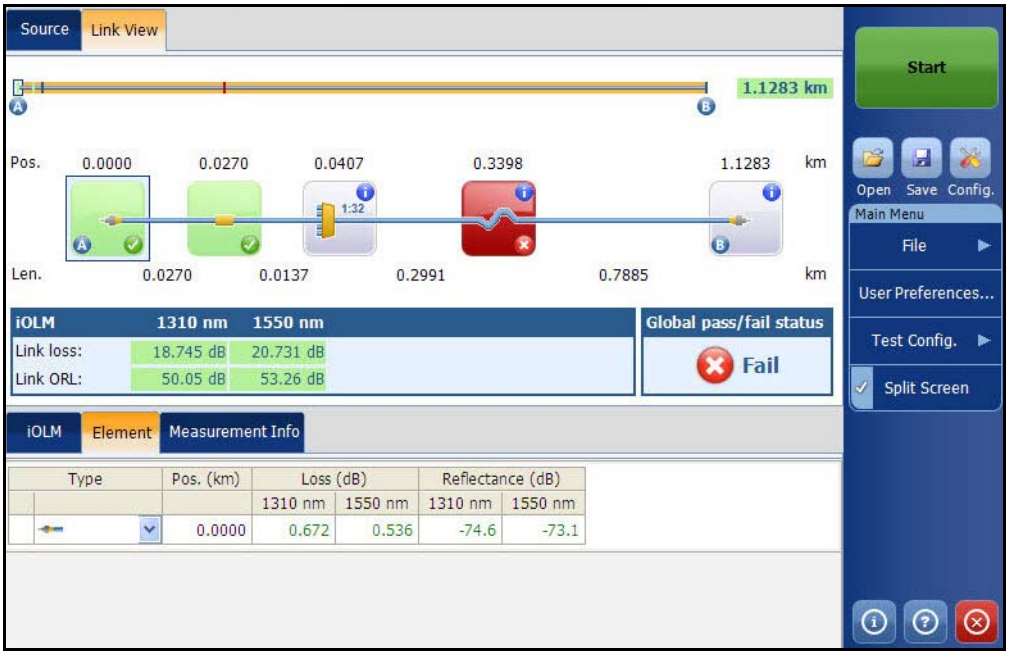
User Guide

iOLM

intelligent Optical Link Mapper



www.EXFO.com
Telecom Test and Measurement

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

Patent protection is being applied for the intelligent Optical Link Mapper, including its proprietary measurement Software.

EXFO's Universal Interface is protected by US patent 6,612,750.

Version number: 3.0.0

Contents

Certification Information

North America Regulatory Statement

This unit was certified by an agency approved in both Canada and the United States of America. It has been evaluated according to applicable North American approved standards for product safety for use in Canada and the United States.

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America and from ICES-003 compliance in Canada. However, EXFO Inc. makes reasonable efforts to ensure compliance to the applicable standards.

The limits set by these standards are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

European Community Declarations of Conformity

DECLARATION OF CONFORMITY

Application of Council Directive(s):
2006/95/EC – The Low Voltage Directive
2004/108/EC – The EMC Directive
93/68/EEC – CE Marking
And their amendments

Manufacturer's Name and Address:

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Equipment Type/Environment: Test & Measurement / Industrial
Trade Name/Model No.: (PON FTTx / MDU OTDRs) / FTB-700 SERIES

Standard(s) to which Conformity is declared:

EN 61010-1:2001 Edition 2.0	**Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements**
EN 61326-1:2006	**Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements**
EN 60825-1:2007 Edition 2.0	**Safety of laser products – Part 1: Equipment classification and requirements**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer:

Stephen Bull, E. Eng
Vice-President Research and Development

400 Godin Avenue,
Quebec City, Quebec
G1M 2K2 CANADA
August 18, 2010

CE EXFO

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Equipment Type/Environment: Test & Measurement / Industrial
Trade Name/Model No.: PON FTTx / MDU OTDR / FTB-7300E

Standard(s) to which Conformity is declared:

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Manufacturer:

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January 09, 2009

CE EXFO

DECLARATION OF CONFORMITY

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Equipment Type/Environment: Test & Measurement / Industrial
Trade Name/Model No.: METRO / CWDM OTDR / FTB-7400E

Standard(s) to which Conformity is declared:

EN 61010-1:2001 Edition 2.0	**Safety requirements for electrical equipment for measurement, control, and laboratory use – Part 1: General requirements**
EN 61326-1:2006	**Electrical equipment for measurement, control and laboratory use – EMC requirements – Part 1: General requirements**
EN 60825-1:2007 Edition 2.0	**Safety of laser products – Part 1: Equipment classification and requirements**

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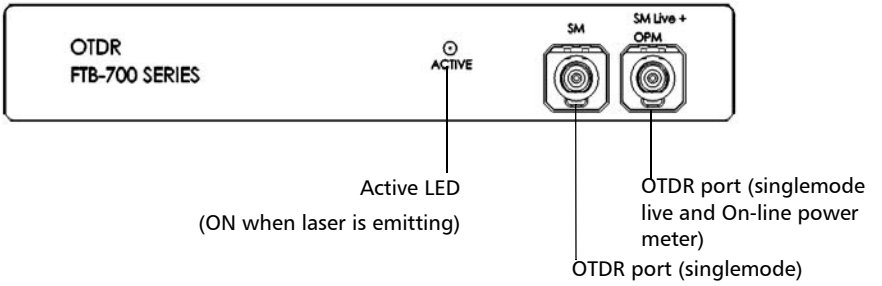
1 Introducing the intelligent Optical Link Mapper

The intelligent Optical Link Mapper is an optimized application for access/FTTx network characterization. Depending on the iOLM module configuration, the application can be used before and after network activation.

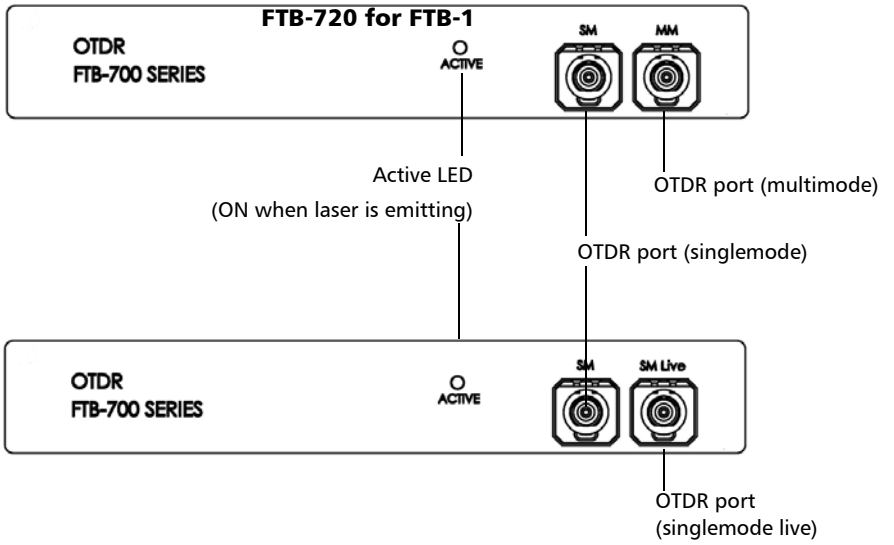
The iOLM module can be equipped optionally with an inline power meter. The power meter is called inline because the acquisition is done using the SM live port used for iOLM measurements. Optionally, you can measure the power levels for two wavelengths in a single acquisition, if two wavelengths are used for testing.

Note: *The iOLM application is supported by FTB-1 and FTB-200 V2. Your screen display may differ slightly from the figures in this user documentation depending on the platform you are using.*

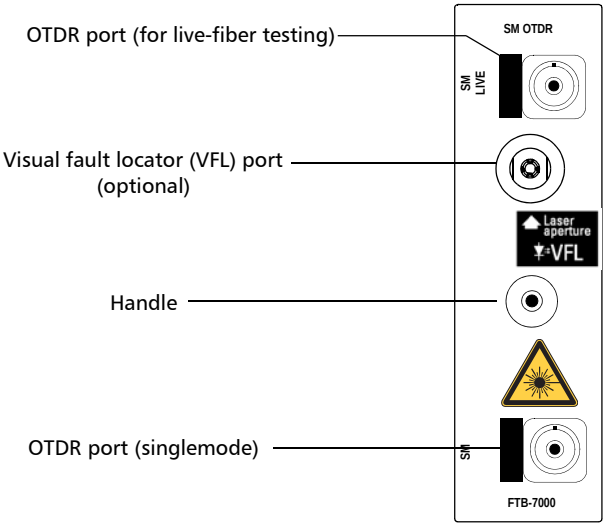
FTB-730 for FTB-1



FTB-720 for FTB-1



FTB-7000 for FTB-200V2



Singlemode and singlemode live models

Available iOLM Models

A wide variety of singlemode iOLM models are offered at several wavelengths to cover different fiber applications.

Module for FTB-1	Description
FTB-720-000-04B	OTDR with filtered 1625 nm port
FTB-720-023B-04B	OTDR 1310/1550 nm with filtered 1625 nm port
FTB-720-23B	OTDR 1310/1550 nm
FTB-720-12CD-23B	OTDR 850/1300 nm, 1310/1550 nm
FTB-730-23B	SM OTDR module, 1310/1550 nm (9/125 μm)
FTB-730-34B	SM OTDR module, 1550/1625 nm (9/125)
FTB-730-236B	SM OTDR module, 1310/1490/1550 nm (9/125 μm)
FTB-730-23B-04B	SM and SM live OTDR module,1310/1550 and 1625 nm live port including inline broadband power meter
FTB-730-000-04B	SM live OTDR with 1625 nm live port (9/125 μm) including inline broadband power meter
FTB-730-000-08B	SM live OTDR with 1650 nm live port (9/125 μm)

Module for FTB-200 V2	Description
FTB-7300E-023B	SM OTDR module, 1310/1550 nm (9/125 μm)
FTB-7300E-034B	SM OTDR module, 1550/1625 nm (9/125 μm)
FTB-7300E-234B	SM OTDR module, 1310/1550/1625 nm (9/125 μm)
FTB-7300E-236B	SM OTDR module, 1310/1490/1550 nm (9/125 μm)
FTB-7300E-023B-04B	SM and SM live OTDR module, 1310/1550 and 1625 nm live port
FTB-7300E-023B-08B	SM and SM live OTDR module, 1310/1550 and 1650 nm live port
FTB-7300E-000-04B	SM live OTDR with 1625 nm live port (9/125 μm)
FTB-7400E-0023B	SM OTDR module, 1310/1550 nm (9/125 μm)
FTB-7400E-0234B	SM OTDR module, 1310/1550/1625 nm (9/125 μm)
FTB-7400E-2347B	SM OTDR module, 1310/1383/1550/1625 nm (9/125 μm)
FTB-7400E-CWS	CWDM SM OTDR module, 1470/1490/1510/1530 nm (9/125 μm)
FTB-7400E-CWCL	CWDM SM OTDR module, 1550/1570/1590/1610 nm (9/125 μm)

Note: *The iOLM application does not support the 1383 nm wavelength. In the case of a CWDM module, only one wavelength can be acquired at a time.*

Principles of Operation

The iOLM application uses the hardware of an EXFO OTDR to perform acquisitions and characterize the various elements detected on the probed link. However, while a regular OTDR takes one averaged trace at a time, with one given set of test parameters, the iOLM takes a series of measurements and integrates them into a simple and intuitive Link View.

The test parameters for each sub-measurement are determined by smart algorithms during the measurement. Just as each link is different, each iOLM measurement is different, with its own set of test parameters according to the link length, loss, and ORL. Test time varies depending on the link tested, but is mostly influenced by total link loss. The application uses information from all sub-measurements to enhance the characterization of each element found on the link, yielding accurate and complete results. Depending on the module configuration, you can perform a single or multiple-wavelength acquisition. In the latter case, results will be provided for each wavelength, and a global pass/fail status for each element is displayed.

The application summarizes the results in a linear representation of the link, displaying each element with its associated position, loss and reflectance, as well as the element type.

Exporting Data to Other Formats

The iOLM application can generate report in various formats and allow batch post-processing of the measurement. The test configuration files can be created from FastReporter and imported on each test unit.

Launch and Receive Fiber

Unlike a traditional OTDR, the iOLM requires only a short launch fiber (>50 m) to benefit from all the advantages of this referencing method, regardless of the link length and loss. A launch fiber longer than 200 m is not recommended when testing PON links. Because the output port of an OTDR may degrade its loss and ORL performances after multiple connections, the use of a launch cable is always recommended.

The first element of the tested link is tagged with the letter (A) into the link view. A launch cable allows you to properly characterize the first connector of the fiber link under test (A) and exclude the OTDR connector's wear from the link evaluation. A reasonable amount of degradation of the OTDR connector is acceptable when using an APC interface; the ORL remains low due to the angle polish, preventing poor near-end resolution. By using a launch fiber, the OTDR connector loss is excluded from the measurement. The iOLM evaluates the OTDR connector loss each time a measurement is performed to inform you about the condition of the connector. It is important to understand that excessive loss at this connector will eventually degrade the measurement capabilities of the instrument. In addition, using a launch cable will help protect your OTDR connector by limiting the number of connections performed directly on that connector. It is easier to repair or replace a launch cable than to replace the OTDR connector.

The last element of the tested link is tagged with the letter (B) into the link view. A receive fiber cable can be used at the end of the link opposite the test module in order to characterize the last connector of the link (B) and increase the precision of the total insertion loss result by comparing differential level of two known fibers (to avoid errors due to different backscatter coefficients of the fiber used in the link). If no receive cable is used, the iOLM application will be able to measure the position and ORL of this connector in unmatched condition, but not its loss. No pass/fail status will be displayed for that connector. The required length of the receive fiber will depend on the loss of the link under test. A higher loss requires a longer pulse to reach the receive fiber level. Unlike the launch fiber, the

receive fiber has the same limitations than that of a traditional OTDR. Test of a 1 km fiber span with less than 2 dB of loss will require only 100 m of receive fiber. Testing a 23 dB PON link will require a receive fiber of 500 m to 2 km, depending on the fiber length after each splitter.

The iOLM application allows you to manually set the lengths of both your launch and receive cables. In addition, it is possible to automatically measure the launch or receive cables. When carrying out the calibration, the application will perform a fast measurement and evaluate length of the fiber. For this reason, only the cable under test must be connected to the module when performing a calibration.

If link elements are found on the fiber under calibration or if the OTDR connector is defective, the calibration will fail and a warning is displayed to explain the reason for the failure. A short patchcord (<5 m) is accepted between the instrument and the fiber under calibration and will be included in the calibrated length. If the calibration is successful, the launch or receive fiber length will be updated in the **Test Parameters** tab.

When performing a measurement, the iOLM will try to match the defined launch and receive fibers with elements found on the link to set the A and B connector positions. If no events are found at specified distances because of a “perfect” connection between link and launch or receive fibers, the iOLM will insert an element at a specified position (with zero loss and ORL).

See *Configuring iOLM* on page 37 for more details.

Conventions

Before using the product described in this guide, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

The use of controls, adjustments and procedures other than those specified herein may result in exposure to hazardous situations or impair the protection provided by this unit.

IMPORTANT

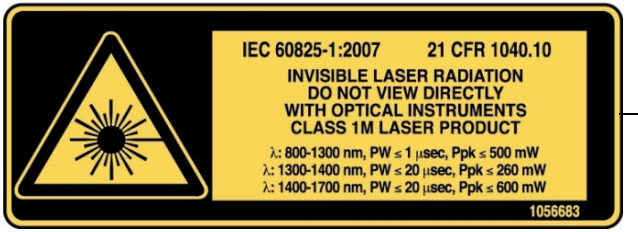
When you see the following symbol on your unit  **, make sure that you refer to the instructions provided in your user documentation. Ensure that you understand and meet the required conditions before using your product.**

Laser Safety Information (Models without VFL)

Your instrument is a Class 1 laser product in compliance with standards IEC 60825-1 2007 and 21 CFR 1040.10. Laser radiation may be encountered at the output port.

The product is safe under reasonably foreseeable conditions of operation but it may be hazardous if you use optics within a diverging or collimated beam. *Do not view directly with optical instruments.*

The following label (s) indicate that the product contains a Class 1M laser source.

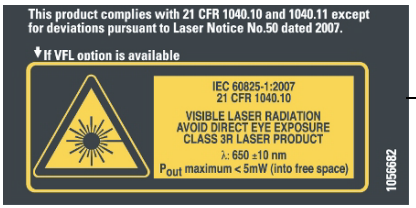


Affixed to module's side panel

Laser Safety Information (Models with VFL)

Your instrument is a Class 3R laser product in compliance with standards IEC 60825-1 2007 and 21 CFR 1040.10. It is potentially harmful in direct intrabeam viewing.

The following label(s) indicate that the product contains a Class 3R source:



Affixed to module's side panel

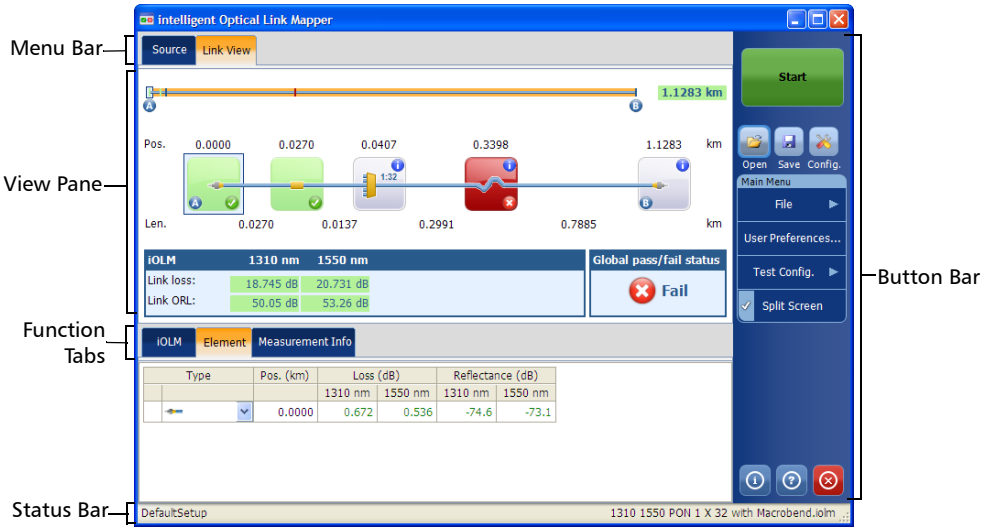
3 Getting Started with intelligent Optical Link Mapper

Note: *Please refer to your platform's user guide for detailed information regarding inserting and removing test modules, and starting module applications.*

Note: *Some features for this application are enabled when you purchase the iOLM EXpert and RT option. For details on how to activate the option, refer to your platform's user guide.*

Main Window

The main window allows you to start the acquisition and view measurement results and values.



Status Bar

The status bar, located at the bottom of the main window, identifies the selected configuration file name in the application, acquisition wavelength (when an acquisition is in progress), and the acquisition progress bar of the intelligent Optical Link Mapper. It also displays the next file name according to the autonaming scheme. For more information, see *Naming iOLM Files Automatically* on page 29.

Note: *When an acquisition is not in progress, the file name of the file currently present in memory is displayed.*

Name of the current configuration file.

Name of the current loaded iOLM file. The loaded file name and the next file name turns into a progress bar during the acquisition.

4 Preparing your intelligent Optical Link Mapper for a Test

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

- **Always inspect fiber ends and make sure that they are clean as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.**
- **Ensure that your patchcord has appropriate connectors. Joining mismatched connectors will damage the ferrules.**

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection microscope. If the fiber is clean, proceed to connecting it to the port. If the fiber is dirty, clean it as explained below.
2. Clean the fiber ends as follows:
   - **2a.** Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.
   - **2b.** Use compressed air to dry completely.
   - **2c.** Visually inspect the fiber end to ensure its cleanliness.

3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces.

   If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.

4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

   If your connector features a screwsleeve, tighten the connector enough to firmly maintain the fiber in place. Do not overtighten, as this will damage the fiber and the port.

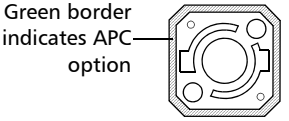
Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

EXFO uses good quality connectors in compliance with EIA-455-21A standards.

To keep connectors clean and in good condition, EXFO strongly recommends inspecting them with a fiber inspection probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation in measurements.

Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) polishing. A green border around the baseplate indicates that it is for APC-type connectors.

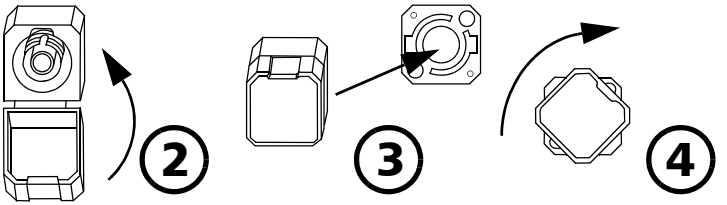


IMPORTANT

EXFO strongly recommends to only use APC module connectors.

To install an EUI connector adapter onto the EUI baseplate:

1. Hold the EUI connector adapter so the dust cap opens downwards.



2. Close the dust cap in order to hold the connector adapter more firmly.
3. Insert the connector adapter into the baseplate.
4. While pushing firmly, turn the connector adapter clockwise on the baseplate to lock it in place.

5 Setting User Preferences

The **User Preferences** window allows you to set general settings, identification settings, and select the power meter mode.

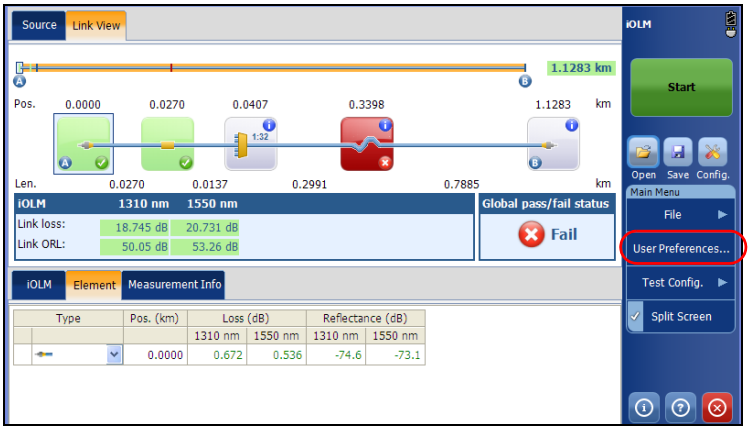
Note: *The preference settings are user specific.*

Defining General Settings

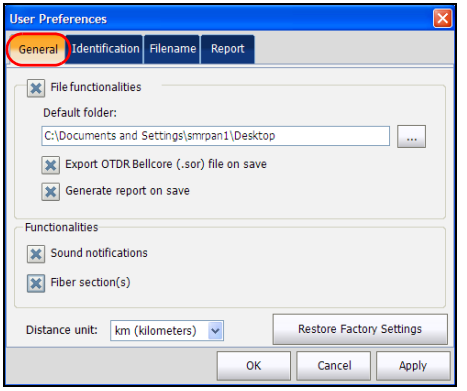
The **General** tab allows you to enable/disable **File functionalities**, **Generate report on save**, enable/disable **Export OTDR Bellcore (.sor) file on save, Sound notifications**, **Fiber section (s)**, and set the **Distance unit** for the application.

To set general settings:

1. From the **Main Menu**, press **User Preferences**.



2. Select the **General** tab.



3. Under the **General** tab, configure the following settings:

➤ **File Functionalities**: If enabled, any user interface control related to file functionalities (for example, Default path, Export OTDR bellcore file, Generate report on save, Open, Save, Filename, etc.) will be visible on the screen.

Note: *If the **File Functionalities** option is disabled, the application does not notify you with the warning message when files are saved. When **File Functionalities** is disabled, the **Default folder**, **Export OTDR Bellcore (.sor) file on save**, and **Generate Report** options are also disabled.*

➤ **File Save Path**: Enter the location for saving the files. This path is used to save the iOLM files and OTDR Bellcore (.sor) files after an acquisition.

Note: *The default path provided by the operating system is used to save the files the first time you start an acquisition.*

- **Export OTDR Bellcore (.sor) file on save**: If enabled, an OTDR Bellcore (.sor) file is generated for each wavelength whenever the iOLM measurement is saved. The wavelength value that is appended to the filename and it is separated with an "_" (underscore).

Note: *The Bellcore (.sor) fails if the iOLM measurement doesn't contain the necessary intermediate OTDR data, or if the iOLM acquisition process is interrupted by the user, or it is self interrupted because of a live fiber is present in iOLM measurement.*

- **Generate Report on Save**: If enabled, the report is automatically saved each time the measurement is saved.

Note: *You can also generate a report by selecting **Report** in the **File** menu.*

- **Distance Unit**: Select the **Distance Unit** from the drop-down menu.

