new description.

**NOTE**

The file is saved automatically by default with the **Job Id** parameter.

Example: if the **Job Id** is defined with *Test Fiber 1*, the otdr filename will be *Test Fiber 1*.sor (name is indicated at the bottom of the screen).

**CAUTION**

If one of the parameters is not defined (empty), a red caution icon is displayed on the parameter field and the file saving is not possible (keys are deactivated).

**3** Once the recording information are defined as wished, select the saving mode wished:

– Click on **FILE ONLY** to save exclusively the results trace to the .sor format

– Click on **FILE + PDF** to save the results trace in a .sor file and to generate a pdf report of the results.

– Click on **Results** to return to Smart Test result view.

# Saving the trace(s) and generating a report

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

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see page 46) with the appropriate **Save Mode**.

**NOTE**

The Save process is different for FTTH-SLM Assistant option (see “Saving results for FTTH-SLM Assistant” on page 156), and the report generation is not available with this option.

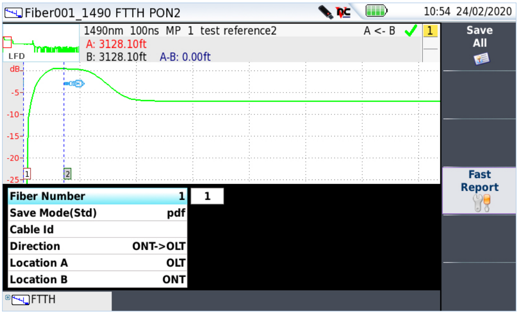
## Saving results and creating a report from results page

To save the trace and generate a report:

**1** Press **Fast Report** key -> .
A menu displays under the trace.

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

**Figure 99** Fast report configuration




**a** In the **Fiber Number** parameter use the left and right direction keys to define the fiber number by scrolling the available numbers.

**b** In the **Save Mode** parameter, select the report format to be generated:

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select **Yes** to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

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

**d** 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**)

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

**3** Once all the parameters are configured, press **Save All** menu key.

**4** Enter a name for the file in the edition keypad.

or

Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see page 45).

**5** Press **Enter** to validate

> **NOTE**
> The sor file and the txt or pdf file will have the same name.

The icon displays during saving process.
Once saving is completed, a sound is emitted onto the Platform.

> **NOTE**
> The file and the report are saved in the last storage media and directory selected.

# Opening a report

**1** To open the report, press **FILE** hardkey

**2** In the **Explorer** page, in the directory selected, select the file/report.
The file name is:
For the txt file: *trace file_sor.txt*
For the pdf file: *trace file.sor.pdf*

**3** Press **Load**.
The file opens on the T-BERD/MTS.

**Figure 100** Fast Report with FTTH-SLM option


| Event | | Distance | Loss | Reflect. | T. Loss |
|---|---|---|---|---|---|
| | | m | dB | dB | dB |
| 1 | | -14.99 | | -65.13 | 0.000 |
| 2 | | 0.00 | 0.378 | | |
| 3 | | 31.42 | 0.251 | | 0.384 |
| 4 | | 81.34 | 0.462 | -65.00 | 0.657 |
| 5 | | 96.17 | | -53.66 | 1.124 |

**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 the root of the disk: `disk > logo.jpg`.

**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS (see “Generating pdf report(s)” on page 244).

9

# Cable-SLM option

This chapter describes the use of the Cable-SLM option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

# Principle of Cable-SLM

The Cable-SLM option is a function used to manage a cable commissioning or a multi-fiber test project.

The aims of this option is to:

- improve workflow in cable commissioning (P2P links even with different distances, for example FTTH drops)
- ensure test consistency
- reduce manipulation errors / issue
- generate a report text file

# Configuring the Cable-SLM project

## Configuring the project

Once the OTDR module is set into the T-BERD/MTS, and the Cable-SLM license installed:

**1** From the Home page, select the **Expert OTDR** function.
The results page automatically displays.
If not, press **RESULTS** hard key to display results page.

**2** Press **SETUP** hard key to display the OTDR configuration screen and:

– Configure the OTDR **Acquisition** parameters (see page 25)

– Configure the OTDR **Alarms** parameters (see page 31)

– Configure the OTDR **File** parameters (see page 43)

**3** Press **Link Cable** menu key 

.

**4** Configure the **Link Description** parameters (see page 38)

**5** In the new window **Project Information**, configure the project as required:

- Use the Edition keypad to enter a name for **Technician ID** / **Job Id** / **Contractor Id** / **Sub Contractor Id** / **Engineer Id**.
- Define the **Display mode** of the Project: **Numbering** or **Labelling**.

If **Numbering** is defined:

– On the parameter **Start Fiber**, press **Edit Number** soft key to enter the number of the first fiber of the cable to be tested (Min 1 / Max 100).

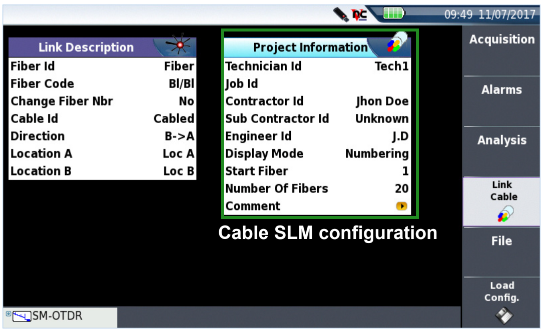
– On the parameter **Number Of Fibers**, press **Edit Number** soft key to enter the total number of fibers of the cable (Min 1 / Max 100).

If **Labelling** is defined:

– On the parameter **Fiber Count**, select the type of connector: **Simplex** / **Duplex** / **MPO (8/12)** / **MPO (12/12)** / **MPO (20/24)** / **MPO (24/24)**

- Press the right direction key to enter a **Comment** if necessary, using the edition keypad.

**Figure 101** Cable SLM Setup




## Saving the project

Once all configuration parameters are defined, save the project:

1 Press **Create Project** soft key (displayed when one parameter of the Cable Project window is displayed).

2 In the Edition keypad opened, enter a name for the project and press **Enter** to validate.

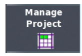
The project file (.prj) contains Acquisition / Alarms / Link / File parameters and is saved in root disk or Harddisk under `Project` > `EXPERT_OTDR` > `OTDR_SM` or `OTDR_MM` directory.

A directory is automatically generated with the project name, and it is saved under `(hard)disk` > `Project` > `EXPERT_OTDR` > `OTDR_SM` or `OTDR_MM`. Measurements are stored into this directory, as well as a summary text file.

> **NOTE**
> Once a project is created, the parameters cannot be modified except the acquisition ones.

# Loading an existing project

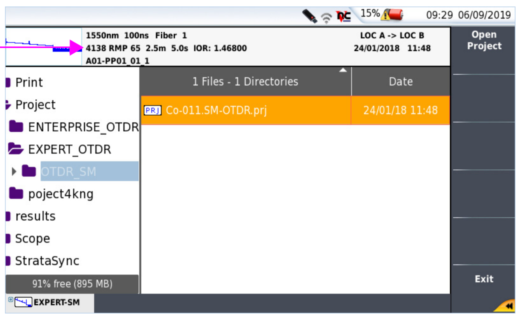
To open the project just created or to load an existing project:

1. Press the **Manage Project** soft key on the Results screen .

2. Select the project file to be used (.prj) in `Project` > `EXPERT_OTDR` > `OTDR_SM` or `OTDR_MM` directory.
3. Press **Open Project** softkey.

**Figure 102** Loading a project

Recall of the Cable Project parameters



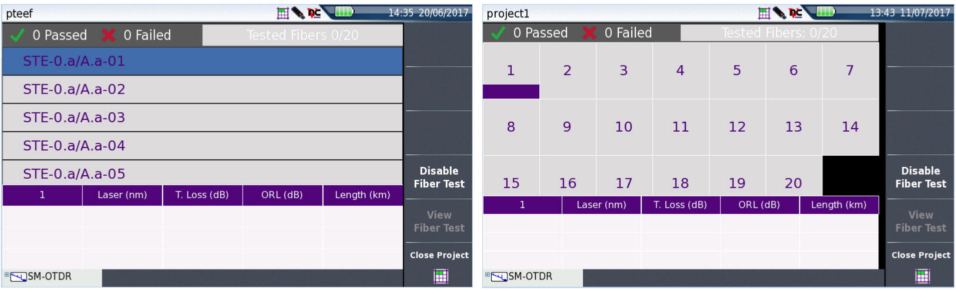

A summary table of all fibers and measurements performed is displayed.

# Starting project test process

**Inspect & clean all fiber connections prior to connecting fiber under test to the OTDR port.**

Once the project is loaded, the following screen is displayed.

**Figure 103** Cable view




View «List» See page 162 View «Number»

1 Click on the first fiber to be tested.
The fiber number is underlined in purple (n°1 in Figure above)

2 Press **START/STOP** hard key to start the acquisition.

**If a test is launched onto a fiber already tested, a dialog box displays:**
**«`Test already done. Do you really want to repeat the test? Results files will be deleted.`».**
Click on **Yes** to confirm the new test, and then, to delete existing file(s).
Click on **No** to cancel the test.

3 Once all wavelengths have been measured, a window opens, asking:


– Click on **Yes** to test next fiber
– Click on **No** to return to project table.

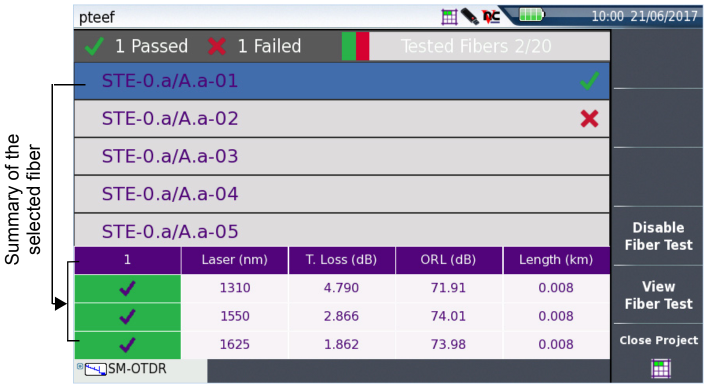
## Trace saving

The traces are automatically stored into the project directory and according to defined filenaming convention.

# Results of project cable

Once fibers have been tested, the project page updates on the fly:

**Figure 104** Cable project Labelling




## Description of the table

An icon is displayed to indicate if the alarm thresholds have been exceeded:

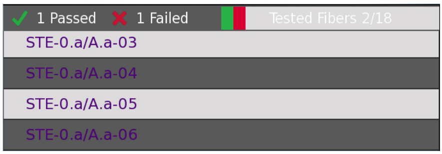
-  Pass
-  Fail
-  No alarm or no test performed

# Deactivate the fiber test

Before starting the test, some fibers can be deactivated so that the acquisition will not be performed.

1. Select the fiber number which does not need to be tested (underlined).
2. Click on the soft key **Deactivate fiber test**.
3. Repeat the process for the fibers which do not have to be tested.

**Figure 105** Fibers 4 and 6 deactivated




The deactivated fibers will be skipped while moving to next fiber to test.

**If a test is deactivated on a fiber already tested, a dialog box displays:** **«You're about to delete acquisition files. Are you sure?».**

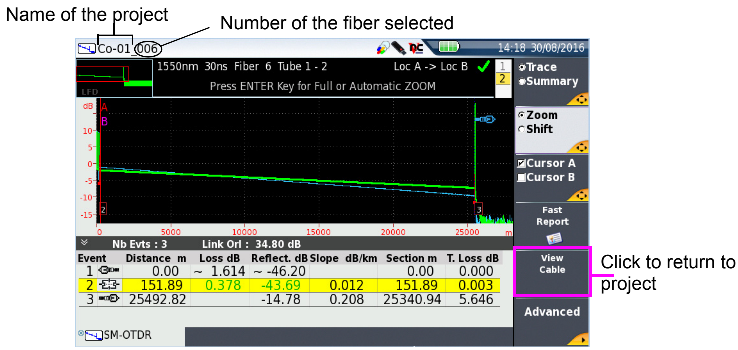
Click on **Yes** to confirm the deactivation, and by consequence, to delete corresponding trace(s).

Click on **No** to cancel the deactivation.

# View Trace

1. In the project page, click on the fiber for which you want to display the corresponding trace.
2. Click on **View Fiber Test** soft key.
   The trace result page displays.

**Figure 106** Trace from fiber selected in project




Click on **View Cable** to return to project page.

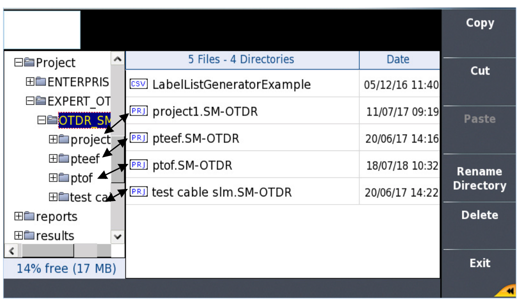
# Files and Project storage

As soon as a project is saved from Setup page (see "Saving the project" on page 163), a folder is automatically generated with associated sub-directories.

The project and all corresponding test files are saved in the automatically created folder `EXPERT_OTDR`.

The project file is saved in the directory `EXPERT_OTDR` > `OTDR_SM` or `OTDR_MM`.

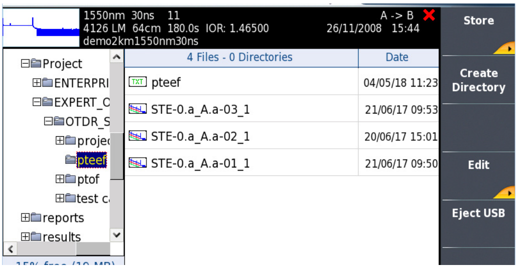
**Figure 107** Project files



**The project file is not visible in the explorer until the project is closed.**

For each project, a subdirectory with the project Id is created, containing test OTDR files and summary results (in text format): `EXPERT_OTDR` > `OTDR_SM` or `OTDR_MM` > `Project_Id`.

**Figure 108** Project directory structure with file contents




## Explorer when one project is open

If a project is open, press the **FILE** button to open the project in the explorer: the explorer displays all the link information exclusively for the project measurement results.

An icon representing the alarm status is displayed for each measurement result (if alarm thresholds have been defined).

**Figure 109** Project in the Explorer

# Text file content

As soon as one acquisition is performed from the project, a summary text file (.txt) is associated to the OTDR test data.

> **The txt file is not available if the explorer is opened while a project is opened (see Figure 109 on page 169).**

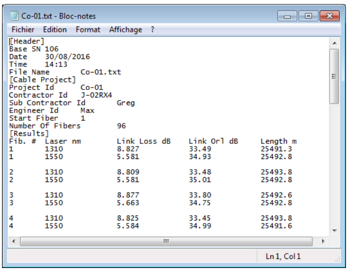
Each new test is inserted into the text file as project process evolves.

This file contains all the summary values of all tested fibers:

- Link loss
- Link distance
- Link ORL

This file uses tabulations to separate values. It is saved with the extension «.txt» and can be opened by the Platform.

**Figure 110** Text file




```
[Header]
Base SN 106
Date    30/08/2016
Time    14:13
File Name       Co-01.txt
[Cable Project]
Project Id      Co-01
Contractor Id   J-02RX4
Sub Contractor Id       Greg
Engineer Id     Max
Start Fiber     1
Number Of Fibers        96
[Results]
Fib. #  Laser nm        Link Loss dB    Link Orl dB     Length m
1       1310            8.827           33.49           25491.3
1       1550            5.581           34.93           25492.8

2       1310            8.809           33.48           25493.8
2       1550            5.581           35.01           25492.8

3       1310            8.877           33.80           25492.6
3       1550            5.663           34.75           25492.8

4       1310            8.825           33.45           25493.8
4       1550            5.584           34.99           25491.6
```

10

# Enterprise-SLM Software option

This chapter describes the use of the Enterprise-SLM option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

# Principle of Enterprise-SLM

The Enterprise-SLM is designed to simplify and automate the characterization (TIER-2) and troubleshooting of structured cabling in Enterprise & Data Centers.

Goals of this function are to:

- characterize/certify the entire link including passive elements such as connectors, cassettes, splices, couplers or splitters, at the installation
- be used as a troubleshooting tool to detect faults such as breaks, bends or excessive losses
- generate all-in-one PDF certification reports on site for each fiber link

# Configuring the Enterprise-SLM

## Loading a SmartConfig™

The SmartConfig™ is defined with pre-defined test settings to be used as a base configuration that can be customized.

Once the Enterprise-SLM license is installed:

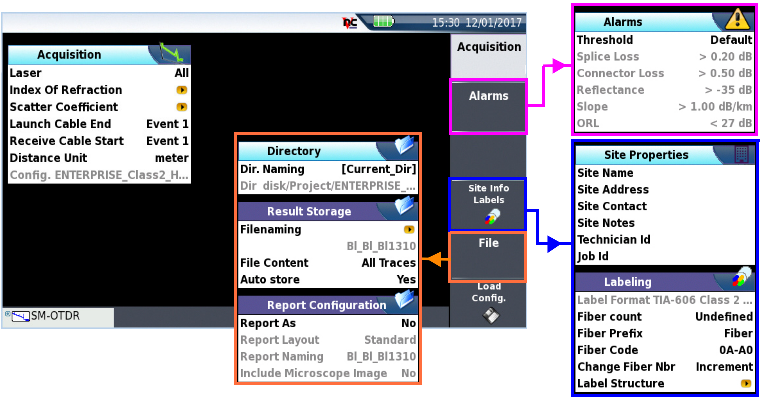
1. From the Home page, select the **Otdr Entreprise** function 

.
   The results page automatically displays.
2. Press **SETUP** hard key to display the OTDR configuration screen.
3. Press **Load Config.** to select a configuration file from the list:
   The configuration file includes pre-defined test parameters and label schemes (for automatic file labels generation)
   – TIA-606A Class 2 Single Building Horizontal Link = ENTERPRISE_Class2_Hlink
   – TIA-606 Class 2 Single Building Backbone Cable = ENTERPRISE_Class2_BBCable
   – TIA-606 Class 3 Campus Backbone Cable = ENTERPRISE_Class3_BBCable
   – TIA-606 Customized Hierarchical Cable Labeling Scheme = ENTERPRISE_Custom
   – TIA Colour Coding = ENTERPRISE_Color
   – Simple Cable Label (Cable Id, Fiber Id, Fiber Num) = ENTERPRISE_Simple

4 Once the file selected, press **Load as ENTREPRISE Config.**.

5 Once desired configuration file is loaded, **Acquisition**, **Alarms**, **Link Cable** and **File** setup menus can be configured.

**Figure 111** OTDR - Enterprise SLM Configuration




# Acquisition

In the first screen, configure the following parameters:

## Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

## Index of refraction

Choice of group refraction index of the whole fiber.

**User** Define for each wavelength (1310 SM, 1360-1510 SM, 1550 SM, 1625 SM) a refraction index of 1.30000 to 1.69999. The selection of an index alters the value of the section AB (actual distance between cursors A and B).

or,

If the actual distance between the cursors A and B is known, enter its value under Section AB to establish the index of the fiber. Selection of this distance causes the display of the indices. The extreme distance values are given by the index values (1.30000 à 1.70000).

