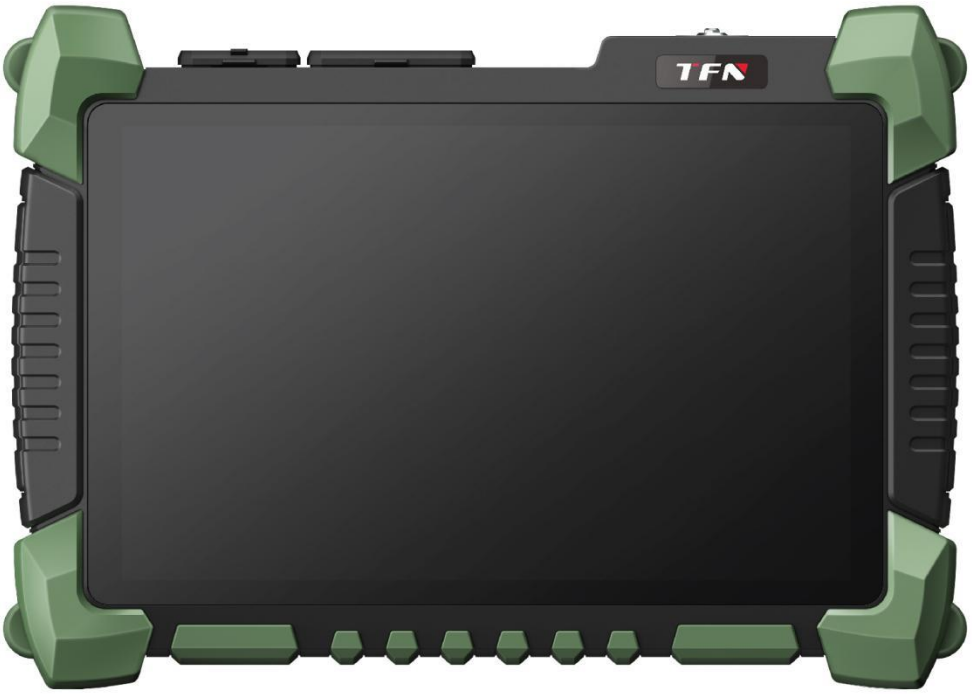
RM7

Optical Time Domain Reflectometer

User's Manual

Please read this manual before using this device.
Please keep this manual with the device.



Directory

Notes

Warning

Making any modifications or alterations not explicitly permitted by this manual will void your right to operate this equipment.

To reduce the risk of fire or electric shock, do not expose this device to rain or moist environments.

To prevent electric shock, do not open the casing. Service must be performed by qualified personnel.

Attention

Due to the harmful effects of the laser beam on the eyes, do not attempt to disassemble the casing or look directly into the laser output.

Precautions for Use

Using Batteries:

This device uses a dedicated rechargeable battery. Do not mix batteries of different models or specifications.

Avoid Condensation:

To avoid condensation, you should avoid sudden changes in temperature. Do not use the device immediately after moving it from a cold place to a hot one, or if the temperature in the room suddenly increases, as condensation may occur inside the device.

If the temperature changes suddenly while using the device, immediately stop using it and remove the battery. Wait at least one hour before reconnecting the power.

Storage:

When the device is not in use for an extended period, the battery module should be removed and stored separately to prevent battery leakage from damaging the device.

※The content of this manual is for reference only; please refer to the actual product for definitive information.

Main Window

1	OPM/VFL Parts	2	DME Parts	3	Power On/Off	4	OTDR Port
5	10.1-inch Display	6	USB	7	Headphones	8	RJ45
9	SIM Card	10	TF Card	11	Power Interface		

(Push)

The main window interface includes the following information:

- Date and Time
- CPU Temperature
- Application Software

Note: The features available in the product depend on the model and options you purchase.

Application software is available in three statuses: activated, trial, and locked. To activate the corresponding features, please contact the product distributor to obtain an authorization code.

Steps to activate the application:

1. Long press the icon of the feature you want to activate on the main window.
2. Tap 'Unlock' to bring up the application authorization popup.
3. Enter the authorization code provided by the product distributor to activate the application.

To clear application software data:

1. Long press the icon of the application software for which you need to clear data on the main window.
2. Simply tap 'Clear Data' to proceed.

- Navigation and status bars (set to enabled). For detailed information on the settings for the navigation and status bars, please refer to page 124, 'Display'.

Note: Due to the use of different platforms, the interface of your product may slightly differ from the images in this user documentation.

Note: In this document, 'tap' and 'double tap' (related to touchscreen operations) correspond to 'click' and 'double click' respectively.

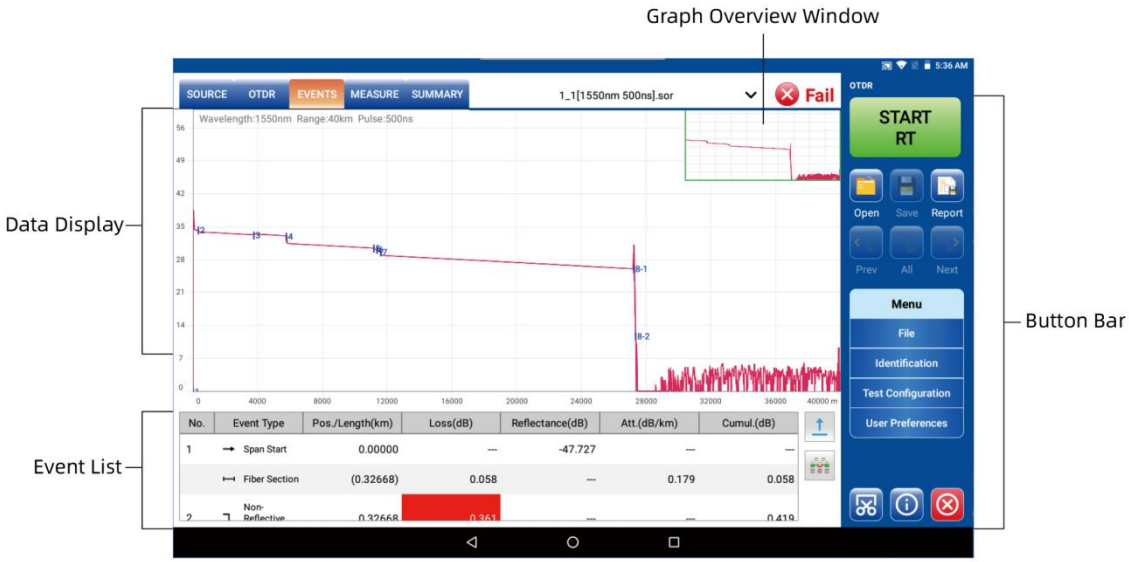
OTDR

I. OTDR Introduction

Optical Time Domain Reflectometer(OTDR) can be used to describe the characteristics of fiber spans. Fiber spans are typically composed of multiple fiber sections connected via joints and connectors.
Standard OTDRs can provide a view of the internal condition of the fiber, as well as calculate fiber length, attenuation, breaks, total return loss, splice loss, connector loss, and total loss.

1.1 Main Window

As shown below, the main window contains all the commands necessary to control the OTDR:



Note: Due to screen resolution issues, the appearance of the OTDR application may differ slightly from the illustrations shown in this user guide.

1.2 Data Post-Processing

If the OTDR application is not used, curves can be viewed and analyzed on a computer where the OTDR Assistant for PC program is installed.

1.3 Basic Principles of OTDR

OTDR is a sophisticated optoelectronic integrated instrument that utilizes the backscatter caused by Rayleigh scattering and Fresnel reflection during the transmission of light through optical fibers. It is widely used in the maintenance and construction of optical cable lines, capable of measuring fiber length, fiber transmission attenuation, connector attenuation, and fault location.

The formula for calculating distance with an OTDR is as follows:

$$\text{Distance}=\frac{c}{n}x\frac{t}{2}$$

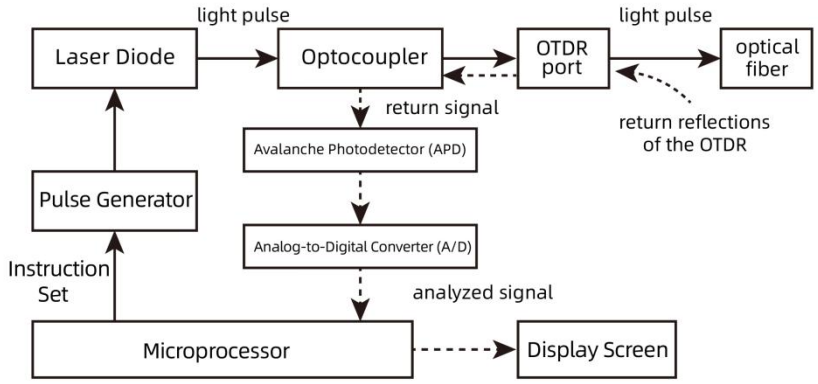
as follows

c = the speed of light in a vacuum (2.998 x 10^8 m/s)

t = the time delay from transmitting the pulse to receiving the pulse

n = the refractive index of the fiber under test (specified by the manufacturer)

- When a pulse propagates along a fiber, it encounters minor changes in the material (such as changes in refractive index and discontinuities), causing light to scatter in all directions, resulting in Rayleigh scattering. However, a small amount of light is directly reflected back to the transmitter, a phenomenon known as backscatter.
- When propagating along a fiber, encountering a sudden change in material density can result in Fresnel reflection. Changes in material density may occur at connections with air gaps or at breaks. Compared to Rayleigh scattering, the amount of Fresnel reflection is considerably larger. The intensity of the reflection depends on the degree of change in the refractive index.



On a complete curve, each point represents the average of multiple sampling points. To view each point, the curve must be magnified.

II. Prepare the OTDR for testing

2.1Install or replace the interchangeable flange on the OTDR

Steps for installing or replacing a stainless steel flange:

1.Rotate the OTDR flange head counterclockwise to remove it.

2.Select the flange head to be replaced and install it by rotating clockwise.

2.2 Clean and connect the fiber optic

Important Notice

To ensure maximum power and avoid erroneous readings:

- Before inserting the fiber end-face into the port, please ensure that it is clean by following the method described below. Our company is not responsible for any damage or errors caused by improper fiber cleaning or handling techniques.
- Please ensure that the fiber optic patch cord has the appropriate connector. Connecting mismatched connectors will damage the ferrule.

Steps for connecting the optical cable to the port:

1. Inspect the fiber using a fiber inspection probe. If the fiber is clean, insert it into the port. If the fiber is dirty, clean it using the following method.
2. Clean the fiber end-face as follows:
   2a. Gently wipe the fiber end-face with a lint-free swab dipped in optical cleaning solution.
   2b. Use a dry swab to completely dry the connector.
   2c. Visually inspect the fiber end-face to ensure it is clean.
3. Carefully align the connector with the port, preventing the fiber end-face from touching the outside of the port or rubbing against other surfaces.
   If the connector has a latch, ensure that it is fully inserted into the corresponding slot in the port.
4. Push the connector in to secure the optical cable in place and ensure full contact.
   If the connector has a threaded sleeve, tighten the connector to securely fasten the fiber. Do not overtighten, as this may damage the fiber and the port.

Note： If the optical cable is not locked and/or properly connected, significant loss and reflection may occur.