Note: *The units displayed in the application and report depend on the unit selected here.*

- **Sound Notification**: If enabled, you will hear a sound when the unit detects important events.
- **Fiber section(s)**: If enabled, you can select the section in the link view and the corresponding details of the selected section are displayed in the **Element** table.

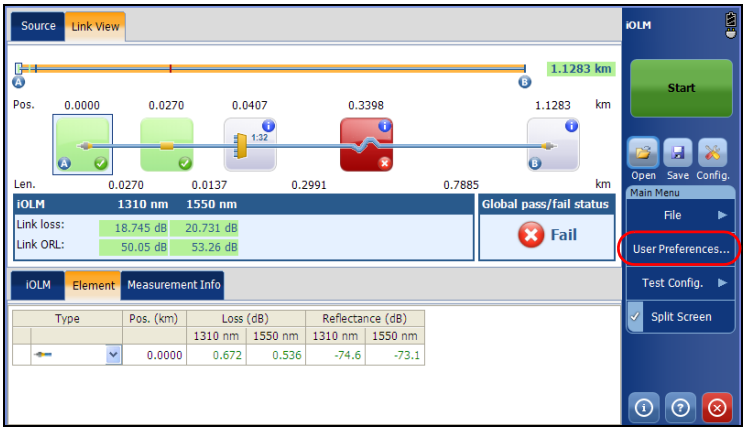
Press **Restore Factory Settings** to remove all the changes and apply the default values.

Defining Measurement Identification

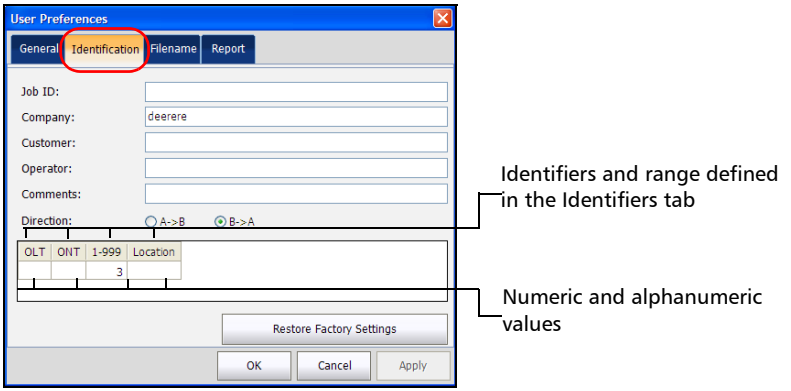
You can define the measurement identification information, that is, job ID, company information, customer name, name of the operator, and comments for the future acquisition in the **Identification** tab. The identifiers defined in the **Link Definition** tab are also displayed here (see *Modifying Link Definition* on page 42 for more details).

To enter identification information:

1. From the **Main Menu**, press **User Preferences**.



2. Select the **Identification** tab.



3. Define the identification information as needed.

   The range describes the auto-increment start and stop values for the identifiers. It is specified in the **Identifiers** tab under the **Test Configuration** window.

   The file name generated for future acquisitions will contain the combination of the numeric and alphanumeric values specified in the respective fields. For more information on file autonaming, see *Naming iOLM Files Automatically* on page 29.

4. Select the direction of the iOLM file from the **Direction** option.

5. Press **Apply** to save the changes.

6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

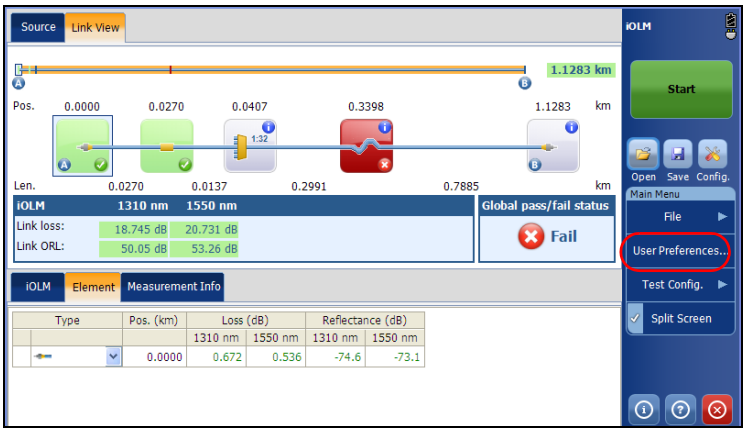
Press **Restore Factory Settings** to remove all the changes and apply the default values.

Customizing the File Name

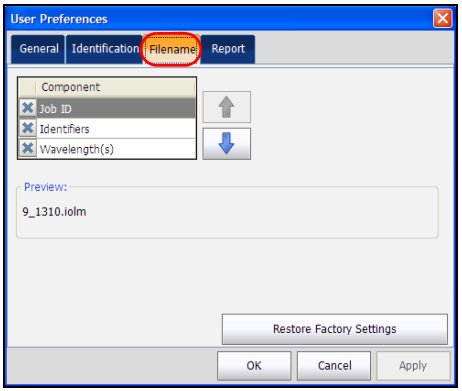
The application provides a way to define the name of the file to be saved. Defining a file autonaming format allows you to quickly and automatically name the files in a sequential order. The customized file name appears when the file is saved using the **Save** or **Save As** option. It is possible to select which fields you want to include in the file name and the order in which it should be displayed.

To customize the file name:

1. From the **Main Menu**, press **User Preferences**.



2. Select the **Filename** tab.



3. Select which component you want to include in the file name from the list of available choices:

- **Job ID**: indicates the Job ID configured in the **Preferences** under the **Identification** tab.
- **Wavelength(s)**: indicates the current iOLM and power meter wavelengths.
- **Identifiers**: indicates the identifier value configured in the **Preferences** under the **Identification** tab.

Note: *The identifier value is automatically incremented after a new acquisition is successfully saved using **Save** option. The **Save As** option will not increment the identifier value automatically.*

4. Press Up ( ) or Down ( ) to change the order in which the components will appear in the file name.

   Based on the items you have selected, a preview of the file name is displayed under **Preview**. The components are separated with an "_" (underscore).

Note: *If you do not select any file component, the **Save As** window appears even when you press **Save**.*

5. Press **Apply** to save the changes.
6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Factory Settings** to remove all the changes and apply the default values.

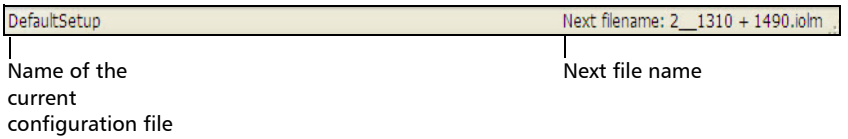
Note: *If the "Wavelengths" file name component is selected, then all of the iOLM wavelengths present in the iOLM measurement are added to the file name. When the power meter level is present in the measurement, power meter wavelengths are added to the file name. For example, if the wavelength is the only file name component selected under the **Filename** tab, the iOLM measurement is done at 1625 nm and the power meter measurement is done at 1490 nm + 1550 nm, then the file name will be "1625_1490 + 1550.iolm".*

Naming iOLM Files Automatically

Each time you start an acquisition, the application suggests a next file name based on autonaming settings.

The application displays the next file name in the status bar in the following scenarios:

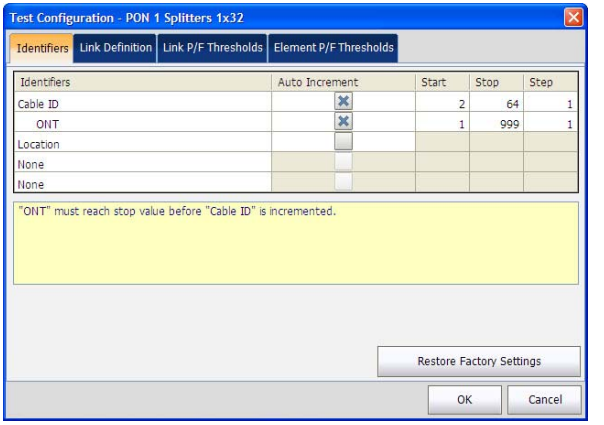
- When the application is started for the first time, the status bar displays the next file name. You can change the name of the next file through the **Filename** tab. When you load the iOLM file the application displays the corresponding file name in the status bar.
- When the acquisition is complete and the file is not saved, the next file name is displayed. Once the file is saved the application displays the file name.



The application displays the file name in the Status bar, after the file is saved.

Note: *All the file name components are enabled in this example. See* Customizing the File Name *on page 26 to enable file name components.*

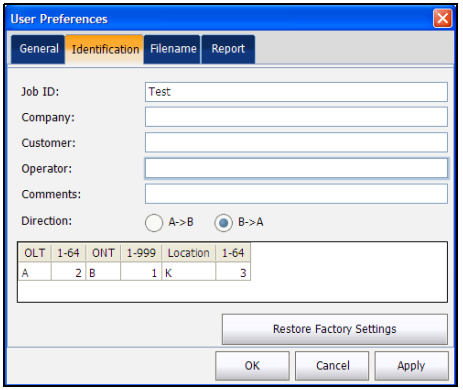
Consider the figure below as an example of autonaming feature.



You can find the above window at **Test Config.** > **Manage** > **Modify** > **Identifiers** tab.

In the figure above, you can modify the identifiers, start, stop, and step values and enable the auto increment of the identifier values. See *Modifying Identifiers* on page 46 for more details on how to specify the start, stop, and step values.

Note: *The identifiers defined in the **Identifiers** tab are displayed in the table under **User Preferences** in the **Identification** tab.*



You can find the above window at **User Preferences** > **Identification** tab.

In the figure above, you can specify the values of the identifiers, such as **OLT** as A, OLT measurement range as 2, **ONT** as B, and so on.

Note: *By default, the start values specified in the **Identifiers** tab are displayed in the measurement range in the table under **User Preferences** in the **Identification** tab. See* Defining Measurement Identification *on page 24 for more details.*

After an acquisition is successfully saved, the file name is the combination of job ID, identifiers, and the wavelength. These values are separated in the file name with an "_" (underscore).

For example, the file name after the first acquisition is <Job ID>_A2_B1_K3_<wavelength>.iolm

Note: *If the ONT, OLT, and location values are not specified, then the file name will only contain the Job ID value, numeric identifiers value, and the wavelength.*

After a new acquisition is successfully saved, the location value will increment by the set step value, that is, for the second acquisition file name, the location value will be 6.

So, the file name after the second acquisition can be

<Job Id>_A2_B1_K6_<wavelength>.iolm

When the location value reaches the stop value, it resets to start value and ONT value starts incrementing by step value.

The auto increment of values proceeds from right to left.

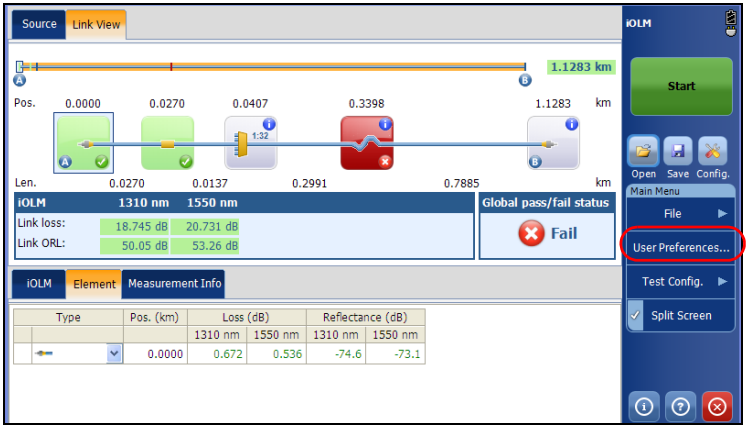
Note: *The auto increment continues until the first number (that is, OLT value) reaches the stop value.*

Customizing the iOLM Report

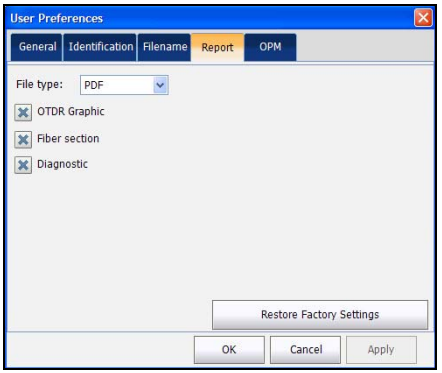
The application allows you to personalize the iOLM report.

To customize the iOLM report:

1. From the **Main Menu**, press **User Preferences**.



2. Select the **Report** tab.



3. Select the report file type from **File type** option.

4. Select the **OTDR Graphic** option to display the OTDR graph in the iOLM report. For more information, see *iOLM Report with OTDR graphic and Diagnostic information* on page 143.

Note: *The OTDR graph generation fails if the iOLM measurement does not contain the necessary intermediate OTDR data, or if the iOLM acquisition process is interrupted by the user, or it is self interrupted because of a live fiber is present in iOLM measurement.*

5. Select **Fiber section(s)** option to display the section information in the iOLM report. For more information, see *iOLM Report* on page 141.
6. Select **Diagnostic** option to display the diagnostics information in the iOLM report. For more information, see *iOLM Report* on page 141

Press **Restore Factory Settings** to remove all the changes and apply the default status.

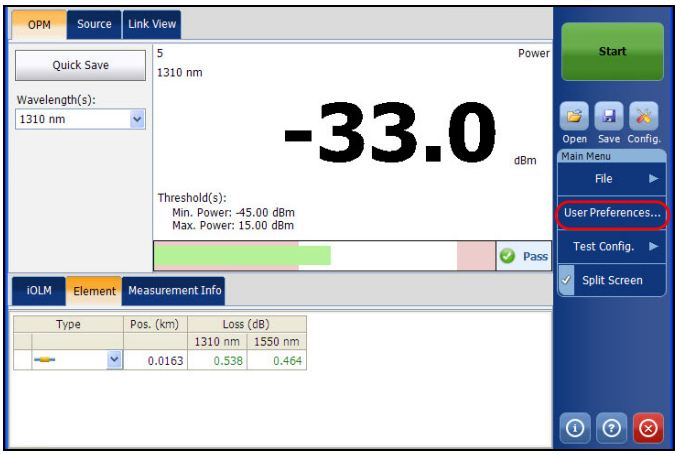
Customizing OPM

The **OPM** tab is available when the power meter is available in the module.This tab allows you to select the power meter mode which affects the available wavelengths in the **OPM** tab of the main window.

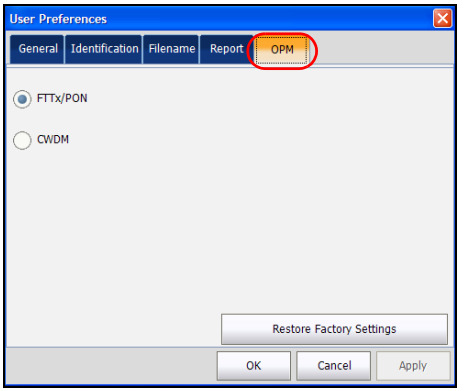
The **OPM** tab is available when the power meter is available in the module.

To customize the OPM:

1. From the **Main Menu**, press **User Preferences**.



2. Select the **OPM** tab.



3. Select the power meter mode. The choices are **FTTx/PON** and **CWDM**.

Note: *The wavelengths available in the **OPM** tab are those used for the selected power meter mode.*

4. Press **Apply** to save the changes.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

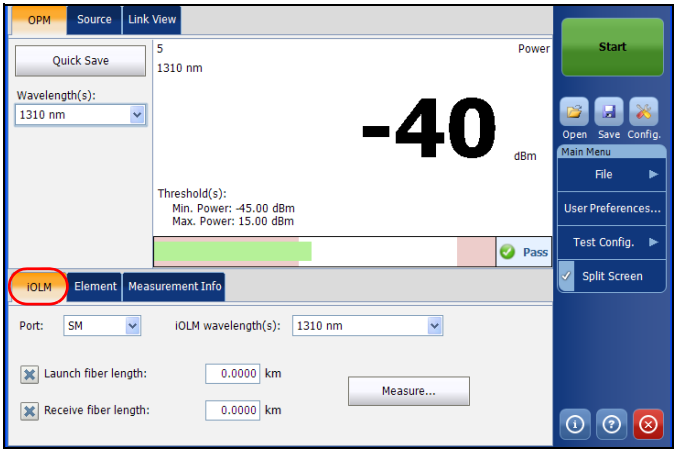
Press **Restore Factory Settings** to remove all the changes and apply the default values.

Configuring iOLM

The **iOLM** tab displays the settings used for taking measurements. The iOLM performs the acquisition on the port and wavelengths selected in the **iOLM** tab. The values of the **iOLM** tab is preserved for the next acquisition.

To configure the* iOLM*:

1. From the main window, select the **iOLM** tab.



2. Change the settings as needed.

- **Port**: The Port field is displayed only if two ports are available. The ports are **SM** and **SM Live**.
- **iOLM Wavelength(s)**: Select the iOLM Wavelengths for the next acquisition. The available wavelengths depend on the iOLM module.
- **Launch Fiber Length**: Specify if a launch fiber is connected between the test unit and the link under test and, enter the length of the launch fiber. The acceptable range is from **0** to **5 km**. See *Launch and Receive Fiber* on page 7 for more details.

- **Receive Fiber Length**: Specify if a receive fiber is connected at the end of the link under test, and enter the length of the receive fiber. If selected, the receive fiber will be included in the acquisition. The acceptable range is from **0** to **5 km**. See *Launch and Receive Fiber* on page 7 for more details.
- **Measure**: Press **Measure** to automatically calibrate the launch or receive fiber length.

6 Managing Test Configurations

This section explains the procedure to select, create, view and modify the test configuration.

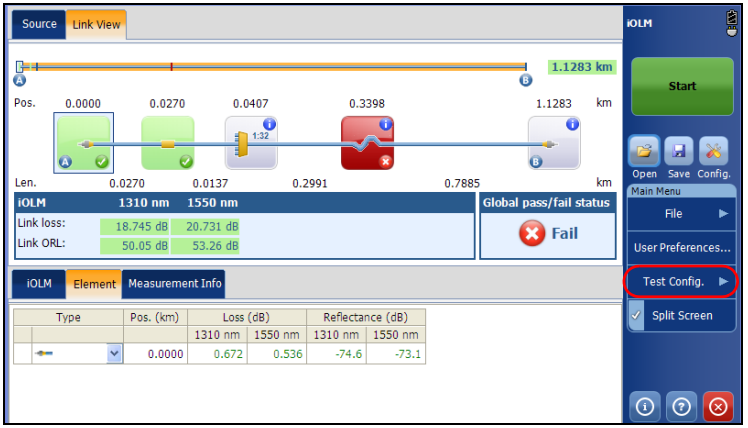
Selecting a Test Configuration

The test configuration is selected to apply the configuration settings (thresholds, link definition parameters, etc.) in the iOLM application for the next acquisition.

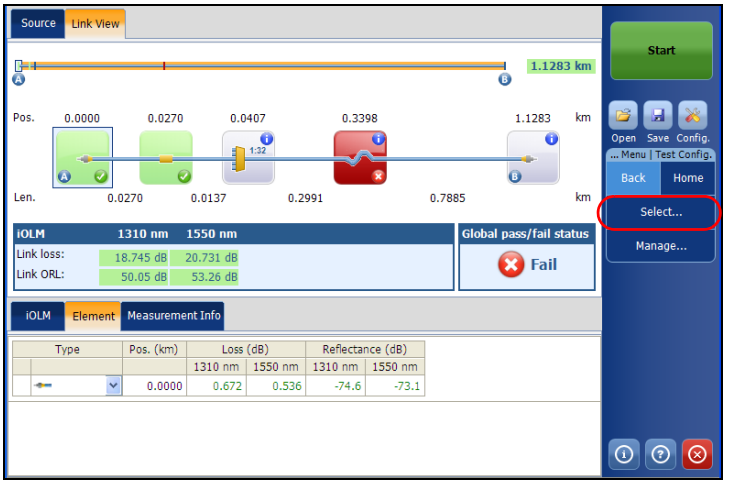
Note: *If no configuration files are available, the application will use the default configuration settings. To manage the test configuration parameters, see* Modifying a Test Configuration *on page 46.*

To select the test configuration:

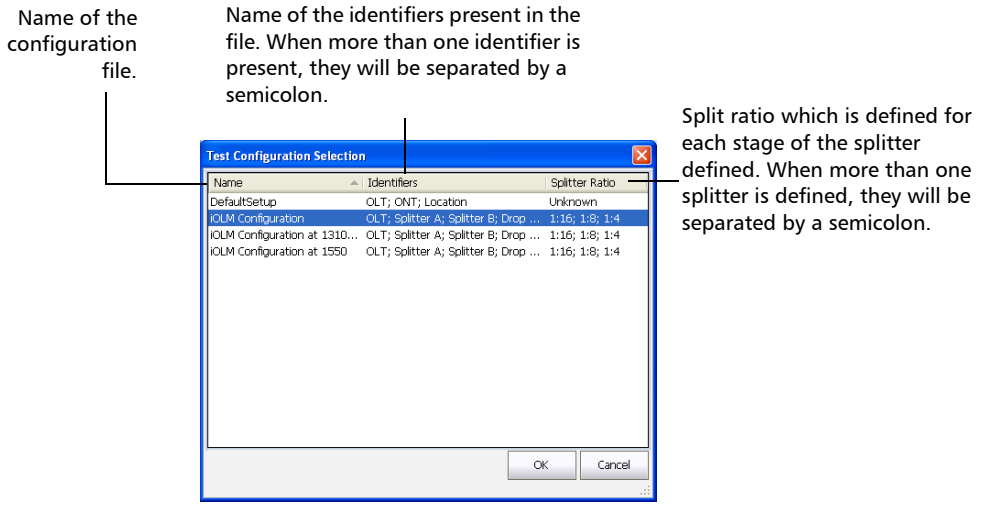
1. From the **Main Menu**, press **Test Config.** or press  .



2. Press **Select**.



3. Select the test configuration file.



Note: *If you have selected any measurement where 2:N is available, then it is displayed as Ready Only mode in the* ***Test Configuration Selection*** *dialog box even if the iOLM EXpert option is not activated*

Note: *Click on the column to sort the column in ascending or descending order. By default, the configuration list will be sorted in ascending order according to the Name column.*

4. Select the test configuration from the list of available choices.

5. Press **OK** to apply the configuration and close the window, or press **Cancel** to exit without applying changes.

Impacts of Test Configurations

Before performing an acquisition, you can select or edit a test configuration that fits the link under test. This configuration contains specific pass/fail thresholds and the definition of any expected PON splitter. Once selected, the configuration will be used for all following measurements.

The configuration data is structured in the same way than an iOLM result file. Each result file contains the entire configuration data used for the measurement.

Using a test configuration may, influence the minimum reach of the measurement in terms of loss. For instance, the expected loss budget of a link that includes splitters will force the acquisition to cover at least this loss budget. Because of this, using an accurate test configuration can improve the accuracy of the measurements. If an inaccurate configuration file is used, some link element types might be wrongly defined. For instance, if no splitter stage is defined, actual splitters will be described as splices or connectors. This will not affect the reflectance and loss values associated with the link elements, only their type. After a measurement is completed, a link element type can be changed in order to apply the correct pass/fail threshold.

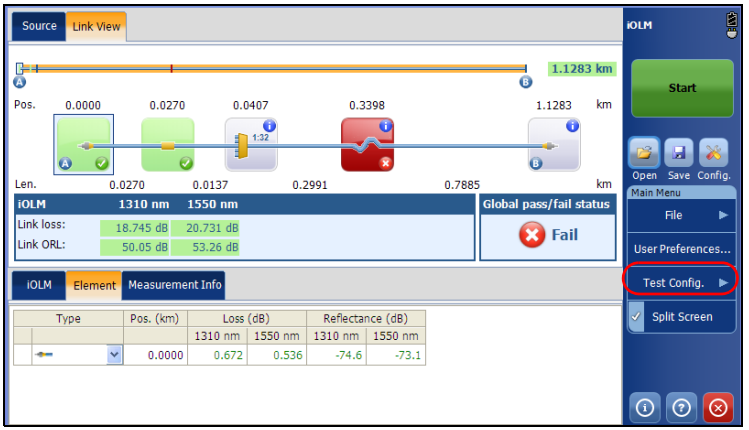
The pass/fail thresholds defined in the configuration file will have no impact on the capacity of the iOLM application to perform measurements. Only the pass/fail status of the link or link elements will be determined by the user-defined thresholds.