**Predefined** It is possible to choose one of the predefined values given for certain cables. See OTDR chapter, Figure 19 on page 34.

### Scatter coefficient

Define the scatter coefficient of the fiber. See OTDR chapter “Scatter coefficient” on page 35.

### Launch Cable End / Receive Cable Start

Configure the parameters **Launch Cable End** and **Received Cable Start** as explained in the OTDR chapter, page 28.

### Distance Unit

Define the unit of the distances displayed: km, kfeet, miles, meter, feet.

### Config.

This parameter displays the last configuration file loaded and cannot be modified unless a new configuration file is loaded.

## Alarms

In the **Setup** page, press the **Alarm** menu key (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

### Alarms > Threshold

Define the alarm thresholds as described in OTDR chapter, page 174.

Note that the pre-defined thresholds **G.697/G.98x PON** and **G.697/IEEE PON** are not available with Enterprise SLM function.

## Site Info Labeling

In the **Setup** page, press **Site Info Labeling** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Site Info Labeling**).

The **Site Info Labelings** screen allows configuring the Site Properties and the Labeling.

# Site Properties

In the **Site Properties** box, click on the right arrow key for each parameter to define the **Site** Properties, the **Technician Id**entification and the **Job Id**entification.

# Labeling

The Labeling box differs according to the configuration file loaded and currently used.

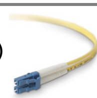
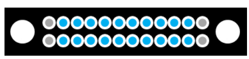
## Label Format

This parameter displays the label format applied to the project according to the configuration file selected.

## Fiber Count (mandatory for project creation)

This parameter is available once the configuration file «ENTERPRISE_Custom_List.XX-OTDR.fo_cfg» is loaded.

Select the right **Fiber Count** for the cables being tested:

| | |
|---|---|
| • Simplex (single fiber strand)  | • Duplex (dual fiber strand)  |
| • MPO  |  **MPO (8/12)**: 8 fibers used over 12<br> **MPO (12/12)**: 12 fibers used over 12<br> **MPO (20/24)**: 20 fibers used over 24<br> **MPO (24/24)**: 24 fibers used over 24 |

## Fiber Prefix

Press the right arrow key to enter the prefix applied to the fiber, as an identification.

## Fiber Number

Use the left and right arrow keys to increment or decrement the fiber number.

## Fiber Code

Once selected, press the right arrow key to modify some fields of the fiber code. The structure must follow TIA-606 standards.

## Change Fiber Number

**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 is not automatically modified at each new file-save.

## Direction

The direction shows if the acquisition must be performed from the origin to the extremity (A->B) or from the extremity to the origin (B->A).

## Location A

The name of the Location A of the link may be entered here.

## Location B

The name of the Location B of the link may be entered here.

## Label Structure

The Label Structure sub-menu is different according to the configuration file selected.

> **NOTE**
> See in OTDR Chapter, "Cable structure" page 41 for a description of the Cable Structure sub-menu available with «Color» configuration.

- **Fiber Code** Displays the fiber code previously configured in the Labeling box (see "Fiber Code" page 176). It cannot be modified from the Label Structure sub-menu.

- **Floor** Press ▶ to open the sub-menu, different according to the selected configuration:
  - define the **Type of Label** (Alphabetical / Numerical / None) and enter the **Min** and **Max** values and the **Separator** type[1] (`No`; «`.`»; «`:`»; «`-`»: «`/`»; «_»).
    or
  - enter a floor number for **Floor 1** & **Floor 2**.
- **Telecom Room** Press ▶ to open the sub-menu, different according to the selected configuration:
  - define the **Type of Label** (Alphabetical / Numerical / None) and enter the **Min** and **Max** values and the **Separator** type (`No`; «`.`»; «`:`»; «`-`»: «`/`»; «_»)[1]
    or
  - enter an identification for **Telecom Room 1** and **Telecom Room 2**.
- **Rack-X / Rack-Y** Press ▶ to open the sub-menu, define the **Label Type** (Alphabetical / Numerical / None) and enter the **Min** and **Max** values and the **Separator** type (`No`; «`.`»; «`:`»; «`-`»: «`/`»; «_»).
- **Panel Slice** Press ▶ to open the sub-menu, define the **Label Type** (Alphabetical / Numerical / None) and enter the **Min** and **Max** values and the **Separator** type (`No`; «`.`»; «`:`»; «`-`»: «`/`»; «_»).
- **Panel** Press ▶ to open the sub-menu, define the **Label Type** (Alphabetical / Numerical / None)[2] and enter the **Min** and **Max** values and the **Separator** type (`No`; «`.`»; «`:`»; «`-`»: «`/`»; «_»)[1].
- **Port/Position** Press ▶ to open the sub-menu, define the **Label Type** (Alphabetical / Numerical / None)[1] and enter the **Min** and **Max** values.
- **Backbone Cable** Press ▶ to open the sub-menu and enter the **Min** and **Max** values according to the **Label Type** defined (not changeable).
- **Cable** Press ▶ to open the sub-menu and enter the **Min** and **Max** values according to the **Label Type** defined (not changeable).
- **Building** Enter an identification for **Building 1** and **Building 2**.

1. This parameter can be modified exclusively with «Custom» configuration
2. This parameter can be modified exclusively with «Custom» configuration

**Table 9** Parameters available according to configuration file loaded

| Label Format | **Simple** | **Custom** | **Color** | **TIA-606 Class 2 Single Building Horizontal Link** | **TIA-606 Class 2 Single Building Backbone Cable** | **TIA-606 Class 3 Campus Backbone Cable** | **List** |
|---|---|---|---|---|---|---|---|
| Fiber Count | | | | | | | x |
| Fiber Prefix | x | x | x | x | x | x | |
| Fiber Code | Fib. Num. | x | x | x | x | x | x |
| Change Fiber Number | x | x | x | x | x | x | |
| Direction | x | | x | | | | |
| Location A / B | x | | x | | | | |
| Label Structure | | | x[1] | | | | |
| Fiber Code | | x | | x | x | x | |
| Floor | | x | | x | x | x | |
| Telecom Room | | x | | x | x | x | |
| Rack -X / -Y | | x | | | | | |
| Panel Slice | | x | | | | | |
| Panel | | x | | x | | | |
| Port/Position | | x | | x | | | |
| Backbone Cable | | | | | x | x | |
| Cable | | | | | x | x | |
| Building | | | | | | x | |

1. See in OTDR Chapter, "Cable structure" page 41

# File

In the **Setup** page, press **File** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **File**).

The file configuration is identical to the OTDR file configuration menu: see, in the OTDR chapter, "Configuring the File parameters" on page 43.

**NOTE**

The **Default Filename**, with the Enterprise SLM option, differs according to the configuration file selected.

# Simple OTDR Testing (for single fiber)

The OTDR Enterprise Option can be use to test single fibers, with the optimum acquisition parameters automatically applied.

1. Select the **OTDR Enterprise** icon (MM or SM) and validate 

.
2. From the results page, press **SETUP** button.
3. In the **Setup** screen, press **Load configuration** to load an Enterprise SmartConfig™ file.
4. Select the file in the explorer and press **Load as ENTERPRISE Config.**
5. Modify / complete the parameters wished (see “Configuring the Enterprise-SLM” on page 172)
6. If necessary, press **Save Config.** to save the new configuration in a file , and reuse it for other tests.
7. Press **Start/Stop** button to launch the acquisition for the fiber.

See Results for description of the results page.

# Managing projects for multi-fibers Testing

The Enterprise OTDR option allows to generate projects in order to easily control and document all test results.

Some existing projects are available on the Platform, and configured automatically. A configuration file exist for each Fiber count (= connector type): Simplex, Duplex and MPO cables.

A project may also be created by the user, with configuration previously defined.

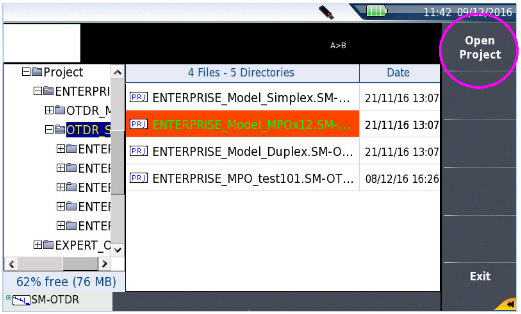
## Opening an existing project

Once the **OTDR Enterprise** icon is validated:

1. Press **RESULTS** to open the result page:
2. Press **Manage Project** menu key 

.
3. In the Explorer, select the project file to be used.

**Figure 112** Select Project file




**4** Press **Open Project** menu key.
The Project displays, with a list of labels to be tested.

**5** Click on the label arrow to open the list of fibers to be tested for this label.

> **NOTE**
> In Simplex mode, only the label is available as it represents the single fiber.

# Creating a project from the Setup page

Once the OTDR Enterprise icon is validated, the results page automatically opens:

**1** Press **SETUP** button to open the **Setup** page.

**2** Load the file `ENTERPRISE_Custom-list` SmartConfig™

**3** Modify setup menus (**Acquisition**, **Alarms**, **Site Info Labels** and **File**) if needed.

**4** In the **Site Info Labels** menu, make sure the **Fiber count** parameter is defined according to the network configuration:

- Simplex: generate a project for one single fiber test
- Duplex: generate the project for double fiber test
- MPO: generate a project for MPO cables

See “Fiber Count (mandatory for project creation)” on page 175.

**5** Once all parameters are configured, press **Save Config.** to save the current configuration in a file.

**6** Press **Import Label List** top right soft key.

**7** Select the csv file that includes the list of labels / Cable Ids to be tested:

Simplex: 1 label = 1 fiber
Duplex: 1 label = 2 fibers
MPO: 1 label = up to 24 fibers

**8** Press **Create Project** menu key to generate the project.

**9** The project displays, with the list of labels defined in the csv file.

> **CAUTION**
>
> If the list of labels exceeds the maximum number of labels authorized by the software (1000 fibers / 500 for Duplex / 83 for MPO (12) / 41 for MPO (24)), a warning displays: `Label max numbers reached, next labels are ignored. Hit any key to continue.`

### Warnings on CSV file

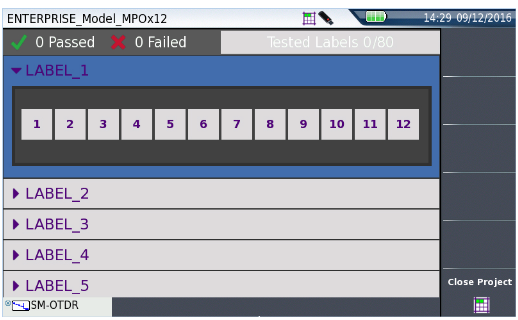
The csv file used for labeling must include the following instructions:

- 1 label per line, starting from row 1 of the spreadsheet.
- the number of characters per label cannot exceed 120.
- avoid the use of special characters, such as: `*`; `/`; `\`; `%`; `&`; `#`...

## Project display

Once the project is loaded on the Platform, it is displayed as follows:

**Figure 113** Example of Project



The icon  displays on the upper banner, indicating a project is opened.

Click on the label to open the sub-menu where the fiber numbers are displayed.

Note; This sub menu cannot be opened for Simplex mode as 1 label corresponds to 1 fiber.

## Disable a test

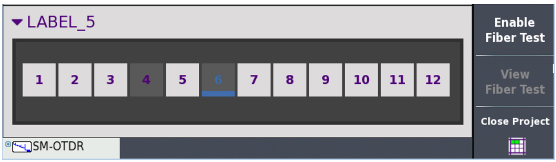
Before starting the test, some fibers can be disabled so that the acquisition will not be performed. on those

**1** Select the fiber number which does not need to be tested (underlined).

**2** Click on the soft key **Disable fiber test**.

**3** Repeat the process for the fibers which do not have to be tested.

**Figure 114** Fibers 4 and 6 deactivated




The disable fibers will be skipped while moving to the next fiber test.

**If Disable Fiber Test is pressed while a tested fiber is selected, a dialog box displays: «`You're about to delete acquisition files. Are you sure?`».**

Click on **Yes** to confirm the deactivation, and by consequence, to delete corresponding trace(s).

Click on **No** to cancel the deactivation.

To activate the fiber, select it and press **Enable Fiber Test**.

# Testing MPO

Once the project is opened, the OTDR acquisitions can be launched.

**1** Connect the Switch to the Platform, via a USB cable.

**2** Activate the USB Switch icon on the Platform 


**3** On the Project page, select the label or fiber to be tested.

If a label is selected (highlighted in blue), all the active fibers of this label will be tested one after the other.

If one fiber number is selected (in blue), the test will be performed exclusively for this fiber.

**4** Press **START/STOP** button to launch the test.

The fiber number being tested in displayed on the **Switch**.

**5** Once a test is completed, a dialog box is displayed to test for next label/fiber.

**6** Press **Yes** to launch a new acquisition or **No** to stop the acquisition and return to project screen.

## Stopping the test

The test stops automatically once the label/fiber test is completed; or the user can press the Start/Stop button at any time to stop the test in progress.

In this case, the icon  is displayed on the label row to indicate that not all of the fibers have been tested.

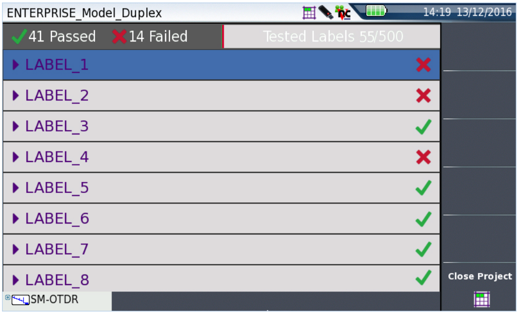
## Trace saving

The traces are automatically stored into the project directory and according to defined filenaming convention.

# Results of project

After each fiber/label tested, the project page is updated, on the fly.

**Figure 115** Enterprise OTDR - Project




# Description of the table

The status for each label is indicated on the right of the label row:

Pass

Fail

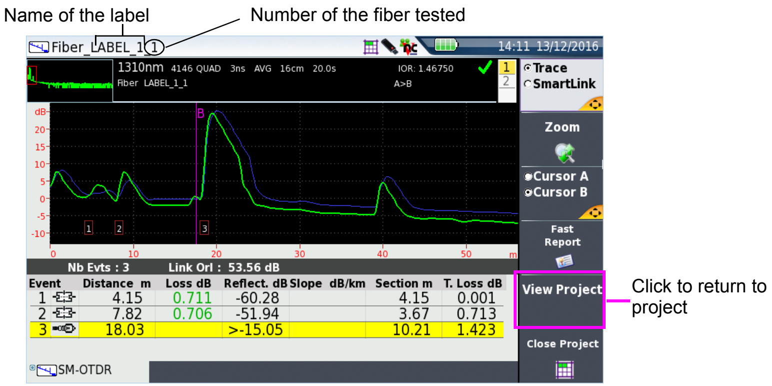
The number of fiber is highlighted in different color according to the alarm status:

| | | | |
|---|---|---|---|
| 1 | Pass | 1 | No Alarm defined |
| 2 | Fail | 1 | No test performed on the fiber |

# View Trace

1. In the project page, click on the fiber number for which you want to display the corresponding OTDR trace (e.g. 1).
2. Click on **View Trace(s)** soft key.
   The trace result page displays.

**Figure 116** Trace from fiber selected in project



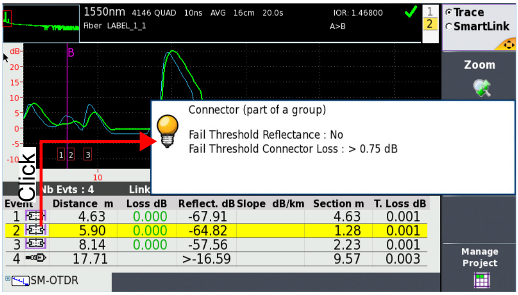

Once the traces are displayed, one can:

- Zoom on trace (see “Zoom function” on page 72).
- Set Cursor A and/or Cursor B (see “Cursors” on page 70).
- Save the traces and create a report (see “Saving the trace(s) and generating a report” on page 187).
- Analyze and visualize the different events (see “Results table” on page 68).

## Detailed description of an event

When clicking on one event icon in the results table, a popup window describes the event type and provides a diagnosis to help troubleshoot faulty optical elements (indicated in red).

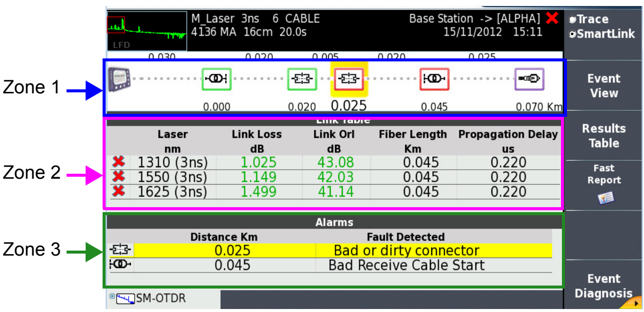
**Figure 117** Event description




# SmartLink view

1 Click on the menu key **Trace/SmartLink** to select **SmartLink**.
A screen as the following one is displayed:

**Figure 118** SmartLink function




The screen is divided into three zones:

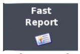
- **Zone 1**: Graphical representation of the link, with icons symbolizing the different events detected.
- **Zone 2**: Link Table, which gives a summary of results for each wavelength, with results within/without thresholds in green/red (according to Alarm thresholds defined in the setup screen).
- **Zone 3**: Alarms table (if any)

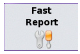
See “Smart Link view” on page 62 to get a description of the SmartLink view.

# Saving the trace(s) and generating a report

Once the results page is displayed, the trace(s) can be saved and a report can be generated directly from the results screen.
Storing and reporting could have been automatically generated if, in the file configuration, the **Auto Store** parameter was set to **Yes** (see page 46) with the appropriate **Save Mode**.

To save the trace(s) and generate a report:

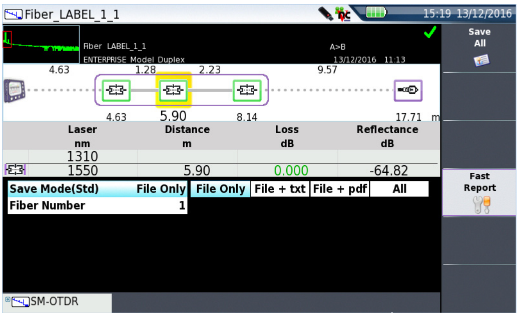
**1** Press **Fast Report** key 

-> 

.
A short menu displays below the trace.

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

**Figure 119** Fast report configuration




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

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select Yes to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

**a** In the **Fiber Code/Number** parameter use the left and right direction keys to modify this field.

**1** Once all the parameters are configured, press **Save All** menu key.

**2** Enter a name for the file in the edition keypad.

or

Click on **Auto Filenaming** menu key to apply the file name defined in the Setup screen, in **Filenaming** parameter (see page 45).