2.3 Automatically Name Curve Files

Based on your settings, the file name consists of one or two fixed parts (alphanumeric) and one or two variable parts (incrementing or decrementing numbers), as follows:

If incrementing is selected ...	If decrementing is selected ...
The variable part increments sequentially until it reaches the maximum value for the specified number of digits, then starts again from 1.	The variable part decrements sequentially until it reaches 1, then starts again from the maximum value for the specified number of digits.

Note： To decrement the value, the starting value must be greater than the stopping value.

After saving the results, the device will increment (or decrement) the current file name suffix to be used as the new file name.

You can choose the number of digits displayed for the increment or decrement value.

One or more identifiers in the filename can be incremented. Selecting an identifier will use the increment (or decrement) value you have set.

If multiple identifiers are selected, starting from the second one, the identifiers will be displayed in the order you set, and incrementation will begin from the last item in the list (the one with the highest identifier number).For example, if the filename includes a location identifier, a cable identifier, and a fiber identifier, in that order, the first item to be incremented would be the fiber identifier, followed by the cable identifier, and finally the location identifier.

location1，fiber cable1，fiber1

location1，fiber cable2，fiber1

location1，fiber cable2，fiber2

and so on.

Note： If the current curve file is not saved, the recommended file name will be used for the next curve file.

This feature is very useful when testing multi-fiber optical cables.

If the file auto-naming feature is disabled, the application will use the default file name.

Note： For the (.sor) format, the device generates a file for each wavelength.

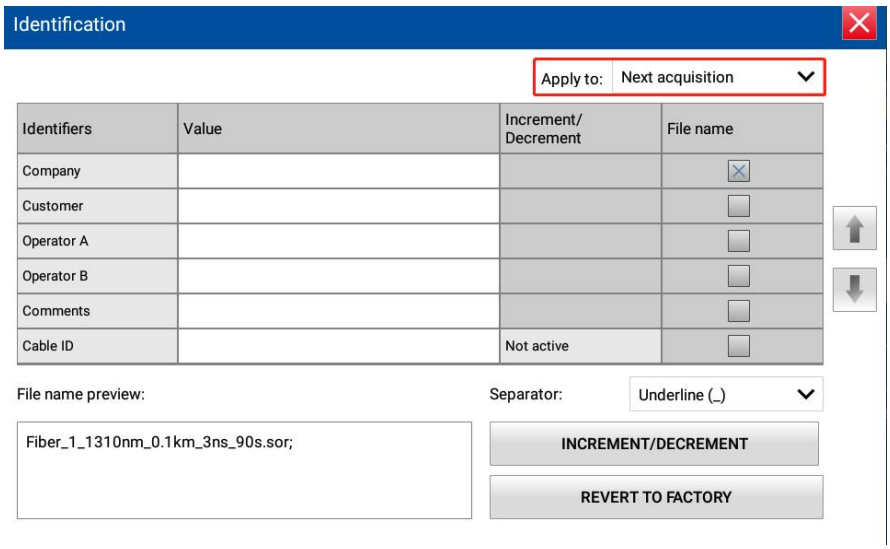
Changes to the auto-naming parameters are only effective for files that have not yet been saved. If the test is complete but not saved, you can only view the auto-naming parameters for the current and next data collection; if the test is not complete, you can only view the parameters for the next data collection. In other cases, the application does not display the file auto-naming parameters.

You can also restore all parameter values to their default settings.

Steps for configuring automatic file naming:

1. In the "Main Menu," tap "Identify."

2. Select "Next Data Collection" or "Current Data Collection" from the "Apply to" list.

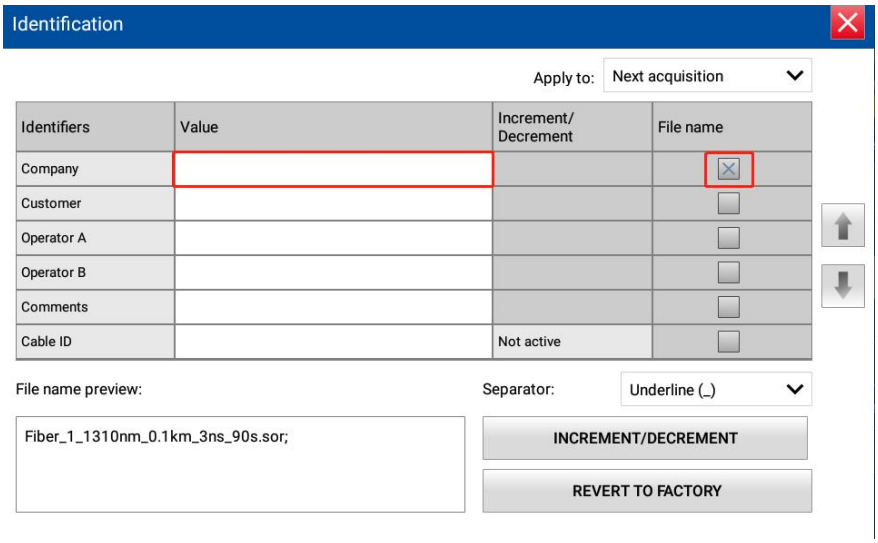


3. Enter all the information by following these steps:

3a. Find the row containing the identifier you want to change, tap the checkbox in the "Filename" column to enable the identifier that needs to be changed.

3b. Tap the "Value" field of the desired identifier.

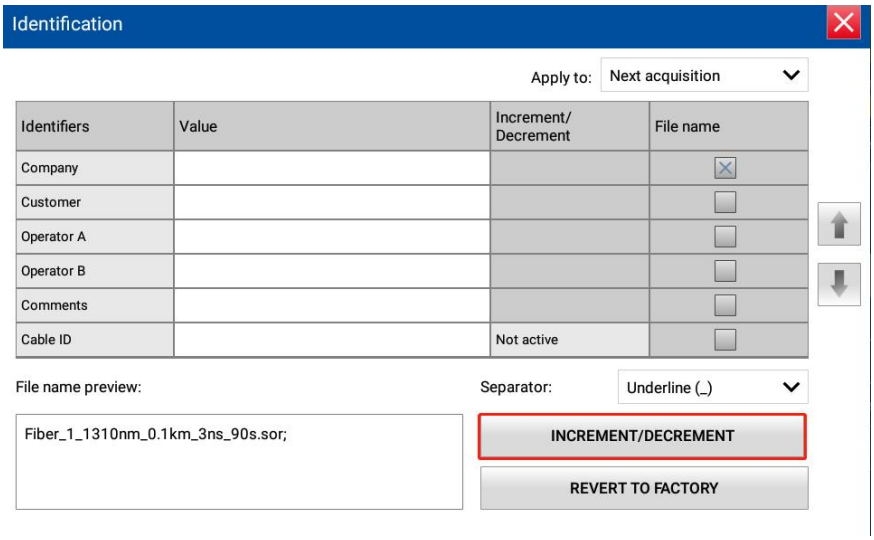
3c. Enter the corresponding information.



Note: Information in the gray box cannot be changed.

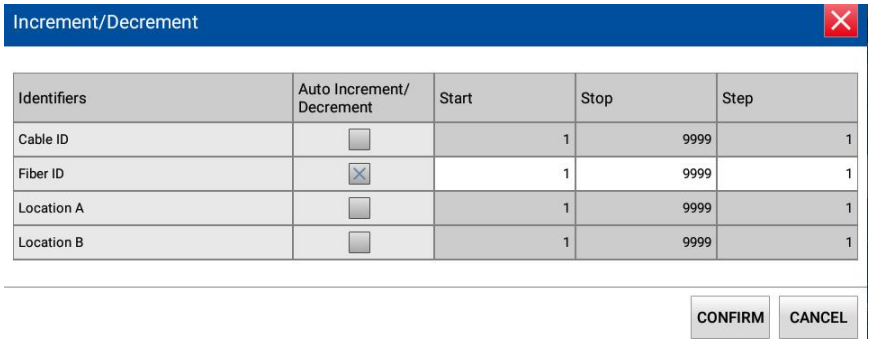
4. To enable automatic incrementation of fiber optic cable identification, fiber identification, or position (A and/or B), please do the following:

4a. Tap the "Increment" button.



4b. In the "Increment" window, check the "Auto Increment" checkbox corresponding to the target identification.

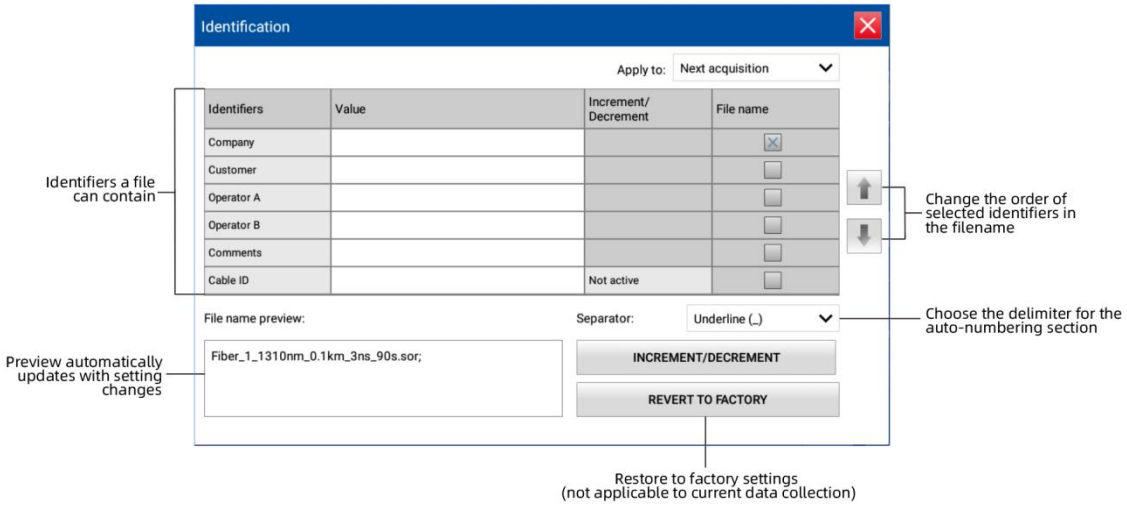
4c. Enter the starting value, stopping value, and step value as needed.



Note: To enable decrementing, the starting value must be greater than the stopping value.

4d. Tap "OK" to return to the "Identification" window.