Creating a Test Configuration

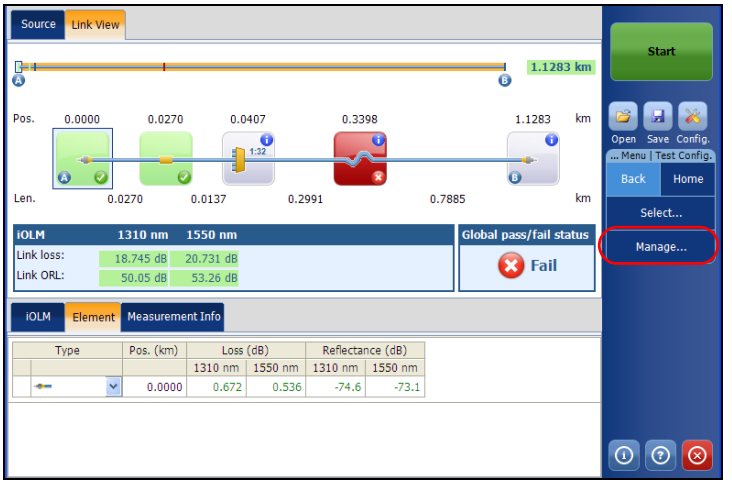
The **Duplicate** button allows you to create a copy of a selected configuration file.

To create a copy of test configuration:

1. From the **Main Menu**, press **Test Config**.

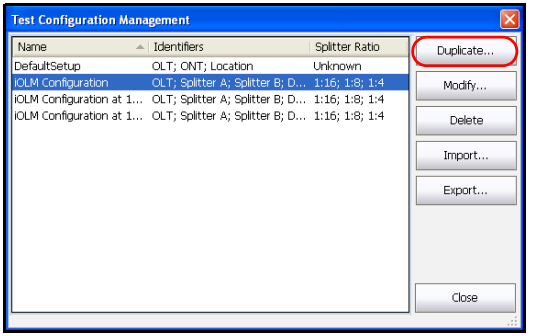


2. Select **Manage**.

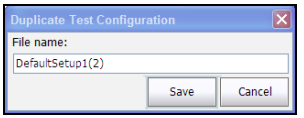


3. Select the test configuration file to duplicate.

4. Press **Duplicate**.



5. The default file name is displayed. You can modify the file name, if required.
6. Press **Save** to save the file or press **Cancel** to exit without saving.



Note: *A number between parenthesis will be automatically incremented at the end of the file name to avoid unwanted overwrites.*

A new copy of the selected configuration file is created. You can modify the duplicated file, if required. See *Modifying a Test Configuration* on page 46 for more details.

7. Press **Close** to close the window.

Modifying a Test Configuration

The **Modify** button in the **Manage** main menu allows you to view the selected configuration file and modify it, if required.

Note: *The test configuration settings will be effective for the next acquisition.*

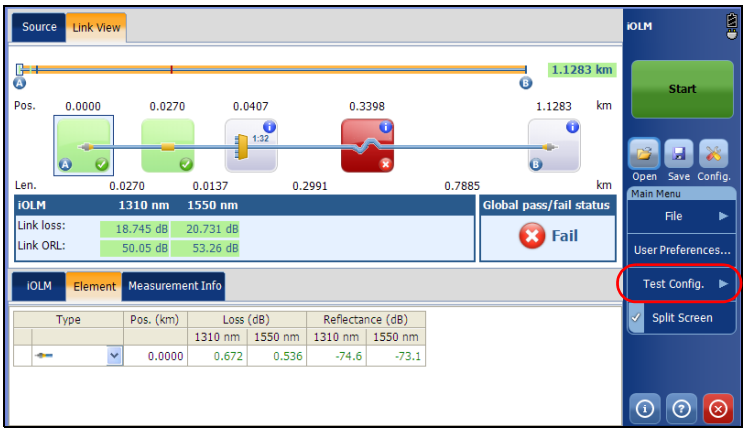
Note: *If the default factory settings file, or any predefined file is selected, the **Modify** button will appear as **View**, which means that you cannot modify the factory test configuration files. Also, you cannot modify the files created by the supervisor, if you are logged in the module as a operator or any user with lower privileges than supervisor.*

Modifying Identifiers

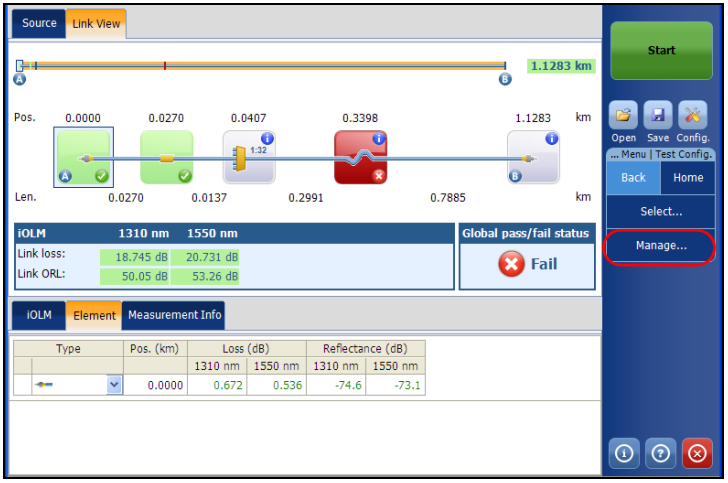
The **Identifiers** tab allows you to view and modify the identifier values.

To modify Identifiers:

1. From the **Main Menu**, press **Test Config**.

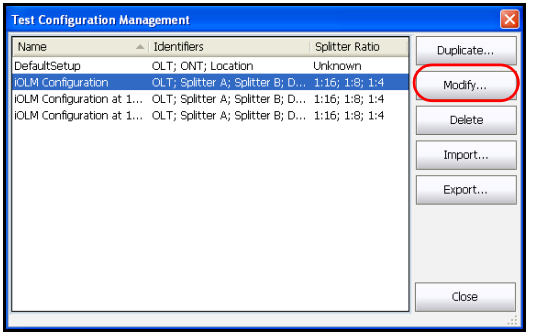


2. Select **Manage**.



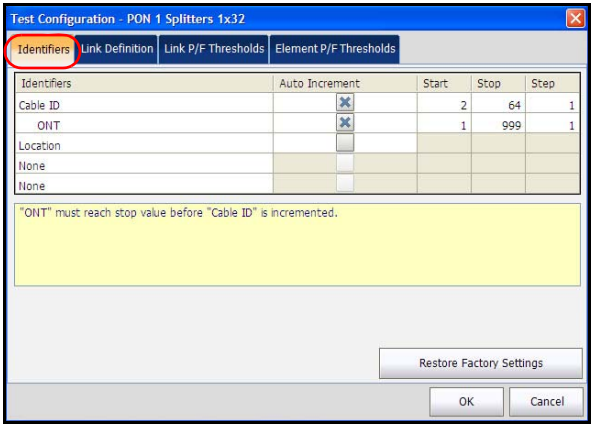
3. Select the test configuration file to modify.

4. Press **Modify**.



The name of the configuration is displayed on the title bar of the window.

5. Select the **Identifiers** tab.



6. Under **Identifiers**, select the identifiers from the list of available choices.

Note: *Two identifiers cannot have the same name.*

7. Under **Auto Increment**, enable or disable the auto increment option. It enables the numeric part of the identifiers to be incremented/decremented after the acquisition has been saved successfully.
8. Enter the start, stop, and step values for the identifier under **Start**, **Stop**, and **Step**.

Note: *The Step value must be smaller than the difference between the Start and Stop values. If the Start is greater than the Stop, then the identifier value begins decrementing by the specified Step.*

9. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Factory Settings** to remove all the changes and apply the default values.

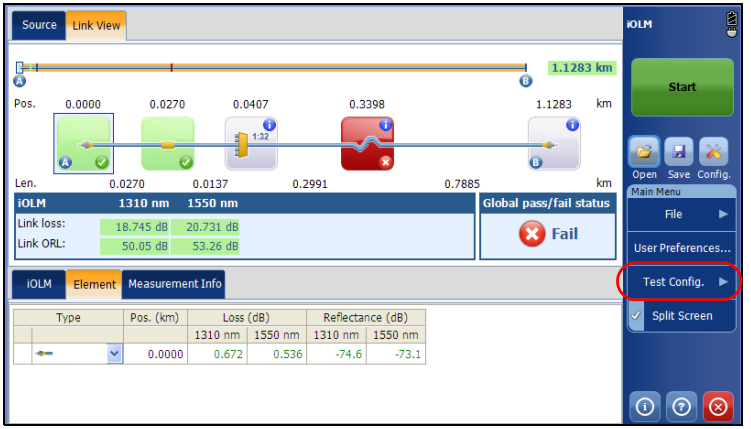
Modifying Link Definition

The **Link Definition** tab allows you to view and modify the link definition.

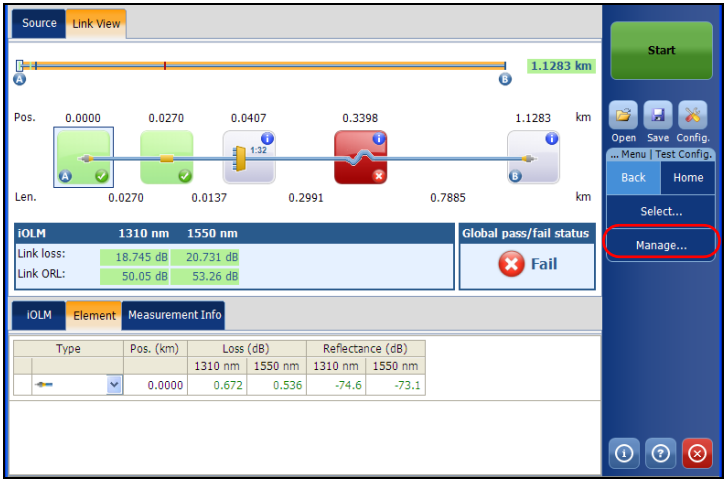
The links defined in the **Link Definition** tab are based on the network topology. For example, if there are 2 splitters present in the PON network, you may define two stages of splitter with their respective split ratio. You may change the IOR value, or change or rename the identifiers according to the network, which will help you to identify where the measurement is done in the PON network. The modifications will be applicable for future acquisitions.

To modify link definition:

1. From the **Main Menu**, press **Test Config**.

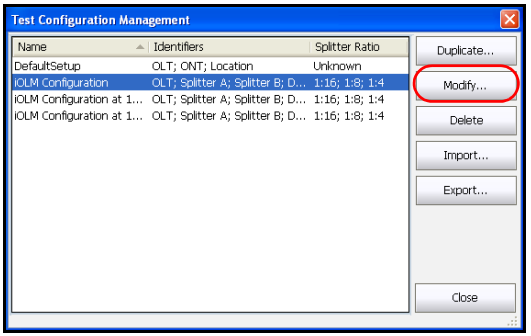


2. Select **Manage**.



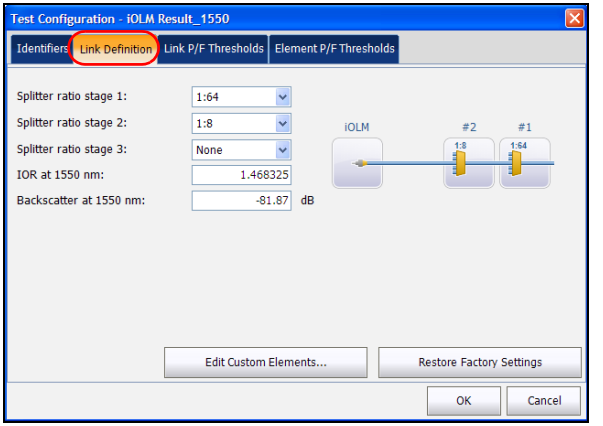
3. Select the test configuration file to modify.

4. Press **Modify**.



The name of the configuration is displayed on the title bar of the window.

5. Select the **Link Definition** tab.



6. Select the split ratio of a splitter at a given stage.

Select **1:?** if the splitter ratio is unknown. The iOLM finds the splitter ratio automatically and the element is not tested for pass/fail.

If **None** is selected as Splitter Ratio Stage, then the iOLM will not try to find or apply a split ratio at the given stage.

The PON network can have multiple splitters. The iOLM application supports testing a PON network having maximum of three splitters. So, the splitter ratios can be defined up to three stages.

Note: *The splitter ratios are defined at different stages, depending on how they are defined in the network.*

Note: *The link view displays the link element closest to the iOLM module to the left and then proceeds towards the right.*

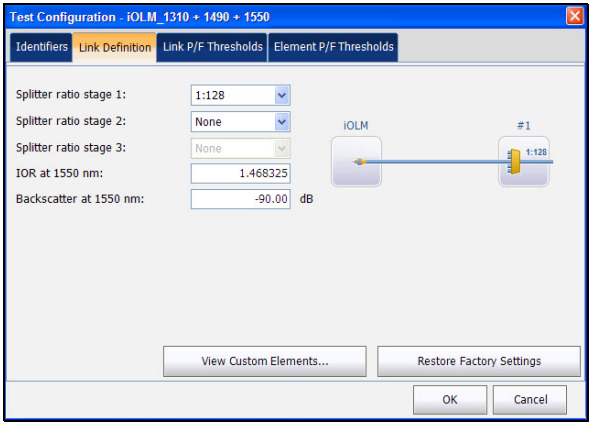
➤ **IOR at 1550 nm**: Refraction index of the iOLM measurement, also known as *group index*. If you modify this parameter, the distance measurements for the trace will be adjusted.

➤ **Backscatter at 1550 nm**: Rayleigh backscatter coefficient setting of the iOLM measurement. If you modify this parameter, the reflectance and ORL measurements for the trace will be adjusted.

Note: *The iOLM application automatically calculates the IOR and Backscatter values for other wavelengths.*

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Click on **Edit Custom Elements** to add, edit, or delete the custom element. For more information, see *Managing Custom Elements (Optional, iOLM EXpert Mode Only)* on page 57. If the iOLM EXpert option is not activated, you can view the custom element present in the test configuration by clicking on the **View Custom Elements**.



Press **Restore Factory Settings** to apply the default values.

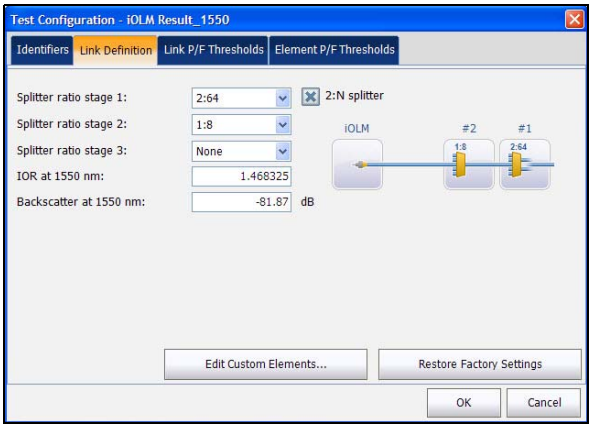
Note: *Restore Factory Settings does not change the modifications done in the* ***Edit Custom Element****.*

Enabling 2:N Splitters (Optional, iOLM EXpert Mode Only)

The 2:N splitter can be used to create network redundancy. If a network break occurs, the operator can connect through the other network branch. This ensures active communication while the repairing of the broken network is in progress.

If the 2:N splitter is selected for the **Splitter ratio stage 1** field and the test configuration is imported on a unit where theiOLM EXpert is not activated then the 2:N splitter is automatically replaced by 1:N splitter. For example, if in the test configuration stage 1 is selected as 2:128 and the iOLM EXpert option is deactivated, then it is automatically replaced by 1:128.

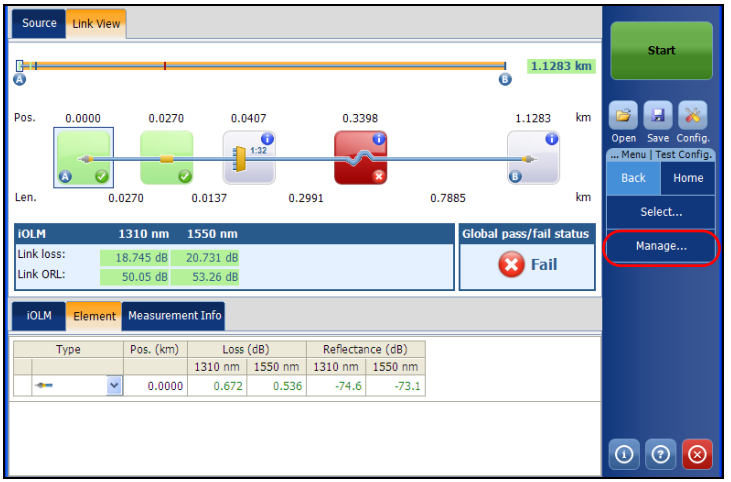
In the Splitter ratio stage 1 field, if 1:? or None is selected and you have enabled the 2:N splitter option, then the 1:? and None are replaced by a splitter value of 2:2.



Note: *The threshold for the 2:N splitter is displayed in the **Element P/F Thresholds** tab only if the 2:N splitter is selected in **Link Definition** tab.*

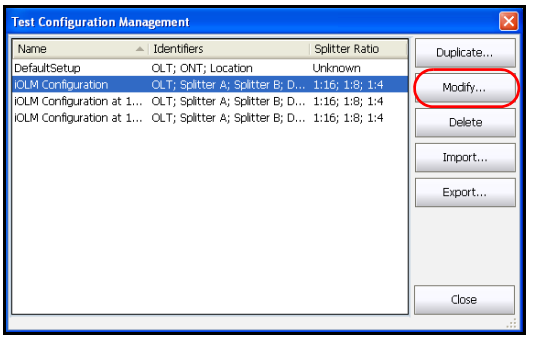
To enable the 2:N splitter:

1. From the **Main Menu**, press **Test Config** > **Manage**.

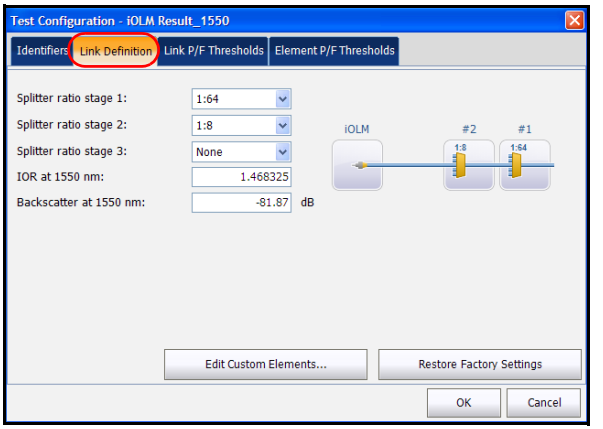


2. Select the test configuration file to modify from the test configuration list file.

3. Press **Modify**.



4. Select the **Link Definition** tab from the test Configuration.



5. Enable **2:N splitter**.
6. Select the required ratio from **Splitter ratio stage 1**.
7. Click **OK** to save your changes or **Cancel** to discard them.

The element pass/fail status remains unknown in the following scenarios:

- If any element is followed by 2:N splitter in the link then the element's loss pass/fail status is displayed as unknown.
- If the element has a reflectance value and it is placed after the 2:N splitter element, then the element's reflectance pass/fail status is displayed as unknown.
- If the 2:N splitter is in a group of elements and an element follow the 2:N splitter in the group, then the pass/fail status of group is displayed as unknown.

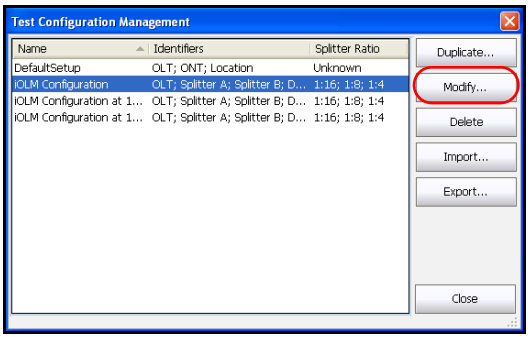
Managing Custom Elements (Optional, iOLM EXpert Mode Only)

The application allows you to add, modify or delete custom elements when the iOLM EXpert option is activated. You can add custom elements of two basic element types: splice or connector. Each custom element must have its unique name. You can view and edit the element's pass/fail threshold of the custom element in the **Element P/F Threshold** tab.

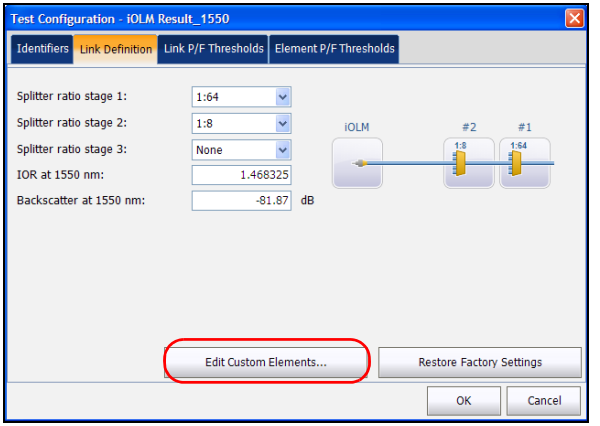
If the iOLM EXpert option is not activated, then you will not be able to edit the element pass/fail threshold for the custom element and if the measurement file contains custom elements, the custom elements are displayed in the **Element P/F Threshold** tab under the **Measurement Settings**.

To add a custom element:

1. From the **Main Menu**, click on **Test Config.** > **Manage**.
2. Select the test configuration file to modify.
3. Press **Modify**.

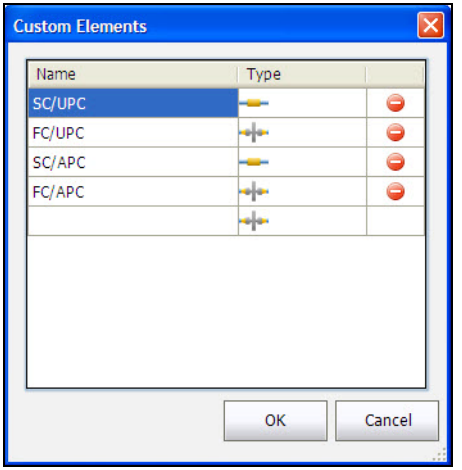


4. Click on **Link Definition** > **Edit Custom Elements**.



5. Enter the custom element name under the **Name** column in the **Custom Elements** dialog box. The name of the custom element can contain a maximum of 12 characters.

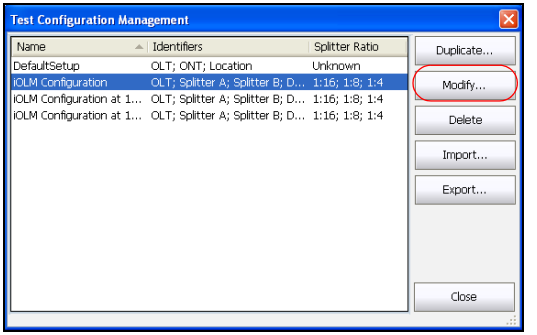
6. Select the custom element type under the **Type** column.



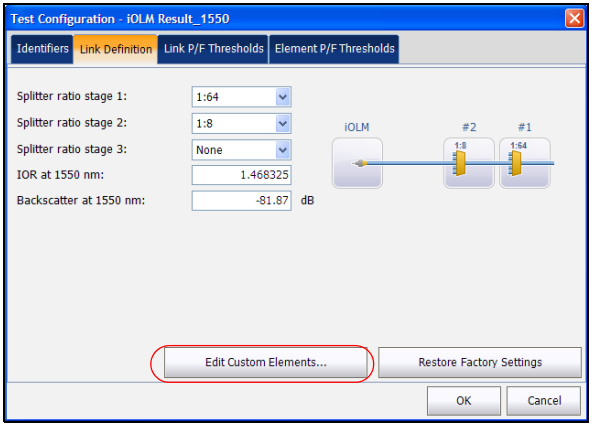
7. Press **OK** to save the changes and close the dialog box, or press **Cancel** to exit without saving.

To modify the custom element:

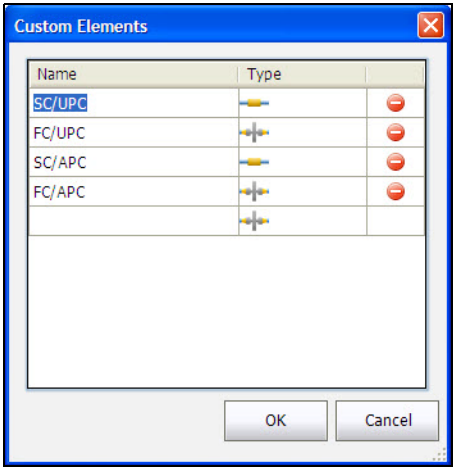
1. From the **Main Menu**, click on **Test Config.** > **Manage**.
2. Select the test configuration file to modify.
3. Press **Modify**.



4. Click on **Link Definition** > **Edit Custom Elements**.



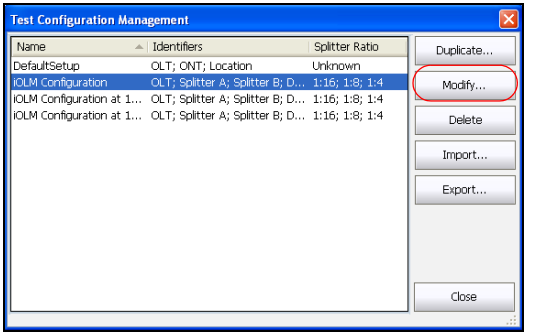
5. Click on the custom element name under the **Name** column and modify it as needed.