**3** Press **Enter** to validate

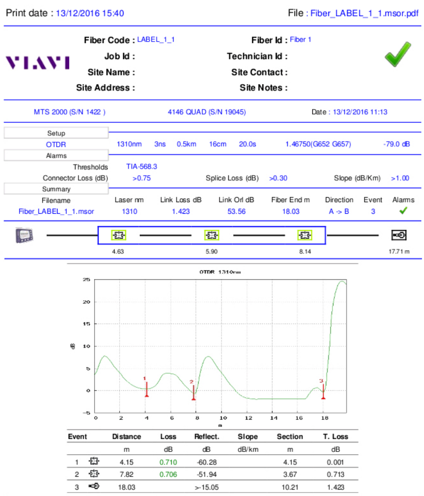
> **NOTE**
>
> The sor file and the txt or pdf file will have the same name.

The icon displays during saving process.

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

> **NOTE**
>
> The file and report are saved in the last storage media and directory selected

**Figure 120** Fast Report with Enterprise OTDR option



**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 the root of the disk: `disk > logo.jpg`.

**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS (see “Generating pdf report(s)” on page 244).

11

# FiberComplete Modules

This chapter describes the functions of the FiberComplete™ modules (Combined OTDR or Fault Finder and auto bidirectional IL/ORL and Distance) and their use.

| | |
|---|---|
| ⚠ | **This function is not available with SmartOTDR.** |

The topics discussed in this chapter are as follows:

# General introduction

## Principle

FiberComplete is used to perform automatically and through a single connection port, the following tests:

- Bidirectional insertion loss (IL)
- Bidirectional optical return loss (ORL) using the continuous wave method (OCWR)
- Distance/length measurements
- Unidirectional / Bidirectional OTDR or fault analysis

To carry out the measurements, 2x T-BERD/MTS are needed, both equipped with FiberComplete capable modules (see references in Chapter 15) and broadband power meters on the mainframes.

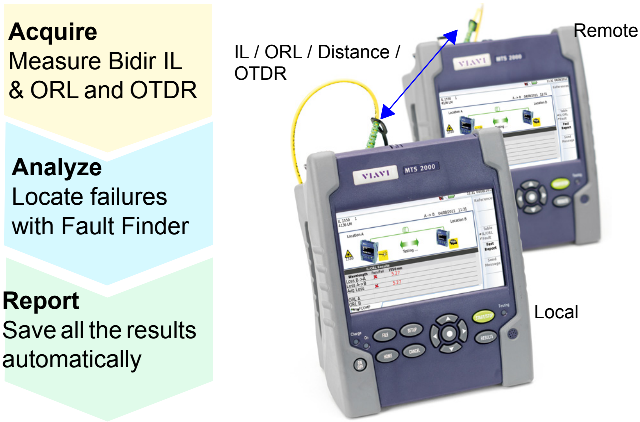
Using one unit at each end of the fiber under test and without any connection/disconnection, IL/ORL and distance measurements are performed and results exchanged via the fiber under test (FUT).

If the OTDR is selected, an OTDR measurement is launched automatically:

- **Unidirectional mode**: the OTDR acquisition is performed from the primary unit where the test has be initiated. Traces are saved locally
- **Bidirectional mode**: the OTDR acquisition is initiated successively from each unit. The traces are saved locally.

A failed value of IL or ORL may trigger the Fault Finder function automatically in order to identify the faulty event.

**Figure 121** Configuration for FiberComplete function




> **NOTE**
> The FiberComplete function can be performed with one T-BERD/MTS-2000 and one T-BERD/MTS-4000 V2.

# Configurations

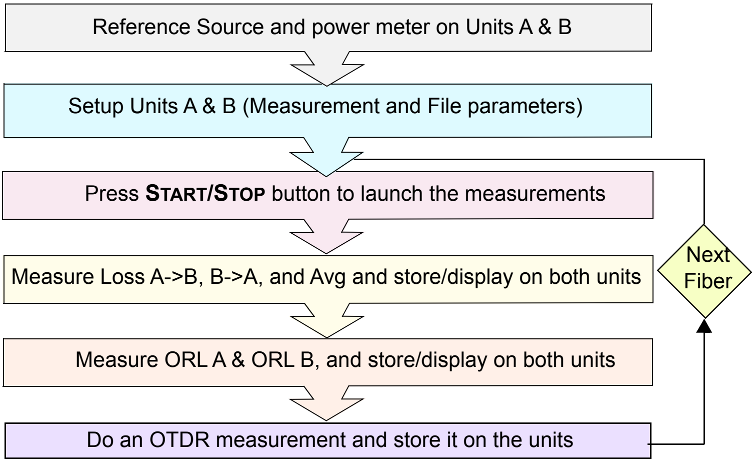
Two configurations are available, depending on the tests that have to be performed:

- Construction/Installation tests with loss, optical return loss, distance and OTDR.
- Acceptance Tests with loss, optical return loss and distance, and faults detection in case of problem.

## Construction/Installation Test

In this configuration, bidirectional IL and ORL, length and/or unidirectional/bidirectional OTDR measurements are performed. The bidirectional IL/ORL and length results are stored on each unit, the OTDR traces are stored on the locally unit (where the test has been initiated).

**Figure 122** Construction/Installation Test




**If a Bidirectional OTDR measurement is performed, the OTDR results are automatically saved on each unit;**

- The OTDR results trace for acquisition performed from Location A to Location B is stored on the primary unit (Location A)
- The OTDR results trace for acquisition performed from Location B to Location A is stored on the secondary unit (Location B)

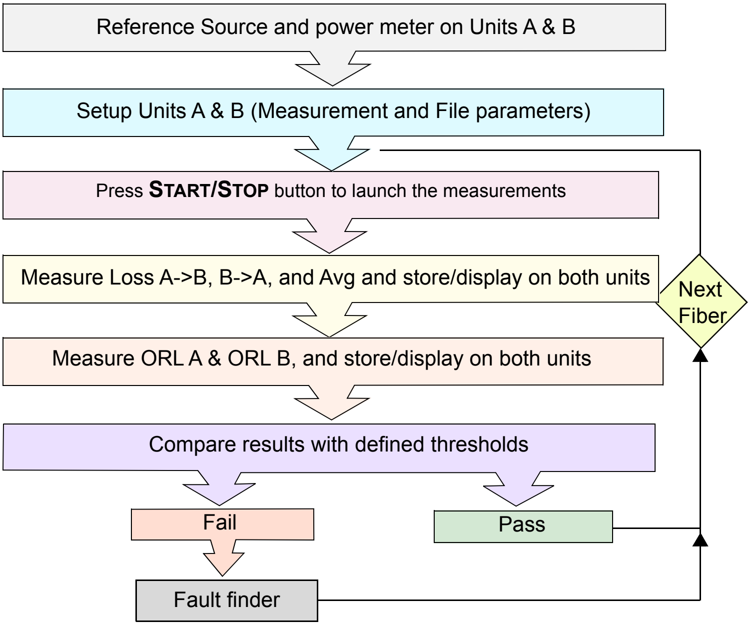
## Acceptance Tests

In this configuration, the bidirectional IL, ORL and length measurements are performed and results are automatically stored on each unit.

If the **Fault Finder** function has been selected in the **Setup** menu, and if at least one result exceeds the defined thresholds, the predominant defects causing the failure are identified and located.

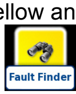
The FiberComplete screen displays an easy to interpret result table that prompts predominant issues for easy troubleshooting.

**Figure 123** Acceptance Test




# Activating the function

1. Press the **HOME** button.
2. Select the icon FCOMP.
   The icon turns yellow and Fiber Complete is displayed 

   .
3. Validate the icon 

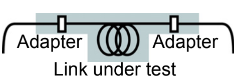
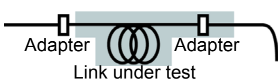
   if the **Fault Finder** option must be used and is available on the module.

# Establishing References

To get a meaningful measurement, the two leads or patch cords used for the measurement have to be referenced. The references are valid for all fibers that will be tested during the day with the same patch cords. If, at anytime, the patchcords are disconnected from the test instruments and/or have been contaminated by dirt or dust, the patchcords have to be re-inspected and referencing stage has to be redone.

### Reference methods for insertion loss and ORL testing

**Table 10** Reference methods for Insertion Loss and ORL Testing

| | **IL Loopback Reference Method** | **IL Side-by-side Reference method** | **Zero ORL reference method** |
|---|---|---|---|
| **Setup requirement** | No specific requirement | Units shall be at the same location for references | No specific requirement |
| **Description** | Each unit is performing its own IL reference, with its source from the module port and powermeter from the base-unit, this with one dedicated jumper. | Each unit is performing its own IL reference, and units are connected using two jumpers and a bulkhead adapter. | Each unit is performing its own ORL reference, with its source / powermeter from the module, this with one dedicated jumper |
| **Recommendat ions** | Easiest process.<br>Not recommended for short links.<br>One the reference is performed, do not disconnect jumper from the source | Most accurate setup, but both units must be at the same location for references.<br>Once the reference is performed, do not disconnect jumper from units ports. | Easy process.<br>Once the reference is performed, do not disconnect jumper from the source.<br>Use of non reflective terminator is mandatory for bend insensitive jumper. |
| **Loss principle** | Link ORL, including link connectors.<br> | Link IL including one link connector<br> | Link ORL measurement after jumper, for optimized testing.<br>Requires mandrel wrap or non reflective termination at link end. |

## Reference stage process

The Power Meter option is mandatory onto the Mainframe.

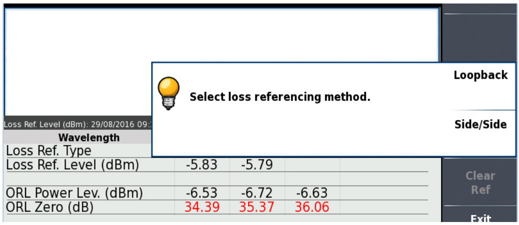
Each test equipment must set its own references and conform to the following process:

1 Press **RESULTS** button

2 Press **References** > **Take Refs** keys and follow the step by step instructions to perform references on each unit.

3 Choose between side by side or loopback for you loss referencing method

**Figure 124** Select the reference to be performed



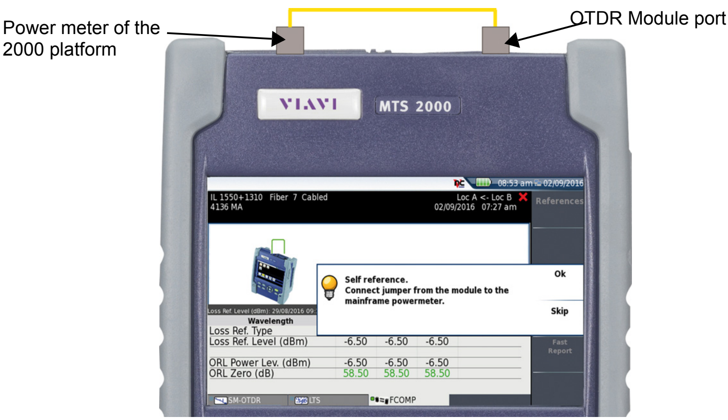

# Loopback Referencing method

The loopback referencing is used when the two units are at different location.

After clicking on **Loopback**, the wizard will guide you through two steps:

1 The self reference is used for loss and ORL testing. Connect the jumper from the module port to the mainframe powermeter and press **Ok** to start referencing.

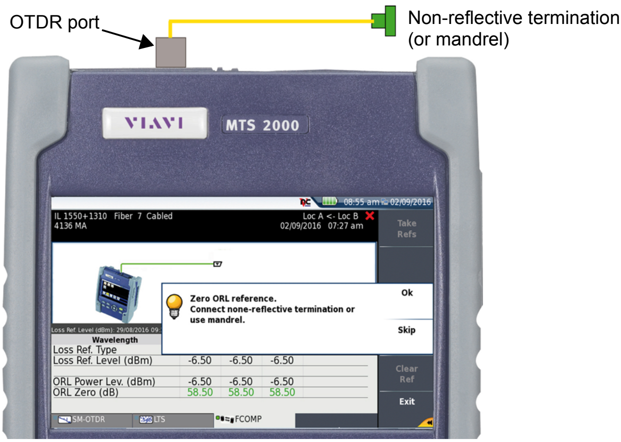
**Figure 125** Self reference



The reference values are stored and displayed at the end

**1** The zero ORL reference is necessary for ORL testing. Once the self reference measurement has been carried out, the Zero ORL adjustment can be performed
Connect the jumper from the module port to the non-reflective termination via a mating sleeve. If you don't have a non-reflective termination, a mandrel can be used. Press **Ok** to start referencing.

**Figure 126** Zero ORL reference




> **NOTE**
> Non-reflective terminations are mandatory when bend insensitive jumpers are used.

# Side-by-Side referencing method

The side-by-side referencing is used when the two units are at the same location and is the preferred method for better loss measurement accuracy.

After clicking on **Side/Side**, the wizard will guide you through three steps:

**1** The side-by-side reference is used for ORL testing. Connect the jumper from the module port to the mainframe powermeter and press **Ok** to start referencing.

**2** The zero ORL reference is necessary for ORL testing. Once the self reference measurement has been carried out, the Zero ORL adjustment can be performed

Connect the jumper from the module port to the non-reflective termination via a mating sleeve. If you don't have a non-reflective termination a mandrel can be used. Press **Ok** to start referencing.

**3** For the loss reference, connect the jumper from the module port of the primary unit, toward the module port of the secondary one via a mating sleeve. Press **Ok** to start referencing.

**NOTE**

The side-by-side loss reference is bidirectional and performed automatically on both units.

**Figure 127** Loss Reference

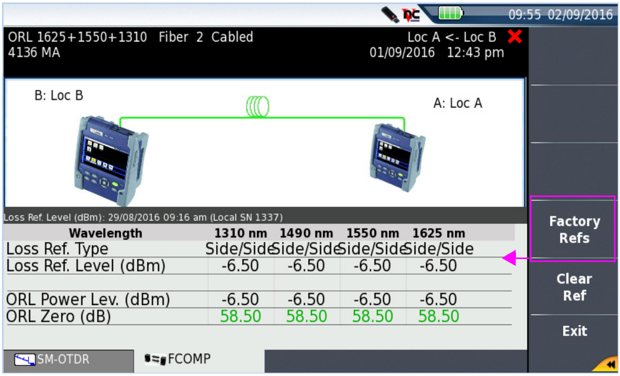

# Factory References

In the **Take Refs** sub-menu, the softkey **Factory Refs** is available.

It allows to apply the reference values defined by default in factory.

The following figure show the values defined by default in factory:

**Figure 128** Factory References



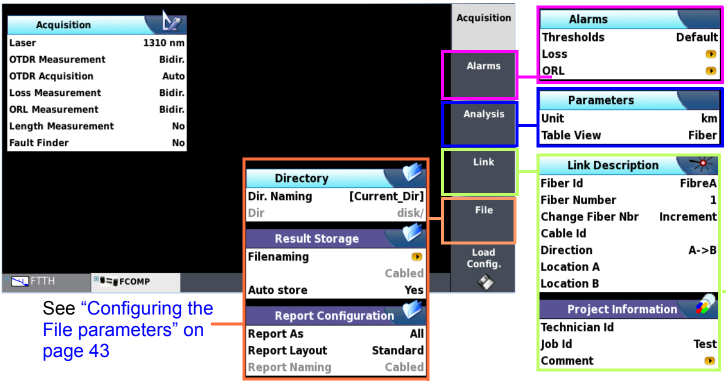

# Configuring the units

Once references have been taken on both Units, the acquisition parameters must be configured.

1 Press **SETUP** button to display the Setup menu of the FiberComplete function.

**The Laser selection and Analysis parameters must be configured on both units. Other acquisition setups shall be set on the primary unit.**

**Figure 129** FiberComplete Setup




See "Configuring the File parameters" on page 43

See "Configuring the Link parameters" on page 38

# Acquisition parameters

- **Laser** select the desired wavelength(s).
  **All**: acquisition is performed for all wavelengths available in the instruments.

**NOTE**

It is possible to select individual wavelength per unit. For example, one can make 1490/1550 nm test from one end, and 1310 nm from the other end.

**The following acquisition parameters are only taken into account if the test is performed from this unit. If not, those parameters are not taken into account.**

- **OTDR Measurement** select the measurement method for OTDR.

  **None.**: OTDR measurement is not performed after FiberComplete test.

  **Unidir.**: OTDR measurement is performed in one way: from the primary unit toward the secondary one.

**Bidir.**: OTDR measurement is performed with parameters defined in automatic mode in the two ways: from primary to seconday unit, and from secondary to primary unit.

- **OTDR Acquisition** if OTDR measurement is configured with **Unidir** or **Bidir** parameter, select the acquisition mode for OTDR.

  **Auto.**: OTDR acquisition is performed with parameters defined in automatic mode.

  **ExpertOTDR**; OTDR measurement is performed with the parameters defined in the OTDR Setup menu (see "Configuring the test in Expert OTDR" page 25).

**NOTE**
Those two OTDR parameters are not available when only the Fault Finder function is available in the module.

- **Loss measurement** select the loss measurement mode.

  **Unidir.**: loss is measured in one direction only

  **Bidir.**: loss is measured in both direction

  **None**: loss is not measured.

- **ORL measurement** select the ORL measurement mode.

  **Unidir.**: ORL is measured in one direction only

  **Bidir.**: ORL is measured in both direction

  **None**: ORL is not measured.

**A measurement will be performed only if at least Loss or ORL parameter is selected.**

- **Length Measurement** select if the fiber length must be measured during the test.

  **Yes**: the fiber length will be measured.

  **No**: the fiber length will not be measured during the test.

- **Fault Finder** select if Fault Finder function must be activated.

  **Yes**: if a result for Loss and/or ORL exceeds one limit value defined in the **Thresholds** parameters (see "Alarms parameters" on page 203), the Fault

Finder function is automatically triggered in order to identify the faulty events.

**No**: the Fault finder function is not activated (no fault finding occurs, even if one value exceeds the thresholds).

**If «Fault Finder» parameter is set to Yes, the «OTDR» parameter is automatically set to No, and vice-versa.**

**The following parameters, defined on master unit, are automatically applied/transferred to the slave unit: Laser - IL/ORL Bidir. - OTDR Acquisition Auto** (if **OTDR Acquisition** is defined on **Manual**, both units will performed a manual measurement, but according to their own configuration in the OTDR tab: the parameters can then be different).

# Alarms parameters

In the **Setup** page, press **Alarms** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Alarms**).

- **Thresholds** select the user defined thresholds to be used: **User 1** / **User 2** / **User 3** / **User 4** and enter limits for:

  - **Loss**: enter a loss threshold for each wavelength (dB)

  - **ORL**: enter an ORL threshold for each wavelength (dB)

  Or select the **Default** parameter to define thresholds by default for Loss and ORL values:

  - **Loss**: > 40 dB for each wavelength

  - **ORL**: < 27 dB for each wavelength

  Select **None** if alarm thresholds must not be defined

# Analysis parameters

In the **Setup** page, press **Analysis** softkey (if one parameter is selected in the current screen, press **Top Menu** soft key to display the right menu keys and click on **Analysis**).