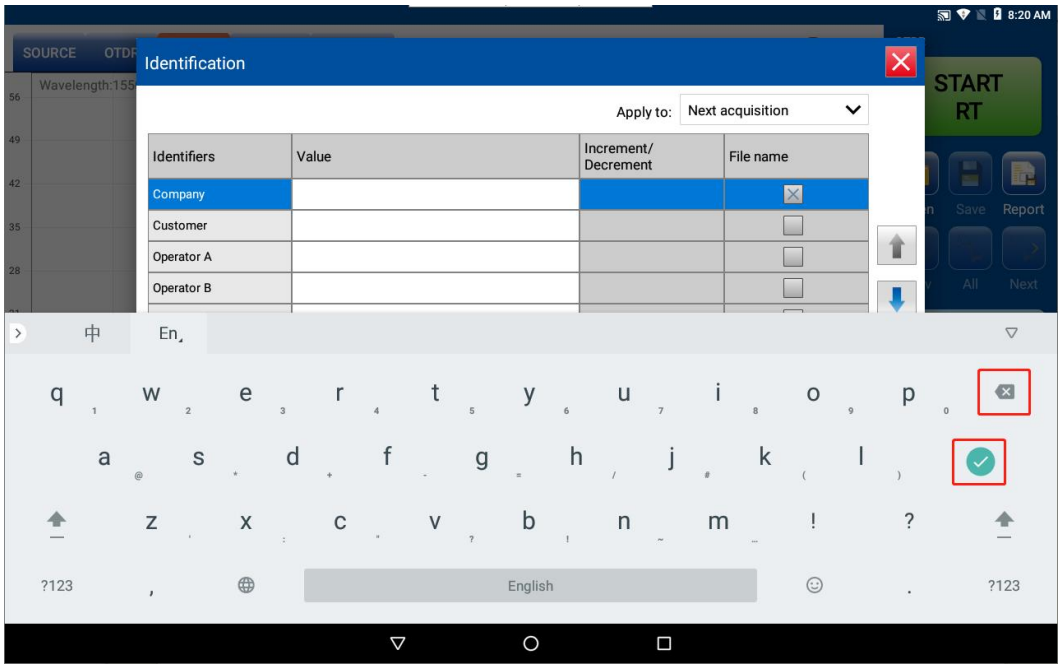
5. Select the identifiers you want to include in the filename. Check the identifiers, and then use the up or down arrow buttons to change their position in the filename.



Tap "  " to confirm the new settings and return to the main window.

Clearing the "Value" Step:

1. In the "Main Menu," tap "Identification."
2. In the "Apply to" list, select "Next Data Collection."
3. Tap the white box in the "Value" column that needs to be cleared, which will bring up the soft keyboard. Tap "" to delete the contents of the "Value" column, then tap the "" button to return to the Identification window.



4.Tap "" to return to the main window.

2.4 To set the refractive index and RBS coefficient:

Before conducting the test, it is necessary to set the refractive index (group index) and backscattering coefficient to ensure these parameters are applied to all newly collected curves.

- The refractive index (IOR), also known as the group index, is used to convert the propagation time of light into distance. For all distance-related OTDR measurements, such as event location, attenuation, section length, total length, etc., the correct refractive index is crucial. The refractive index is provided by the cable manufacturer or fiber manufacturer.

  The testing application sets default values for each wavelength. You can configure the refractive index for each available wavelength. This information should be confirmed before each test.
- The backscattering (RBS) coefficient indicates the amount of backscatter in a specific fiber. This coefficient is used for calculating event loss and reflectivity, and is usually provided by the cable manufacturer.

  The testing application sets default values for each wavelength. You can configure the RBS coefficient for each available wavelength.

  The application saves the thresholds to the measurement result files. Therefore, these thresholds can be viewed even when the measurement files are opened on other devices. The refractive index and RBS coefficient can both be reset to their default values.

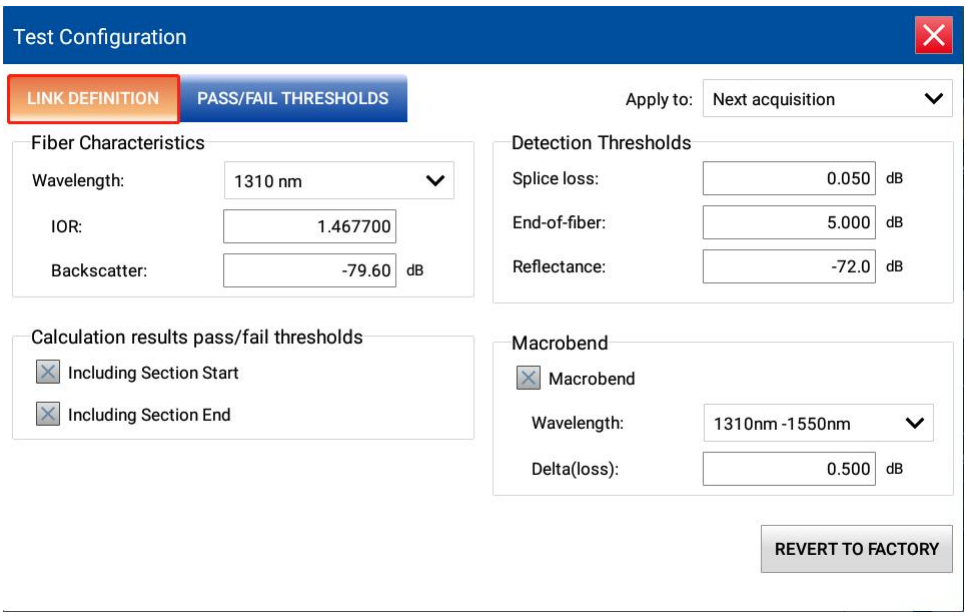
Steps to Set the Refractive Index and RBS Coefficient:

1. In the "Main Menu," tap "Test Configuration."
2. In the "Apply To" list, select "Next Data Collection."

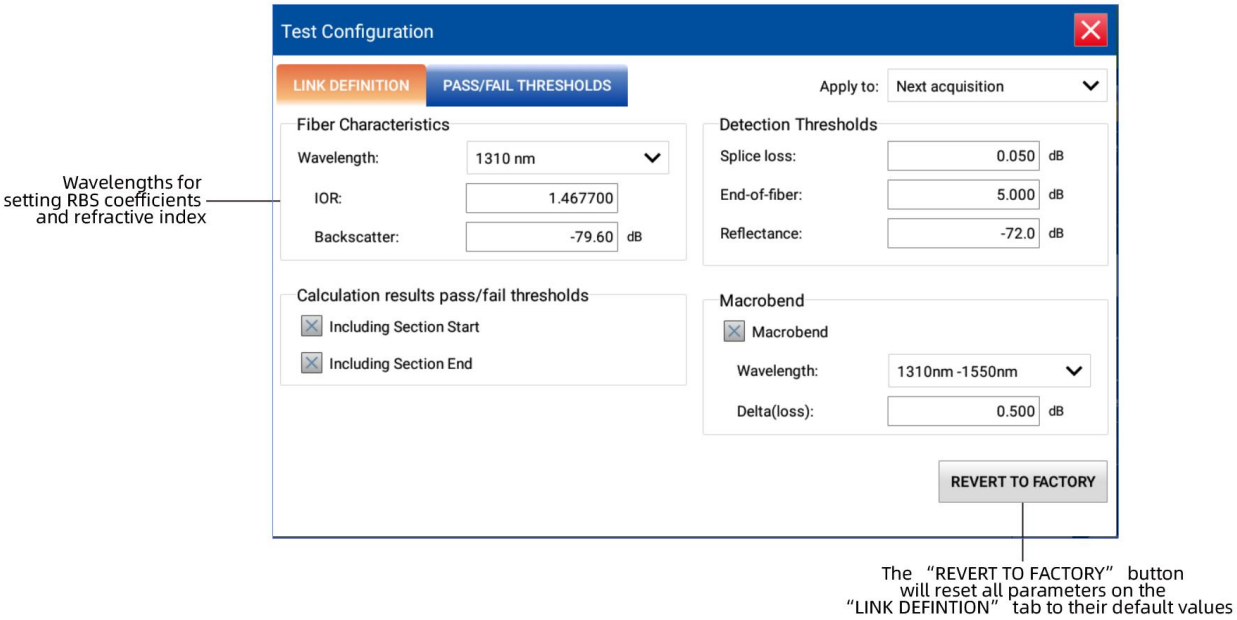
Important Note

- Important Note: If there are already executed and saved data collections, the "Apply To" list will display two options: "Next Data Collection" and "Current File." Both the current curve settings and the new data collection will be modified.
- "Apply and Next Data Collection" means to modify the parameters for both the current file and the next data collection simultaneously.

3. In the "Test Configuration" window, open the "Link Definition" tab.



4. Select the desired wavelength.



Important Note

Important Note: You must have the RBS (Rayleigh Backscatter) coefficients provided by the fiber manufacturer in order to change their default values. If this parameter is set incorrectly, reflectance measurements will be inaccurate.

5. Tap "  " to return to the main window.

2.5 Set the analysis detection threshold.

Setting the following analysis detection thresholds can optimize the event detection function:

- Connector Loss Threshold: Display or hide minor non-reflective events.
- Reflectance Threshold: Used to hide false reflective events caused by noise, convert harmless reflective events into loss events, or detect reflective events that may harm the network and other fiber optic equipment.
- Fiber End Threshold: Used to immediately stop analysis when severe event losses occur, such as those that may jeopardize network signal transmission.

Note： If you are using the Live module, the default setting for the Fiber End Threshold is 15 dB.

Note： Changing the detection thresholds for the current curve will cause the application to reanalyze the curve. All manually changed values will be lost.

Important Note

If you allow the application to determine the data acquisition settings, use the user-defined Fiber End (EoF) threshold.

If the user has defined this threshold, the application will insert an EoF (End of Fiber) event at the first instance where the loss exceeds the threshold. Subsequently, the application will use this EoF event to determine the data acquisition settings.

Setting the threshold helps to ignore events with known smaller measurement values, or to ensure that all events are detected, even those with very small measurement values.

The application saves the thresholds in the measurement result file. Therefore, these thresholds can be viewed even when the measurement result file is opened on other devices.

Setting up analysis detection threshold steps:

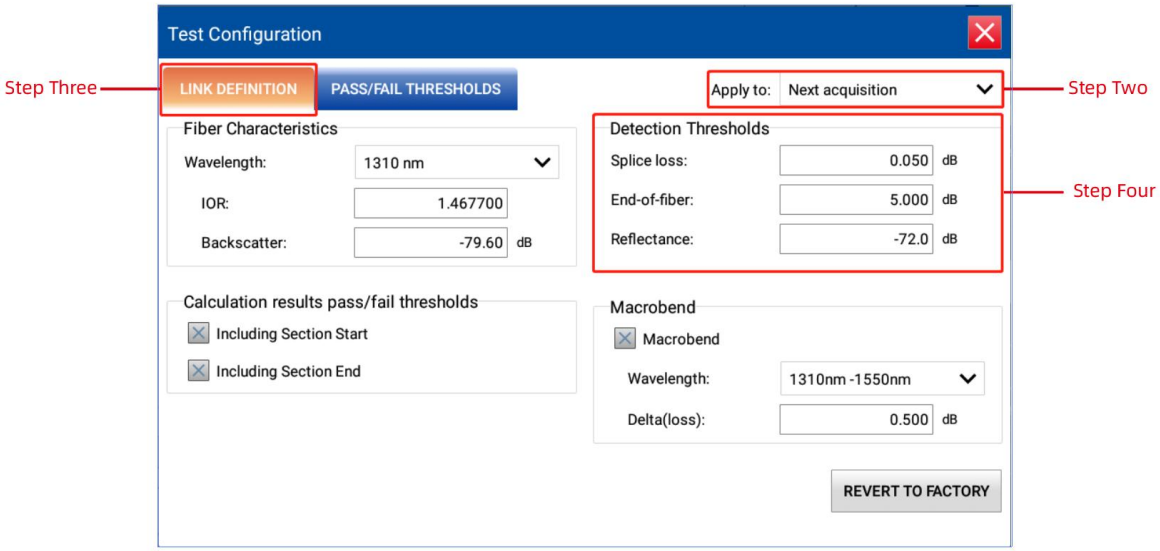
1. In the "Main Menu," tap "Test Configuration."
2. In the "Apply to" list, select "Next Data Collection."
3. In the "Test Configuration" window, open the "Link Definition" tab.