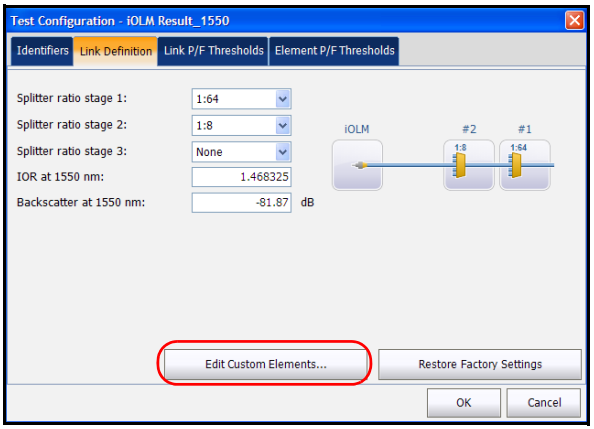
6. Select the required custom element type under the **Type** column.
7. Press **OK** to save the changes and close the dialog box, or press **Cancel** to exit without saving.

To delete the custom element:

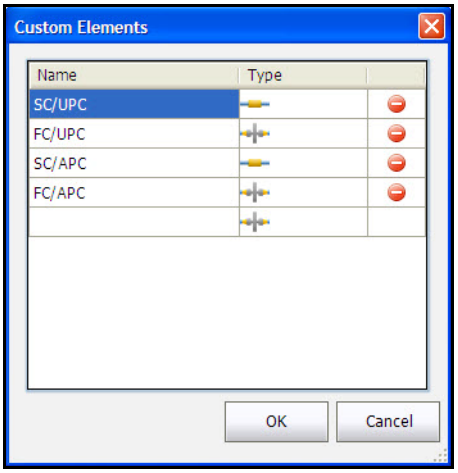
1. From the **Main Menu**, click on **Test Config.** > **Manage**.
2. Select the test configuration file to modify.
3. Press **Modify**.



4. Click on **Link Definition** > **Edit Custom Elements**.



5. Click the icon beside the custom element which you want to delete.



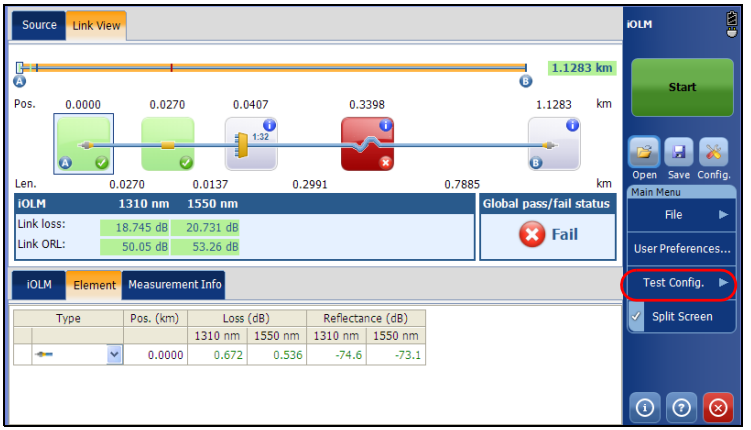
6. Press **OK** to save the changes and close the dialog box, or press **Cancel** to exit without saving.

Modifying Link Pass/Fail Thresholds

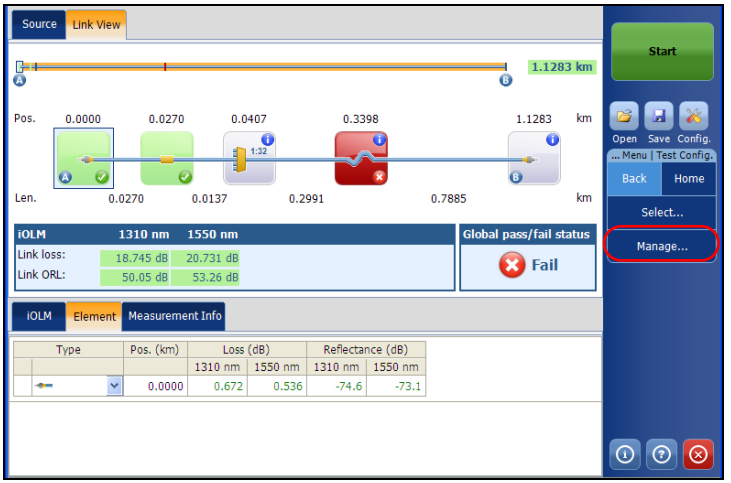
This tab allows you to apply modification to the link pass/fail thresholds. If the selected wavelength is *Any*, the values edited will be applied to all the wavelengths present.

To modify link pass/fail thresholds:

1. From the **Main Menu**, press **Test Config**.

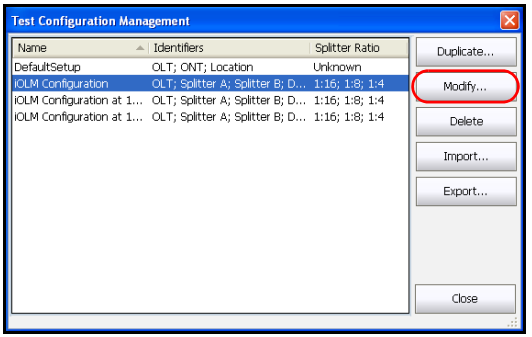


2. Select **Manage**.

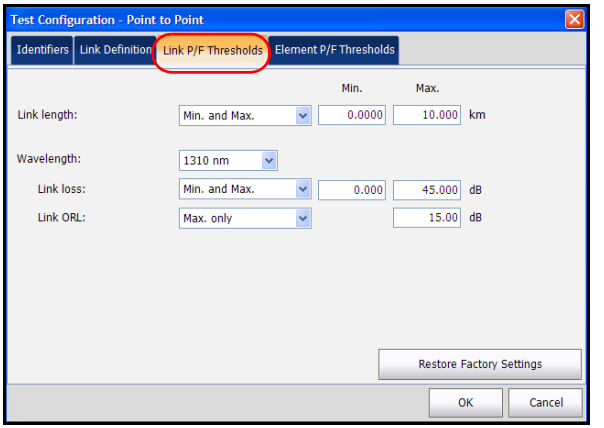


3. Select the test configuration file to modify.

4. Press **Modify**.



5. Select the **Link P/F Thresholds** tab.



6. Under **Link P/F Thresholds**, modify the following parameters, as needed.

➤ **Link Length**: Select the link length threshold type from the available choices and then modify the link length as required.

Note: *The minimum link length cannot be greater than the maximum link length.*

➤ **Wavelength**: Select the wavelength for which the different Pass/Fail threshold values can be specified. The available choices of the wavelength depend on the iOLM module.

➤ **Link Loss**: Select the Link Loss threshold type from the available choices and then modify the link loss as required.

Note: *The minimum link loss cannot not be greater than the maximum link loss.*

➤ **Link ORL**: Select the Link ORL (Optical Return Loss) threshold type from the available choices and then modify the link ORL as required. The optical return loss (ORL) refers to the total effect of multiple reflections and scattering events within a fiber-optic system.

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

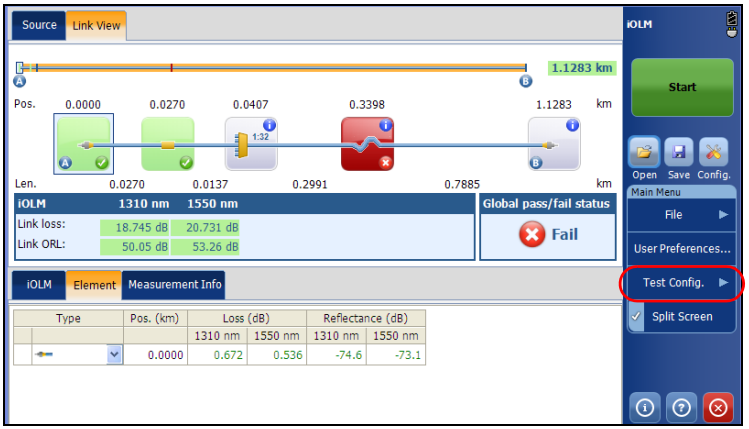
Press **Restore Factory Settings** to remove all the changes and apply the default values.

Modifying Element Pass/Fail Thresholds

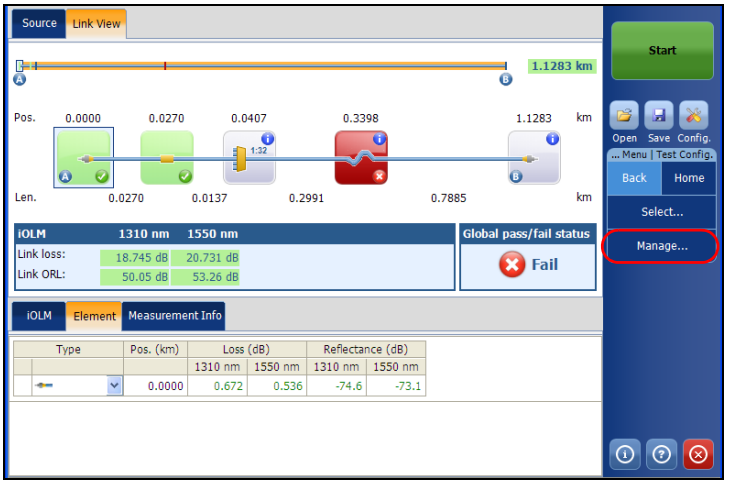
This tab allows you to apply modifications to the element pass/fail thresholds.

To modify element pass/fail thresholds:

1. From the **Main Menu**, press **Test Config**.

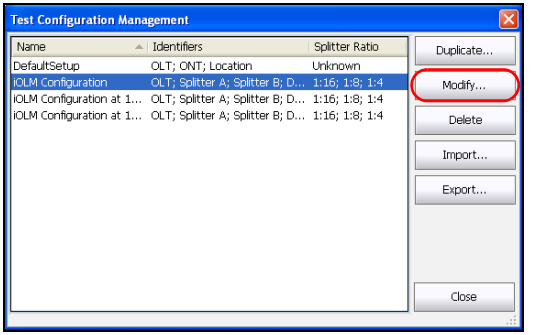


2. Select **Manage**.

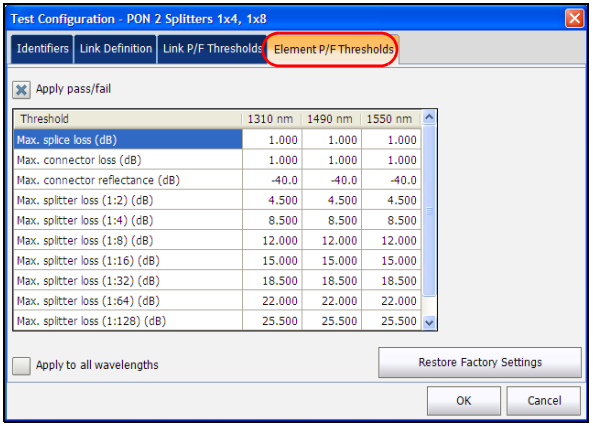


3. Select the test configuration file to modify.

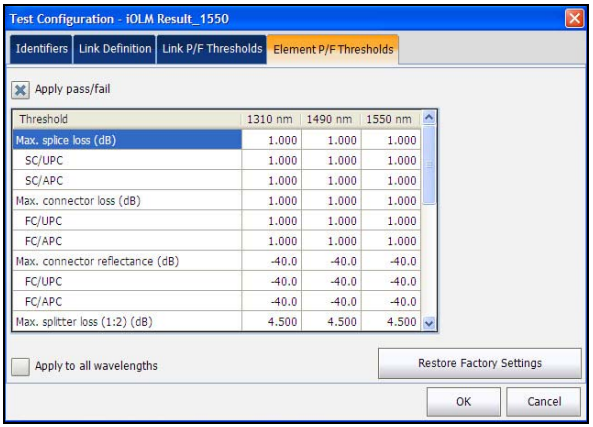
4. Press **Modify**.



5. Select the **Element P/F Thresholds** tab.



The **Threshold** column displays the threshold values for Splice, Connector, and Splitter ratios (1:N and 2:N) for each available wavelength in the test configuration settings. The custom elements are displayed in the group under Max. connector loss or Max. connector reflectance or Max. splice loss. This information is also displayed in the iOLM report. For more information, see *Report Sample* on page 141.



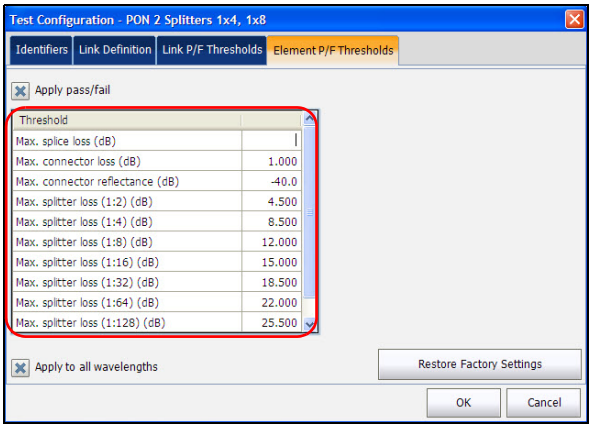
6. Enable the **Apply pass/fail** option to access the parameters, and modify them as needed. You can add, edit, and delete the custom element by clicking on the custom element. For steps to modify or create custom elements, see *Managing Custom Elements (Optional, iOLM EXpert Mode Only)* on page 57.

Note: *The pass/fail thresholds of the custom elements can only be edited when the iOLM EXpert option is activated.*

Note: *The available wavelength choices depend on the iOLM module.*

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Select **Apply to all wavelengths** to display the common threshold values for all the wavelengths. If any threshold has different values for its wavelengths, then the cell will be empty.



Press **Restore Factory Settings** to remove all the changes and apply the default values.

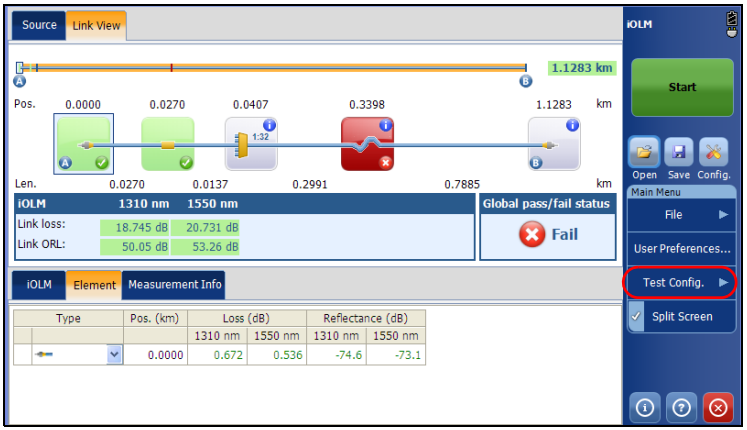
Modifying Power Meter Pass/Fail Thresholds

This tab allows you to modify the power meter pass/fail thresholds.

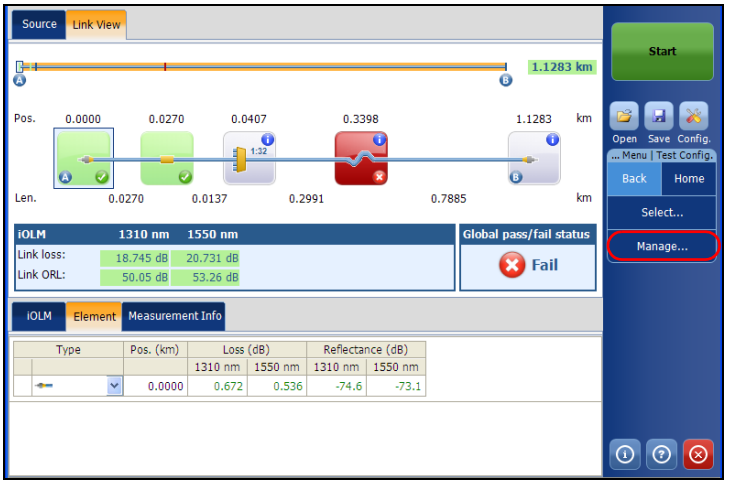
Note: *The **OPM P/F Thresholds** tab will only be available if an inline power meter is present in the module.*

To modify power meter pass/fail thresholds:

1. From the **Main Menu**, press **Test Config**.

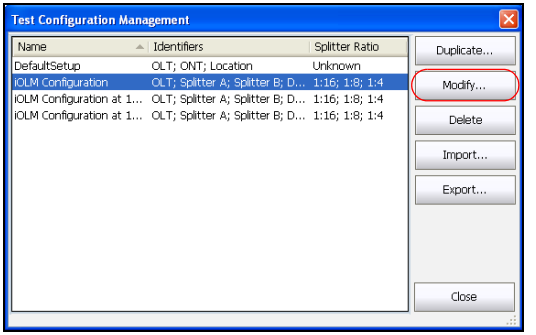


2. Select **Manage**.

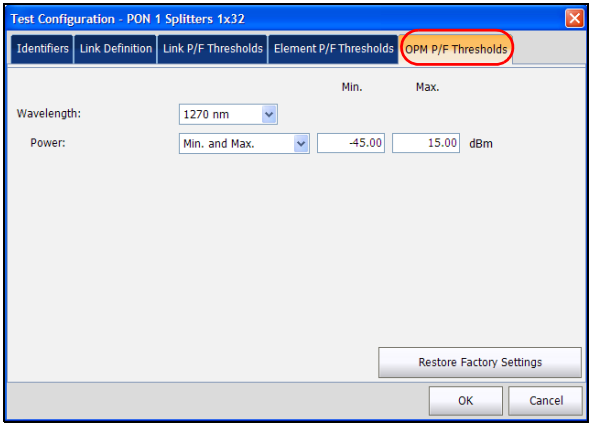


3. Select the test configuration file to modify.

4. Press **Modify**.



5. Select the **OPM P/F Thresholds** tab.



6. Under **OPM P/F Thresholds**, modify the following parameters, as needed.

➤ **Wavelength**: Select the wavelength for which the different Pass/Fail threshold values can be specified. The available choices of the wavelength depends on the iOLM module and the Power Meter settings in the **Preferences** tab.

Note: *The **Any** wavelength option will be displayed only if more than one wavelength is present. If **Any** wavelength is selected, the threshold values will be applied to all the wavelengths present in the drop-down box.*

➤ **Power**: Select the power threshold type from the available choices and then modify the power as required.

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Factory Settings** to remove all the changes and apply the default values.

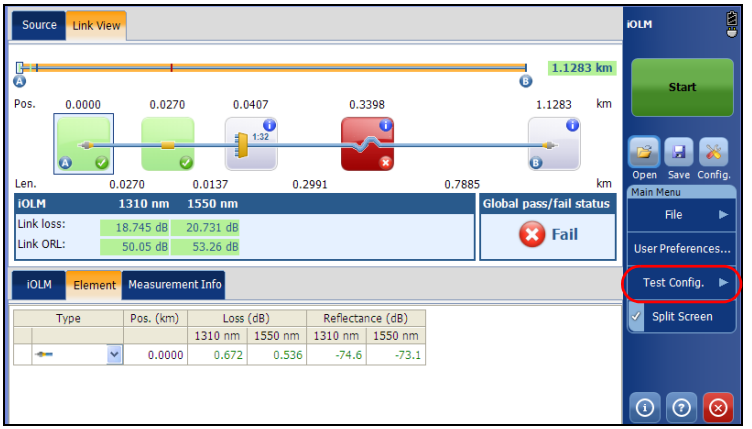
Deleting Test Configuration

The **Delete** button allows you to delete an existing configuration file.

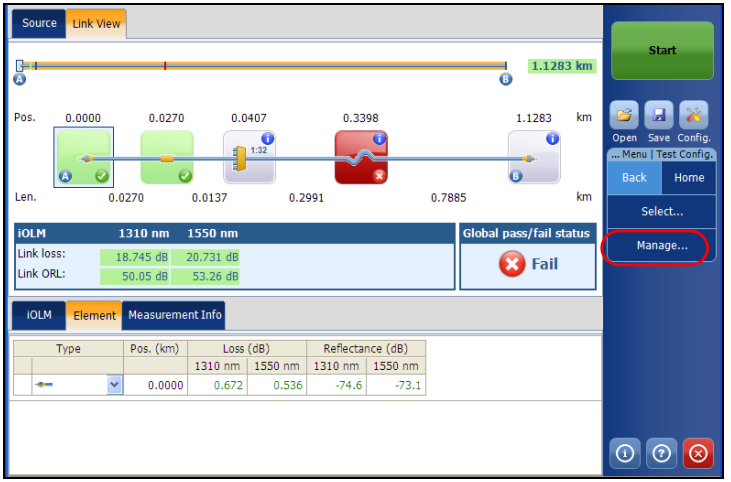
Note: *You cannot delete the default factory settings or predefined configuration files.*

To delete a test configuration:

1. From the **Main Menu**, press **Test Config**.

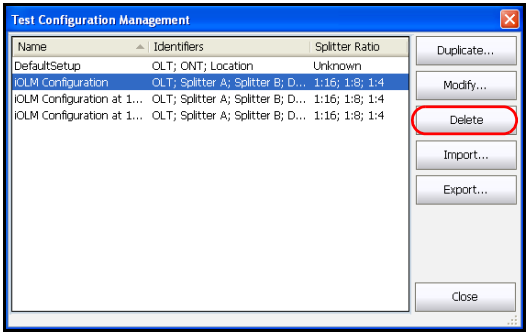


2. Select **Manage**.



3. Select the test configuration file to delete.

4. Press **Delete**.



A confirmation message is displayed.

5. Press **Yes** to delete the file or press **No** to cancel the deletion.

6. Press **Close** to close the window.

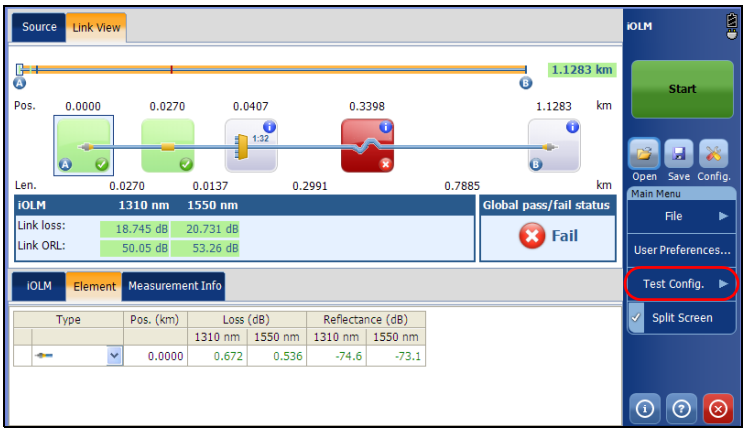
Importing or Exporting a Test Configuration

The **Import** button allows you to import test configuration from an external storage device and the **Export** button allows you to export the selected configuration to an external storage device.

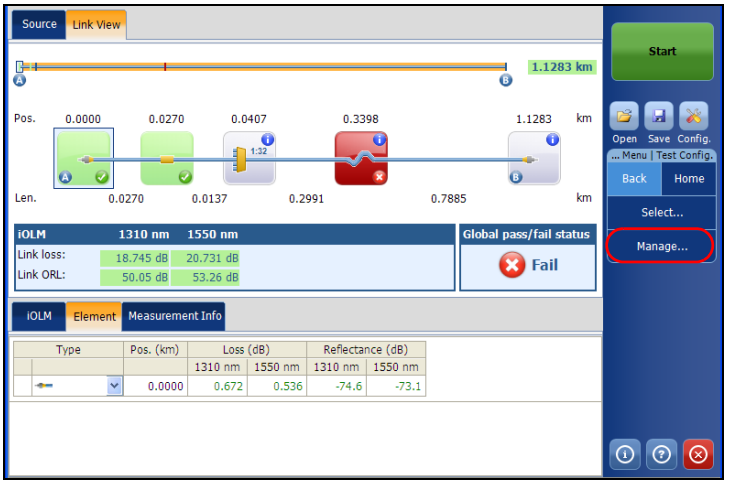
Note: *If a USB device is connected to the module, the default path for import/export will be the USB device.*

To import a test configuration:

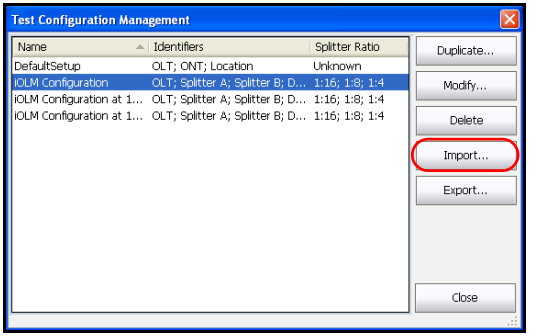
1. From the **Main Menu**, press **Test Config**.