## Unit

Select the unit for the distance measurement: km / kfeet / miles / meter / feet.

### Table View

Allows to choose the kind of table to be displayed at the end of acquisition.

- **Fiber** displays detailed results for one fiber: Loss B -> A and loss A -> B at each wavelength; the average loss at each wavelength and the ORL A and ORL B at each wavelength. See "Fiber View" page 211.

> **NOTE**
> If **Fiber View** is selected, and if results are stored, then the filenaming convention is; *[fiber Id][fiber Num]*. Therefore, the unit will generate one IL / OLR / Distance file per fiber.

- **Cable** displays cable result of multiple fibers: the average loss and the ORL A and ORL B at each wavelength. See "Cable view" page 210.

> **NOTE**
> If **Cable View** is selected, and if results are stored, then the filenaming convention is; *[cable ID]*. Therefore, the unit will generate one IL / OLR / distance file per complete cable.

## File parameters

The File storage parameters must be also configured, in order to define how the results traces will be saved onto the MTS/T-BERD.Result storage.

All the parameters of the File screen are described in the OTDR configuration chapter: see "Configuring the File parameters" on page 43.

Only the **Filenaming** parameter, defined with default filename, is different for FiberComplete configuration.

### Filenaming

Select **Filenaming** parameter and press the right arrow key to modify the name of the file for the result trace.

In the edition keypad, select the pre-defined parameters available or, press **abc** key to enter a name manually for the directory. Then, press **Enter** to validate.

See Figure 24 on page 45.
or
Press **Default Filename** to apply the name by default to the file.

## Default Filename for FCOMP results

#### Filenaming convention in Fiber View

In Fiber View, the filenaming convention is as follows:

`[Fiber_Id][Fiber_Num]`

#### Filenaming convention in Cable View

In Cable View, the filenaming convention is as follows:

`[Cable_Id]`

As soon as the Cable Id changes, the result table is cleared and the next tests are stored with the new Cable Id name.

The table view can be modified in the **Setup** page (see Figure 121 on page 193).

#### Filenaming convention for Fault Finder results

If the fault finder is selected, the fault finderresult is using the following filenaming convention:

**Fiber** View: `[Cable_Id]`
**Cable** View: `[Fiber_Id][Fiber_Num]`

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

# Automatic configuration

Press the key **Auto Setup** to configure automatically the acquisition parameters as follows:

- Lasers: **All**
- Loss Measurement: **Bidir.**
- ORL Measurement: **Bidir.**
- Distance: **Yes**
- OTDR Measurement: **None**
- Fault Finder: **No**
- Table View: **Fiber**

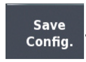
- Threshold: **Default**

# Saving the parameters from FiberComplete configuration

Once the OTDR and FCOMP File and Measurement parameters are configured, it can be saved in a configuration file.

This configuration file can then be recalled for future acquisition in FiberComplete mode.

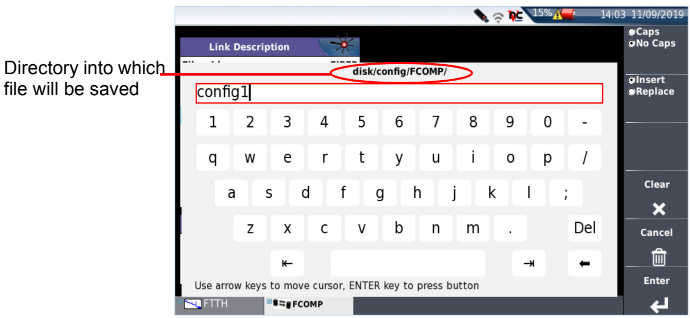
To save parameters in a configuration file:

**1** In the **Setup** page, select one parameter & press menu key 

.
An edition keypad displays

**2** Enter a name for the configuration file.

**Figure 130** Save Configuration file - Edition keypad




> **NOTE**
> Configuration file is saved by default in the directory `disk` / `config` / `FCOMP`.

**3** Press **Enter** to validate
The configuration file is saved with the extension «fo_cfg» (icon ).

**NOTE**

The FiberComplete configuration file includes data storage and measurement settings of FCOMP and SM_OTDR. This configuration file can be shared and reused with other units.

## Loading a configuration file FiberComplete

FiberComplete configuration file includes OTDR and FCOMP setup and file parameters.

To load a configuration file previously created and apply parameters to new tests:

1. Press **FILE** hard key
2. Select the configuration file in the wished directory.
3. Press **Load** > **Load Config.**

- Press **SETUP** hard key to display the OTDR and FCOMP acquisition parameters saved in the configuration file.

You can modify some acquisition or file storage parameters, and save them in a new configuration file (see "Saving the parameters from FiberComplete configuration" on page 206).

**NOTE**
Some configuration files are available in the Platform: press **FILE** and select **disk** > **config** > **FCOMP**.

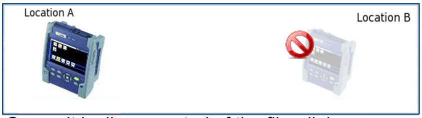
# Performing the tests

Once **Setup** is configured on both units, they can be linked to the fiber to be tested.

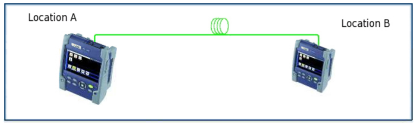
1. Press **RESULTS** hard key to display the results page for FiberComplete function

### Automatic pairing / continuity check

As soon as the secondary (B) unit is connected to the fiber, the primary (A) unit detects it (and vice-versa).




One unit is disconnected of the fiber link, or there is a break




Both unit are connected to the same fiber

# Sending a message to the distant Platform

Once both Platforms are paired via the fiber to be tested, each one can send a message to the other Platform.

This message can be sent to launch a test, to wait before launching the test, to clean the connectors...

To send a message to the distant Platform:

**1** Go to the **Results** page.

**2** Press **Send Message** softkey.
A new screen displays.

**Figure 131** Messages list

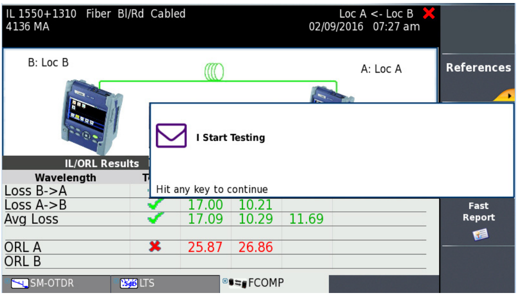

**3** Select the message to send.

> **NOTE**
> If the message "Go to Fiber Nb" is selected, use left and right direction keys to decrement/increment the fiber number.

**4** Press the **Send Message** softkey.

The message displays automatically on distant Platform.

**Figure 132** Receipt of the message on the distant Platform




# Starting the test

Below are described the steps when bidirectional IL/ORL and distance are selected in the **Setup** menu.

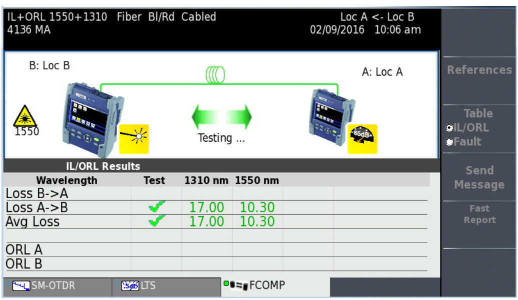
**1** Press **START/STOP** button to launch the test

**a** Unit A and B are performing IL test and mutually exchange their result values

**b** Unit A and B are performing ORL test (using OCWR method) and mutually exchange their result values.

**c** Distance measurement is performed and recorded on both units.

**Figure 133** Test in progress



**d** Once all tests are performed, results are displayed on both units

**e** If **OTDR** parameter is set to **Auto** or **Manual** in the **Setup** menu, the OTDR acquisition starts.

If **Fault Finder** parameter is set to **Yes** and an IL or ORL value reaches one of the user defined thresholds, the Fault Finder starts.

See “Configuring the units” on page 200.

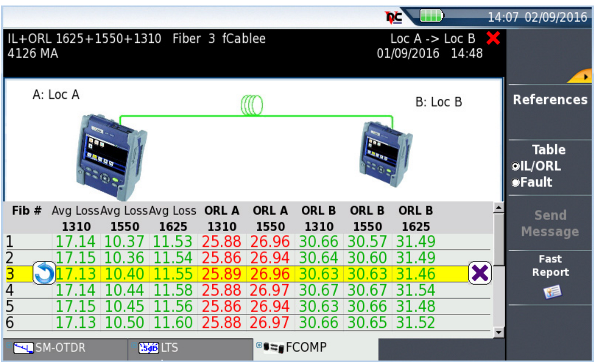
# Results screen

Once the tests are completed, the results screen displays on both units.

## Cable view

If, in the **Setup** page, the parameter **Table View** is set to **Cable**, the following result table is displayed:

**Figure 134** Result Cable View




The **Cable View** allows to display results of multiple fibers:

– the average loss at each wavelength
– the ORL A and ORL B at each wavelength
– the distance is displayed on top of the screen

**NOTE**
In order to erase the results table, the Cable ID must be modified in the **File Setup** menu (see "Description of the explorer" on page 236).

# Fiber View

If, in the **Setup** page, the parameter **Table View** is set to **Fiber**, a screen as the following one displays:

**Figure 135** Result Fiber View


The Fiber View allows to display results of one fiber:

– Loss B -> A and loss A -> B at each wavelength
– the average loss at each wavelength
– the ORL A and ORL B at each wavelength
– the distance is displayed on top of the screen

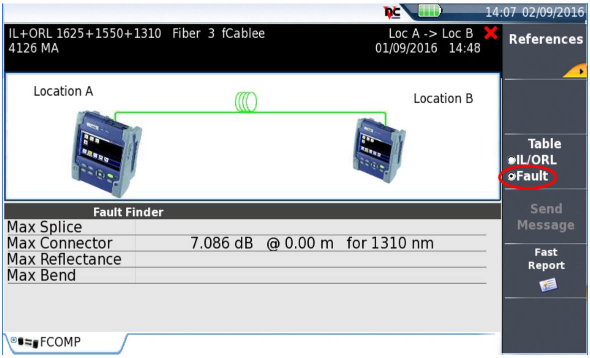
# Fault Finder

If, in the **Setup** page, the **Fault Finder** parameter is set to **Yes**, a Fault analysis is automatically launched, if one value exceeds the thresholds defined in the Setup menu.

As soon as the Fault Finder finishes its analysis, an easy to interpret table displays. It indicates the attenuation values and/or reflectance of the predominant defects that may have caused the IL / ORL values to fail.

**1** Select **Table IL/ORL - Fault** to switch between the IL/ORL and Fault Finder result.

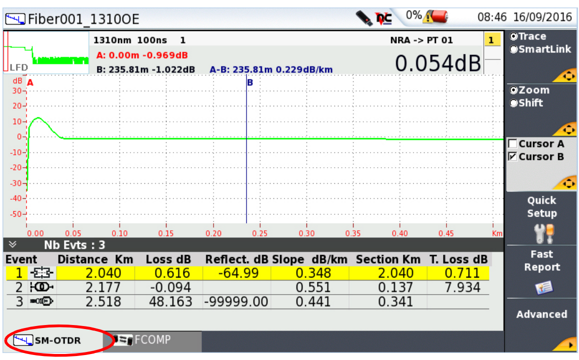
**Figure 136** Fault finder result screen




# OTDR

If the **OTDR** parameter has been set to **Manual** or **Auto**, the OTDR acquisition is launched and the trace(s) can be seen by selected the OTDR tab at the bottom of the screen.

**Figure 137** OTDR trace



> **NOTE**
>
> In **Unidir/Bidir** modes, the wavelengths selected for IL/ORL are also used for OTDR testing.
>
> In **Manual** mode, all the OTDR parameters can be adjusted in the OTDR setup menu.

> **NOTE**
>
> To go from one tab to the other one, press the **RESULTS** button or, with touch-screen, directly select the tab wished.

> **NOTE**
>
> In bidirectional mode:
>
> - The OTDR results trace for acquisition performed from Location A to Location B is stored on the primary unit (Location A)
>
> - The OTDR results trace for acquisition performed from Location B to Location A is stored on the secondary unit (Location B).

# Saving results and generating a report

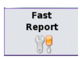
Once the results page is displayed, the results can be saved and a report can be generated directly from the results screen.

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see page 46) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To generate a report:

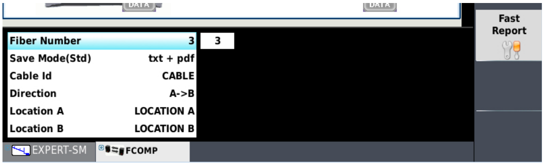
1 Press **Fast Report** soft key 

-> 

.
A menu displays under the trace.

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

**Figure 138** Fast report configuration




**a** Modify the **Fiber Number** / **Fiber Code** using the key ▶.

The parameter is different according to the Cable Structure configuration (see “Cable structure” on page 41).

Or

If the Fiber number parameter is displayed, click on the current number to open the numeric keypad and enter a new number. Press **Enter** to validate.

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

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select Yes to save the results in a .sor file and to generate a json file.

If all parameters are defined with **No**, only the .sor (or .msor) file will be saved.

**c** In the **Cable Id** parameter, enter/modify the name of the Cable using the

**NOTE**

The report layout is defined in the parameter name: **Save Mode (Std)** if the **Report Layout** parameter is defined to **Standard** in the File Setup screen, or **Save Mode (Combo)** if the **Report Layout** parameter is defined to **Consolidated** in the File Setup screen

See "Report Layout" page 46.

edition keypad.

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

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

4 Enter a name for the file in the edition keypad

or

Press **Auto Filenaming** to apply the file name defined in the Setup screen, in **Filenaming** parameter (see “Filenaming” on page 204)

5 Press **Enter** to validate

> **NOTE**
> The blts file and the txt or pdf file will have the same name.

The icon displays during saving process.
Once saving is completed, a sound is emitted onto the Platform.

> **NOTE**
> The file and the report are saved in the last storage media and directory selected.

# Opening a report

1 To open the report, press **File** hardkey

2 In the **Explorer** page, in the directory selected, select the file of the report.
For the txt file: *trace file_sor.txt*
For the pdf file: *trace file.sor.pdf*.

3 Press **Load**.
The file opens on the T-BERD/MTS.

**Figure 139** Example of PDF report

| | | | |
|---|---|---|---|
| VIAVI | Cable Id : Cable | Fiber Id : Fiber 1 | |
| | Location A : | Location B : | |
| | Job Id : | Technician Id : | |

| | | |
|---|---|---|
| MTS 2000 (S/N 27) | 4126 MA(CT) (S/N 0001) | Date : 21/09/2011 15:55 |

Setup

| | | |
|---|---|---|
| FCOMP | 1550+1310 | IL+ORL |

Reference

| Wavelength | Side/Side | Loopback | ORL Power Lev. (dBm) | ORL Zero (dB) |
|---|---|---|---|---|
| --- | --- | --- | --- | --- |

| Length | Wavelength | Loss B->A | Loss A->B | Avg Loss | ORL A | ORL B |
|---|---|---|---|---|---|---|
| | 1310 | 30.31 | 29.84 | 30.07 | 47.32 | 31.04 |
| | 1550 | 21.43 | 20.67 | 21.03 | 44.26 | 30.71 |

**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 the root of the disk: `disk > logo.jpg`.

**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS or SmartOTDR (see “Generating pdf report(s)” on page 244).

# File management

## Storing results

Although each measurement is automatically stored, it is possible to save the results under a different file name, directory etc.

Once the results are displayed:

1. Press the **FILE** button
2. Select **Setup** with the key **Setup/Explorer**
3. Modify the parameter you want in the **File** configuration menu

# Filenaming convention

The filenaming convention is automatically generated by the unit.

## Filenaming convention in Fiber View

In Fiber View, the filenaming convention is as follows:

**`[Fiber_Id][Fiber_Num]`**

One blts file is created per each individual fiber tested. The Fiber Number is automatically incremented.

## Filenaming convention in Cable View

In Cable View, the filenaming convention is as follows:

**`[Cable_Id]`**

The cable results, which includes all fibers, are stored in a .blts file.

As soon as the Cable Id changes, the result table is cleared and the next tests are stored with the new Cable Id name.
The table view can be modified in the Setup page (see Figure 129 on page 201).

## Filenaming convention for OTDR results

If the OTDR is set to **Auto**, the sor traces have the following filenaming convention:

**`[Cable_Id][Fiber_Id][Fiber_Num]`**

A pre formatted .txt file can also be generated automatically at each measurement. It includes the Fault Finder table.

Please refer to Chapter 13 “File management” for more information on storage/recall functions.

12

# TestPro Software option

This chapter describes the use of the TestPro software option, when the software license has been purchased with an OTDR module.

The topics discussed in this chapter are as follows:

# General introduction

## Principle

The TestPro Software license allows to perform an OTDR Unidirectional or Bi-directionnal measurement on 2 fibers, at the same time, using a single test device.

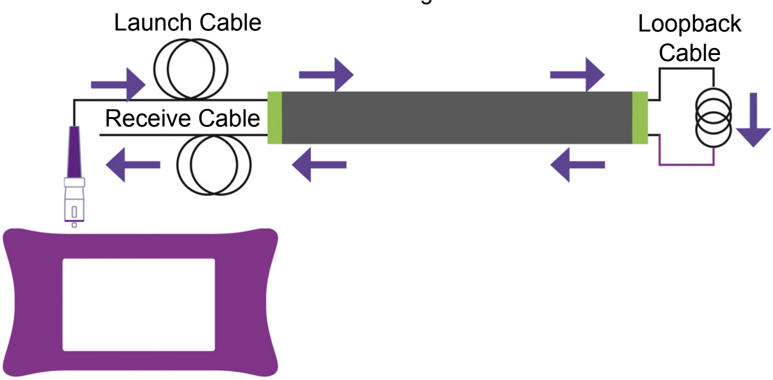
To perform a loopback measurement using the license, you need only:

- Launch cable
- Loopback cable
- Receive cable
- Validation of the continuity using a VFL or the real-time OTDR

### Unidirectional measurement using loopback method

For unidirectional measurement, the technician must launch a test from the Launch cable.

**Figure 140** Unidirectionnal measurement using TestPro solution

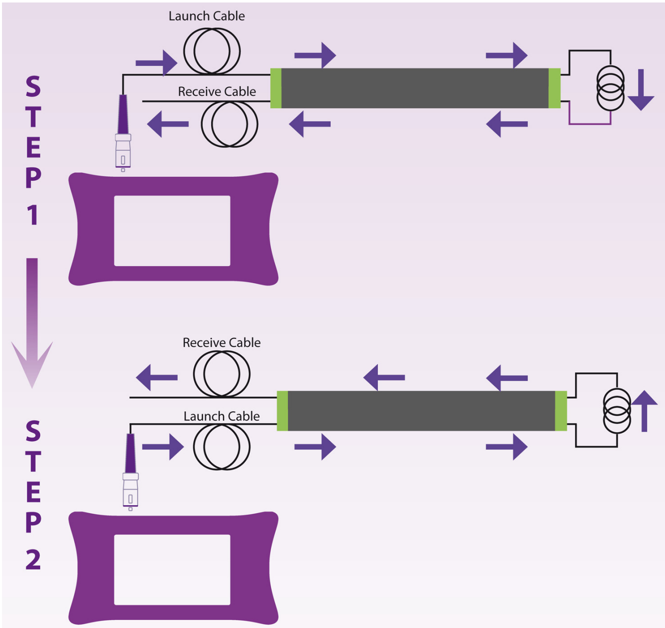



### Bidirectional measurement using loopback method

To perform the bidirectional, the technician must connect launch fiber to the MTS/T-BERD, set the feeder cable, then the Loopback cable and the receive cable.