Important Note

The "Restore Factory Settings" button will reset all parameters on the "Link Definition" tab to their default values.

4. Under "Detection Thresholds," enter the values for each parameter as required.

If you want to reset all parameters to their default values, tap the "Restore Factory Settings" button.



5.Tap the "  " to return to the main window.

Changes made to the analysis detection thresholds will apply to all new curves.

2.6 Set the macro bend parameters.

Note： Single-mode single-wavelength cannot use macro bending, while single-mode multi-wavelength can use macro bending.

The device can measure the event loss values at a given wavelength (e.g., 1310 nm) and another wavelength (e.g., 1550 nm) at the same location, and then compare these two loss values to locate macro bends.

If the following conditions are met when comparing the two loss values, the device will confirm the presence of a macro bend:

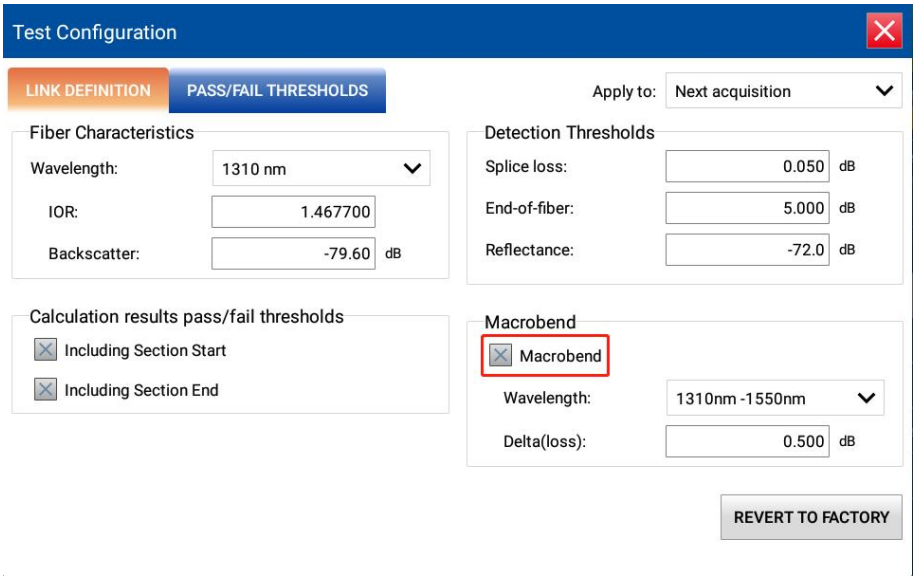
- The loss at the longer wavelength is greater than the loss at the shorter wavelength.
  and
- The difference between the two loss values exceeds a specified loss difference threshold. The default loss difference threshold is 0.5 dB (suitable for most optical fibers). You can change this threshold based on actual conditions.

You can also disable the macro bend detection feature.

Note： The macro bend detection feature is only applicable to single-mode wavelengths. Filtering wavelengths or single-wavelength ports cannot perform macro bend detection.

Steps for Setting Macro Bend Parameters:

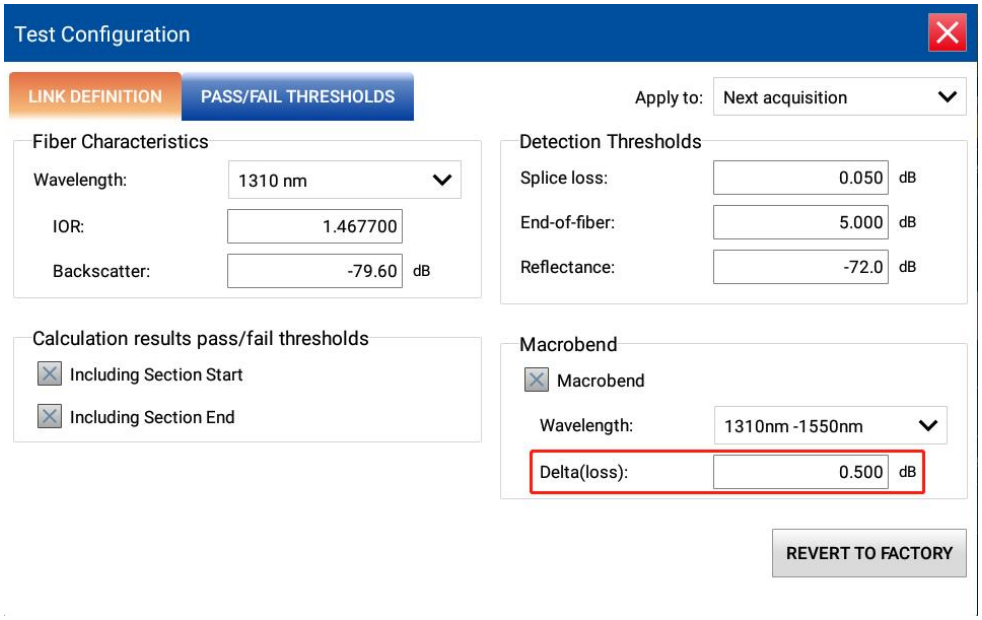
1. In the "Main Menu," tap on "Test Configuration."
2. In the "Apply to" list, select "Next Data Acquisition."
3. Select the "Link Definition" tab.
4. Check the "Macro Bend" checkbox to enable the macro bend detection feature.
   or
   Uncheck this checkbox to disable the macro bend detection feature.



5. If needed, set the loss difference as follows:
   5a.In the "Wavelength" list, select a pair of wavelengths for which you want to set the difference.

Note： For the next data collection, only the wavelength combinations supported by the module can be used. The current data collection will use the available wavelengths in the file.

5b. In the "Difference (Loss)" box, enter the desired value.



5c. Repeat steps 5a and 5b to set the difference for other wavelength combinations.

6.Tap the "  " to return to the main window.

2.7 Set Pass/Fail Thresholds

You can set the "Pass/Fail Threshold" parameters for the test.

The application saves the thresholds to the measurement results file. Therefore, these thresholds can be viewed even when the measurement results file is opened on other devices. You can set thresholds for connector loss, reflectance, fiber segment attenuation, span loss, and span ORL. Different thresholds can be applied to each wavelength.

These pass/fail thresholds will be applied to the analysis results of the current curve and all new curves for the corresponding wavelengths.

If the processed file contains other wavelengths, the application will automatically add these wavelengths to the available wavelength list. You can then set thresholds for these new wavelengths. You can also restore all thresholds to their default values.

The set thresholds for loss, reflectance, and attenuation apply to all events that can measure such values.

Once the thresholds are set, the application can perform pass/fail tests to determine the status of the measurement results (pass or fail).

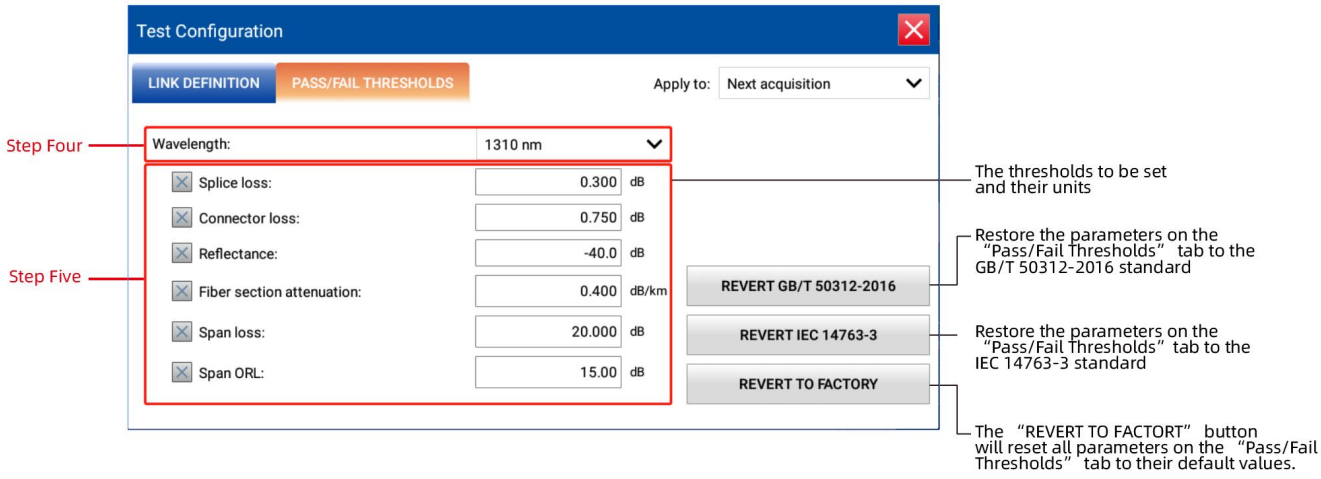
In the "Events" table, values that exceed the preset thresholds are displayed in white text on a red background. The values for span length, span loss, and span optical return loss are displayed in the "Summary" tab.

Steps to Set Pass/Fail Thresholds:

1. In the "Main Menu," select "Test Configuration."
2. In the "Apply To" list, select "Next Data Collection."
3. Select the "Pass/Fail Thresholds" tab.

Important Note
If there is an executed and saved data collection available, the "Apply To" list will display two options: "Next Data Collection" and "Current File." Both the current curve settings and the new data collection will be modified.

4. In the "Wavelength" list, select the wavelength for which you want to set the threshold.
5. Check the checkbox corresponding to the threshold you want to use, and enter the required value in the associated text box.
6. Tap "  " to return to the main window.



2.8 Set whether the calculation results and pass/fail thresholds include the start/end points of segments

You can configure whether the calculation results for application testing and the pass/fail thresholds include the start and end points of segments.
The application defaults to including the start and end points of segments.

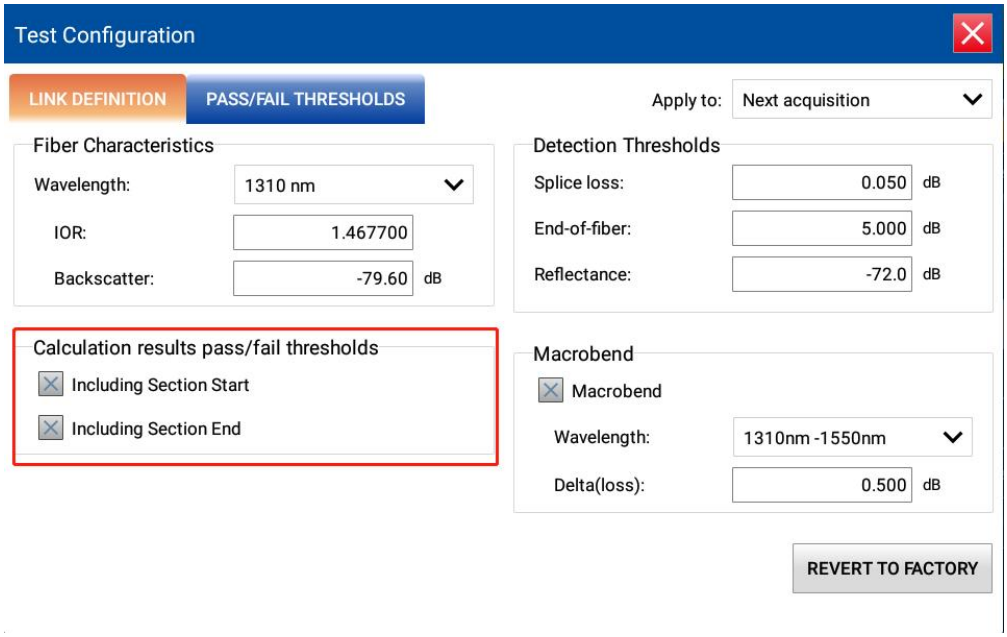
Steps to set whether the calculation results and pass/fail thresholds include the start/end points of segments:

1. In the "Main Menu," tap "Test Configuration."
2. Select the "Link Definition" tab.
3. Under "Calculation Results and Pass/Fail Thresholds," check the box for "Include Segment Start Point" or check the box for "Include Segment End Point."

   or

   Uncheck the box for "Exclude Segment Start Point" or "Exclude Segment End Point."