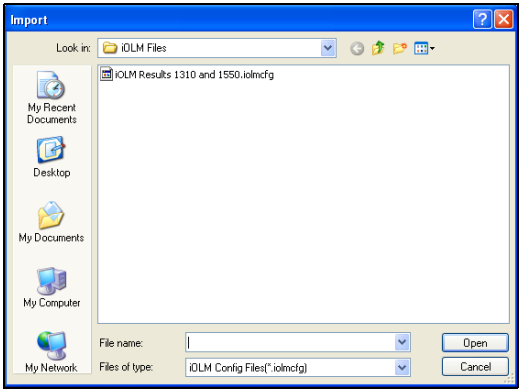
2. Select **Manage**.



3. Press **Import**.

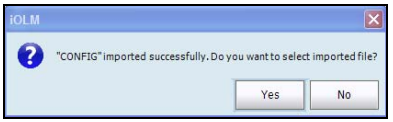


4. An **Import** dialog box opens, select the file to import and press **Open**.



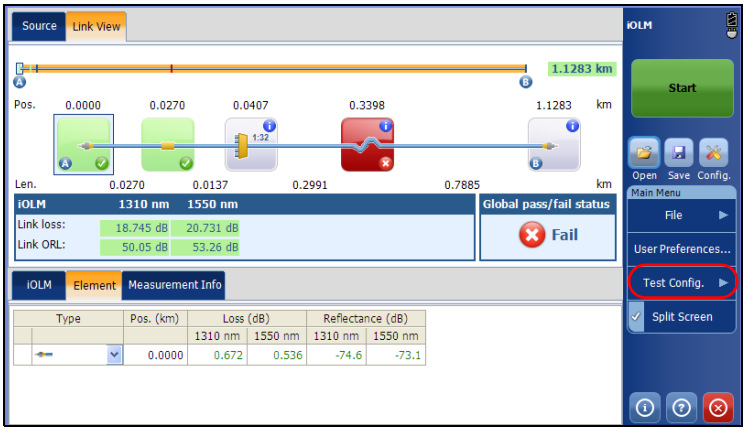
A confirmation message is displayed.

5. Press **Yes** to select the file or press **No** to cancel the selection.

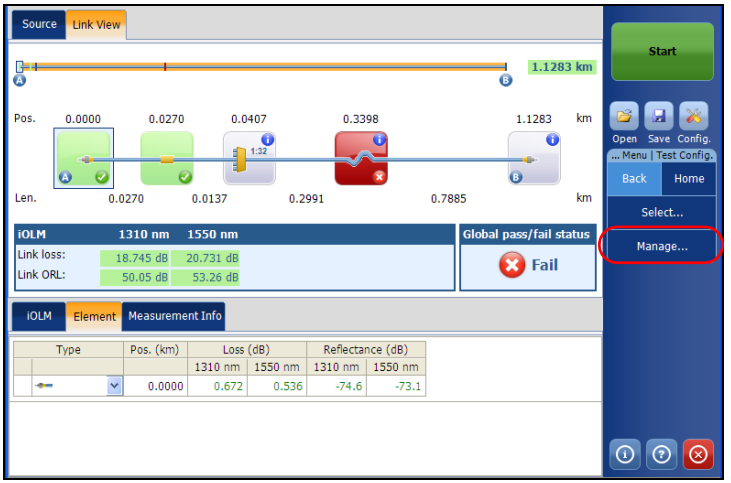


To export a test configuration:

1. From the **Main Menu**, press **Test Config**.

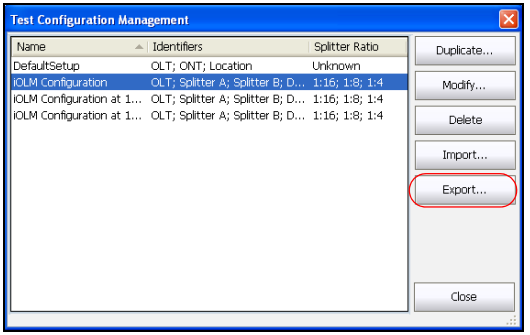


2. Select **Manage**.

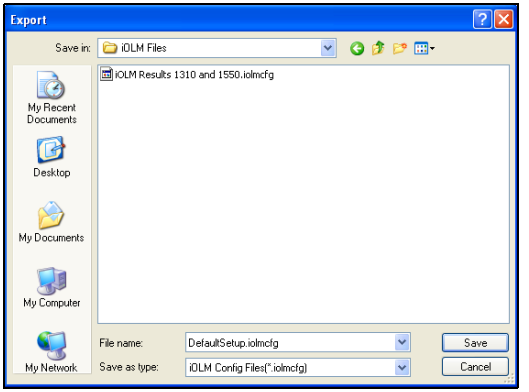


3. Select the test configuration file.

4. Press **Export** to export the configuration to an external storage device.



5. An **Export** dialog box opens, select the location and press **Save**.



7 Starting an Acquisition

This section explains the acquisition process of the intelligent Optical Link Mapper.

Starting an iOLM Acquisition

This section explains the iOLM acquisition process. The iOLM allows you to characterize a fiber-optic span, usually optical fiber sections joined by splices and connectors. The iOLM provides an inside view of the fiber, and can calculate fiber length, breaks, total return loss, splice, connector, and total losses.

To perform an iOLM acquisition:

1. Press **Start**.

   The application displays a confirmation message asking to save unsaved data (if any) before starting a new acquisition.

2. Select **Yes**, **No**, or **Cancel** as required.

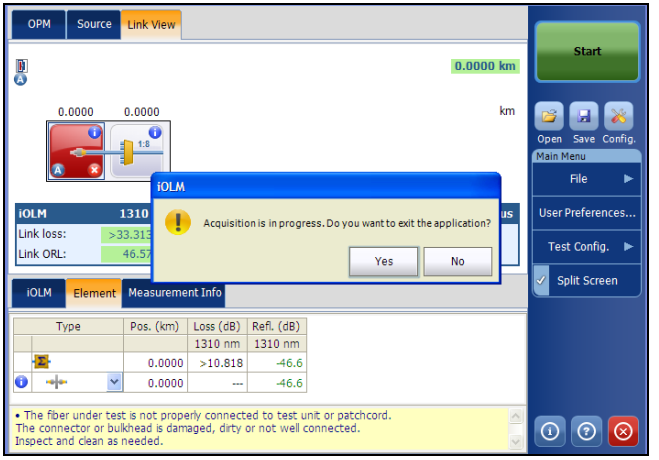
Note: *You will not be asked to save the file if the file functionalities are not activated. See* Setting User Preferences *on page 21 for more details.*

When an iOLM acquisition starts, the link view and element details are displayed by default.

The progress of the overall acquisition for all wavelengths is displayed in the status bar. For example, if two wavelengths have to be processed, at the end of the first wavelength acquisition the overall progress will be 50 %.

The current wavelength is displayed in front of the acquisition progress.

When an iOLM acquisition is in progress and you try to exit the application, a confirmation message is displayed.

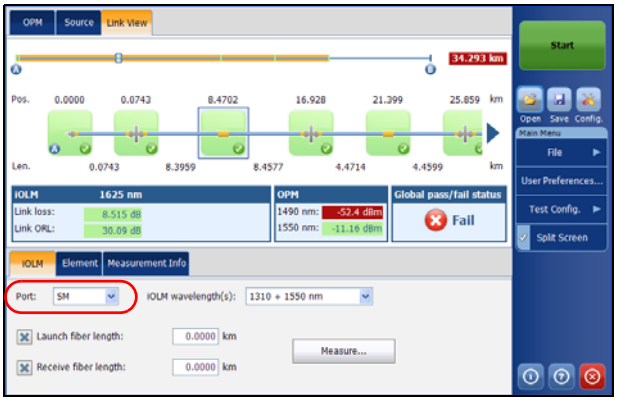


Starting a Single-Wavelength Acquisition

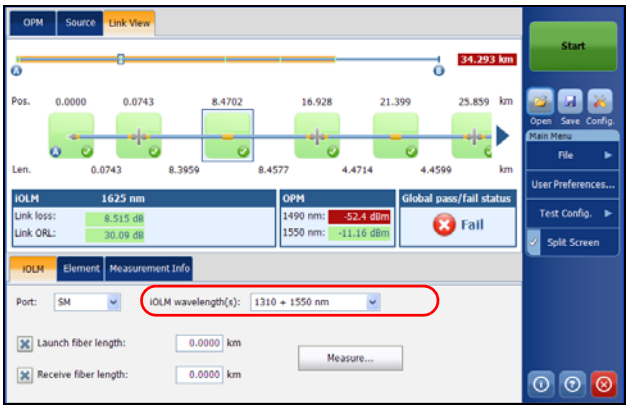
The single-wavelength acquisition allows you to take an acquisition on a specific wavelength if multiple wavelengths are present in the module.

To start single wavelength acquisition:

1. From the **Test Parameters** tab, select the port to use.



2. Select the desired **iOLM Wavelength(s)** (one wavelength).



3. Press **Start**.

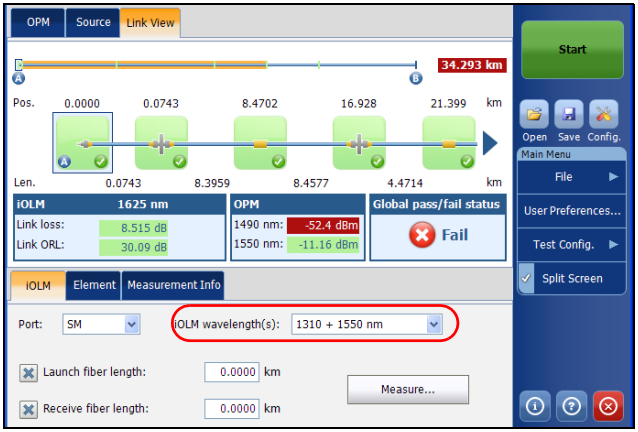
Starting a Multiple-Wavelength Acquisition

The multiple-wavelength acquisition allows you to take an acquisition on multiple wavelengths, if multiple wavelengths are present in the module.

In a multiple wavelength acquisition, the current wavelength in the acquisition is displayed.

To start multiple wavelength acquisition:

1. From the **Test Parameters** tab, select the SM port.
2. Select the desired **iOLM Wavelength(s)** (combination of multiple wavelengths, combined by a '+' sign).



3. Press **Start**.

Stopping an Acquisition

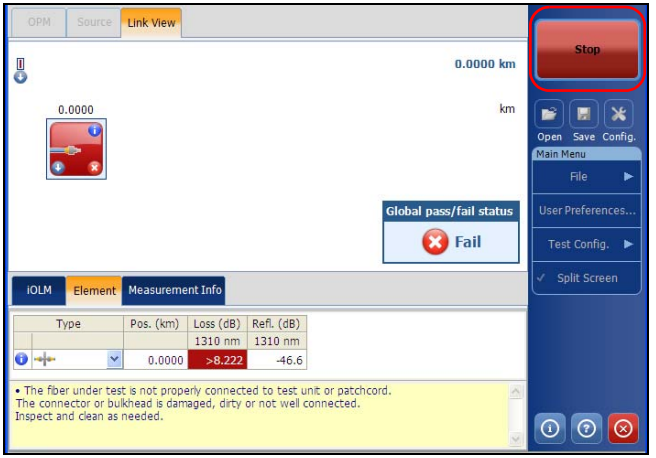
The acquisition stops automatically after the acquisition is complete.

It is possible to stop the acquisition at any time while the acquisition is in progress.

Note: *The unprocessed wavelengths will not be processed when a multiple wavelength acquisition is stopped manually.*

To stop the acquisition:

Press **Stop** from the main window.



The stopped acquisition status will be saved in the measurement file. The stopped acquisition status is also displayed in the **Measurement Info** tab.

The global pass/fail status will show unknown or fail when the acquisition is stopped manually.

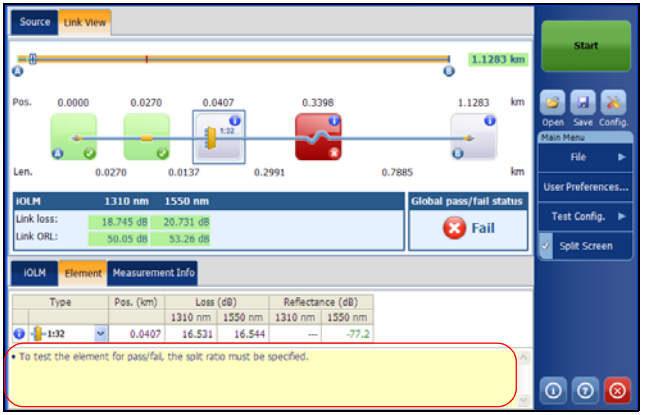
Note: *A manually stopped acquisition should not be considered as a reliable link measurement. To fully characterize a link, a complete acquisition should be performed.*

8 Understanding Diagnostics

This section explains the diagnostics feature available in the intelligent Optical Link Mapper application.

Diagnostics are used to provide additional information about detected problems or ambiguous measurement situations, such as root cause possibilities for the fail status of a link element. The diagnostics provide help to troubleshoot faulty connectors, understand why link elements are tagged as fail or unknown, indicate unexpected instrument or test conditions and so forth.

Link elements with an associated diagnostic are marked with an icon, and the diagnostics are displayed in the **Element** tab. More than one diagnostic can be associated with any given element.



Elements diagnostics are associated with specific link elements issues. Each failed link element will have associated diagnostics to assist in troubleshooting. Some elements, such as macrobends, will have associated diagnostics even with a pass status.

9 Using the Inline Power Meter

This section will help you use the inline power meter and perform acquisitions.

Note: *The **OPM** tab will not be available if no power meter is available in the module.*

Understanding the Inline Power Meter

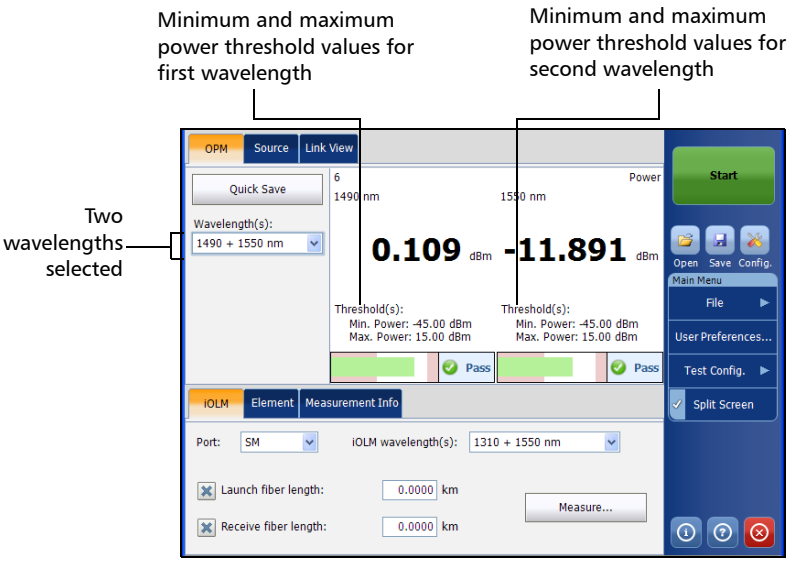
The inline power meter in your module measures the power of the link through the SM live port, which is also used for iOLM measurements.

Minimum and maximum power threshold values are displayed in the same window used to display the current power meter value. The Pass/Fail thresholds wavelength is the same as the current power meter reading.

Note: *The inline power meter can be equipped with two-channels for taking the power meter measurements at multiple wavelengths at once.*

When two power meter values are displayed, one for each channel, according to the wavelength, two sets of minimum and maximum power threshold values are displayed, one for each channel.

A visual representation of the power value for each channel is displayed and updated each time a new power value is measured. This visual representation of power value gives an idea of the power on a scale and power level versus pass/fail thresholds.



The identifiers defined in the **Identification** tab under **User Preferences** are also displayed on this page.

Performing a Power Meter Acquisition

The power meter level is refreshed in real time and can help you to decide if an iOLM acquisition is required to identify the cause and location of a problem. You can select the power meter wavelength from the list of available wavelengths.

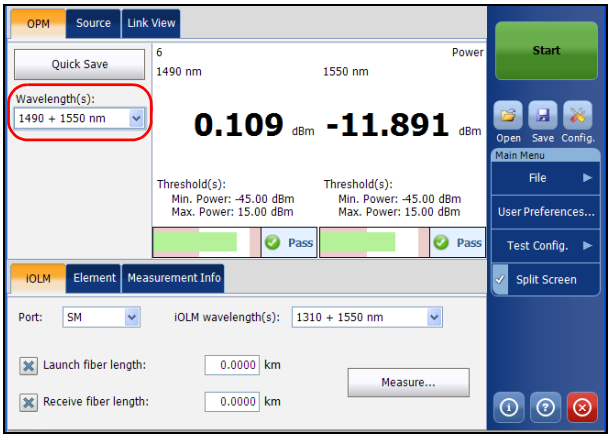
Note: *The **OPM** tab will not be available if no power meter is available in the module.*

Note: *The wavelengths depends on the iOLM module.*

If no wavelength is selected, you cannot perform a power meter acquisition.

To perform a power meter acquisition:

1. Select the **OPM** tab.
2. Select the wavelength at which you want to measure the power levels.



The power levels are displayed for the selected wavelength in the **OPM** tab.

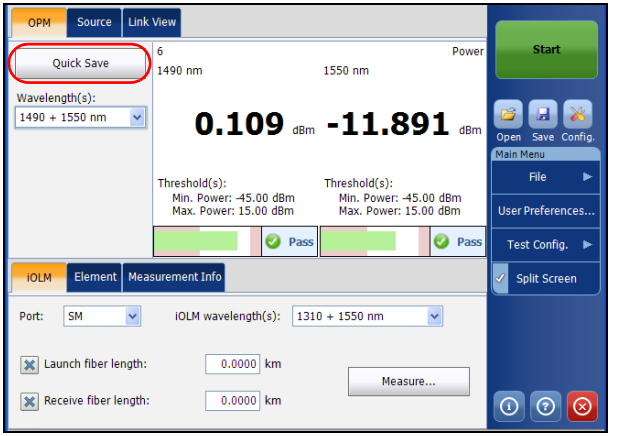
When both wavelengths of a two-channels power meter are selected, both power levels will be displayed side by side. Both values will be refreshed at the same time.

Saving the Power Level

Pressing **Quick Save** saves the current power level(s) into the file for future reference. You can view the file by loading it in the iOLM application. See *Managing Files* on page 131 for more details on opening iOLM files.

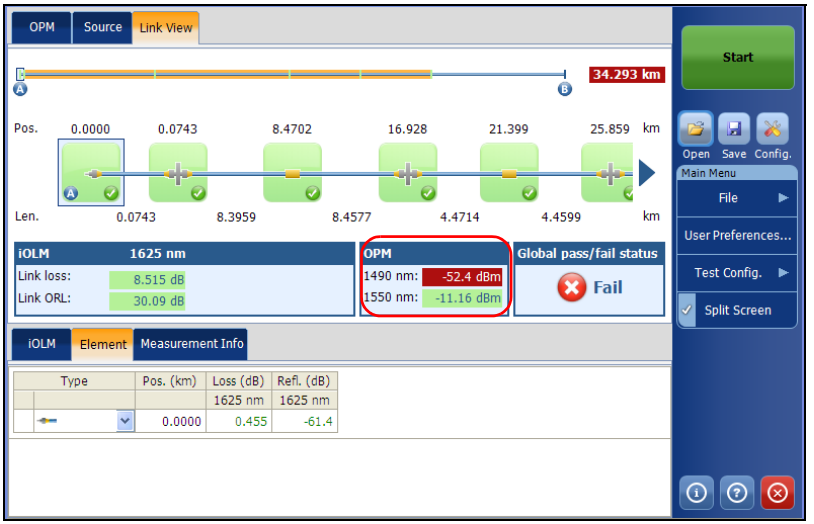
To save the power level:

Press **Quick Save** at any time you want to save the power level.



The power level is saved into a file, the file name is displayed in the status bar.

The saved power level is also displayed in the **OPM** table under the **Link View** tab.



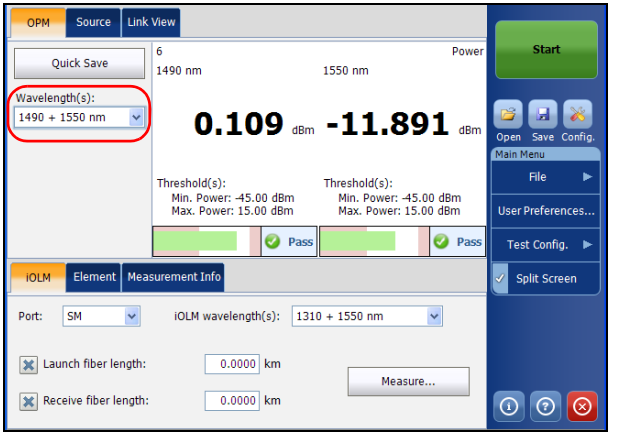
iOLM Acquisition with Power Meter

The iOLM and power meter acquisition is performed together to save the iOLM acquisition results along with the power levels (power meter acquisition results) in a file for future reference.

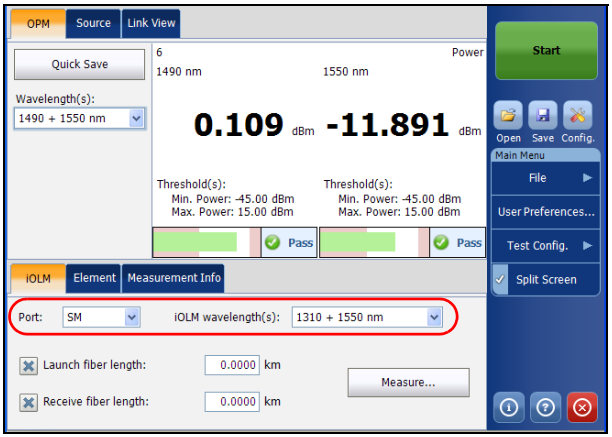
The measurements are taken at the wavelength(s) set in the **OPM** tab.

To perform an iOLM acquisition with power meter:

1. Select the **OPM** tab.
2. Select the wavelength at which you want to take the power meter measurements.



3. Select the SM Live Port and the iOLM wavelength from the **iOLM** tab.



4. Press **Start**.

Note: *Two power levels are considered for measurement when two wavelengths are selected from the* ***Wavelength(s)*** *drop down box for the real-time power meter display.*

Note: *The Power Meter acquisition is taken on the SM Live port.*

Note: *One channel or two channel support for the power meter depends on the iOLM module.*

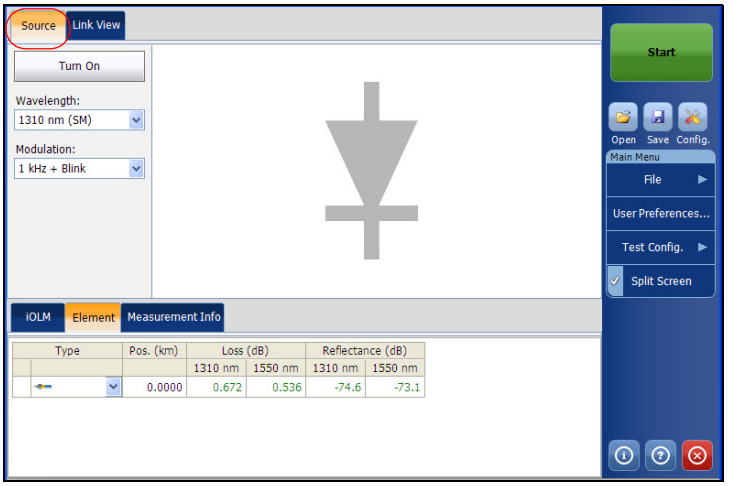
The wavelengths used to take the power meter measurement during iOLM acquisition process are the same as those used to display power levels in real-time.

10 Using the OTDR as a Source

The **Source** tab allows you to operate the existing OTDR laser as a source to do power meter measurements at the other end of the fiber. This helps to quickly locate the correct fiber or perform loss measurements.

To use the OTDR as a source:

1. From the upper panel, select **Source** tab.



2. Select the desired wavelength from the **Wavelength** list.

3. Select the desired modulation from the **Modulation** list.

   Select **Continuous** to receive the measurement loss with a power meter at the other end.

   Select **1 kHz** or **2 kHz** to identify the fiber under test, which could be particularly useful when working with cables containing many fibers.

   You can also select **1 kHz + Blink** and **2kHz + Blink** for easier fiber identification. If you select this pattern, the modulated signal (1 KHz or 2 KHz) is sent for 1 second, then is off for the next second, then be sent again for 1 second, and so on.