1. Once installation and configuration are performed, press **START/STOP** to launch the first test.
2. Once completed, disconnect the Launch fiber from the MTS/T-BERD and connect the receive cable, which will then become the launch fiber.
3. Press **START/STOP** to launch the test on the other side.

**Figure 141** Bidirectionnal measurement using TestPro solution

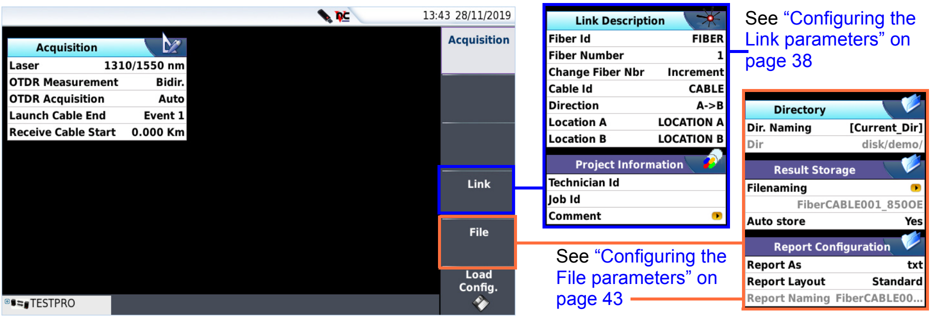



# Configuring the TestPro Test

Once the license is installed onto the T-BERD/MTS (see Base Unit User Manual), the icon  displays on the Home page:

1. Validate the icon  on the **Home** page.
2. Press **SETUP** to display the configuration screen.

**Figure 142** TestPro configuration




# Acquisition parameters

You can choose the OTDR acquisition parameters.

1 Once the **Setup** page is displayed, press **Acquisition** menu key to configure the Acquisition parameters.

## Laser

The acquisition will be carried out on the wavelength(s) selected (for multiple-wavelength modules). In case of a multi-wavelength module, select **All** to perform a measurement for all the wavelengths available (this parameter visible exclusively on modules with one single OTDR port). The possible values depend on the module used.

## OTDR Measurement

Select the otdr measurement type to be perform: **Unidir**ectional (see Figure 140 on page 220) or **Bidir**ectional (see Figure 141 on page 221).

## OTDR Acquisition

Select the type of acquisition to be performed:

**Auto** The acquisition is automatically performed using the best pulse, range and resolution.

**Expert OTDR** The acquisition is performed according the parameters configuration for in Expert OTDR mode (see "Configuring the Acquisition parameters" on page 25).

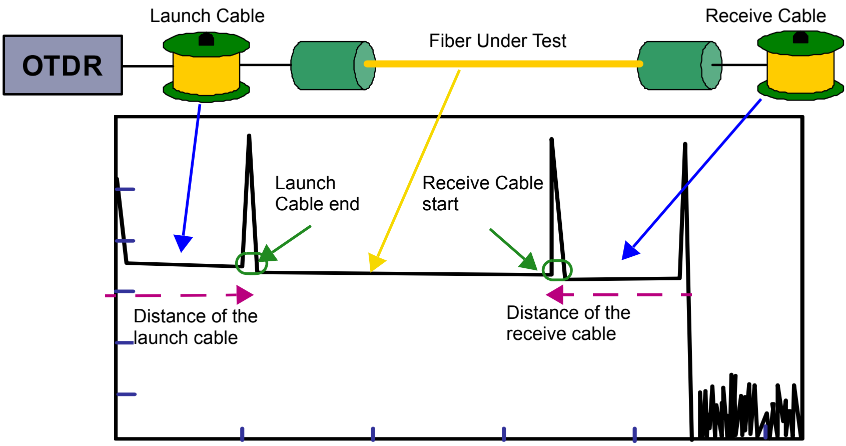
### Launch Cable End / Receive Cable Start

**No** All the results are displayed and referenced on the basis of the board of the module.

**Evt 1, 2, 3** The results relating to the launch cable are eliminated from the table. Attenuation and distances are then measured on the basis of the marker Evt 1, 2 or 3 selected.

**Length** Use the **Edit Number** key to enter a length (Min= 0 / Max=50 km / 164.042 kfeet / 31.075 miles) or affect the active cursor value, using the **Set Cursor Distance** key.

**Figure 143** Launch Cable / Receive Cable

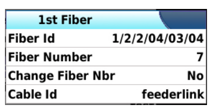



## Link parameters

Only different or extra parameters than the otdr link parameters are described (see “Configuring the Link parameters” on page 38)

### 1st Fiber / 2nd Fiber

Click on **1st fiber** or **2nd Fiber** and in the sub-menu



| 1st Fiber | |
|---|---|
| Fiber Id | 1/2/2/04/03/04 |
| Fiber Number | 7 |
| Change Fiber Nbr | No |
| Cable Id | feederlink |

**Fiber Id** Select the **Fiber Id** and modify if necessary the fiber name.

**Fiber Number** Select the **Fiber number** parameter and click on left or right arrow to modify the Number

**Change Fiber Nbr** Select **Change Fiber Nbr** and select

- **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.

**Cable Id** Select the **Cable Id** parameter and click on the right arrow to display the edition keypad and enter/modify the cable identifier.

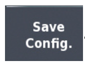
# Saving the parameters from configuration

Once the File and Measurement parameters are configured, it can be saved in a configuration file.

This configuration file can then be recalled for future acquisition in TestPro mode.

> **NOTE**
> The configuration from TestPro Setup page can be saved exclusively if the ExpertOTDR function is selected at the same time on the Home page.

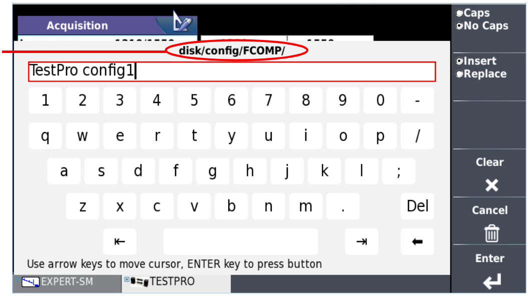
To save parameters in a configuration file:

1. In the **Setup** page, select one parameter & press menu key 

.
   An edition keypad displays
2. Enter a name for the configuration file.

**Figure 144** Save Configuration file - Edition keypad

Directory into which
file will be saved




> **NOTE**
> Configuration file is saved by default in the directory `disk` / `config` / `FCOMP`.

**3** Press **Enter** to validate

The configuration file is saved with the extension «fo_cfg» (icon ).

> **NOTE**
>
> The configuration file includes data storage and measurement settings of TESTPRO and SM_OTDR. This configuration file can be shared and reused with other units.

# Loading a configuration file

The TestPro configuration file includes OTDR and TestPro setup and file parameters.

To load a configuration file previously created and apply parameters to new tests:

**1** Press **FILE** hard key

**2** Select the configuration file in the wished directory.

**3** Press **Load** > **Load Config.**

- Press **SETUP** hard key to display the OTDR and TestPro acquisition parameters saved in the configuration file.

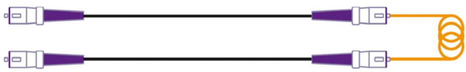
You can modify some acquisition or file storage parameters, and save them in a new configuration file (see “Saving the parameters from configuration” on page 224).

> **NOTE**
> Some configuration files are available in the Platform: press **FILE** and select **disk** > **config** > **FCOMP**.

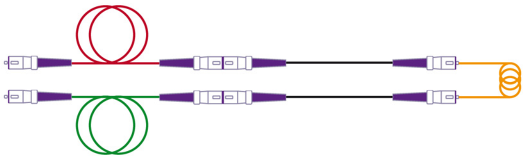
# Performing the tests

Below are described the steps when bidirectional OTDR measurement has been selected and inspection of the connectors has been validated.

1 Connect a **loopback cable** at one extremity of each fiber

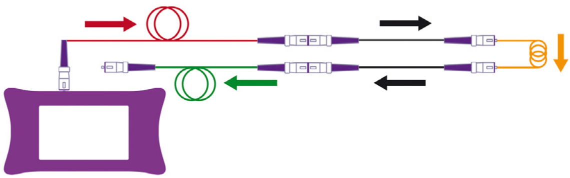


2 Connect a **launch cable** at Extremity A and a **receive cable** at Extremity B

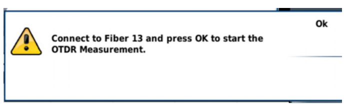


3 Connect the **launch cable** to the Module.

4 Launch the measurement from **Launch cable** toward **Receive cable**

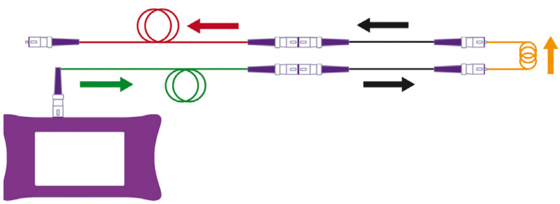


Once completed, a pop up message displays on the Platform:




5 Follow the instructions displayed: connect the **receive cable** to the Module of the Platform.

6 Press **START/STOP** lo launch the measurement from **Receive cable** toward **Launch cable**



Once measurement is completed, the results display in SmartLink mode.

**NOTE**
For unidirectional measurement, the process stops at step 4 on page 226.

# Results screen

Once the tests are completed, the results screen displays, both with TestPro view (tab TestPro) and with OTDR result trace (tab ExpertOTDR).

## TestPro results page

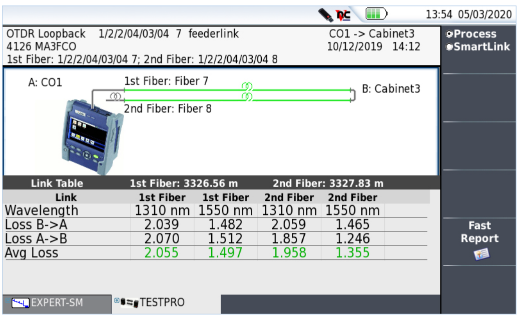
The Results page can display either:

- the **Process** view, displaying the graphical representation of the measurement and the Loss results for each fiber

  or
- the **SmartLink** view, for the 1st and the 2nd fiber.

### Process View

**Figure 145** Result TestPro Bidirectional measurement - Process view




On the upper part, a graphical representation of the installation for the test is displayed, with the Identifier for each component (name of the location and of the loopback, fiber numbers...).

The second part displays a summary table of the loss measurement for the first and second fiber.

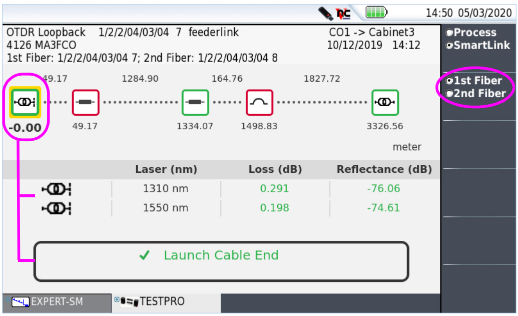
The results displayed in green or red are values for which a threshold has been defined: in green, the value does not exceed the thresholds defined in OTDR setup, in red it exceeds the thresholds. See "Configuring the Alarms parameters" on page 31.

## SmartLink view

Click on **SmartLink** softkey to display a SmartLink view of each measured fiber:

Click on the softkey **1st Fiber/2nd Fiber** to select the

**Figure 146** SmartLink View




Click on one event on the graphical representation to display the loss and reflectance values for each wavelength, and the event description, at the bottom of the display.

The event is framed in red if it is above the alarm thresholds defined in the setup menu.

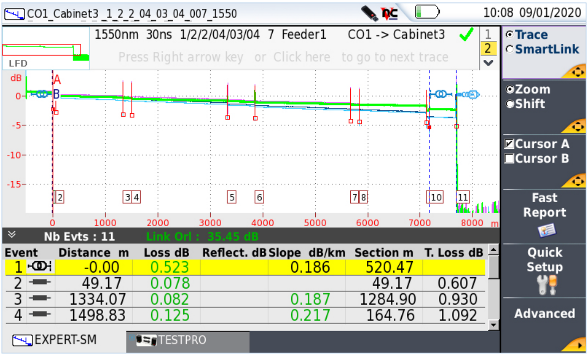
It is framed in green if it lies within the thresholds.

# OTDR results trace / SmartLink results

### OTDR Results trace

In OTDR tab, the OTDR results traces are displayed with the results table.

**Figure 147** OTDR Results trace

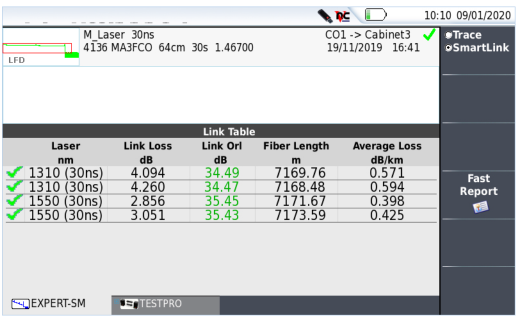



The results displayed in green or red are values for which a threshold has been defined: in green, the value does not exceed the thresholds defined in OTDR setup, in red it exceeds the thresholds. See “Configuring the Alarms parameters” on page 31.

## SmartLink view

Press Trace/SmartLink menu key to display the SmartLink view of the results.

**Figure 148** SmartLink results page



# Saving results and generating a report

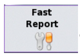
Once the results page is displayed, the results can be saved and a report can be generated directly from the results screen.

Saving and report can have been automatically generated if, in the file configuration, the **Auto Store** parameter has been set to **Yes** (see page 46) with the appropriate **Save Mode**.

## Saving results and creating a report from results page

To generate a report:

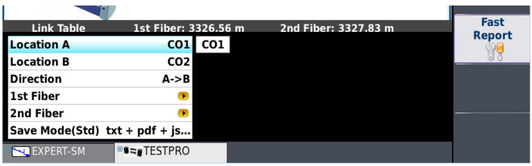
**1** Press **Fast Report** soft key 

-> 

.
A menu displays under the trace.

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

**Figure 149** Fast report configuration




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

**b** 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**).

**c** Click on **1st fiber** or **2nd Fiber** and in the sub-menu

– Select the **Fiber number** parameter and click on left or right arrow to modify the Number

– Select the **Fiber Id** and modify if nec essary the fiber name.

– Select **Change Fiber Nbr** and select

**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.

– Select the **Cable Id** parameter and click on the right arrow to display the edition keypad and enter/modify the cable identifier (and **second fiber** identifier.

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

**txt file** select **Yes** to save the results in a .sor file and to generate a txt file of the results.

**pdf file** select **Yes** to save the results in a .sor file and to generate a report in a pdf file.

**json file** select **Yes** to save the results in a .sor file and to generate a json file.

> **NOTE**
>
> The report layout is defined in the parameter name: **Save Mode (Std)** if the **Report Layout** parameter is defined to **Standard** in the File Setup screen, or **Save Mode (Combo)** if the **Report Layout** parameter is defined to **Consolidated** in the File Setup screen
>
> See "Report Layout" page 46.

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

4 Enter a name for the file in the edition keypad

or

Press **Auto Filenaming** to apply the file name defined in the Setup screen, in **Filenaming** parameter: `[Fiber Id][Fiber_Num]`.

5 Press **Enter** to validate

> **NOTE**
>
> The blts file and the txt or pdf file will have the same name.

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

The pdf report is composed of two files: the pdf report for 1st Fiber and the pdf report for 2nd fiber.

> **NOTE**
> The file and the report are saved in the last storage media and directory selected.

# Opening a report

**1** To open the report, press **FILE** hardkey

**2** In the **Explorer** page, in the directory selected, select the file of the report.

For the txt file: *trace file_sor.txt*

**3** For the pdf file: *trace file.sor.pdf* Press **Load**.

The file opens on the T-BERD/MTS.

**Figure 150** Example of PDF report

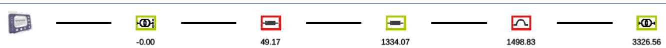
**Cable Id A :** feederlink
**Location A :** CO1
**Job Id :** test
**Comment :** 1st Fiber: 1/2/2/04/03/04 7; 2nd Fiber: 1/2/2/04/03/04 8

**Fiber Id A :** 1/2/2/04/03/04 7
**Location B :** Cabinet3
**Technician Id :** Sertieg5

MTS 4000 V2 (S/N EBAH00025) 4126 MA3FCO (S/N 00466) Date : 10/12/2019 14:12

Summary

| | | |
|---|---|---|
| Fiber Length (m) | 3326.56 | |
| Wavelength (nm) | 1310 | 1550 |
| Loss B->A (dB) | 2.039 | 1.482 |
| Loss A->B (dB) | 2.070 | 1.512 |
| Avg Loss (dB) | 2.055 | 1.497 |




| Event | Distance | Wavelength | | Loss | Reflect. | Section Length |
|---|---|---|---|---|---|---|
| | m | nm | | dB | dB | m |
| 1 | -0.00 | 1310 | | 0.291 | -76.06 | |
| | | 1550 | | 0.198 | -74.61 | |
| 2 | 49.17 | 1310 | | 0.498 | | 49.17 |
| | | 1550 | | 0.407 | | |
| 3 | 1334.07 | 1310 | | 0.045 | | 1284.90 |
| | | 1550 | | 0.049 | | |
| 4 | 1498.83 | 1310 | | | | 164.76 |
| | | 1550 | | 0.119 | | |
| 5 | 3326.56 | 1310 | | 0.104 | -70.61 | 1827.72 |
| | | 1550 | | 0.071 | -69.62 | |

**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 the root of the disk: `disk > logo.jpg`.

**NOTE**

A pdf report can also be generated from the File Explorer page onto the T-BERD/MTS or SmartOTDR (see "Generating pdf report(s)" on page 244).

13

# File management

The topics discussed in this chapter are as follows:

# Description of the explorer

## Opening the file explorer

To access the Explorer

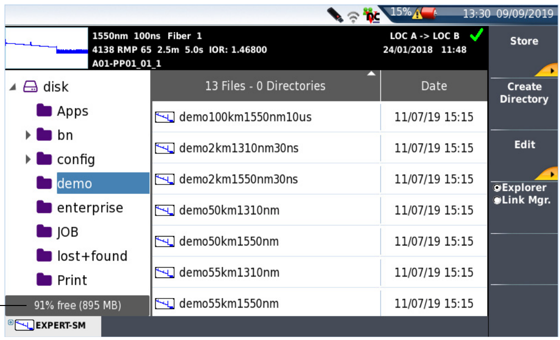
**1** Press the **FILE** button

The explorer is used to select the storage medium, and to create or rename directories and files:

- The left-hand part presents the storage architecture. Click on the left of the screen or use the keys ▲ and ▼ to move around among all the media and their respective directories.
- The right-hand part displays all the files present in the directory selected.