4. Tap on "  " to return to the main window.



III. Test the fiber optic

You can perform a comprehensive OTDR (Optical Time Domain Reflectometer) test using various tools and have control over all test parameters.
By default, all available wavelengths are selected.
You can set the data acquisition parameters yourself, or let the application determine the most suitable values.
In the latter case, the application automatically evaluates the optimal settings based on the fiber optic link currently connected to the device.
The pulse width is determined based on the factory-set Signal-to-Noise Ratio (SNR) requirements, which are sufficient to detect the End of Fiber (EoF) events.
The End of Fiber (EoF) event detection algorithm uses the fiber end threshold set in the "Test Configuration" window. For more details, please refer to page 14, "Setting Analysis Detection Thresholds". If you are unsure about the values to choose, you can restore this parameter to its factory default settings.

Note： You can interrupt data acquisition at any time. The application will display the last information obtained up to the interruption point along with the accompanying analysis results.

After the analysis is completed, all events will be displayed in the "Events" tab. For more details, please refer to page 43, "Analyzing Curves and Events."

After the analysis, you can save the measurement results. If the previous results have not been saved, the application will prompt you to save them before restarting data collection.

Steps to Obtain the Curve:

1. Properly clean the connectors (for more details, please refer to page 7, "Cleaning and Connecting Fiber Optics").
2. Connect the fiber optic cable to the OTDR port.

If the device has two OTDR ports, ensure that the fiber is connected to the appropriate port according to the wavelength to be used (single-mode, single-mode online, or multi-mode).

Note

Do not connect the online fiber to the OTDR port unless it is properly configured.

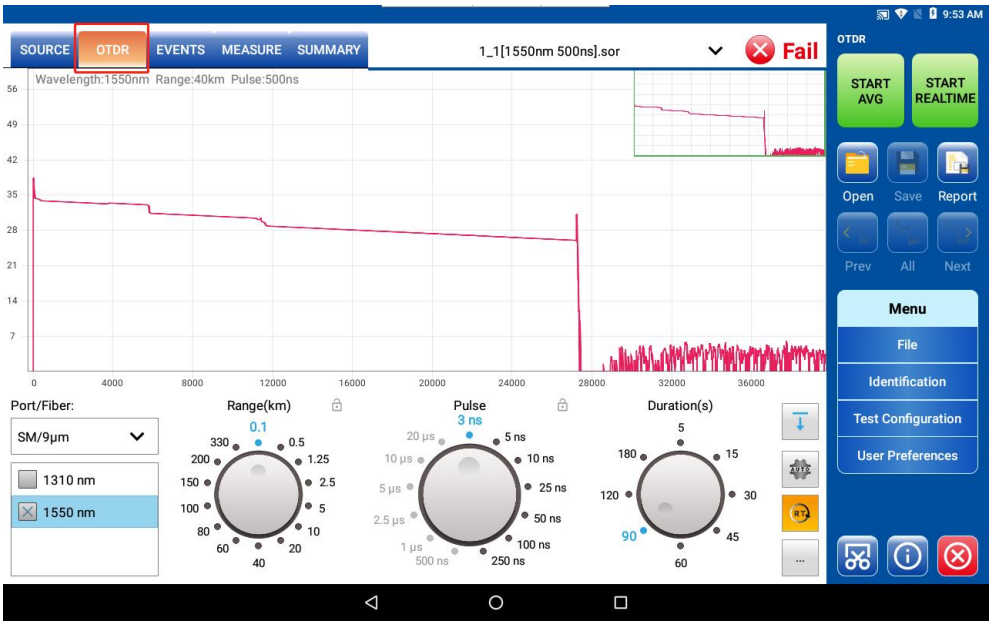
Injected light with a power range of -65 dBm to -40 dBm will affect the data acquisition results of the OTDR. The extent to which the data acquisition results are affected depends on the selected pulse width.

An injected signal with a power greater than 10 dBm can cause permanent damage to the OTDR module.

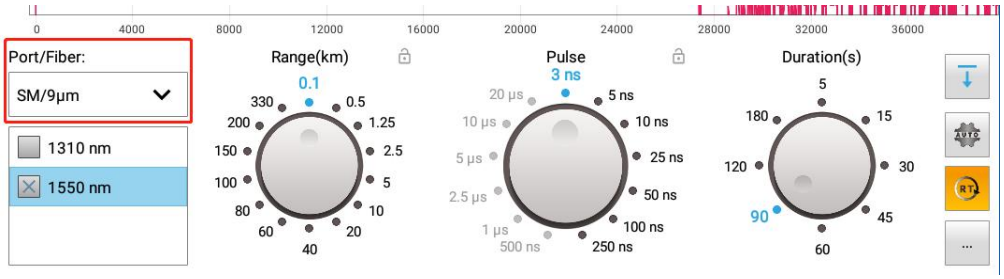
3. Set the refractive index (group index) and the RBS coefficient as needed. For more details, please refer to page 12 under the section "Setting Refractive Index, RBS Coefficient."

4. Set the inspection of the first connector as needed. For more details, please refer to page 26 under the section "Enabling or Disabling the First Connector Check Feature."

5. Open the "OTDR" tab.

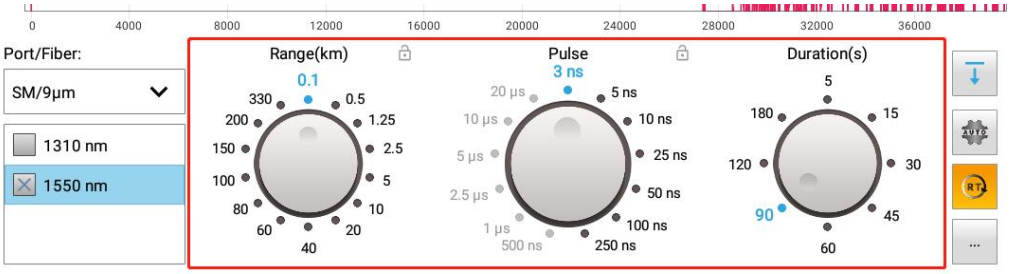


6. When using a standard OTDR, select the desired fiber type from the "Port/Fiber" list. For online fiber testing, choose "SM Live"; for Type C fiber, select "50 μm"; for Type D fiber, choose "62.5 μm".



7. When using a standard OTDR, select or click on the desired wavelength.

8. Select the desired distance range, pulse width, and acquisition time values. For more details, please refer to page 25 under the section "Setting Distance Range, Pulse Width, and Data Acquisition Time."



9. Tap "Start". If the first connector check feature is enabled, the device will display a message if there is an abnormal injection power. For more details, please refer to page 27 under the section "Enabling or Disabling the First Connector Check Feature."

Note： The application begins data acquisition from the selected wavelength and proceeds with other wavelengths in order from shortest to longest.

During the data acquisition process, you can modify the data acquisition parameters as needed. Each time the parameters are modified, the OTDR recalculates the averages. The recalculation of averages is only applicable to the wavelength currently being tested. Changing the time parameters does not cause the data acquisition to restart.

10. After the analysis is complete, tap "Save" on the button bar to save the trace.

The application generates the filename based on the set automatic naming parameters. For more details, please refer to page 8 under the section "Automatic Naming of Trace Files." The filename will be displayed in the status bar. Files that need to be saved will be stored in the default folder. For more details, please refer to page 38 under the section "Setting the Default Storage Folder."

3.1 Automatically Set Data Acquisition Parameters

If the automatic parameter setting function is used and your module supports multiple wavelengths, the application will first calculate the distance and pulse for the first wavelength, then calculate the distance and pulse for the second wavelength, and so on.

After using the automatic parameter setting function at least once, you can also enable the feature to select the optimal range and pulse based on the distance set by the application.

Steps for Using the Automatic Data Acquisition Parameter Setting Feature:

1. In the main window, select the "OTDR" tab.
2. Select the desired test duration.
3. Tap the "AUTO" button.
4. Tap "Start" to begin data collection.

3.2 Configure the launch fiber and the receive fiber

The launch fiber and the receive fiber are used respectively to identify the first and last connectors on the fiber under test. The launch fiber allows the OTDR to recover after sending the test pulse into the fiber, while the receive fiber is used to enable connector measurements (loss and reflectivity) at the end of the fiber under test.

When testing with the device, the fiber under test is connected to the device through a launch fiber. A receive fiber can also be connected at the end of the fiber under test. By default, the fiber span includes the receive fiber (but not the launch fiber).

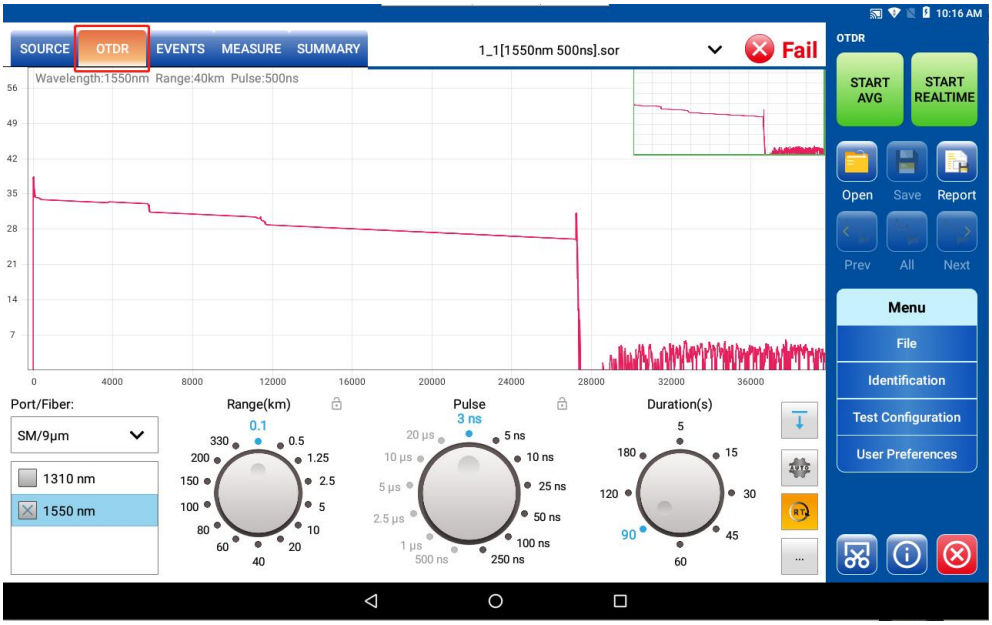
After setting the length of the launch fiber, the application sets the start of the fiber under test as the start of the fiber span. The start of the span becomes Event 1, and its distance reference becomes Event 0. This allows the device to identify the first connector at the start of the fiber. The displayed values include the loss caused by the span start event. When assessing the state of connector loss and reflectivity, the span start event is also considered. If the length of the fiber is unknown, the launch fiber can also be configured by event number.