4. Select **Turn On** to start emission.

Note: *The application displays the source wave length, source port, and the turn on state in the status bar.*

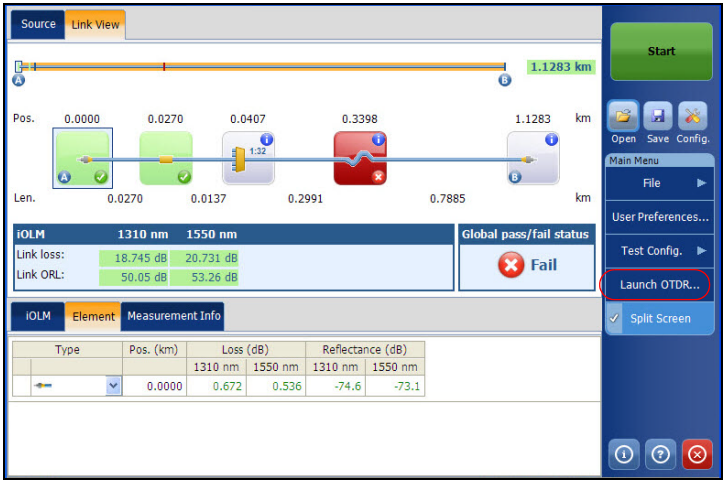
11 Starting the OTDR Application

You can start the classic OTDR application without leaving the iOLM application through the **Launch OTDR** button. You can use this option to do real-time acquisition with the OTDR application and quickly switch back to the iOLM application to do troubleshooting in a more user-friendly environment.

Note: *The **Launch OTDR** button is displayed only when the OTDR or RT software option is activated.*

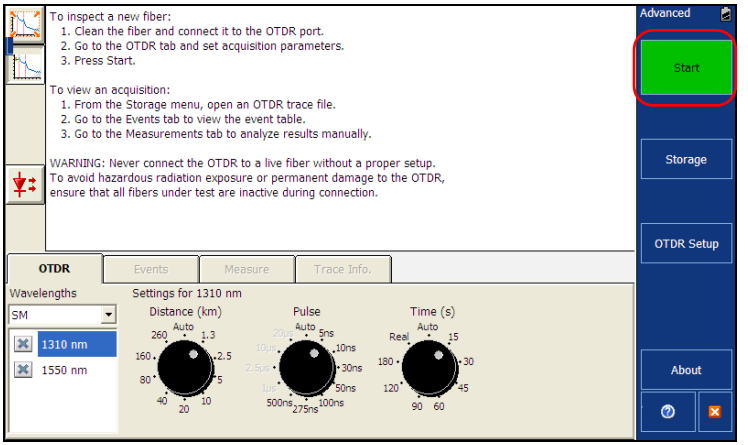
To use the OTDR application:

1. From the **Main Menu**, press **Launch OTDR**.



Note: *You cannot do any operations related to hardware when the classic OTDR application is started. You will be notified that you need to close the OTDR application to allow interaction with the hardware.*

2. Press **Start** to start the OTDR acquisition. For more information, refer OTDR user guide.



12 Managing Results

This section explains the link view, measurement information, element details, and the results displayed after the acquisition process.

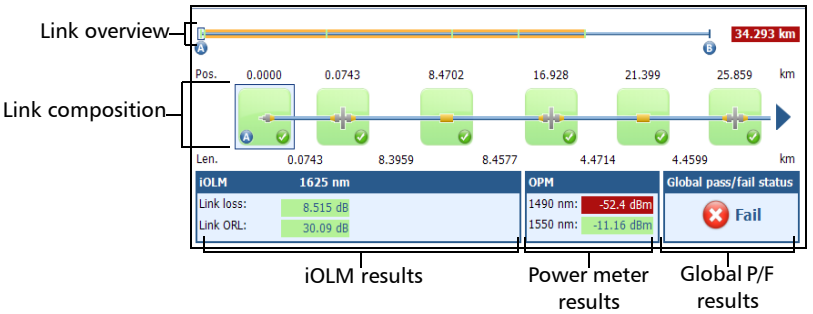
Note: *See* Using the Inline Power Meter *on page 91 for Power Meter results.*

Link View

The iOLM Link View is an intuitive representation, which combines several measurement results and values into a single view.

The Link view is divided into five different regions.

- Link overview
- Link composition
- Link details, which include
  - iOLM results
  - Power meter results (if power meter measurement is taken)
  - Global Pass/Fail Status



Link Overview

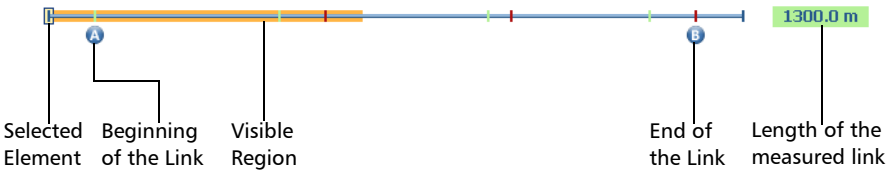
The link overview shows the entire link without scrolling. You can directly select an element by pressing the tick mark ( ) representing it.

The following color codes are used for the link overview.

- **Red**: If element is fail.
- **Green**: If element is pass.
- **Blue**: When the element is not tested for Pass/Fail or the status of the element is unknown.

The pass/fail status also depends on the threshold values specified. See *Modifying Element Pass/Fail Thresholds* on page 50 for more details.

The link overview representing all the elements discovered on the link is described below.

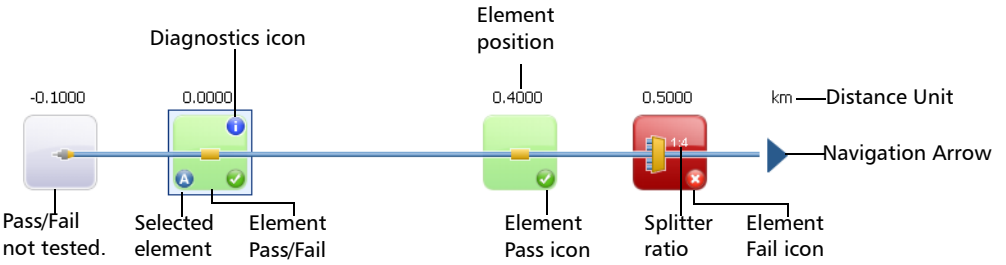


- **Length of the measured link**: Length of the measured link excluding the launch and receive fiber. In other words, the fiber length between point A and point B.
- **Selected element**: Rectangle representing the selected element.
- **Visible region**: The colored background represent the visible region in the Link Composition view.
- **Beginning of the link**: Beginning of the link under test.
- **End of the link**: End of the link under test.

Elements before A and after B are referred to as *out of span* elements. Elements out of the span are not tested for pass/fail status, but can have diagnostics on them. If the receive fiber is not defined, the element marked as "B" will not be tested for pass/fail.

Link Composition

The link composition is described below.



- **Element position**: The distance of the element from the beginning of the link under test.
- **Navigation Arrow**: The navigation arrow is only displayed when more items are available on a particular side. It indicates that you have to scroll to view those items. This arrow can also appear on the left side.
- **Selected Element**: The gray background represents the currently selected element.
- **Letter A**: The beginning of the link under test.
- **Letter B**: The end of the link under test.

Note: *An arrow ( ) icon is displayed on the element, if the start and the end of the link is represented by the same element.*

- **Element Pass/Fail**: The status of the element whether it is pass, fail, or unknown.
- **Element Pass icon**: The pass status of the element.

- **Element Fail icon**: The fail status of the element.
- **Pass/Fail not tested**: Gray background indicates that the element is unknown. If there is no icon at the right side corner, it indicates that thresholds are not applied on the element and the element is not tested for Pass/Fail.
- **Diagnostics icon**: This icon specifies that some diagnostics are present on the element. See *Understanding Diagnostics* on page 89, for more details.
- **Distance Unit**: The units are defined in the **Distance unit** under **General** tab in **User Preferences**.
- **Splitter Ratio**: The splitter ratio is displayed on the element, if the element type is splitter.

Note: *The number of elements displayed in the composition view varies according to the available space, number of elements, and section size.*

Note: *When the link length is large, not all of the elements are visible; you may need to scroll on the link using the navigation arrow.*

Note: *The distance between the elements are not 100 % proportional. To have a proportional representation of the element, see* Link Overview *on page 104.*

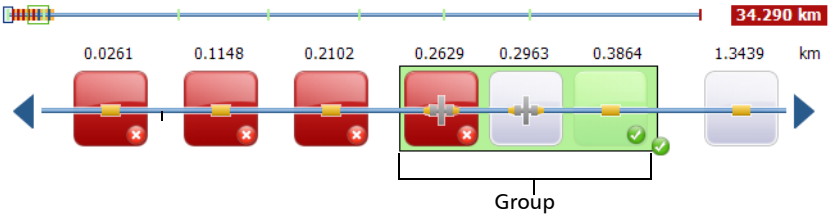
Link Groups

Link elements will be displayed as groups when the iOLM analysis detects several link elements that are too close to one another to be independently characterized. When this occurs, as much information as possible will be displayed for each individual sub-element. The pass/fail status is applied to each sub-element whenever possible, and a global status is also displayed for the group.

Groups can also be displayed when a link element (such as a splitter) is found to have wavelength dependant loss. In that case, the link element is grouped with a macrobend element. In this particular case, there might not be a physical macrobend next to the link element, but the macrobend icon is used to highlight the presence of the wavelength dependant loss.

When elements are grouped, the group loss and group reflectance value is also displayed in the **Element** tab.

The grouped elements are described below.



Each sub-element is directly displayed as if they were normal elements. See *Link Composition* on page 105 for more details on elements.

Note: *For grouped elements, some values may not be available individually but are available at the group level such as loss and reflectance.*

Note: *If some elements are grouped then the total group loss value is compared with the addition of the thresholds defined for the individual elements in group. If the total group loss value is greater than the addition of the thresholds defined for the individual elements in group, the element will show a fail status.*

You can individually select grouped elements as any other standalone element.

When elements are grouped at the beginning of the link, icon A is displayed on one of the sub-elements.

When elements are grouped at the end of the link, icon B is displayed on one of the sub-elements.

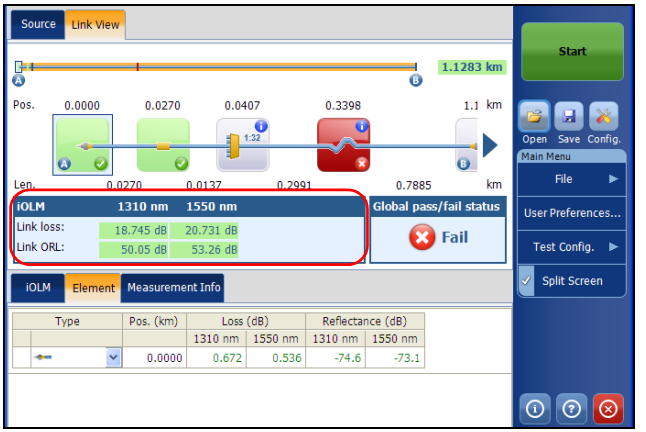
Link View Elements

Element Name	Element Icon	Element Description
Macrobends		Macrobends can be displayed in the link view when more than one wavelength is present in the measurement. ***Note:*** *The macrobend will always be displayed as a failed element.*
Out of Range		The out of range element is displayed when the end of fiber could not be detected by the module because of not enough dynamic range.
Splitter		The splitter is a passive fiber optic coupler that divides light from a single fiber into two or more fiber channels. The splitter ratio is displayed beside the icon.
2:N Splitter		2:N splitter can be used to create network redundancy. If a network break occurs, the operator can connect through the other network branch.
Splice		The splice can indicate the junction of two fiber sections, the presence of a macrobend, or a microbend in the fiber.
Connector		The connector is used to join two fibers.

iOLM Results

The iOLM acquisition results are displayed in the **iOLM** table for all the wavelengths at which the iOLM acquisition was performed.

Note: *The iOLM results are not displayed if they are not available.*



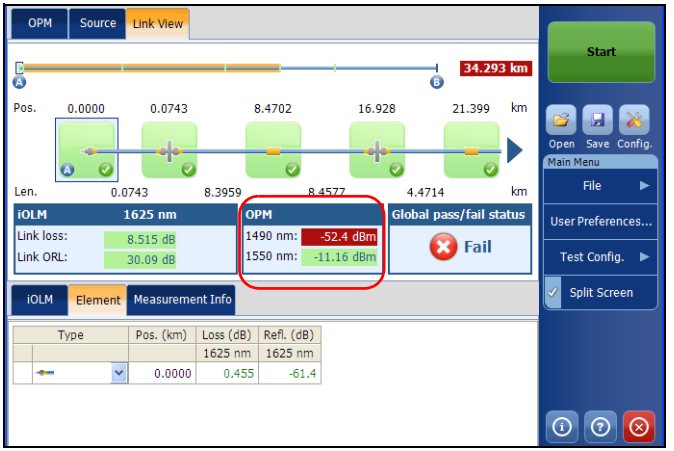
When a multiple-wavelength acquisition is in progress, only the wavelength currently being acquired and the ones already completed are displayed. Link loss and link ORL are displayed for each wavelength. All the values are tested and displayed according to current pass/fail settings.

Note: *If the link ORL value is saturated, that is, if the value is displayed with a < symbol, the value will be tested for Pass/Fail and it will be able to specify the fail status if the value is fail, but it will not be able to specify the pass status.*

Power Meter Results

The power meter acquisition results are displayed in the **OPM** table for all the wavelengths at which the power meter acquisition was performed.

Note: *The power meter results are not displayed if they are not available.*



More than one wavelengths can be displayed in the power meter section. All the values are tested and displayed according to the current pass/fail settings.

Global Pass/Fail Status

The global pass/fail status depends on the pass/fail status of the link length, link loss, link ORL, power meter values (if taken), and the link elements.

If any of the status is fail, then the global pass/fail status will be fail.

The status is automatically updated when a value is modified in the application. When the element type is changed from the **Elements** tab, the individual pass/fail status is recalculated, which might affect the global pass/fail status.

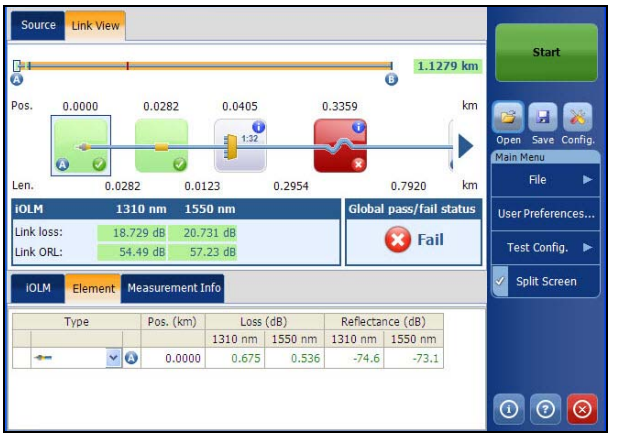
The iOLM application waits for the acquisition to finish before displaying the Pass status, However, the Fail status is displayed as soon as any of the values tested has a Fail status. A fail value can change to unknown or pass when the acquisition is finished.

Note: *It is important to complete the entire acquisition process to have a good pass/fail status.*

The global pass/fail status of the iOLM measurement is displayed as unknown, if there is no failed value and one element is not tested because it follows the 2:N splitter on the link.

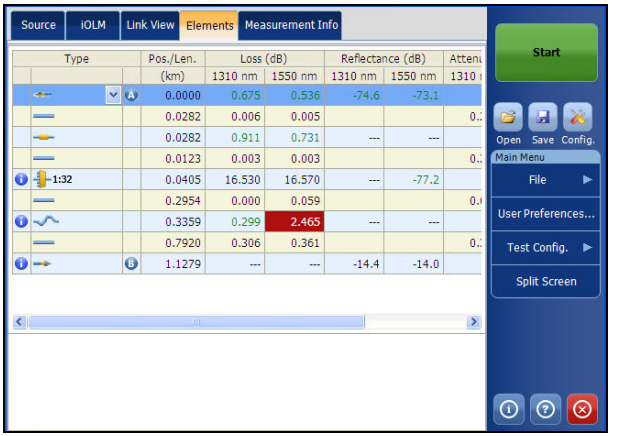
Viewing Element and Section Details

When an element or section is selected from the Link view, the details of the corresponding element/section is displayed in the **Element** tab. In the split screen mode, you can view the details of only the selected element.



Split screen

In the full screen mode, you can view the list of all the elements present in the selected iOLM measurement file and their details in the **Elements** tab. The loss and reflectance are displayed with appropriate coloring based on the pass/fail status of each value.



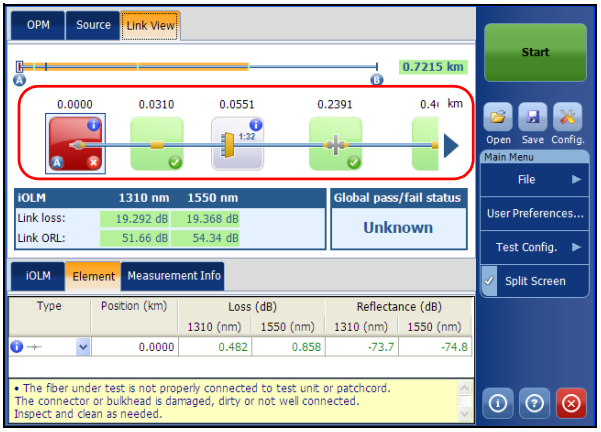
Full screen

To view the element or section details:

1. From the Link view select the desired element or section.

Note: *You can select the section only if the **Fiber section(s)** option is enabled in the **User Preference** window. For more information, see* *Fiber section on page 23.*

2. From the main window, press the **Element** tab.You can view the selected element or section details.

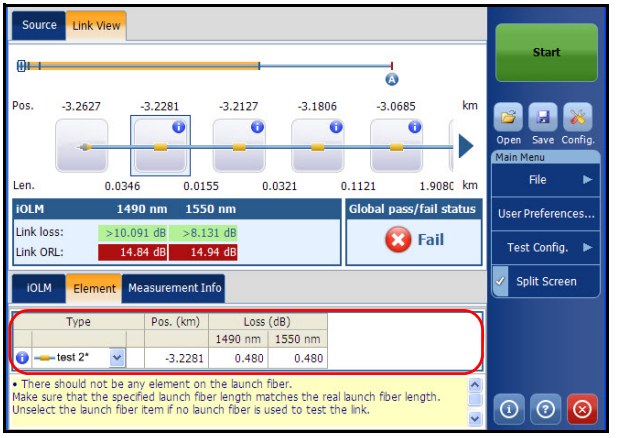


3. Under the **Element** tab, the following information is displayed.

➤ **Type**: The type of element selected in the Link View. You can modify the type of element by selecting it from the drop down menu in Split view as well as in the Full screen view. You can change the splitter ratio if the selected element is a splitter. You can change the element type to splitter ratio 2:N if the iOLM EXpert option is activated and the 2:N splitter ratio is present in the iOLM measurement. If the custom element is defined in the test configuration used for iOLM acquisition, you can select the custom element from the element type list. For more information on custom element, see *Managing Custom Elements (Optional, iOLM EXpert Mode Only)* on page 57.

➤ The application displays the beginning of the link A and link end B in the element table. If the beginning of the link and link end are in the same element, the application displays ↓ in the element table. This information is also displayed in the report.

➤ **Position**: The position of the selected element in the link. The position 0.00 is set on the first element when the launch fiber is present.



Note: *When an element is selected through **Element** table, automatically the corresponding element of the link view will get selected*

Note: *The items available in the list depends on the characteristics of the selected element. It may not be possible to change the element type.*

Note: *If the type of an element is modified, a "*" sign is displayed at the value in the **Type** column. When you generate the report the "*"mark is displayed in the **Type** column of the report.*

- **Loss (dB)**: The loss at different wavelengths.
- **Reflectance (dB)**: The reflectance at different wavelengths.
- **Attenuation**: If any section is selected in the Link view then the attenuation value is displayed in the **Element** table.

Note: *It is possible to underestimate the loss or reflectance value if the noise level is too high (for instance, after a lot of loss on the link, the noise levels increase). In that case, it is possible for the signal processing algorithms to detect an element, and to estimate the loss/reflectance values, but since the measured signal does not completely clear the noise floor, the loss or reflectance/Attenuation values are likely to be underestimated. If the loss or reflectance/Attenuation value is underestimated, the value is displayed with a > symbol.*

Note: *If the loss or reflectance value is saturated, that is, the value is displayed with a > symbol, the value will be tested for Pass/Fail and it will be able to specify the fail status if the value is fail but it will not be able to specify the pass status.*

For grouped elements, the following information is displayed:

- **Group Loss**: The total loss of the grouped elements.
- **Group Reflectance**: The highest reflectance of the grouped elements.

Note: *When the main screen is split, the first row of the element table displays the Group Loss and Group Reflectance, and the second displays the loss and reflectance of the selected element of the group.*

Managing Elements and Analyzing Links (Optional, iOLM EXpert Mode Only)

The application allows you to add and delete elements from both the Link view and **Elements** tab. You can also analyze the link.

Note: *These functionalities are available only if the iOLM EXpert option is activated.*

Adding Elements (Optional, iOLM EXpert Mode Only)

The *i*OLM application allows you to add elements by selecting any element or fiber section.

Note: *You cannot add any element before the first element and after the last element*

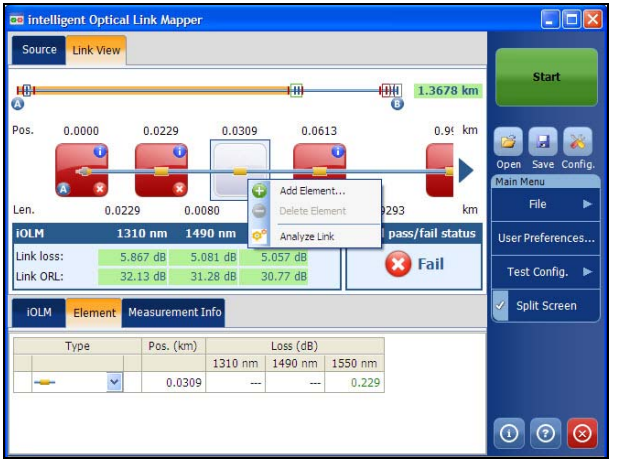
To add an element:

1. Open an iOLM file.
2. Select the existing element in the Link view where you want to add the new element

   OR

   Select the element from the **Elements** tab.

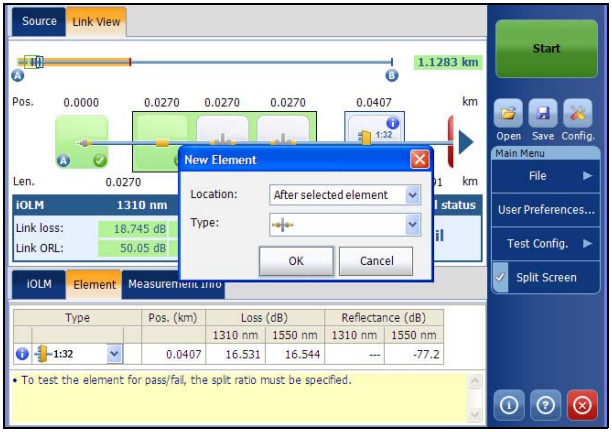
3. Tap and hold on the element to view the contextual menu. If a mouse is connected to your platform, then right-click on the element or click and hold down the mouse button to view the contextual menu.



4. In the **New Element** dialog, configure the element details.

4a. You can add the new element after or before the selected element. The position can be selected as required in the **Location** field.

4b. Select the type of the new element as required.



Note: *The 2:N splitter and custom elements are displayed in the element type list if they are present in the selected iOLM files.*

5. Click **OK** to apply the changes or **Cancel** to discard it.

Note: *If an element is added, the "*" sign is displayed at the **Position** and **Type** columns in the **Element** table.*

Note: *You can add an element to a group of elements and it will influence the pass/fail status of the grouped element.*

The application also allows you to add an element by selecting the fiber section.

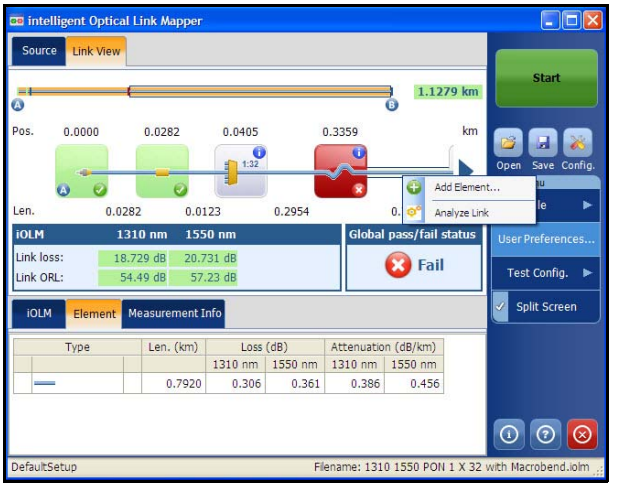
Note: *You can select the fiber section only if the* ***Fiber section*** *option is enabled from* ***User Preferences*** *>* ***General****.*

To add an element on a fiber section:

1. Open an iOLM file.
2. Select the required section in the Link view where you want to add the element.

   OR

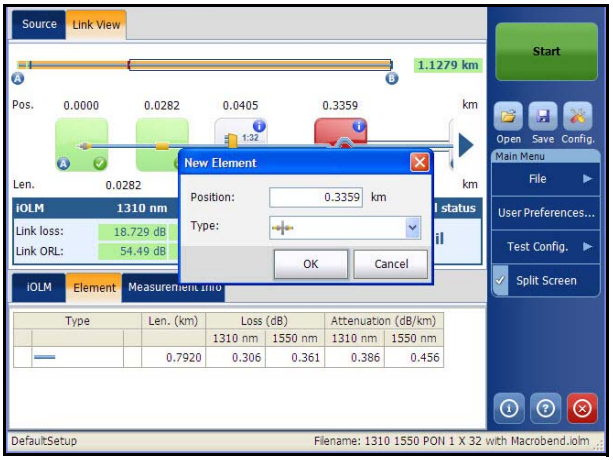
   Select the section from the **Elements** tab.
3. Tap and hold on the fiber section to view the contextual menu. If a mouse is connected to your platform, then right-click on the fiber section or click and hold down the mouse button to view the contextual menu.