**Figure 151** Example of explorer

Free space available on the selected media




The direction keys can be used to move horizontally between the two parts and vertically within each zone.

At the top of the screen, the file signature selected is repeated (see Figure 152 on page 237).

## Managing tabs

Tabs give access to the File menu of each application present in the modules of the instrument.

It is possible to open a file even if the corresponding module is not present in the instrument. A new tab then temporarily manages this application.

When several different applications (corresponding to modules for different measurements) are managed by the SmartOTDR, pressing the **FILE** key several times in succession changes from one tab to another to give access to the file configuration of the desired application (e.g. FCOMP, LTS etc.).

# File signature

The acquisition parameters of the trace contained in the selected file are displayed at the top of the screen together with a small-scale representation of the trace (provided it was acquired on a MTS / T-BERD).

**Figure 152** Example of signature of an OTDR file (in the File Menu)

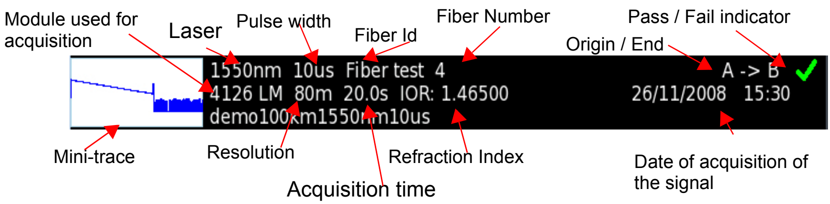
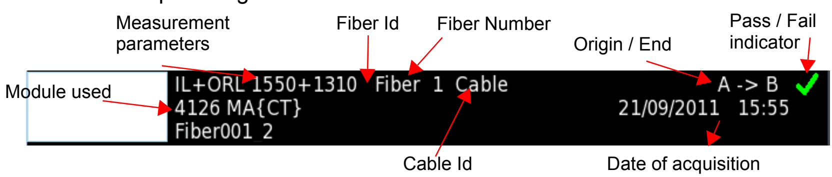



**Figure 153** Example of signature with FCOMP file



# Buttons on the right of the screen

## Saving traces


Three buttons are used to save one or more traces.

- **Save**: allows to save the current trace opened.
- **Save All**: allows to store all the traces displayed in overlay (OTDR) in one single file.
- The softkey **Next Trace** is used to activate the menu of the following trace, when several OTDR traces are in overlay.

# Storage media

For saving or recalling data, the equipment offers a wide choice of media, both built-in and external.

Free space on selected media is clearly displayed at the bottom of the left panel.

> **Remote Base Unit and data transfer**
> During a data transfer (with the option Data/Talkset), the distant Base-Unit hard drive connected by the fiber is displayed as a storage media. File and directory edition features may all be used in the same manner with this storage media as with the other ones

# Directories and files editing function

The Files and directories editing functions are similar to those available in the Explorer page of the Platform.
Refer to 2000/4000 V2 Platform or SmartOTDR User Manual if you want to work on directories and files (copy/paste, rename...).

# Saving and loading files

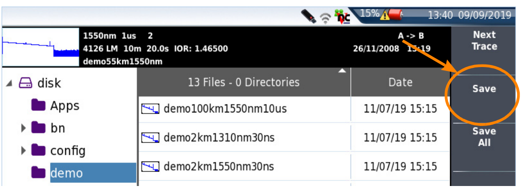
## Saving files from the Explorer

When the explorer is displayed, the active trace for the selected tab is displayed in the File Signature.

You can then save the active trace:

1. Select a directory by clicking once on it
2. Click on **Store** to save the active trace
   A new sub-menu displays
3. For OTDR traces only click on **Next Trace** to change the file signature on the top part of the screen and to save the next trace from traces in overlay
4. Click on **Save All** or on **Save** (OTDR files only).
   The **Save All** menu key in OTDR tab allows to save all the traces opened, whereas the **Save** menu key allows to save exclusively the trace described in the file signature.
5. If you wish, click on **FILE** button to display the Explorer page for another application and save, using the same method, the active trace from this application.

**Figure 154** Saving active trace from the explorer (with OTDR trace)




Displayed when two active overlaid traces are open.

The trace described in the file signature will be saved in the directory selected (in this example: demo)

This will open automatically the edition keypad, in order to give a filename for the active trace.

**The «Store» menu key is not available if the type of saving for OTDR files is defined to «All Traces» in the File Content parameter (see “File Content” on page 45).**

# Loading files and displaying traces

To access the functions for loading one or more files, select the file(s) in the explorer and press **Load**.

**NOTE**
For TXT, PDF, LTS and FCOMP, only one file can be opened at a time.

## Simple loading

The key **View Trace(s)** enables simple loading of traces, using the current parameters of the MTS/T-BERD or SmartOTDR. The current trace is then replaced with this new trace.

## Load with configuration

**T**he key **Load Trace + Config** will display the traces, recalling the configuration recorded in the file. Thus the zooms, cursors and parameters present at the time of acquisition will be used for the display.

This function also enables to recall and set the parameters defined in the screens corresponding respectively to the **FILE** and **SETUP** keys.

It is then possible to perform an acquisition under the same conditions as those of the trace recalled.

- If the SmartOTDR was equipped with a different module from the current one when the trace was acquired, certain configuration parameters cannot be updated. A message warns the user of this.
- If several traces are selected, the configuration used will be that of the first trace.
- If the number of traces added and the number of traces present is greater than 8, then the last traces added will not all be taken into account.

**The configuration cannot be recalled if the trace was not originally created by a SmartOTDR or T-BERD/MTS.**

## Loading several traces in overlay

Up to 8 traces in the same application (OTDR) can be displayed simultaneously in overlay.
To obtain a display of multiple traces, two methods are possible:

- Select all the files to be loaded at the same time (see 2000 or 4000 V2 Platform User manual for multiple selection of files) and click on **Load > View Trace(s)**
- Define a reference trace in a first time, open it, then come back to the explorer to select the other traces to be added (see “Reference Trace function” on page 86).

# Exporting files

Click on the **Export** menu key allows to display a sub-menu from which selected files can be:

- generated into one/several reports
- merged into one file (for txt/pdf files only)
- sent by e-mail

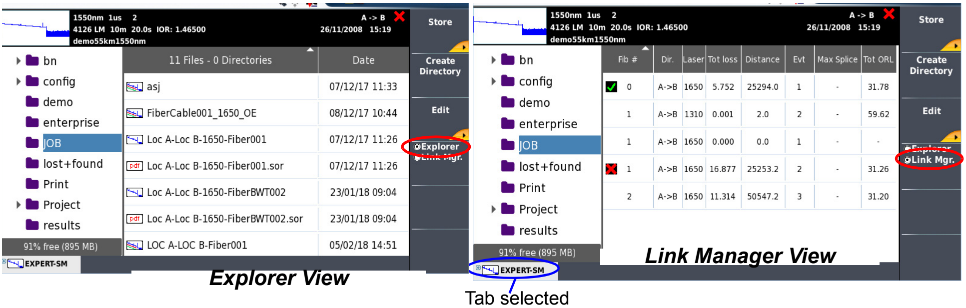
## Explorer/Link Manager

Before exporting file(s), the display can be modified, and the Link Manager can be selected instead of the Explorer using the **Explorer/Link Mgr** menu key.

The Link Manager function allows to display the explorer with all the link information exclusively for the active application (the function must be activated in **Home** page, or at least one result trace must be opened to get the tab and display files in the Link Manager page).

For example, if the **Link Mgr.** function is selected in the tab OTDR, only the link information from the OTDR files will be displayed (whether in multimode or singlemode).
Select **Link Mgr** with the menu key **Explorer/Link Mgr.** to display the corresponding files for the active tab.

**Figure 155** Explorer and Link Manager display




According to the application selected, the fiber information available are different. The table below describes the fiber information displayed for each selected tab:

> **NOTE**
> The files in the Link Manager window can be sorted according each column available for a tab.

**Table 11** Fiber Information displayed

| Column. | OTDR & OEO | LTS | FCOMP Cable View | FCOMP Fiber View |
|---|---|---|---|---|
| 1st | Alarm status (icon) & Fiber number | | Alarm status (icon) & Cable Id | Alarm status (icon) & Fiber Id |
| 2nd | Direction | Laser | Fiber number | Length |
| 3rd | Lambda | Power (dBm) | AL1310: number of fibers with loss alarms at 1310 nm | L1310: Average loss at 1310 nm |
| 4th | Total Loss | Loss (dB) | AL1550: number of fibers with loss alarms at 1550 nm | L1550: Average loss at 1550 nm |
| 5th | Distance | Ref (dBm) | AL1625: number of fibers with loss alarms at 1625 nm | L1625: Average loss at 1625 nm |
| 6th | Nb of Event | - | AO1310: number of fibers with ORL alarms at 1310 nm | O1310: worst ORL at 1310 nm |
| 7th | Max Splice | - | AO1550: number of fibers with ORL alarms at 1550 nm | O1550: worst ORL at 1550 nm |

**Table 11** Fiber Information displayed

| Column. | OTDR & OEO | LTS | FCOMP Cable View | FCOMP Fiber View |
|---|---|---|---|---|
| 8th | Total ORL | - | AO1625: number of fibers with ORL alarms at 1625 nm | O1625: worst ORL at 1625 nm |

# Editing function

The same editing functions as those from the Explorer are available with the Link Manager function, except the merging function (as this is used with txt files):

Refer to 2000/4000 V2 Platform or SmartOTDR User Manual if you want to work on directories and files (copy/paste, rename...).

Moreover, the **Edit** menu from the **Link Manager** page allows to export the whole directory, with the files corresponding to the active tab, in a txt file.

# Exporting a directory in a txt file

**1** Click on **Export** and select the **Link Manager** function

**2** Select the tab corresponding to the files you want to use

**3** Select the directory to open

**4** Select one file from the list

**5** Click on **Export** menu key.

The txt file is automatically generated, in the same directory as the one selected for the export.

The name by default for the txt file is: *fiber_info_"name of application selected".txt.*

For example, for the export of the Fiber Information from the OTDR application, the txt file will be called: *fiber_info_otdr.txt*

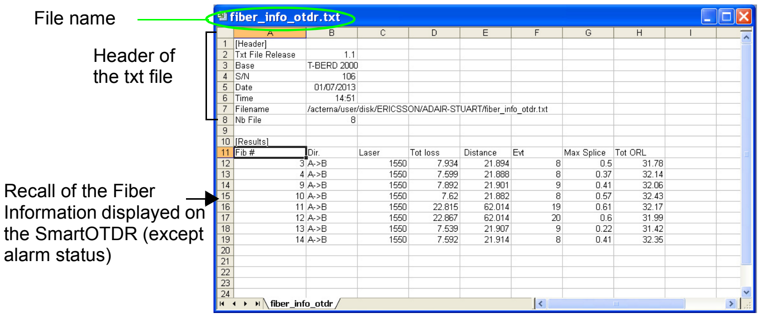
**NOTE**
The txt file can be renamed once it is saved.

This file is made of two parts:

- The Header, with general information: the equipment used and its serial number, the date and time of export, the location of the file, and the number of files exported.
- The table, containing all the fibers information coming from the files of the active tab.

Once generated, the txt file can be transferred onto a PC and opened via a spreadsheet program (e.g. Excel...).

**Figure 156** Example of a directory exported in a txt file (open with Excel)




| | A | B | C | D | E | F | G | H | I |
|---|---|---|---|---|---|---|---|---|---|
| 1 | [Header] | | | | | | | | |
| 2 | Txt File Release | 1.1 | | | | | | | |
| 3 | Base | T-BERD 2000 | | | | | | | |
| 4 | S/N | 106 | | | | | | | |
| 5 | Date | 01/07/2013 | | | | | | | |
| 6 | Time | 14:51 | | | | | | | |
| 7 | Filename | /acterna/user/disk/ERICSSON/ADAIR-STUART/fiber_info_otdr.txt | | | | | | | |
| 8 | Nb File | 8 | | | | | | | |
| 9 | | | | | | | | | |
| 10 | [Results] | | | | | | | | |
| 11 | Fib # | Dir. | Laser | Tot loss | Distance | Evt | Max Splice | Tot ORL | |
| 12 | 3 | A->B | 1550 | 7.934 | 21.894 | 8 | 0.5 | 31.78 | |
| 13 | 4 | A->B | 1550 | 7.599 | 21.888 | 8 | 0.37 | 32.14 | |
| 14 | 9 | A->B | 1550 | 7.892 | 21.901 | 9 | 0.41 | 32.06 | |
| 15 | 10 | A->B | 1550 | 7.62 | 21.882 | 8 | 0.57 | 32.43 | |
| 16 | 11 | A->B | 1550 | 22.815 | 62.014 | 19 | 0.61 | 32.17 | |
| 17 | 12 | A->B | 1550 | 22.867 | 62.014 | 20 | 0.6 | 31.99 | |
| 18 | 13 | A->B | 1550 | 7.539 | 21.907 | 9 | 0.22 | 31.42 | |
| 19 | 14 | A->B | 1550 | 7.592 | 21.914 | 8 | 0.41 | 32.35 | |
| 20 | | | | | | | | | |
| 21 | | | | | | | | | |
| 22 | | | | | | | | | |
| 23 | | | | | | | | | |
| 24 | | | | | | | | | |

# Generating pdf report(s)

Several files of a same type (example: all OTDR files) can be generated in one/several pdf report(s).

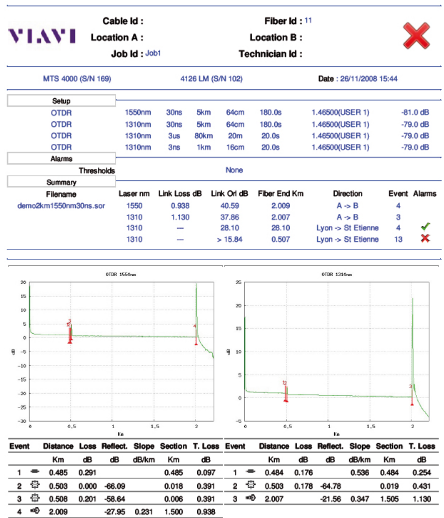
1. Select the file(s) to be generated in a pdf report
2. Press **Export** menu key
3. Using the menu key 

 select:
   – **1 Trace** if the report must be generated with one trace per page
   – **Multi** if the report must be generated with up to three traces per page (for OTDR files only).
   – ODM: to convert the odm files in pdf.
4. Click on **Build Report**.
5. In the edition menu displayed, enter the name for the report
6. Press **Enter** to validate and launch the report
   The icon  display during report generation.

Once report is generated, a beep is emitted.

**Figure 157** Report: 1 Trace and Multi (with OTDR files)

PDF Report: «1 Trace» mode



PDF Report: «Multi» mode

> **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 the root of the disk: `disk > logo.jpg`.

> **NOTE**
> The report is saved in the same directory as the selected files.

# Using the Merge key, with the txt/pdf files

The txt or pdf files that have been saved/generated from a results page can be merged into one txt/pdf file from the Explorer.

The key **Merge** is used to merge several txt or pdf files into one file, putting together the results of all files.

**1** In the explorer, select the txt/pdf files generated with the trace files you want.

> **The merging can be done exclusively from files of the same format. Pdf and txt files cannot be selected at the same time to generate a merged file.**

**2** Click on **Export** > **Merge** key

The icon displays during merging process, and a beep is emitted once process is completed.

The file is saved with the filename: `merged_yyyy_mm_day__hr_mn_sec.pdf/txt`

It is automatically saved in the same directory as the one where the txt/pdf files have been selected.

> **NOTE**
> The file can be renamed once it is saved.

14

# Technical specifications

This chapter shows the technical specifications of the OTDR modules and of the options available for the or T-BERD/MTS 2000 or SmartOTDR, and the OTDR technical specifications for SmartOTDR.

The topics discussed in this chapter are as follows:



**NOTE**

For specifications regarding the environment, refer to the Base-Unit user manual.

# OTDR modules for T-BERD/MTS 2000/4000 V2

## Characteristics of reflectometry measurements

### Distance measurement

- Dual cursor
- Distance displayed takes into account the calibration of the refractive index of the fiber.
- Index adjustable from 1,30000 to 1,70000 in steps of 0,00001
- Resolution of display: 1 cm max.
- Resolution of cursor: 1 cm max.
- Spacing of measurement points: from 4 cm, with up to 256 000 acquisition points.
- Accuracy: ± 1m± sampling resolution ±$10^{-5}$ x distance for LA, MM and QUAD (excluding errors of calibration of refractive index of the fiber).

  ± 0.5m± sampling resolution ±$10^{-5}$ x distance for MA2, MA3, MP2, B and C Modules (excluding errors of calibration of refractive index of the fiber).
- Display span: 3.25 m up to 400 km, according to the Module

### Attenuation measurement

- Dual cursor
- Resolution of display: 0,001 dB
- Resolution of cursor: 0,001 dB
- Linearity: ± 0.05 dB/dB with LA Modules

  ± 0.03 dB/dB with MA2, MA3, MP2, QUAD/MM, B and C Modules
- Display span: 1.25 dB to 55 dB

### Reflectance Measurement

- Resolution of display: 0,01 dB
- Accuracy: ± 2 dB

### Automatic measurement

- Automatic measurement of all the elements of the signal. Slope measurement by least squares or 2 points of measurement.

- Display threshold of faults:
  - 0 to 5.99 dB in steps of 0.01 dB for event thresholds
  - -11 to -99 dB in steps of 1 dB for the reflectance
  - 0.01 to 5.99 dB in steps of 0.01 dB for attenuation
- Display of slope and attenuation for a segment of fiber.
- Display of the position of a fault and of attenuation.
- Display of the reflectance of the fault.
- Display of ORL

# Manual Measurement

- Measurement of slope between the cursors.
- Measurement of attenuation between two segments of fiber.
- Measurement of reflectance of a reflecting element.
- Measurement of ORL between the two cursors.
- Measurement of splice by 2 or 5 points method

# Typical specifications

Typical values, measured at 25°C for all modules, unless specified.

## Multimode Module

| **Multimode OTDR Module** | **41XXMM** |
|---|---|
| Central Wavelength[1] | 850 / 1300 nm ± 30 nm |
| Typical RMS Dynamic Range[2] | 26 / 24 dB |
| Distance Range | Up to 80 km |
| Pulse width | 3 ns to 1 µs |
| Event Dead Zone[3] | 0.8 m |
| Attenuation Dead Zone[4] | 4 m |

1. Laser in CW mode, at 25° C
2. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
3. EDZ measured at +/- 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
4. ADZ measured at +/- 0.5 dB on the basis of a linear regression, using a - 40 dB type reflectance, at shortest pulse width.