After setting the length of the receive fiber, the application locates the end event of the fiber and moves the endpoint of the fiber span according to the specified length of the receive fiber (excluding continuous events or end of analysis events). There should be an event near the designated endpoint of the span. If there is none, the application will automatically add an event at the appropriate location. In addition to distance values, the application can also set the endpoint of the span based on event numbers.

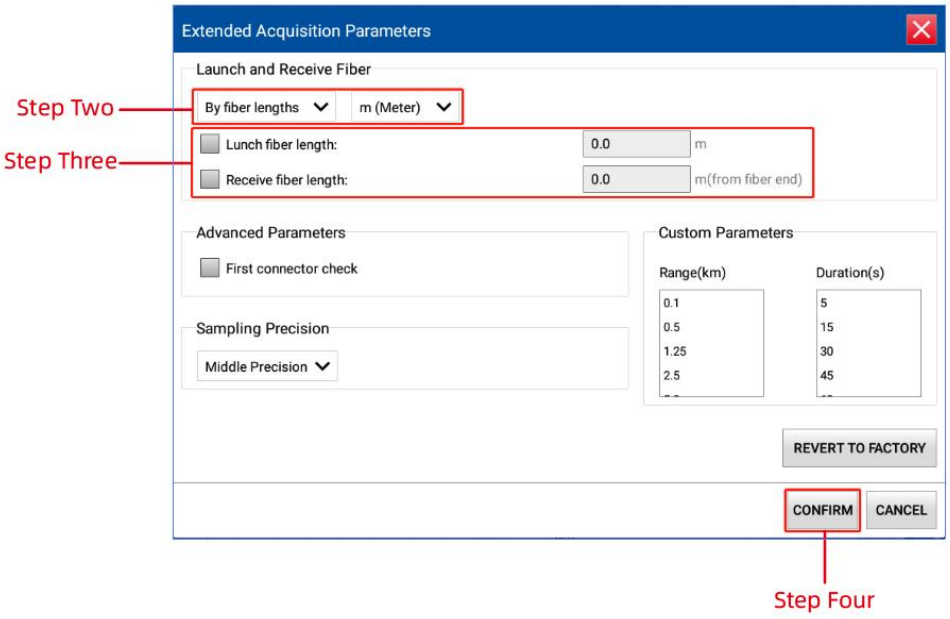
If the launch fiber and receive fiber are not set, they are considered part of the fiber under test (fiber span). The application calculates cumulative loss only for the designated fiber span. Events outside the fiber span are displayed in gray in the event table, and these events are not shown in the graph.

Steps to Set Up Launch Fiber and Receive Fiber:

1. In the main window, select the "OTDR" tab, then tap the "  " button.



2. Under "Launch Fiber and Receive Fiber", choose either "By Distance" or "By Event".
3. Check the desired checkbox, then enter the value in the corresponding text box.
4. Tap "CONFIRM" to return to the main window.

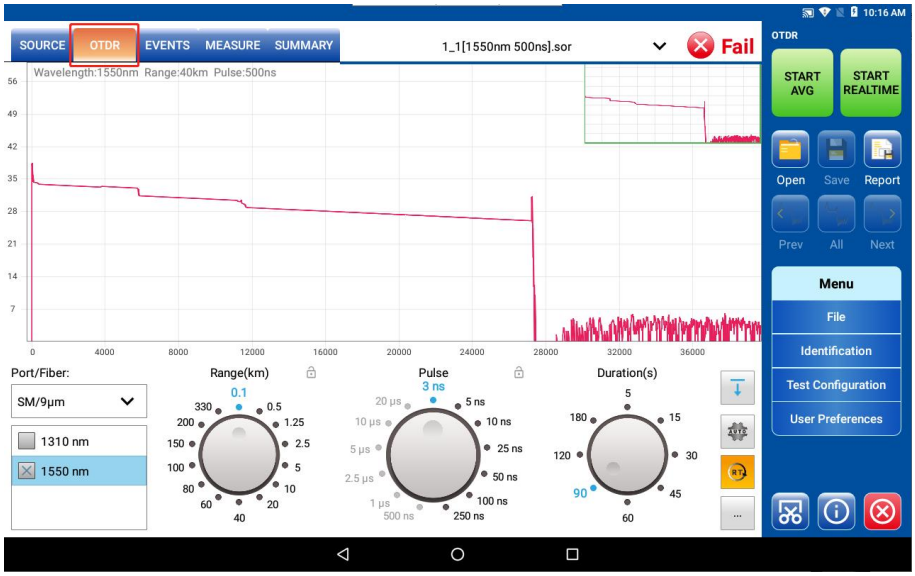


3.3 To enable or disable the first connector check feature, toggle the corresponding switch or checkbox in the settings or options menu

The first connector check feature is used to ensure that the fiber is correctly connected to the OTDR. It checks the injection power. If the loss at the first connector is abnormally high, a message will be displayed indicating that the fiber is not connected to the OTDR port. By default, this feature is disabled.

Steps to enable or disable the first connector check feature:

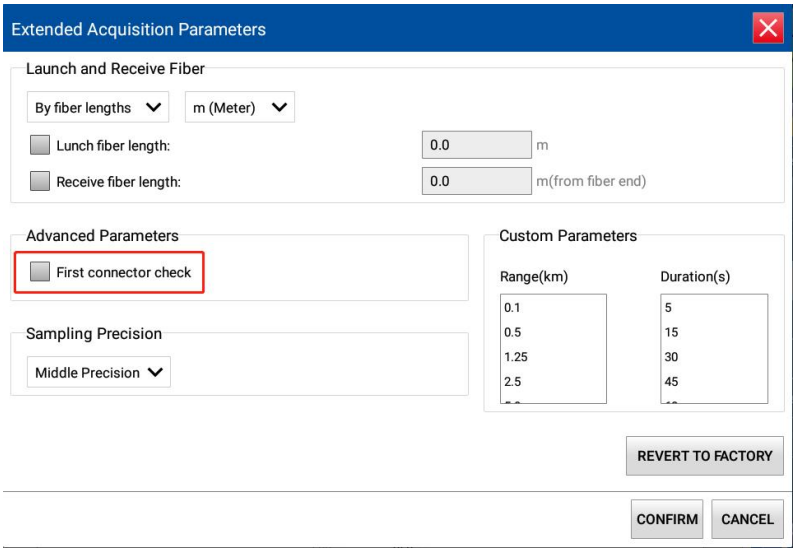
1. In the main window, tap the "OTDR" tab, then tap the "[...]" button.



2. Under "Advanced Parameters", check the "Check First Connector" checkbox to enable the first connector check feature.

or

Uncheck this checkbox to disable the feature.



3. Tap "OK" to return to the main window.

3.4 Set the distance range, pulse width, and data acquisition time

The distance range, pulse width, and data acquisition time can be set through the controls in the OTDR main window.

- Range: Specify the distance range for the fiber under test based on the selected measurement unit (for detailed information, refer to page 29, "Selecting Distance Units"). Changing the distance range will alter the effective value of the pulse width. The application only retains the valid values within the specified range.
- Pulse：Specify the pulse width for the test. The wider the pulse, the longer the detectable distance of the fiber, but the lower the resolution. The narrower the pulse, the higher the resolution, but the shorter the detectable distance of the fiber. The supported distance range and pulse width depend on the OTDR model.

Note： If certain pulse widths are selected, some distance ranges may not be available.

- Duration：Specify the data acquisition duration (the time period for calculating the average result). Usually, the longer the data acquisition time, the purer the generated curve (especially for long-distance curves), because as the data acquisition time increases, more noise is averaged out. This averaging process can improve the signal-to-noise ratio (SNR) and the OTDR's ability to detect small events.

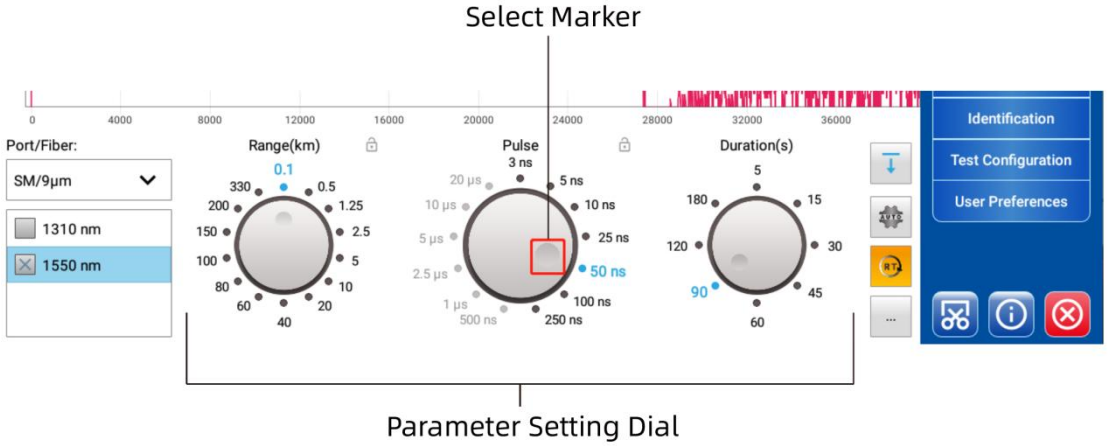
The time settings will also determine how the timer in the toolbar counts during the test.

Instructions for Setting Distance Range, Pulse Width, and Data Acquisition Time Parameters:

If you are using a standard OTDR, please go to the "OTDR" tab:

- Tap the dial for the parameter you want to set (choose the marker to move clockwise or counterclockwise).

  or
- Tap directly on the value you want to select. The selection marker will immediately move to that value.



Note： If the OTDR supports single-mode, single-mode online, or multi-mode wavelengths, the application will apply the settings to the single-mode, single-mode online, or multi-mode wavelengths (50 μm and 62.5 μm use the same settings) based on the selected type of fiber.

3.5 Monitor the fiber in real-time mode

The application supports the immediate display of sudden changes in the fiber link. In this mode, the application will refresh the curve without calculating averages until you switch to average mode or stop data collection.

Note： Real-time mode does not support reanalysis of curves.

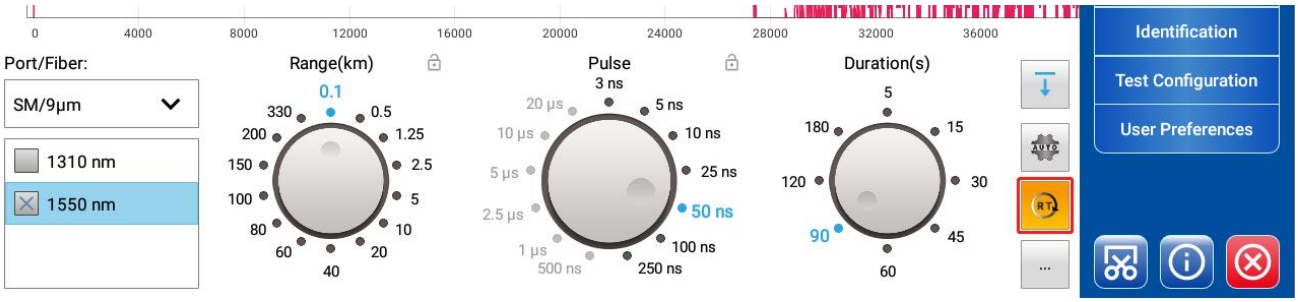
Note： In real-time mode, if the graphical overview is selected, the application refreshes the curve at a lower frequency (for more details, please refer to page 29, "Customizing the OTDR").