4. Select **Add Element** from the contextual menu.

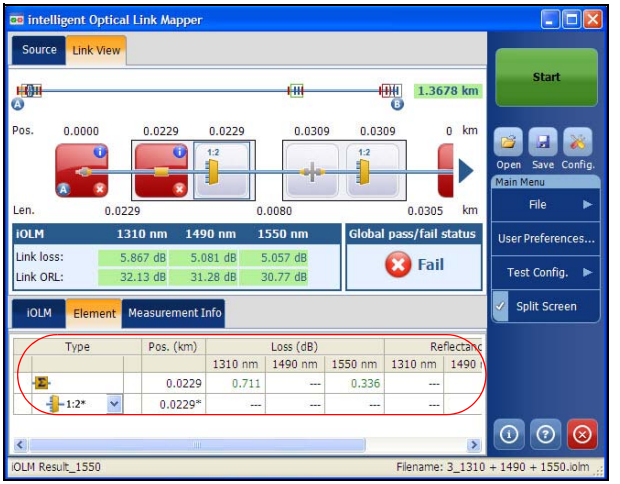
5. Enter the position of the new element in the **Position** field as per your requirement.
6. Select the element type in the **Type** list.

Note: *The 2:N splitter and custom elements are displayed in the element type list if they are present in the selected iOLM files.*



7. Click **OK** to apply the changes or **Cancel** to discard it.

When you add a new element to an element or group of elements, the Loss and Reflectance values are set to "---" and the Pass/Fail threshold is not applied to the newly added element. Accordingly the status for the new element is reflected as unknown. The global pass/fail status can be affected after adding an element on an existing element. The added elements are taken into account to determine the pass/fail status of group.



Deleting Elements (Optional, iOLM EXpert Mode Only)

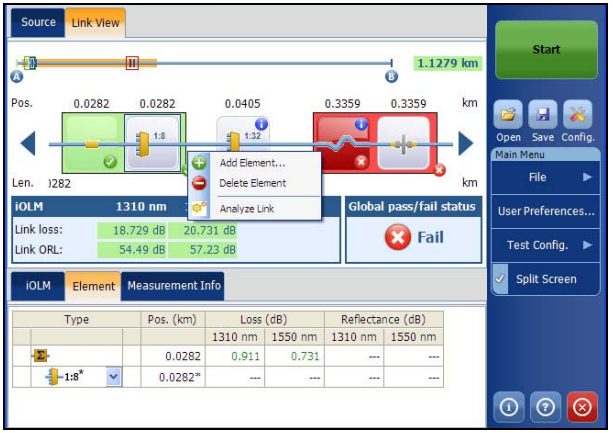
The application allows you to delete manually added elements.

To delete an element:

1. Open an iOLM file.
2. Select the required element which you want to delete.

   OR

   Select the element from the **Elements** tab.
3. Tap and hold on the element to view the contextual menu. If a mouse is connected to your platform, then right-click on the element or click and hold down the mouse button to view the contextual menu.



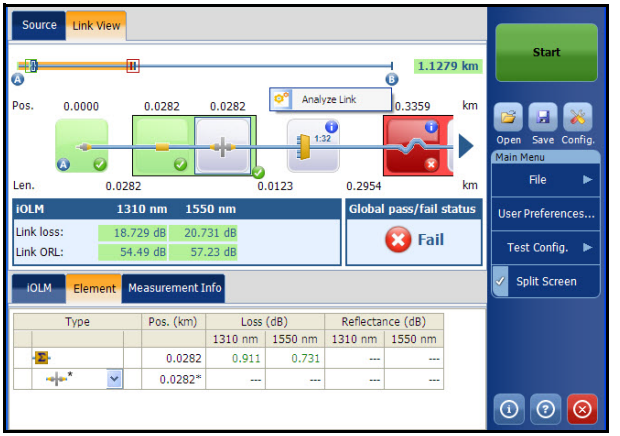
4. Select **Delete Element** from the contextual menu or press Delete from the keyboard.
5. A confirmation message is displayed. Click **Yes** to continue or **No** to cancel it.

Analyzing Links (Optional, iOLM EXpert Mode Only)

The application allows you to reanalyze measurements from the Link view as well as from the **Elements** tab. When you re-analyze the link, it regenerates all the elements from the acquired measurement and resets the link start and link end values. Once a measurement is re-analyzed, any UI element related to the link composition, values, and characteristic are refreshed. All the manually added elements are removed from the link; the global pass/fail status and element table are also refreshed when you analyze the link.

To analyze the link:

1. Open an iOLM file.
2. Tap and hold on the Link view to view the contextual menu. If a mouse is connected to your platform, then right-click on the Link view or click and hold down the mouse button to view the contextual menu.



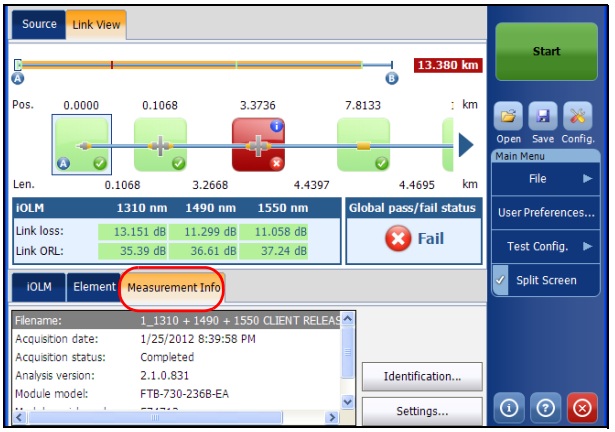
3. Select **Analyze Link** from the contextual menu.
4. A confirmation message is displayed. Click **Yes** to continue or **No** to cancel it.

Measurement Information

This section explains the **Measurement Info** tab.

To view measurement information:

1. From the main window, press **Measurement Info**.



The following information is displayed.

➤ **File Name**: The name of the file.

Note: *If file autonaming is deactivated, the file name will be "---".*

➤ **Acquisition Date**: The date and time at which acquisition was done.

➤ **Acquisition Status**: The status of acquisition. It displays if the acquisition has been taken normally or if it has been interrupted.

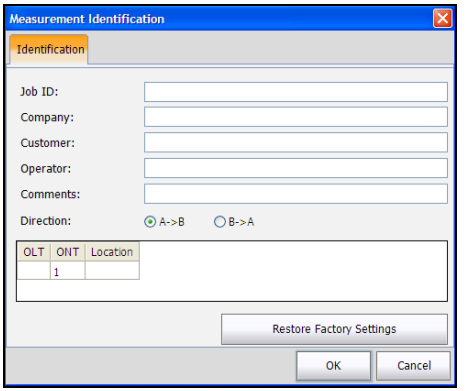
➤ **Analysis version**: It is the version of the application used to analyze the measurement. The application version is the same as the install kit version.

➤ **Module Model**: The model type of the iOLM module when the measurement was created.

- **Module Serial Number**: The serial number of the iOLM module when the measurement was created.
- **Module Calibration Date**: The date of calibration of the iOLM module when the measurement was created.

To view identification information:

1. From the main window press **Measurement Info**.
2. Press **Identification**.

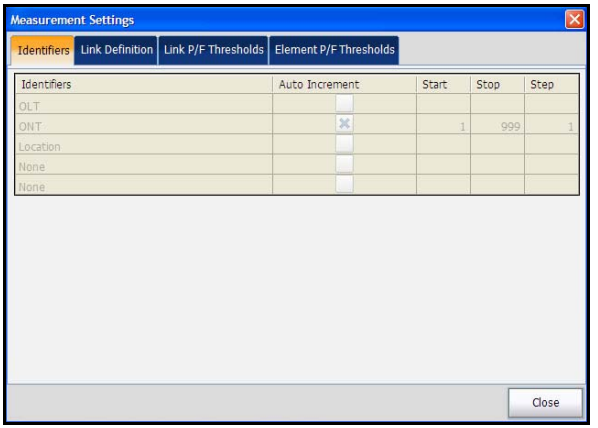


3. Modify the identification information, if required.
4. Set the direction of the measurement.
5. Click **OK** to save the modification.

Note: *The modifications done here will be saved in the measurement file only, not in the application user preferences.*

To view measurement settings:

1. From the main window, press **Measurement Info**.
2. Press **Settings**.



3. By default, the **Identifiers** tab is selected. To view the thresholds, select the corresponding tab.

Note: *See* Modifying a Test Configuration *on page 46 to modify the settings for future acquisitions.*

4. Press **Close** to close the window.

13 Managing Files

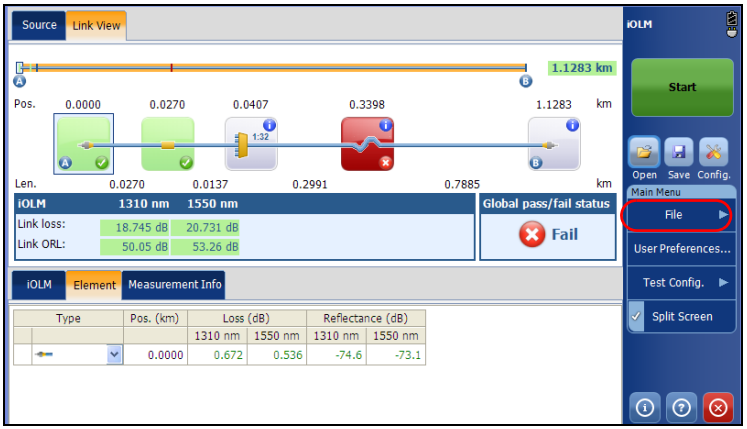
The **File** menu allows you to open an existing file, save a file, and generate a report from the measurement currently in the memory.

Opening iOLM Files

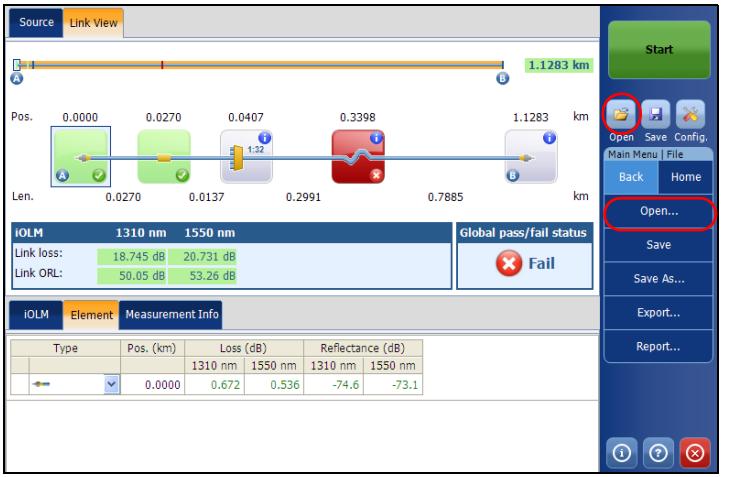
The **Open** menu item allows you to open an existing iOLM file in the application.

To open iOLM files:

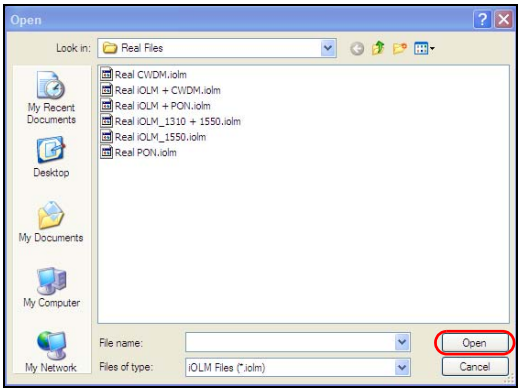
1. From the **Main Menu**, press **File**.



2. Press **Open** or  .



3. Select the file you want to open and Press **Open**.



The file will be loaded in the application. The **Link View** and **Element** tab are displayed by default.

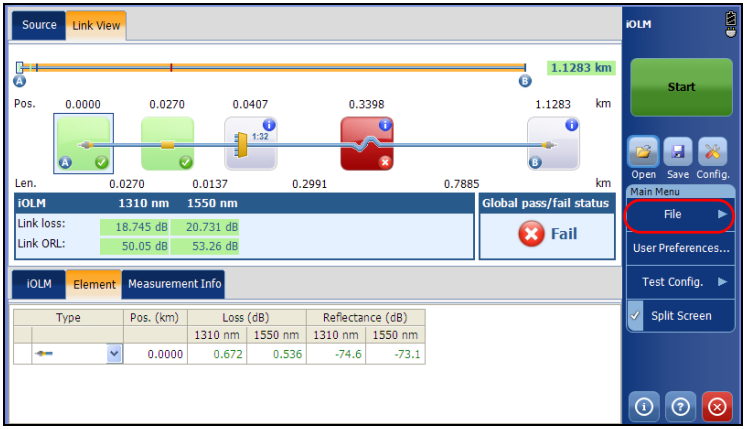
Saving iOLM Files

The **Save** or **Save As** menu item allows you to save an existing iOLM file on the disk.

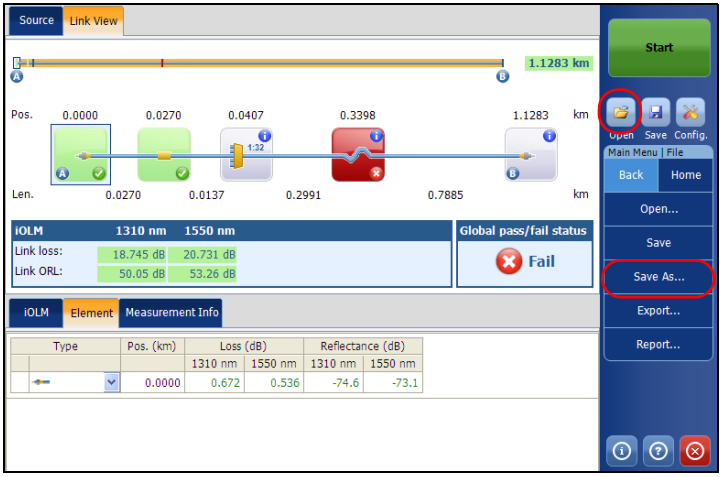
If the wavelengths file name component is selected under the **Filename** tab, then all of the iOLM wavelengths present in the iOLM measurement are added to the file name. If the power meter measurement is present in the application, wavelengths used for the measurement are also added to the file name. For example, if the wavelength is the only file name component selected under the **Filename** tab, the iOLM measurement is done at 1625 nm and the power meter measurement is done at 1490 nm + 1550 nm then the file name will be “1625_1490 + 1550.iolm”.

To save iOLM files:

1. From the **Main Menu**, press **File**.



2. Press **Save or** to save the file. The **Save** option overwrites the existing file with the new file.

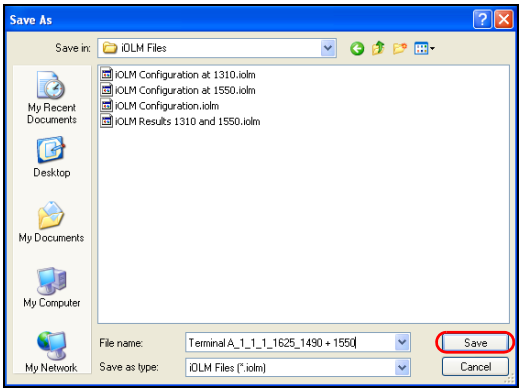


Note: *If a file already exists on the disk and it is saved a first time after an acquisition, a confirmation message will be displayed to overwrite the existing file. If you select* ***No****, the* ***Save As*** *dialog will open.*

3. Press **Save As** to save the file with a different name or at a different location.

Note: *If an OTDR Bellcore (.sor) file already exists on disk, a number in parenthesis will be automatically incremented at the end of the file name to avoid unwanted overwrite.*

4. Enter the file name and Press **Save**.

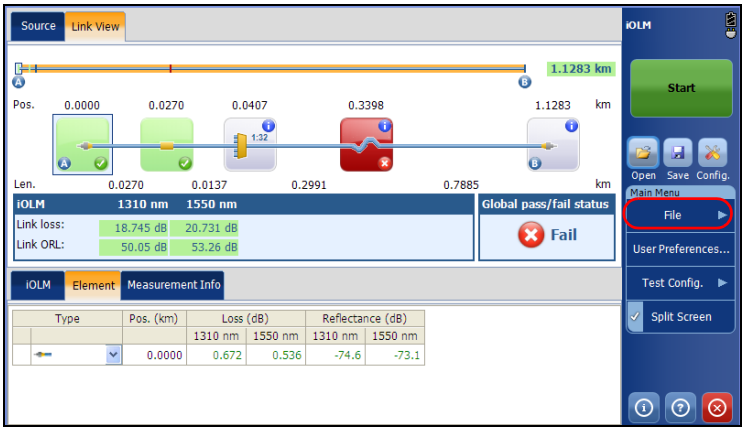


Exporting OTDR Bellcore Files

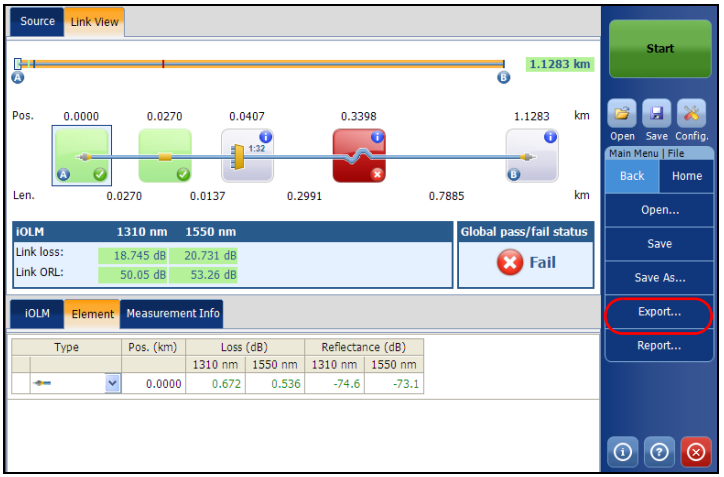
The **Export** option allows you to manually export a OTDR Bellcore file to the disk. If multiple wavelengths are present in the iOLM measurement, a Bellcore (.sor) file is generated for each wavelength.

To export .sor file:

1. From the **Main Menu**, press **File**.

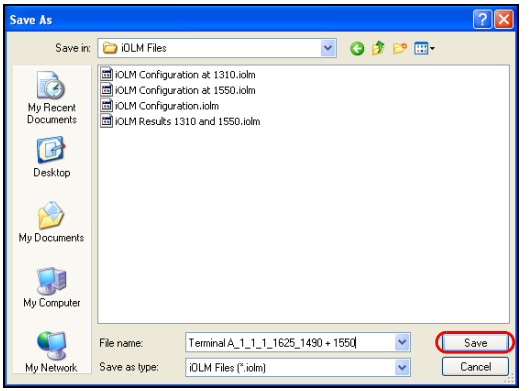


2. Press **Export** to save the file in .sor format.



3. The default file name is displayed in the **File name** field. You can edit the file name and press **Save**. If multiple wavelengths are present in the iOLM file, then the wavelengths are appended in the file name while you save the Bellcore (.sor) files.

Note: *Application provides the path in dialog to save the OTDR Bellcore (.sor) file on disk.*



When you attempt to generate the .sor file and that the iOLM measurement does not contain the necessary intermediate OTDR measurements, you are notified that the file was not generated, and the reason why. If you interrupt the generation of the .sor file, you are also notified that the file was not generated.

Generating a Report

The **Report** menu item allows you to generate an iOLM report, Power meter report or iOLM plus Power Meter Report. The type of report will depend on the type of measurements you have taken. You can generate MHTML reports and PDF reports

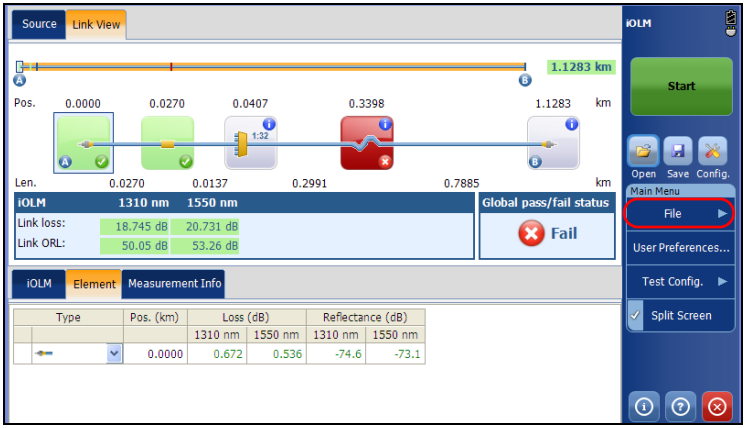
Note: *You need Internet Explorer 7 or later to open .mht files. The UNmht plug-in is required to open the report files in any browser other than Internet Explorer. You can retrieve the plug-in on the website of the browser.*

Note: *In Internet Explorer, you have to enable the **Print Background Colors and Images** option from **File** > **Page Setup** to print the report properly.*

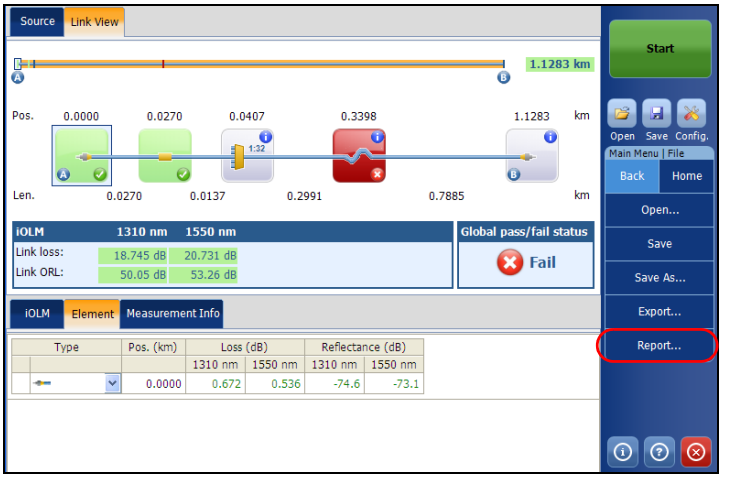
Note: *Google Chrome and Safari do not support the UNmht plug-in.*

To generate a report:

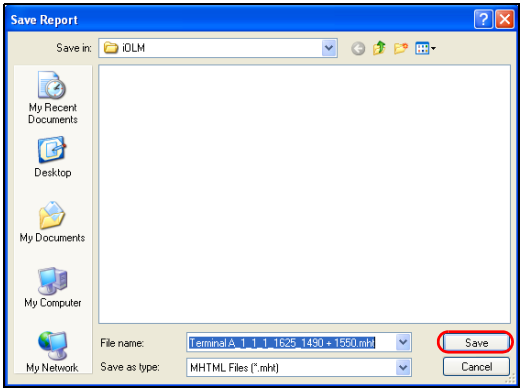
1. From the **Main Menu**, press **File**.



2. Press **Report**.



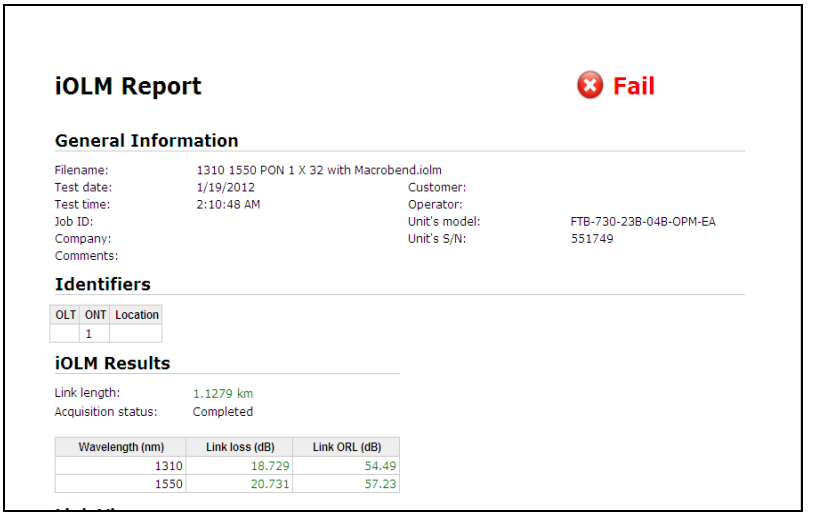
3. Enter the report file name and Press **Save**.