## LA/MA2/MA3/MP2 Modules

| **Singlemode Modules** | **LA 41xxLA** | **MA2 41xxMA2** | **MA3 41xxMA3** | **MP2 41xxMP2** |
|---|---|---|---|---|
| Central Wavelength [1] | 1310 ± 20 nm<br>1550 ± 20 nm<br>1650 ± 20 nm | 1310 ± 20 nm[2]<br>1383 ± 3 nm[2]<br>1550 ± 20 nm[2]<br>1625 ± 15 nm[2] | 1310 ± 20 nm[2]<br>1550 ± 20 nm[2]<br>1625 ± 10 nm<br>1650 + 10/-5 nm | 1310 ± 20 nm<br>1550 ± 20 nm<br>1625 ± 10 nm<br>1650 ± 15 nm |
| RMS Dynamic Range [3] | 35 dB<br>33 dB<br>30 dB | 40 dB<br>37 dB<br>38 dB<br>38 dB | 43 dB<br>41 dB<br>41 dB<br>41 dB | 45 dB<br>43 dB<br>43 dB<br>42 dB |
| Distance Range | up to 260 km | | | Up to 400 km |
| Pulse width | 5ns to 20 µs | | | |
| Event Dead Zone [4] | 1.5 m | 0.7 m<br>1383 nm: 1.76 m[5] | 0.7 m | 0.65 m |
| Attenuation Dead Zone [6] | 6 m | 3 m<br>1383 nm: 5.27 m[7] | 3 m | 2.5 m |
| Typical Splitter Attenuation Dead Zone | - | - | 45 m[8] | 35 m[9] |

1. Laser at 10 µs and 25° C
2. Laser in CW and 25° C
3. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
4. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
5. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at 10 ns.
6. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at shortest pulse width, at 1310 nm.
7. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at 10 ns.
8. At 200ns, 1550nm, with 16dB loss non reflective, SADZ threshold at 1dB.
9. At 100ns, 1550nm, with 16dB loss non reflective, SADZ threshold at 1dB

## B and C Modules

| **Singlemode Modules** | **41xxB** | **41xxC** |
|---|---|---|
| Central Wavelength [1] | 1310 ± 20 nm[2]<br>1550 ± 20 nm[2]<br>1625 ± 10 nm<br>1650 + 10/-5 nm | 1310 ± 20 nm<br>1550 ± 20 nm<br>1625 ± 10 nm<br>1650 ± 15 nm |

| **Singlemode Modules** | **41xxB** | **41xxC** |
|---|---|---|
| RMS Dynamic Range [3] | 42 dB<br>40 dB<br>40 dB<br>40 dB | 45 dB<br>43 dB<br>43 dB<br>42 dB |
| Distance Range | Up to 260 km | Up to 400 km |
| Pulse width | 5 ns to 20 µs | |
| Event Dead Zone [4] | 0.65 m | |
| Attenuation Dead Zone [5] | 3 m | 2.5 m |
| Typical Splitter Attenuation Dead Zone | 45 m[6] | 20 m[7] |

1. Laser at 10 µs and 25° C
2. Laser in CW and 25° C
3. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width.
4. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width.
5. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at shortest pulse width.
6. Measured on a 16 dB loss (typical 1x32 split ratio) non-reflective splitter at 1310nm, using 200ns pulsewidth.
7. Measured on a 16 dB loss (typical 1x32 split ratio) non-reflective splitter at 1310nm, using 100ns pulsewidth

## Multimode and QUAD Modules

| | **Multimode / Singlemode OTDR Module** | |
|---|---|---|
| Central Wavelength [1] | 850 / 1300 nm ± 30 nm | 1310 / 1550 nm± 20 nm |
| Typical RMS Dynamic Range [2] | 26 / 24 dB | 37 / 35 dB |
| Distance Range | Up to 80 km | Up to 260 km |
| Pulse width | 3 ns to 1 µs | 3 ns to 20 µs |
| Event Dead Zone [3] | 0.8 m | 0.9 m |
| Attenuation Dead Zone | 4 m[4] | 4 m[5] |

1. Laser in CW mode, at 25° C
2. Typical value corresponding to the difference (in dB) between the level of back-diffusion extrapolated at the beginning of the fiber and the RMS noise level, after 3 minutes of averaging, with the largest pulse width
3. EDZ measured at +/- 1.5 dB below the peak of a non-saturated reflecting event at shortest pulse width
4. ADZ measured at +/- 0.5 dB on the basis of a linear regression using a -40 dB type reflectance, at shortest pulse width.
5. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/UPC (-55 dB) at shortest pulse width, at 1310 nm.

## CWDM Modules

| CWDM Modules | 41CWDM8U | 41CWDM10U | 41CWDM10L |
|---|---|---|---|
| Central Wavelength[1] | 1471 ±3 nm<br>1491 ±3 nm<br>1511 ±3 nm<br>1531 ±3 nm<br>1551 ±3 nm<br>1571 ±3 nm<br>1591 ±3 nm<br>1611 ±3 nm | 1431 +/-3 nm<br>1451 +/-3 nm<br>1471 +/-3 nm<br>1491 +/-3 nm<br>1511 +/-3 nm<br>1531 +/-3 nm<br>1551 +/-3 nm<br>1571 +/-3 nm<br>1591 +/-3 nm<br>1611 +/-3 nm | 1271 ± 3 nm<br>1291 ± 3 nm<br>1311 ± 3 nm<br>1331 ± 3 nm<br>1351 ± 3 nm<br>1371 ± 3 nm<br>1391 ± 3 nm<br>1411 ± 3 nm<br>1431 ± 3 nm<br>1451 ± 3 nm |
| RMS Dynamic Range[2] | 35 dB | | |
| Distance Range | Up to 260 km | | |
| Puse Width | 10 ns to 20 µs | | |
| Event Dead Zone [3] | 1.50 m | | |
| Attenuation Dead Zone[4] | 5 m | | |
| Output power of the source in continuous mode | -3.5 dBm | | |
| Modes[5] | CW, 270Hz, 330Hz, 1kHz, 2kHz | | |

1. Guaranteed, with laser at 25°C measured at 10 µs.
2. Value corresponding to the difference (in dB) between the backscattered level extrapolated at the origin of the fiber and the RMS noise level , after 3 minutes of averaging, with the largest pulsewidth.
3. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at shortest pulsewidth.
4. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/PC (-55 dB) at shortest pulsewidth.
5. Remove 3 dB if used in modulation mode (270/330/1k/2kHz/Twintest/Auto)

## DWDM Modules

| DWDM Modules | 41DWDMC |
|---|---|
| Wavelengths | C-Band tuning - C62 to C12<br>(1527.9 nm - 1567.95 nm) |
| Channel Spacing | 50/100/200 GHz |
| Puse Width | 10 ns to 20 µs |
| RMS Dynamic Range[1] | 44 dB |

| **DWDM Modules** | **41DWDMC** |
|---|---|
| Distance Range | Up to 260 km |
| Event Dead Zone [2] | 1.50 m |
| Attenuation Dead Zone[3] | 4 m |
| Output power of the source in continuous mode | 0 dBm |
| Modes[4] | CW, 270Hz, 330Hz, 1kHz, 2kHz |

1. Value corresponding to the difference (in dB) between the backscattered level extrapolated at the origin of the fiber and the RMS noise level , after 3 minutes of averaging, with the largest pulsewidth.
2. EDZ measured at 1.5 dB below the peak of a non-saturated reflecting event at shortest pulsewidth.
3. ADZ measured at +/- 0.5 dB on the basis of a linear regression from a reflectance of type FC/PC (-55 dB) at shortest pulsewidth.
4. Remove 3 dB if used in modulation mode (270/330/1k/2kHz/Auto)

# Ranges

## Ranges for LA Modules

| | **5 ns** | **30 ns** | **60ns** | **100 ns** | **300 ns** | **1 µs** | **3 µs** | **10 µs** | **20 µs** |
|---|---|---|---|---|---|---|---|---|---|
| 0.1 km | x | x | | | | | | | |
| 0.5 km | x | x | | | | | | | |
| 1 km | x | x | x | | | | | | |
| 2 km | x | x | x | x | | | | | |
| 5 km | x | x | x | x | x | | | | |
| 10 km | x | x | x | x | x | x | | | |
| 20 km | x | x | x | x | x | x | x | | |
| 40 km | x | x | x | x | x | x | x | x | x |
| 80 km | | x | x | x | x | x | x | x | x |
| 260 km | | | | | x | x | x | x | x |

## Ranges for MA2, MA3 Singlemode and B OTDR Modules

| | 5ns | 10ns | 30ns | 100ns | 200ns | 500ns | 1us | 3us | 10us | 20us |
|---|---|---|---|---|---|---|---|---|---|---|
| 100 m | x | x | x | | | | | | | |
| 200 m | x | x | x | | | | | | | |
| 500 m | x | x | x | | | | | | | |
| 1 km | x | x | x | x | | | | | | |
| 2 km | x | x | x | x | x | x | | | | |
| 5 km | x | x | x | x | x | x | x | | | |
| 10 km | x | x | x | x | x | x | x | | | |
| 20 km | x | x | x | x | x | x | x | x | | |
| 40 km | x | x | x | x | x | x | x | x | x | x |
| 80 km | | | x | x | x | x | x | x | x | x |
| 160 km | | | | | x | x | x | x | x | x |
| 260 km | | | | | | | x | x | x | x |

## Ranges for MP2 Singlemode and C OTDR Modules

| | 5ns | 10ns | 30ns | 100ns | 200ns | 500ns | 1us | 3us | 10us | 20us |
|---|---|---|---|---|---|---|---|---|---|---|
| 100 m | x | x | x | | | | | | | |
| 500 m | x | x | x | | | | | | | |
| 1 km | x | x | x | x | | | | | | |
| 2 km | x | x | x | x | x | x | | | | |
| 5 km | x | x | x | x | x | x | x | | | |
| 10 km | x | x | x | x | x | x | x | | | |
| 20 km | x | x | x | x | x | x | x | x | | |
| 40 km | x | x | x | x | x | x | x | x | x | x |
| 80 km | | | x | x | x | x | x | x | x | x |
| 160 km | | | | | x | x | x | x | x | x |
| 260 km | | | | | | | x | x | x | x |
| 400 km | | | | | | | | | x | x |

## Ranges for Multimode Modules

| | 3 ns | 10 ns | 30 ns | 100 ns | 300 ns | 1 µs |
|---|---|---|---|---|---|---|
| 0.5 km | x | x | | | | |
| 1 km | x | x | x | | | |
| 2 km | x | x | x | x | | |
| 5 km | x | x | x | x | x | |
| 10 km | x | x | x | x | x | x |
| 20 km | | x | x | x | x | x |
| 40 km | | | | x | x | x |
| 80 km | | | | x | x | x |

## Ranges for CWDM Modules

| | 10 ns | 30 ns | 100 ns | 300 ns | 1 µs | 3 µs | 10 µs | 20 µs |
|---|---|---|---|---|---|---|---|---|
| 0,5 km | x | x | | | | | | |
| 1 km | x | x | | | | | | |
| 2 km | x | x | x | | | | | |
| 5 km | x | x | x | x | | | | |
| 10 km | x | x | x | x | x | | | |
| 20 km | x | x | x | x | x | x | | |
| 40 km | x | x | x | x | x | x | x | x |
| 80 km | | x | x | x | x | x | x | x |
| 160 km | | | | x | x | x | x | x |
| 260 km | | | | | | x | x | x |

## Ranges for DWDM Modules

| | 10 ns | 30 ns | 100 ns | 300 ns | 1 µs | 3 µs | 10 µs | 20 µs |
|---|---|---|---|---|---|---|---|---|
| 0,5 km | x | x | | | | | | |
| 1 km | x | x | x | | | | | |
| 2 km | x | x | x | x | | | | |
| 5 km | x | x | x | x | x | | | |
| 10 km | x | x | x | x | x | | | |
| 20 km | x | x | x | x | x | x | | |

| | 10 ns | 30 ns | 100 ns | 300 ns | 1 µs | 3 µs | 10 µs | 20 µs |
|---|---|---|---|---|---|---|---|---|
| 40 km | x | x | x | x | x | x | x | x |
| 80 km | | x | x | x | x | x | x | x |
| 160 km | | | x | x | x | x | x | x |
| 260 km | | | | | | x | x | x |

## Class of the lasers of the OTDR modules

| Module Standard | IEC 60825-1, Ed 1.2, 2001 -08 | FDA21CFR§1040.10 |
|---|---|---|
| Singlemode LA,, MA2, B and C OTDR Modules | Class1 | Class 1 |
| Singlemode MA3 and MP2 OTDR Module | Class 1M @ 1310 nm<br>Class 1 @ 1490, 1550, 1625 & 1650 nm | Class 1 |
| Multimode OTDR Modules | Class 1M @ 850 nm<br>Class 1 @ 1300 nm | Class 1 |

## OTDR modules measurement

Weight: approx. 300 g (0,66 lbs) (400g for the QUAD OTDR Module / 510g for the DWDM Module)

Dimensions (in mm) - w x h x d: 128 x 134 x 41

## OTDR Module supply

OTDR modules are powered by the mainframe which they are attached to.

- Rated range supply 8 -15 VDC
- Maximum power consumption is 8 W

# Environmental conditions

## Indoor/outdoor

- Backlight high visibility color screen
- High visibility capacitive touchscreen for indoor and outdoor use.

- Use in altitude up to 4000m.

> **CAUTION**
> It is strongly recommended to work on the Platform in its glove when the product is used outdoor, in rainy weather.

> **CAUTION**
> AC/DC power supply must be used indoor!
> The Platform battery charging must be performed indoor only!

# Temperature

| | |
|---|---|
| • Platform operating temperature range | Refer to platform's specification sheet |
| • Storage | -20°C to +60°C<br>(-4°F to +140°F) |

IEC 61010-1 Temperature range from 0 to 40°C.

# Humidity

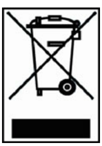
- 5 to 95% without condensation

# Pollution degree

- Pollution degree: 2

VIAVI recommends that customers dispose of their instruments and peripherals in an environnmentally 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.

# Technical specifications of the Power meter function on OTDR module for T-BERD/MTS-2000/ 4000 V2

Specifications given for 25°C, after 20 minutes stabilization time and after zero setting.

## Power meter option for Singlemode Modules

| Plug-ins Singlemode | Power meter for MA2, MA3, MP2, B and C Modules | Power meter for E4126 LA Module |
|---|---|---|
| **Measurement Wavelength** | 1310 / 1490 / 1550 / 1625 / 1650 nm | 1310 / 1490 / 1550 nm |
| **Calibrated Wavelength** | 1310 / 1490 / 1550 / 1625 / 1650 nm | 1310 / 1550 nm |
| **Accuracy at calibrated wavelengths**[1] | ± 0.5 dB | ± 0.5 dB |
| **Input power range** | -55 to -3 dBm | - 50 to -2 dBm |
| **Display resolution** | 0.01 dB / 0.01nW | 0.01 dB / 0.01nW |
| **Linearity within the specification range** | ± 0.5 dB<br>(- 50 to - 3 dBm)<br>(-50 to -3.5 dBm for OTDR MA3 Modules) | - |

1. typical value at -30dBm, excluding connector uncertainty, at calibrated wavelengths

## Power meter option for Multi/Single mode Modules

| Plug-ins Single / Multi mode | Singlemode Power meter | Multimode Power meter |
|---|---|---|
| **Measurement Wavelength** | 1310 / 1490 / 1550 / 1625 / 1650 nm | 850 and 1300 nm |
| **Calibrated Wavelength** | 1310 / 1490 / 1550 / 1625 / 1650 nm | 850 and 1300 nm |
| **Accuracy at calibrated wavelengths** | ± 0.5 dB (at -30 dBm) | ± 1 dB (at -15 dBm) [1] |

| **Plug-ins Single / Multi mode** | **Singlemode Power meter** | **Multimode Power meter** |
|---|---|---|
| **Input power range** | - 50 to - 2 dBm | - 30 to -3 dBm |
| **Maximum resolution** | 0.01 dB / 0.01nW | |
| **Linearity within the specification range** | ± 0.5 dB (- 45 to - 5 dBm) | - |

1. Using a mode conditioner

# Technical specifications of the Source function on OTDR module for T-BERD/MTS-2000/4000 V2

| | |
|---|---|
| **Laser Class** | Class 1 |
| **Wavelengths** | Same as OTDR Ports (see page 250)[1] |
| **Output Power Level** | - 3.5 dBm typical for continuous signal (CW)<br>0 dBm typical for the DWDM Module |
| **Modulated Mean Level** | -6.5 dBm typical<br>- 3 dBm typical for DWDM Module |
| **Output Power Accuracy** | ± 0.65 dB (for B Module only)[2] |
| **Stability**<br>(over 8 hours after 20 minutes warm-up time) | ± 0.05 dB @25°C for MA2 and MP2 Modules<br>± 0.1dB @25°C for MA3, B and C Modules. |
| **Tone Generation** | 270 Hz/330 Hz/1kH/2kHz |
| **Auto λ Mode**[3] | Yes (with VIAVI Power meters) |
| **Spectral Bandwith (for DWDM only)** | 2.5 GHz |

1. Except filtered wavelengths
2. Excluding connector uncertainty
3. Twintest Mode available for LA, MA2, MA3, MP2, B and C OTDR Modules

# Technical specifications of the FiberComplete modules

**This function is not available with SmartOTDR.**

Typical values, measured at 25°C unless specified.

| | **E41XXMA3XXXX** | **B Modules** |
|---|---|---|
| Wavelength | 1310 / 1490 / 1550 / 1625 nm [1] | 1310 nm ± 20 nm<br>1550 nm ± 20 nm<br>1625 ± 10 nm |
| **Insertion Loss** | | |
| Dynamic range | 40 dB | 40 dB |
| IL uncertainty[2] | +/- 0,25 dB | +/- 0,2 dB |
| IL repeatability[3] | < 0,05 dB | 0.05 dB |
| Display resolution | 0.01 dB | |
| **ORL** | | |
| ORL display range | up to 45 dB | from 10 to 55 dB |
| ORL uncertainty | +/- 0,9 dB[4] | +/- 0.5 dB[5] |
| ORL repeatability | < 0,1 dB[4] | |
| Display resolution | 0.01 dB | |
| **Length** | | |
| Measurement range | 150 km | |
| Length uncertainty[6] | +/- 30m from 50 m to 20 km range[7]<br>+/- 100m above 20 km[7] | 0/+5m +/-$10^{-5}$ x distance[8] |

1. 1625nm not available with filtered version
2. side by side reference
3. 10 consecutive measurements, without disconnection
4. from 20 to 40 dB range
5. from 10 to 40 dB range, with user reference, excluding connector uncertainty
6. measurement @ 1550 nm
7. with an index of refraction n = 1.468
8. excluding group index uncertainty

For the OTDR specifications, please refer to page 248.