Note： Only one wavelength can be used to monitor the fiber at a time.

You can switch from real-time mode to average time interval mode at any time. If multiple wavelengths were selected before starting the test, you can also switch wavelengths at any time during data collection.

Steps to Enable Real-Time Mode:

1. In the "OTDR" tab, tap "RT". The "RT" button turns orange, indicating that real-time mode is enabled.



2. When using a standard OTDR, please select the desired fiber type from the "Port/Fiber" list (for online fiber testing, select "SM Live"; for type C fiber, select "50 µm"; for type D fiber, select "62.5 µm").
   or
3. Using a standard OTDR, please check the checkbox for the desired test wavelength.
4. Select the desired distance range, pulse width, and acquisition time. For more details, please refer to page 27, "Setting the Distance Range, Pulse Width, and Data Acquisition Time."
5. Tap "Start Real-Time".

Note： In real-time mode, the program does not display the time.

6. If you are using a standard OTDR, tap on the value of the wavelength you want to monitor in the wavelength list (not the checkbox).

Note： You must ensure that the selected wavelength is highlighted.

How to Disable Real-Time Mode:

- To stop monitoring, tap "Stop Real-Time".

Note： If you only have access to the real-time mode of the OTDR application, tap the "Stop Real-Time" button.

- If you have full access to the OTDR program, you can also stop real-time data collection by starting data acquisition in averaging mode. The application will test all selected wavelengths, not just the highlighted ones.

IV. Customize OTDR

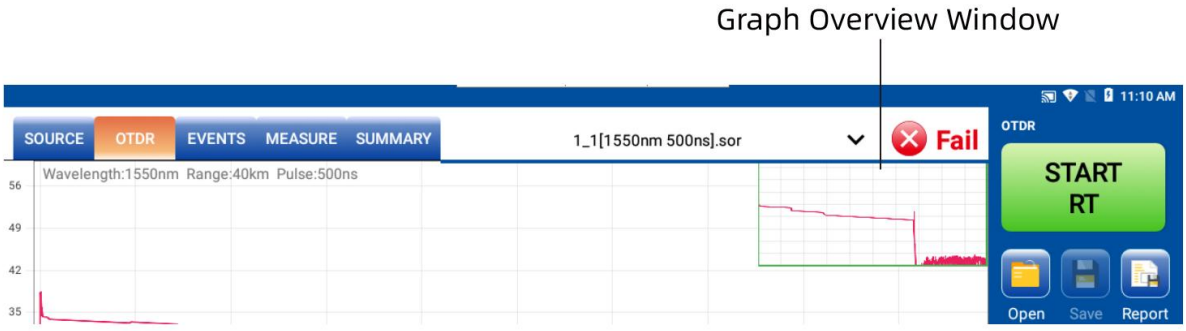
You can customize the appearance and operation of the OTDR application.

4.1 Set up event table and graphical display parameters.

You can choose which items to show or hide in the event table as needed. You can also change the following curve display parameters:

Note： Hidden fiber sections will not be deleted.

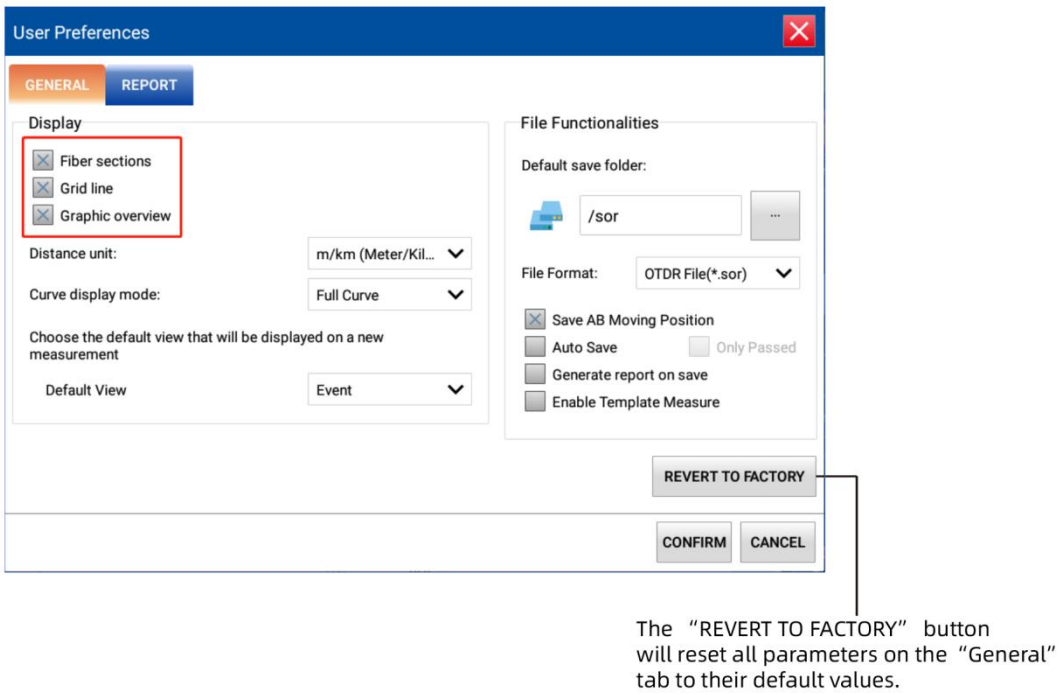
- Fiber Segment:Depending on the type of values to be displayed, you can show or hide fiber segments in the event table.
- Grid Lines:Grid lines on the graph background can be displayed or hidden. By default, the grid is displayed.
- Graph Overview:The Graph Overview window shows the position of the magnified section within the entire graph.



Steps to Set Event Table and Graph Display Parameters:

1. In the "Main Menu", select the "User Preferences" button.
2. Select the "General" tab.

3. Under "Display", check the boxes for the items you want to show or include in the table.
   or
   Uncheck the boxes to hide the corresponding items.



4. Tap "CONFIRM" to return to the main window.

4.2 Select the distance unit

You can choose the measurement units to use in the application. Options include:

- m/km (meters/kilometers)
- ft/mi (feet/miles)

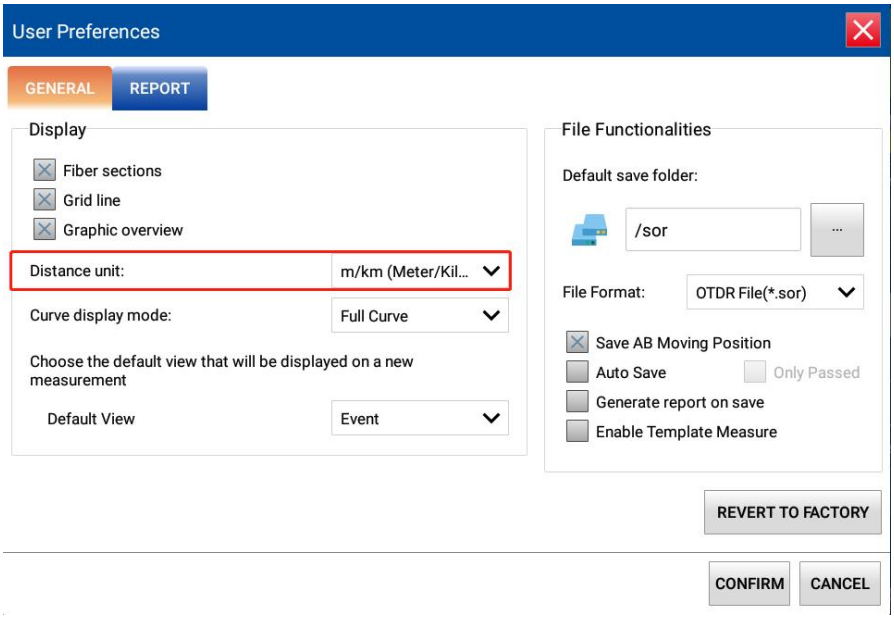
The default distance unit is kilometers.

Note： Typically, distances less than 1 kilometer or 1 mile are converted to meters or feet. However, if only kilometers or miles are listed as options, distances less than 1 kilometer or 1 mile will not be converted.

Note： Even if the selected distance unit is not kilometers, the attenuation values for fiber optic segments are always displayed in dB/km, as this is more in line with the standards of the fiber optics industry.

Steps to Set the Display Unit for Distance:

1. In the "Main Menu," select the "User Preferences" button.
2. Select the "General" tab.
3. In the "Distance Units" dropdown list, select the desired distance unit.

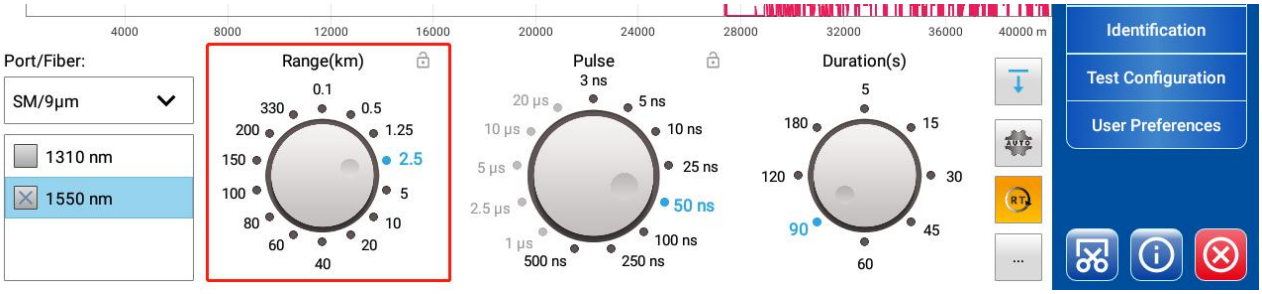


4. Tap "OK" to return to the main window.

The application will return to the main window, and all places that use distance units will now use the newly selected unit.

4.3 Customize the data collection distance range

Distance range is one of the parameters you can customize before performing data collection. You can set a longer or shorter distance, depending on the specific fiber optic inspection tasks you are conducting. For more details, please refer to page 27, "Setting the Distance Range, Pulse Width, and Data Collection Time."