Report Sample

Below you can see samples for the iOLM reports:

iOLM Report



iOLM Report

Fail

General Information

Filename:	1310 1550 PON 1 X 32 with Macrobend.iolm		
Test date:	1/19/2012	Customer:	
Test time:	2:10:48 AM	Operator:	
Job ID:		Unit's model:	FTB-730-23B-04B-OPM-EA
Company:		Unit's S/N:	551749
Comments:			

Identifiers

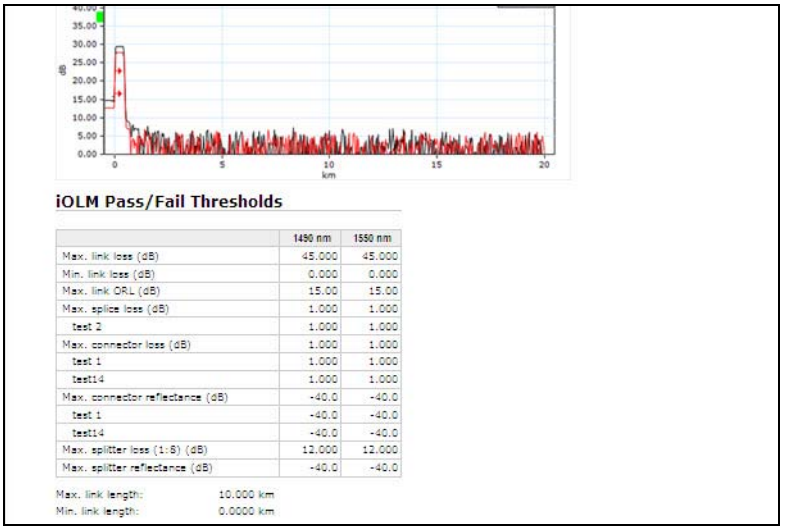
OLT	ONT	Location
	1	

iOLM Results

Link length: 1.1279 km
Acquisition status: Completed

Wavelength (nm)	Link loss (dB)	Link ORL (dB)
1310	18.729	54.49
1550	20.731	57.23

iOLM Report with Pass/Fail threshold information

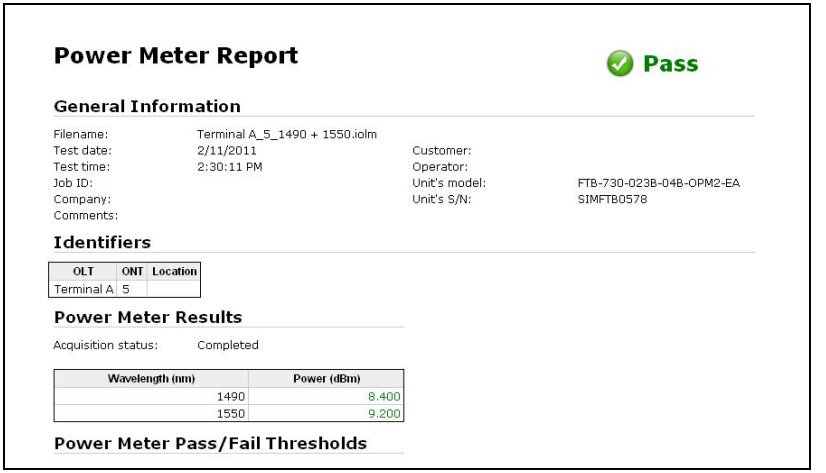


iOLM Pass/Fail Thresholds

	1490 nm	1550 nm
Max. link loss (dB)	45.000	45.000
Min. link loss (dB)	0.000	0.000
Max. link ORL (dB)	15.00	15.00
Max. splice loss (dB)	1.000	1.000
test 2	1.000	1.000
Max. connector loss (dB)	1.000	1.000
test 1	1.000	1.000
test14	1.000	1.000
Max. connector reflectance (dB)	-40.0	-40.0
test 1	-40.0	-40.0
test14	-40.0	-40.0
Max. splitter loss (1:8) (dB)	12.000	12.000
Max. splitter reflectance (dB)	-40.0	-40.0

Max. link length: 10.000 km
Min. link length: 0.0000 km

Power Meter Report



Power Meter Report

Pass

General Information

Filename:	Terminal A_5_1490 + 1550.iolm		
Test date:	2/11/2011	Customer:	
Test time:	2:30:11 PM	Operator:	
Job ID:		Unit's model:	FTB-730-023B-04B-OPM2-EA
Company:		Unit's S/N:	SIMFTB0578
Comments:			

Identifiers

OLT	ONT	Location
Terminal A	5	

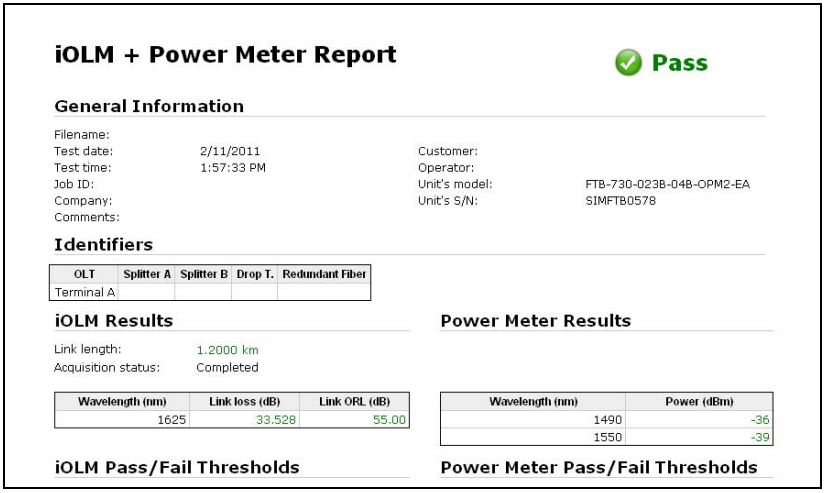
Power Meter Results

Acquisition status: Completed

Wavelength (nm)	Power (dBm)
1490	8.400
1550	9.200

Power Meter Pass/Fail Thresholds

iOLM + Power Meter Report



iOLM + Power Meter Report

Pass

General Information

Filename:			
Test date:	2/11/2011	Customer:	
Test time:	1:57:33 PM	Operator:	
Job ID:		Unit's model:	FTB-730-023B-04B-OPM2-EA
Company:		Unit's S/N:	SIMFTB0578
Comments:			

Identifiers

OLT	Splitter A	Splitter B	Drop T.	Redundant Fiber
Terminal A				

iOLM Results

Link length: 1.2000 km
Acquisition status: Completed

Wavelength (nm)	Link loss (dB)	Link ORL (dB)
1625	33.528	55.00

Power Meter Results

Wavelength (nm)	Power (dBm)
1490	-36
1550	-39

iOLM Pass/Fail Thresholds

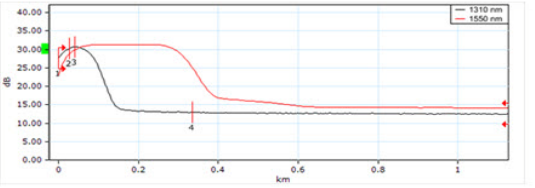
Power Meter Pass/Fail Thresholds

iOLM Report with OTDR graphic and Diagnostic information

Element Table

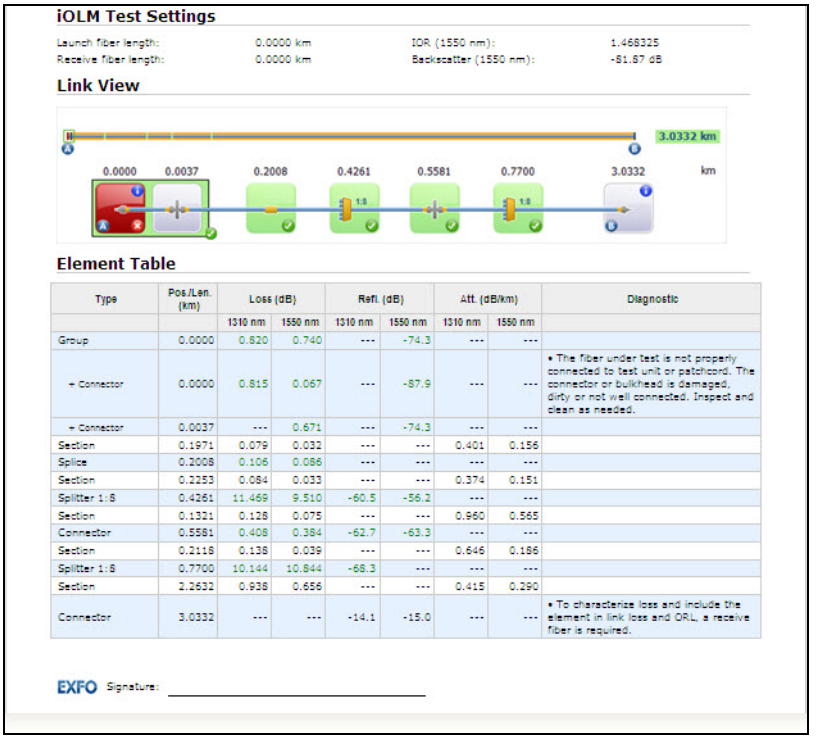
Type	No.	Pos./Len. (km)	Loss (dB)		Refl. (dB)		Att. (dB/km)		Diagnostic
			1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	
Connector (A)	1	0.0000	0.675	0.536	-74.6	-73.1			
Section		0.0282	0.006	0.005			0.200	0.200	
Splice	2	0.0282	0.911	0.731	---	---			
Section		0.0123	0.003	0.003			0.200	0.200	
Splitter 1:32	3	0.0405	16.530	16.570	---	-77.2			• To test the element for pass/fail, the split ratio must be specified.
Section		0.2954	0.000	0.059			0.000	0.200	
Macrobend	4	0.3359	0.299	**2.465**	---	---			• Inspect the fiber in this area to search for excessive bending or cable compression.
Section		0.7920	0.306	0.361			0.386	0.456	
Connector (B)	5	1.1279	---	---	-14.4	-14.0			• To characterize loss and include the element in link loss and ORL, a receive fiber is required.

OTDR Graphic



iOLM Pass/Fail Thresholds

iOLM Report with section details



iOLM Test Settings

Launch fiber length:	0.0000 km	IOR (1550 nm):	1.468325
Receive fiber length:	0.0000 km	Backscatter (1550 nm):	-81.87 dB

Link View

Element Table

Type	Pos./Len. (km)	Loss (dB)		Refl. (dB)		Att. (dB/km)		Diagnostic
		1310 nm	1550 nm	1310 nm	1550 nm	1310 nm	1550 nm	
Group	0.0000	0.820	0.740	---	-74.3	---	---	
+ Connector	0.0000	0.815	0.067	---	-87.9	---	---	• The fiber under test is not properly connected to test unit or patchcord. The connector or bulkhead is damaged, dirty or not well connected. Inspect and clean as needed.
+ Connector	0.0037	---	0.671	---	-74.3	---	---	
Section	0.1971	0.079	0.032	---	---	0.401	0.156	
Splice	0.2008	0.106	0.086	---	---	---	---	
Section	0.2253	0.084	0.033	---	---	0.374	0.151	
Splitter 1:8	0.4261	11.469	9.510	-60.5	-56.2	---	---	
Section	0.1321	0.126	0.075	---	---	0.960	0.565	
Connector	0.5581	0.408	0.384	-62.7	-63.3	---	---	
Section	0.2118	0.136	0.039	---	---	0.646	0.186	
Splitter 1:8	0.7700	10.144	10.844	-68.3	---	---	---	
Section	2.2632	0.936	0.656	---	---	0.415	0.290	
Connector	3.0332	---	---	-14.1	-15.0	---	---	• To characterize loss and include the element in link loss and ORL, a receive fiber is required.

EXFO Signature: _____

14 Maintenance

To help ensure long, trouble-free operation:

- Always inspect fiber-optic connectors before using them and clean them if necessary.
- Keep the unit free of dust.
- Clean the unit casing and front panel with a cloth slightly dampened with water.
- Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.
- Avoid high humidity or significant temperature fluctuations.
- Avoid unnecessary shocks and vibrations.
- If any liquids are spilled on or into the unit, turn off the power immediately, disconnect from any external power source, remove the batteries and let the unit dry completely.

WARNING

The use of controls, adjustments and procedures other than those specified herein may result in exposure to hazardous situations or impair the protection provided by this unit.

Cleaning EUI Connectors

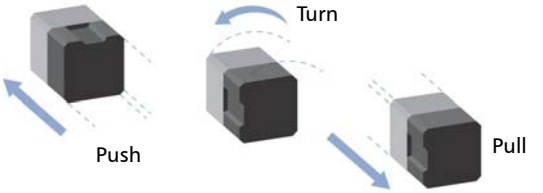
Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

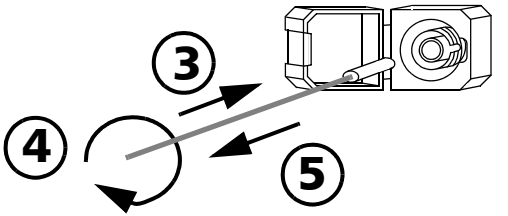
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

To clean EUI connectors:

1. Remove the EUI from the instrument to expose the connector baseplate and ferrule.



2. Moisten a 2.5 mm cleaning tip with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).
3. Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.

5. Repeat steps 3 to 4 with a dry cleaning tip.

Note: *Make sure you don't touch the soft end of the cleaning tip.*

6. Clean the ferrule in the connector port as follows:

   6a. Deposit *one drop* of isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Isopropyl alcohol may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.

   6b. Gently wipe the connector and ferrule.

   6c. With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

   6d. Verify connector surface with a portable fiber-optic microscope (for example, EXFO's FOMS) or fiber inspection probe (for example, EXFO's FIP).

WARNING

Verifying the surface of the connector WHILE THE UNIT IS ACTIVE WILL result in permanent eye damage.

7. Put the EUI back onto the instrument (push and turn clockwise).

8. Throw out cleaning tips and wiping cloths after one use.

Recalibrating the Unit

Manufacturing and service center calibrations are based on the ISO/IEC 17025 Standard, which states that calibration documents must not contain a recommended calibration interval, unless this has been previously agreed upon with the customer.

Validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance. You should determine the adequate calibration interval for your unit according to your accuracy requirements.

Under normal use, EXFO recommends calibrating your unit every year.

Recycling and Disposal (Applies to European Union Only)

For complete recycling/disposal information as per European Directive WEEE 2002/96/EC, visit the EXFO Web site at www.exfo.com/recycle.

15 Troubleshooting

Viewing Online Documentation

An online version of the intelligent Optical Link Mapper user guide is available at all times from the application.

Note: *You will also find a printable PDF version on your installation DVD.*

To access online help:

At the bottom of the **Main Menu**, tap  .

Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

For detailed information about technical support, visit the EXFO Web site at www.exfo.com.

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.

Viewing Information About the Product

You can view the product version details and technical support information in this window.

To view the information about the product:

From the **Main Menu**, press .

Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

16 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of EXFO.

IMPORTANT

EXFO will charge a fee for replacing optical connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 159). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 159).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
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Shenzhen, China, 518126

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Fax: +86 (755) 2955 3101
support.asia@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

FTB-720

SPECIFICATIONS [a]

TECHNICAL SPECIFICATIONS	
Wavelength (nm) [b]	850 ± 20, 1300 ± 20, 1310 ± 20, 1550 ± 20, 1625 ± 15 (filtered)
Dynamic range (dB) [c, d]	27, 26, 36, 34, 34
Event dead zone (m) [e]	0.8
Attenuation dead zone (m) [f]	4, 4.5, 5, 5, 5
Distance range (km)	Multimode: 0.1, 0.3, 0.5, 1.3, 2.5, 5, 10, 20, 40 Singlemode: 1.25, 2.5, 5, 10, 20, 40, 80, 160, 260
Pulse width (ns)	Multimode: 5, 10, 30, 50, 100, 275, 500, 1000 Singlemode: 5, 10, 30, 50, 100, 275, 500, 1000, 2500, 10 000, 20 000
Launch conditions [f]	Class CPR 1 or 2 [i]
Linearity (dB/dB)	±0.03
Loss threshold (dB)	0.01
Loss resolution (dB)	0.001
Sampling resolution (m)	Multimode: 0.04 to 2.5 Singlemode: 0.04 to 5
Sampling points	Up to 256 000
Distance uncertainty (m) [g]	±(0.75 + 0.0025 % x distance + sampling resolution)
Measurement time	User-defined (60 min. maximum)
Typical real-time refresh (Hz)	3
Stable source output power (dBm) [h]	–3 (1300 nm), –7 (1550 nm)

NOTES

a. All specifications valid at 23 °C ± 2 °C with an FC/PC connector, unless otherwise specified; APC connector for FTB-720 singlemode model.

b. Typical.

c. Typical dynamic range with longest pulse and three-minute averaging at SNR = 1.

d. Multimode dynamic range is specified for 62.5 µm fiber; a 3 dB reduction is seen when testing 50 µm fiber.

e. Typical dead zone for multimode reflectance below –35 dB and singlemode reflectance below –45 dB, using a 5 ns pulse.

f. For multimode port, controlled launch conditions allow 50 µm and 62.5 µm multimode fiber testing.

g. Does not include uncertainty due to fiber index.

h. Typical output power is given at 1300 nm for multimode output and 1550 nm for singlemode output.

i. Under improvement to achieve better conditions.

EXFO | Assessing Next-Gen Networks

FTB-730

TECHNICAL SPECIFICATIONS (OTDR)	
Model	FTB-730 [a]
Wavelength (nm) [b]	1310 ± 20/1490 ± 15/1550 ± 20/1625 ± 10/1650 ± 7
Dynamic range at 20 µs (dB) [c]	39/38/37/39 [d]/37
Event dead zone (m) [e]	0.8
Attenuation dead zone (m) [e]	4/4.5/4.5/4.5/4.5
Distance range (km)	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400
Pulse width (ns)	5, 10, 30, 50, 100, 275, 500, 1000, 2500, 10 000, 20 000
Linearity (dB/dB) [b]	± 0.03
PON dead zone (m) [f]	35
Loss threshold (dB)	0.01
Loss resolution (dB)	0.001
Sampling resolution (m)	0.04 to 5
Sampling points	Up to 256 000
Distance uncertainty (m) [g]	± (0.75 + 0.0025 % x distance + resolution)
Measurement time	User-defined (60 min. maximum)
Typical real-time refresh (Hz)	4
Stable source output power (dBm) [h]	–2.5
Visual fault locator	n/a [i]
Reflectance (dB) [b]	± 2

For complete details on all available configurations, refer to the Ordering Information section.

Notes

a. SM Liveport built in filter's bandpass 1625 nm ± 15 nm/1650 nm ± 7 nm.
b. Typical.
c. Typical dynamic range with a three-minute averaging at SNR = 1.
d. Non-SM Live 1625 nm dynamic range is 37 dB.
e. Typical dead zone for reflexions below –45dB using a 5 ns pulse.
f. Non-reflective FUT, non-reflective splitter, 13 dB loss, 50 ns pulse, typical value.
g. Does not include uncertainty due to fiber index.
h. Typical output power value at 1550 nm.
i. Visual fault locator available on FTB-1 platform.

EXFO | Assessing Next-Gen Networks

FTB-7300E

TECHNICAL SPECIFICATIONS

Model	**FTB-7300E** [a]
Wavelength (nm) [b]	1310 ± 20/1490 ± 10/1550 ± 20/1625 ± 10/1650 ± 7
Dynamic range at 20 µs (dB) [c]	39/35/37/39 [d]/37
Event dead zone (m) [e]	0.8
Attenuation dead zone (m) [e]	4/4.5/4.5/4.5/4.5
Distance range (km)	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400
Pulse width (ns)	5, 10, 30, 50, 100, 275, 500, 1000, 2500, 10 000, 20 000
Linearity (dB/dB) [b]	± 0.03
Loss threshold (dB)	0.01
Loss resolution (dB)	0.001
Sampling resolution (m)	0.04 to 5
Sampling points	Up to 256 000
Distance uncertainty (m) [f]	± (0.75 + 0.001 % x distance + sampling resolution)
Measurement time	User-defined (60 min. maximum)
Typical real-time refresh (Hz)	4
Stable source output power (dBm) [g]	–2.5
Visual fault locator (optional) [b]	Laser, 650 nm ± 10 nm CW, P_{out} in 62.5/125 µm: 1.5 dBm (1.4 mW)
Reflectance (dB) [b]	± 2

For complete details on all available configurations, refer to the Ordering Information section.

Notes

a. SM Live port built in filter's bandpass 1625 nm ± 15 nm/1650 nm ± 7 nm.
b. Typical.
c. Typical dynamic range with a three-minute averaging at SNR = 1.
d. Non-SM Live 1625 nm dynamic range is 37 dB.
e. Typical dead zone of singlemode modules for reflectance below –45 dB, using a 5 ns pulse.
f. Does not include uncertainty due to fiber index.
g. Typical output power value at 1550 nm.

GENERAL SPECIFICATIONS

Module	**FTB-7300E**
Size (H x W x D)	97 mm x 25 mm x 260 mm (3 $^{13}/_{16}$ in x 1 in x 10 ¼ in)
Weight	0.55 kg (1.2 lb)

FTB-7400E

TECHNICAL SPECIFICATIONS

Model [a]	FTB-7400E-XXXX	FTB-7400E-CWS	FTB-7400E-CWCL
Wavelengths (nm) [b]	1310 ± 20/1383 ± 1/1550 ± 20/1625 ± 10	1470 ± 3/1490 ± 3/1510 ± 3/1530 ± 3	1550 ± 3/1570 ± 3/1590 ± 3/1610 ± 3
Dynamic range at 20 µs (dB) [c]	42/40/41/41	41/41/ 41/41	41/41/ 40/40
Event dead zone (m) [d]	0.8	0.8	0.8
Attenuation dead zone (m) [d]	4/4/4.5/4.5	4/4.5/4.5	4/4.5/4.5
Distance range (km)	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400	1.25, 2.5, 5, 10, 20, 40, 80, 160, 260, 400
Pulse width (ns)	5, 10, 30, 100, 275, 1000, 2500, 10 000, 20 000	5, 10, 30, 100, 275, 1000, 2500, 10 000, 20 000	5, 10, 30, 100, 275, 1000, 2500, 10 000, 20 000
Linearity (dB/dB) [b]	± 0.03	± 0.03	± 0.03
Loss threshold (dB)	0.01	0.01	0.01
Loss resolution (dB)	0.001	0.001	0.001
Sampling resolution (m)	0.04 to 5	0.04 to 5	0.04 to 5
Sampling points	Up to 256 000	Up to 256 000	Up to 256 000
Distance uncertainty (m) [e]	± (0.75 + 0.001 % x distance + sampling resolution)	± (0.75 + 0.001 % x distance + sampling resolution)	± (0.75 + 0.001 % x distance + sampling resolution)
Measurement time	User-defined (5 sec. minimum to 60 min. maximum)	User-defined (5 sec. minimum to 60 min. maximum)	User-defined (5 sec. minimum to 60 min. maximum)
Typical real-time refresh (Hz)	4	4	4
Stable source output power (dBm) [f]	–4.5 (7400E-0023B)		
Visual fault locator (optional) [b]	Laser, 650 nm ± 10 nm CW, P_{out} in 62.5/125 µm: 1.5 dBm (1.4 mW)		

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NOTICE
通告

CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES
中国关于危害物质限制的规定

NAMES AND CONTENTS OF THE TOXIC OR HAZARDOUS SUBSTANCES OR ELEMENTS CONTAINED IN THIS EXFO PRODUCT
包含在本 **EXFO** 产品中的有毒有害物质或元素的名称和含量

O	Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
X	Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

Part Name 部件名称	Toxic or hazardous Substances and Elements 有毒有害物质和元素					
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 隔 (Cd)	Hexavalent Chromium 六价铬 (Cr VI)	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴二苯醚 (PBDE)
Enclosure 外壳	O	O	O	O	O	O
Electronic and electrical sub-assembly 电子和电子组件	X	O	X	O	X	X
Optical sub-assembly[a] 光学组件 [a]	X	O	O	O	O	O
Mechanical sub-assembly[a] 机械组件 [a]	O	O	O	O	O	O

a. If applicable.
如果适用。

MARKING REQUIREMENTS
标注要求

Product 产品	Environmental protection use period (years) 环境保护使用期限 (年)	Logo 标志
This Exfo product 本 EXFO 产品	10	
Battery[a] 电池 [a]	5	

a. If applicable.
如果适用。

P/N: 1064052

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