# MPO Switch Module Technical specifications

| | |
|---|---|
| **Wavelength range** | 1270 to 1650 nm |
| **Insertion Loss**[1 2] | 1.2 dB typ |
| **Input port** | SC/APC |
| **Output port** | MPO APC (pinned) |

1. Measured at 1310, 1550 and 1625 nm
2. 2.5 dB maximum

# OTDR Technical specifications for SmartOTDR

## OTDR Optical Interfaces

Switchable optical connectors: FC, LC, SC

## OTDR Optical characteristics

| | |
|---|---|
| **Laser safety class (21 CFR)** | Class 1 |
| **Distance units** | Kilometer, meter, feet, and miles |
| **Group index range** | 1.300000 to 1.700000 in 0.00001 steps |
| **Number of data points** | Up to 256,000 data points |
| **Distance measurement** | Automatic or dual cursor |
| **Display range** | 0.1 km to 260 km for single-mode |
| **Cursor resolution** | 1 cm |
| **Sampling resolution** | 4 cm for single-mode |
| **Accuracy** | ±1 m ±sampling resolution ±1.10–5 * x distance<br>(Excluding group index uncertainties) |

## Warning labels

**Dangerous voltage (> 70VDC) is present inside of the product.**

**Do not attempt to remove cover when product is in use.**

Due to the reduced dimensions of the optical modules, it is not always possible to attach the required warning labels to them. In line with the provisions of Article 5.1 of the IEC 60825-1 standard, the laser class identification labels are shown below:

| Standard Ref. | IEC 60825-1, Edition 1.2, 2001-08 | FDA21CFR§1040.10 |
|---|---|---|
| Class 1 | CLASS 1<br>LASER PRODUCT | |
| Class 1M | LASER RADIATION<br>DO NOT VIEW DIRECTLY<br>WITH OPTICAL INSTRUMENTS<br>CLASS 1M LASER PRODUCT | |
| Class 2 | LASER RADIATION<br>DO NOT STARE INTO BEAM<br>CLASS 2 LASER PRODUCT | CAUTION<br>LASER RADIATION - DO NOT STARE<br>INTO BEAM<br>CLASS II LASER PRODUCT |

The user must take the necessary precautions concerning the optical output of the instrument and follow the manufacturer's instructions.

**Measurements on optical fibers are difficult to execute and the precision of the results obtained depends largely on the precautions taken by the user.**

# Characteristics of reflectometry measurements

## Distance measurement

- Automatic or Dual cursor
- Distance displayed takes into account the calibration of the refractive index of the fiber.
- Index adjustable from 1,30000 to 1,70000 in steps of 0,00001
- Resolution of display: 1 cm max.
- Resolution of cursor: 1 cm max.

- Spacing of measurement points: from 4 cm, with up to 256 000 acquisition points.
- Accuracy: ± 1m± sampling resolution $\pm 1.10^{-5}$ x distance (excluding errors of calibration of refractive index of the fiber).
- Display span: 0.1 km m to 260 km for single mode

### Attenuation measurement

- Automatic, manual, 2-point, 5-point, and LSA
- Resolution of display: 0,001 dB
- Resolution of cursor: 0,001 dB
- Linearity: ± 0.04 dB/dB for single mode
- Display span: 1.25 dB to 55 dB

### Reflectance / ORL Measurement

- Resolution of display: 0,01 dB
- Accuracy: ± 2 dB

### Automatic measurement

- Automatic measurement of all the elements of the signal. Slope measurement by least squares or 2 points of measurement.
- Display threshold of faults:
  - 0 to 5.99 dB in steps of 0.01 dB for event thresholds
  - -11 to -99 dB in steps of 1 dB for the reflectance
  - 0.01 to 5.99 dB in steps of 0.01 dB for attenuation
- Display of slope and attenuation for a segment of fiber.
- Display of the position of a fault and of attenuation.
- Display of the reflectance of the fault.
- Display of ORL

### Manual Measurement

- Measurement of slope between the cursors.
- Measurement of attenuation between two segments of fiber.
- Measurement of reflectance of a reflecting element.
- Measurement of ORL between the two cursors.
- Measurement of splice by 2 or 5 points method

## Typical specifications

Typical values, measured at 25°C unless specified.

| | 100B Series | 100A Series |
|---|---|---|
| **Central Wavelength[1]** | 1310 ± 20nm<br>1550 ± 20nm<br>filtered 1625 nm ± 20nm | 1310 nm ± 20nm<br>1550 nm ± 20nm<br>filtered 1650 nm ± 20 nm |
| **Cut Wavelength range on live port (filtered)** | 1290 - 1580 nm<br>Isolation > 45 dB | |
| **Typical RMS Dynamic Range[2]** | 40 / 40 / 41 dB | 37 / 35 / 32 dB |
| **Distance Range[3]** | Up to 260 km | |
| **Pulse width** | 3 ns to 20µs | 5 ns to 20µs |
| **Event Dead Zone[4]** | 0.90 m | 1.35 m |
| **Attenuation Dead Zone[5]** | 2.5 m | 4 m |
| **Splitter Attenuation Dead Zone** | 45 m after 15dB splitter loss | N/A |

1. Laser, at 25° C and measured at 10 µs
2. Typical value corresponding to the one-way difference (in dB) between the extrapolated backscattering level at the beginning of the fiber and the RMS (SNR = 1) noise level, after 3 minutes averaging and high dynamic resolution, using the largest pulse width.
3. At 1550 nm
4. EDZ measured at ± 1.5 dB below the peak of a unsaturated reflective event using the shortest pulse width.
5. ADZ measured at ± 0.5 dB from the linear regression, using a FC/UPC- type reflectance, at shortest pulse width.

# Characteristics of the Source (standard) and Power Meter (optional)

## Source

- Output Power Level[1]: -3.5 dBm
- Stability long term (8h): ± 0.05 dB[2]

1.+/- 1 dB
2.After 30min light source stabilization time

# Power meter (through OTDR port)

Specifications given for 25°C, after 20 minutes stabilization time and after zero setting.

- Calibrated wavelengths: 1310 / 1490 / 1550 / 1625 / 1650 nm
- Accuracy at calibrated wavelengths: ± 0.5 dB (at -30 dBm)[1]
- Input power range: -60 dBm to +10 dBm
- Maximum resolution: 0.01 dB / 0.01nW
- Measurement range:0 to -55 dBm
- Linearity: ± 0.5 dB[2]

# PON/XG-PON Power Meter (E118FA65PPM version)

- Wavelengths: 1490/1550 nm; 1490/1578 nm
- Measurement ranges
  - 1490 nm: -35 to +5 dBm
  - 1550/1578 nm: -35 to +23 dBm
- Measurement accuracy: ± 0.5 dB
- Channels isolation from external source:
  - 1310/1490: > 40dB
  - 1550 to 1650: > 20dB

1.Except 1650 nm
2.from -5 dBm to -50 dBm

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# Options and accessories

This chapter shows the references of the options and accessories for the modules of the T-BERD/MTS-2000 or T-BERD/MTS-4000 V2, and the references for the SmartOTDR.

The topics discussed in this chapter are as follows:

# Commercial References of measurement modules for T-BERD/MTS-2000/4000 V2

Product marking is based on the commercial reference excluding the first letter. Example : Commercial reference E4146QUAD is identified 4146QUAD on the product

## OTDR Modules[1]

### Multimode Module

| Modules | Commercial Reference |
|---|---|
| Multimode 850 / 1300 nm OTDR Module | E4123MM |

### Singlemode Module

| LA Modules | Commercial References |
|---|---|
| LA OTDR 1310/1550 nm Module with source option | E4126LA |
| LA OTDR 1550 nm Module with source option | E4115LA |
| LA OTDR filtered 1650 nm Module | E4118RLA65 |

| MA2 Modules | Commercial References |
|---|---|
| Metro-Access 1310/1550 nm OTDR Module with APC connector and continuous light source | E4126MA2-APC |
| Metro-Access 1310/1550 nm OTDR Module with PC connector and continuous light source | E4126MA2-PC |
| Metro-Access 1310/1550/1625 nm OTDR Module with APC connector and continuous light source | E4136MA2-APC |
| Metro-Access 1310/1550/1625 nm OTDR Module with PC connector and continuous light source | E4136MA2-PC |

1. Specify optical connector of each OTDR ports

| **MA2 Modules** | **Commercial References** |
|---|---|
| Metro-Access 1310/1383/1550 nm OTDR Module with PC connector and continuous light source | E4138MA283-PC |

| **MA3 Modules** | **Commercial References** |
|---|---|
| Metro-Access/PON Filtered 1650 nm OTDR Module with APC connectors and continuous light source | E4118FMA365-APC |
| Metro-Access/PON 1310/1550 nm OTDR Module with APC connector and continuous light source | E4126MA3-APC |
| Metro-Access/PON 1310/1550 nm OTDR Module with PC connector and continuous light source | E4126MA3-PC |
| Metro-Access/PON 1310/1550/1625 nm OTDR Module with APC connector and continuous light source | E4136MA3-APC |
| Metro-Access/PON 1310/1550/1625 nm OTDR Module with PC connector and continuous light source | E4136MA3-PC |
| Metro-Access/PON 1310/1550 nm and Filtered 1650 nm OTDR Module with APC connector and continuous light source | E4138FMA365-APC |

| **MP2 Modules** | **Commercial References** |
|---|---|
| Metro PON 1310/1550 nm OTDR Module with Source option | E4126MP2-PC/-APC |
| Metro PON 1310/1550/1625 nm OTDR Module with Source option | E4136MP2-PC/-APC |
| Metro PON 1310/1550 nm and filtered 1625 nm OTDR Module with APC connectors and Source option | E4136FMP2-APC |
| Metro PON 1310/1550 nm and filtered 1650 nm OTDR Module with APC connectors and Source option | E4138FMP265-APC |

| **B Modules** | **Commercial References** |
|---|---|
| Module B OTDR 1310/1550 nm - PC/APC | E4126B-PC/-APC |
| Module B OTDR 1310/1550/1625 nm - PC/APC | E4136B-PC/-APC |
| Module B OTDR 1310/1550/Filtered 1650 nm - APC | E4138FB65-APC |
| Module B OTDR Filtered 1650 nm - APC | E4118FB65-APC |

| **C Modules** | **Commercial References** |
|---|---|
| Module C OTDR 1310/1550 nm - PC/APC | E4126C-PC/-APC |
| Module C OTDR 1310/1550/1625 nm - PC/APC | E4136C-PC/-APC |
| Module C OTDR 1310/1550/Filtered 1650 nm - APC | E4138FC65-APC |
| Module C OTDR 1310/1550/Filtered 1625 nm - APC | E4136FC65-APC |

| **Multimode/Singlemode Modules** | **Commercial Reference** |
|---|---|
| Multimode/Singlemode 850/1300/1310/1550 nm OTDR Module | E4146QUAD |

## CWDM OTDR Modules[1]

| **Modules** | **Commercial References** |
|---|---|
| CWDM OTDR Module from 1471nm to 1611nm for T-BERD/ MTS2000 and 4000 V2 | E41CWDM8U |
| CWDM OTDR Module from 1431nm to 1611nm for T-BERD/ MTS2000 and 4000 V2 | E41CWDM10U |
| CWDM OTDR Module from 1271nm to 1451nm for T-BERD/ MTS2000 and 4000 V2 | E41CWDM10L |

## DWDM OTDR Modules[2]

| **Modules** | **Commercial References** |
|---|---|
| Tunable DWDM APC OTDR Module - C Band, with Tunable Light Source included | E41DWDMC-APC |
| Tunable DWDM PC OTDR Module - C Band, with Tunable Light Source included | E41DWDMC-PC |

1. Specify optical connector of each OTDR ports
2. Specify optical connector of each OTDR ports

| **Modules** | **Commercial References** |
|---|---|
| Four wavelengths OTDR Module for Corwave application (1290, 1291, 1293 and 1295 nm) | E41OWDM4C |

# MPO Switch Module

| **Modules** | **Commercial Reference** |
|---|---|
| Singlemode MPO Switch Module - 1x12 Pinned MPO - SC/APC | E41MPO12SM |

# FiberComplete modules with OTDR function

| **Modules** | **Commercial References** |
|---|---|
| Metro-Access/PON 1310/1550 nm FiberComplete Module with APC connector. Also includes continuous wave light source and built-in Power meter | E4126MA3FCO-APC |
| Metro-Access/PON 1310/1550 FiberComplete Module with PC connector. Also includes continuous wave light source and built-in Power meter | E4126MA3FCO-PC |
| Metro-Access/PON 1310/1550/1625 nm FiberComplete Module with APC connector. Also includes continuous wave light source and built-in Power meter | E4136MA3FCO-APC |
| Metro-Access/PON 1310/1550/1625 NM PC FiberComplete Module with PC connector. Also includes continuous wave light source and built-in Power meter | E4136MA3FCO-PC |
| Metro-Access/PON 1310/1550/ nm and Filtered 1650 nm Fiber Complete module with APC connector. Also includes continuous wave light source | E4138FMA365FCO |
| Module B FiberComplete 1310/1550 nm - PC/APC. Also includes continuous wave light source and built-in Power meter | E4126B-FCOMP-PC/-APC |
| Module B FiberComplete 1310/1550/1625 nm - PC/APC. Also includes continuous wave light source and built-in Power meter | E4136B-FCOMP-PC/-APC |

| **Modules** | **Commercial References** |
|---|---|
| Module B FiberComplete 1310/1550/Filtered 1650 nm - APC. Also includes continuous wave light source and built-in Power meter | E4138FB65-FCOMP-APC |

# FiberComplete modules with Fault Finder function

| **Modules** | **Commercial References** |
|---|---|
| FiberComplete Fault Finder 1310/1490/1550 nm | E4138FCOMP-FF |
| FiberComplete Fault Finder 1310/1550 nm - APC | E4126FCOFF-APC |
| FiberComplete Fault Finder 1310/1550/1625 nm - APC | E4136FCOFF-APC |
| FiberComplete Fault Finder 1310/1550 nm - APC<br>Also includes continuous wave light source and built-in power meter | E4126-FCOMPFF-APC |
| FiberComplete Fault Finder 1310/1550/1625 nm - APC<br>Also includes continuous wave light source and built-in power meter | E4136-FCOMPFF-APC |

# Options

| **Modules** | **Commercial References** |
|---|---|
| Power meter option for OTDR modules | E41OTDRPM |
| Light source option for OTDR modules | E41OTDRLS |

| **Mode Conditioner for Multimode fiber** | **Commercial References** |
|---|---|
| Encircled flux mode conditioner embedded in a patchcord for 50 µm multimode fiber in FC/PC | EFJEF50CONFCPC |
| Encircled flux mode conditioner embedded in a patchcord for 50 µm multimode fiber in SC/PC | EFJEF50CONSCPC |

| Non Reflective Terminator Packages | Commercial References |
|---|---|
| SC/PC and SC/APC non-reflective terminator package | ENRTERMSC |
| FC/PC and FC/APC non-reflective terminator package | ENRTERMFC |

# Commercial References of the SmartOTDR

| OTDR Configurations[1] | Commercial References |
|---|---|
| SmartOTDR 1550nm A Range Handheld Tester With Continuous Light Source & PC Connector | E100A-PC |
| SmartOTDR 1550nm A-Range Handheld Tester with Continuous Light Source & APC Connector | E100A-APC |
| SmartOTDR filtered 1650 nm A-Range Handheld Tester with APC connector | E118FA65-APC |
| SmartOTDR filtered 1650 nm A-Range Handheld Tester with PON-XGPON (1490/1550/1578 nm) Power meter and APC connector | E118FA65PPM-APC |
| SmartOTDR 1310/1550nm A-Range Handheld Tester with Continuous Light Source & PC connector | E126A-PC |
| SmartOTDR 1310/1550nm A-Range Handheld Tester with Continuous Light Source & APC connector | E126A-APC |
| SmartOTDR 1310/1550nm & Filtered 1625nm B-Range Handheld Tester with Continuous Light Source & PC connector[2] | E136FB-PC |
| SmartOTDR 1310/1550nm & Filtered 1625nm B-Range Handheld Tester with Continuous Light Source & APC connector | E136FB-APC |
| SmartOTDR 1310/1550nm & Filtered 1650nm A-Range Handheld Tester with PC or APC connector | E138FA65-PC/-APC |

1. Comes with AC/DC converter/adapter, hands-free carrying case, stylus and getting started manual.
   OTDR connector adapter and battery type (LiPo mandatory for E126A and E136FB) are not included.
2. Available with SC OTDR connector adapter (EUSCADS) only

# Commercial references of the User manuals

| User manuals for MTS/T-BERD modules and SmartOTDR | Commercial References |
|---|---|
| Printed user manual for OTDR functions, Options and Software applications (French) | E4100M01 |
| Printed user manual for OTDR functions, Options and Software applications (English) | E4100M02 |
| Printed user manual for OTDR functions, Options and Software applications (German) | E4100M03 |

**NOTE**

The User Manuals are available in pdf format, into the unit.

The printed versions are available on option, in French, English or German.

# Commercial References of optical connectors and adapters

| Front Panel Optical Connectors for modules[1]<br>Single-mode Universal OTDR (Except LA OTDR Modules) | Commercial References |
|---|---|
| Universal PC Connector with FC adapter | EUNIPCFC |
| Universal PC Connector with SC adapter | EUNIPCSC |
| Universal PC Connector with ST adapter | EUNIPCST |
| Universal PC Connector with DIN adapter | EUNIPCDIN |
| Universal APC Connector for SM only with FC adapter | EUNIAPCFC |
| Universal APC Connector for SM only with SC adapter | EUNIAPCSC |
| Universal APC Connector for SM only with ST adapter | EUNIAPCST |
| Universal APC Connector for SM only with DIN adapter | EUNIAPCDIN |

1. A connector (universal) must be specified at time of order of the module

| **Front Panel Optical Connectors for Single-mode LA OTDR modules and SmartOTDR**[1] | **Commercial References** |
|---|---|
| Universal PC Connector with FC adapter (Screw Type) | EUNISPCFC |
| Universal PC Connector with SC adapter (Screw Type) | EUNISPCSC |
| Universal APC Connector ith FC adapter (Screw Type) | EUNISAPCFC |
| Universal APC Connector with SC adapter (Screw Type) | EUNISAPCSC |

1. A connector (universal) must be specified at time of order of the module

| **Front Panel Optical connectors for plug-ins**[1] **Multi-mode Universal OTDR** | **Commercial References** |
|---|---|
| Universal PC Connector with FC adapter | EUNIPCFCMM |
| Universal PC Connector with SC adapter | EUNIPCSCMM |
| Universal PC Connector with ST adapter | EUNIPCSTMM |
| Universal PC Connector with DIN adapter | EUNIPCDINMM |
| Universal PC Connector with LC adapter | EUNIPCLCMM |

1. A Connector (fixed or universal) must be specified at time of order of the plug-in

| **Additional Adapters for Universal Connectors**[1] | **Commercial References** |
|---|---|
| Universal FC Adapter | EUFCAD |
| Universal FC Adapter (Screw Type) | EUFCADS |
| Universal SC Adapter | EUSCAD |
| Universal SC Adapter (Screw Type) | EUSCADS |
| Universal ST Adapter | EUSTAD |
| Universal LC adapter (Screw Type) | EULCADS |
| Universal DIN Adapter | EUDINAD |

1. Interchangeable in the field

# Index

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English


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