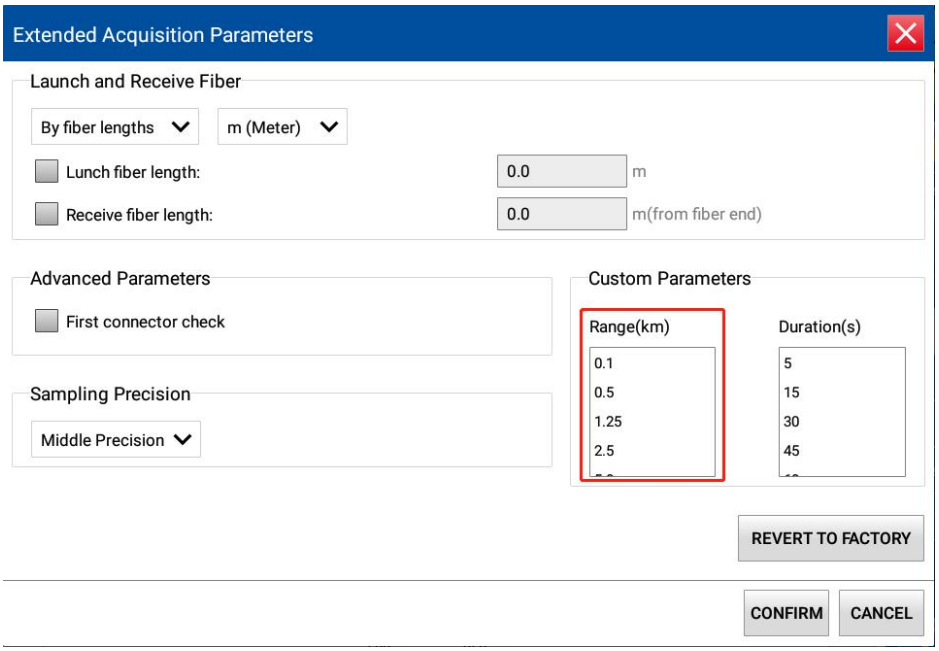
Note： The values selected through automatic range data collection cannot be changed.

Customize Distance Range Operation Steps:

1. In the main window, select the "OTDR" tab, then tap the "..." button.
2. If the OTDR supports single-mode or multi-mode, specify the desired fiber type in "Custom Parameters".

Note： If there is only one type of fiber in the module, the list will not be displayed.

3. In the "Range" list, select the value you want to modify.
4. When the value is highlighted, enter the new value.

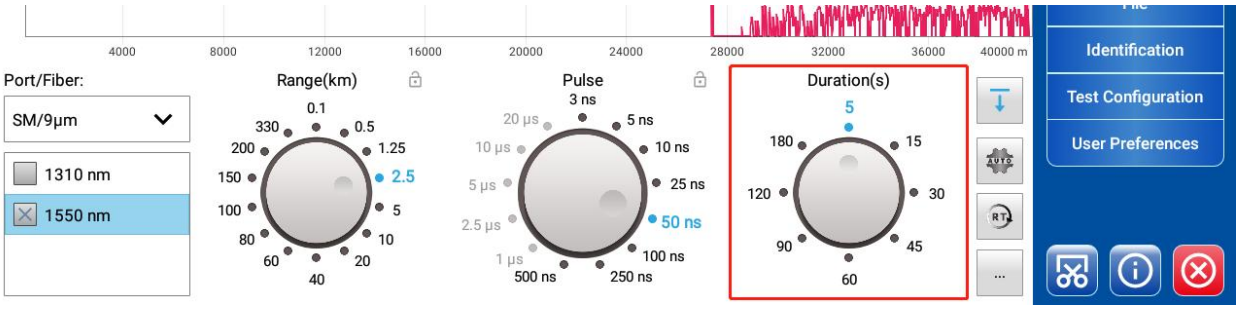


5. Tap "OK" to return to the main window.

Note： Press "Restore to Factory Settings" to revert to the factory settings.

4.4 Customize Data Collection Time Value

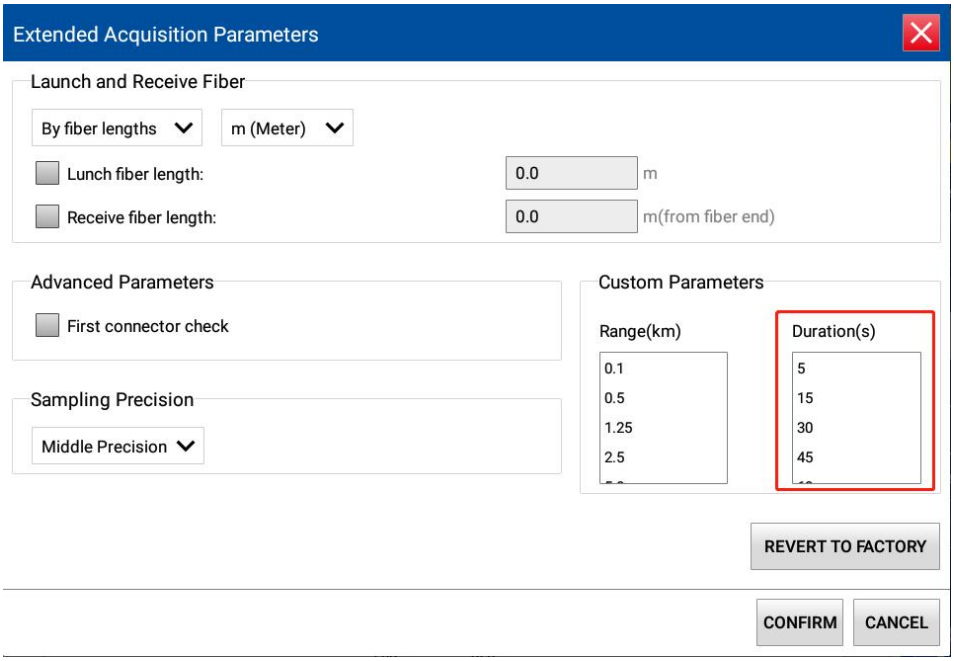
You can customize the data collection time values. These values are the periods over which the OTDR averages the data collection. For more details, please refer to page 27, "Setting Distance Range, Pulse Width, and Data Collection Time."



By customizing the data collection time, you can improve the signal-to-noise ratio (SNR) of the curve, enhancing the detection capability for low power level events. Every fourfold increase in data collection time doubles the SNR (i.e., a 3dB increase).

Steps to Customize Data Collection Time Values:

1. In the main window, select the "OTDR" tab, then tap the "  " button.
2. Under "Custom Parameters", select the value you want to modify from the "Duration" list.
3. When the value is highlighted, enter the new value.



4. Tap "OK" to return to the main window.

Note： Press "Restore Factory Settings" to revert to the factory settings.

4.5 Select the curve display mode.

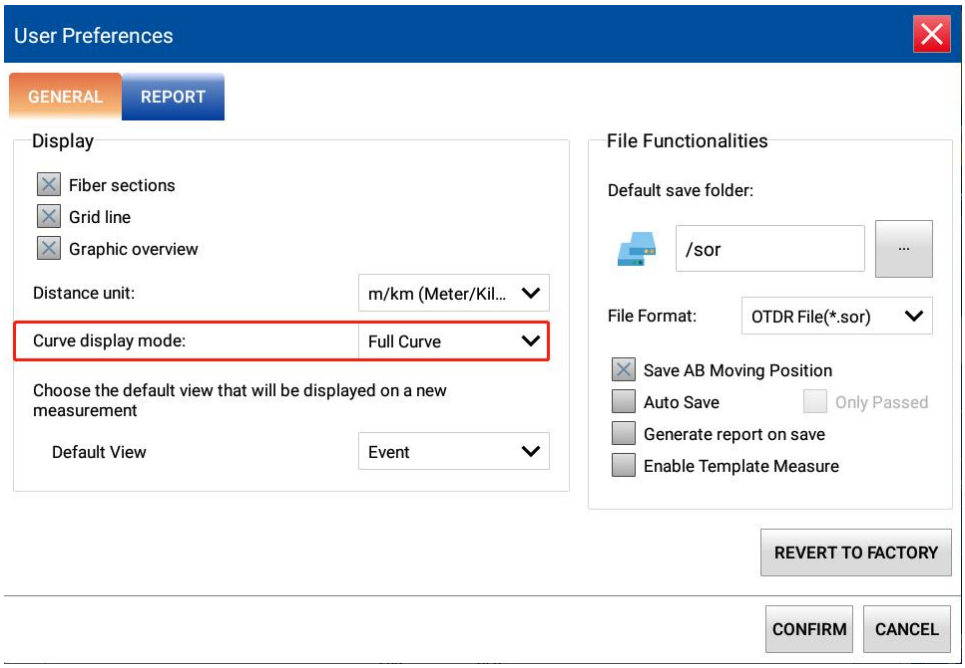
You can choose how the application displays curves on the screen and in reports. The options include:

- Full Curve: Displays the entire curve and the complete data collection distance.
- Span: Displays the curve from the start to the end of the span.

Note： The default curve scaling range is the span area.

Steps for selecting the curve display mode:

1. In the "Main Menu," select the "User Preferences" button.
2. Select the "General" tab.
3. In the "Curve Display Mode" dropdown list, select the mode for displaying curves.



4. Tap "OK" to return to the main window.

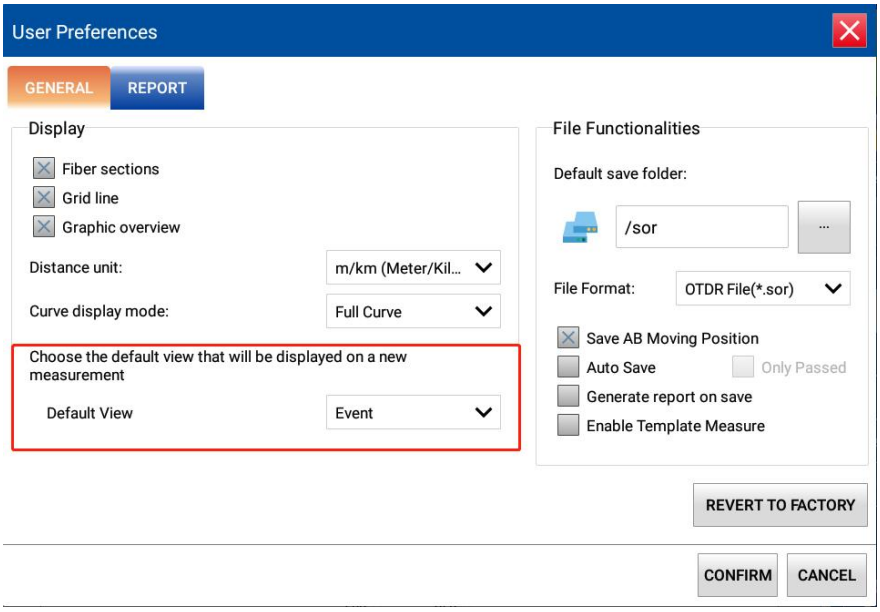
4.6 Select the default view

You can choose the default view that is displayed after all data collection and analysis for selected wavelengths are completed. When you open the test result file, the default view is also displayed.
The following image lists the views that can be displayed.

View	Remarks
Maintain the current view.	The tabs displayed before and after data collection remain unchanged.
OTDR	The view displays graphics and controls for OTDR data collection. The appearance of this view may vary slightly depending on the module used and whether the graphics are displayed in full view mode. For more details, please refer to page 40, "Graphics."
Event	Default view. The data collection results are displayed in the "Events" tab. For more details, please refer to page 42, "Events Tab."
Measurement	The data collection results are displayed in the "Measurement" tab. For more details, please refer to page 44, "Measurement Tab."
Summary	This tab displays information for each wavelength, such as the pass/fail status of the results, span loss, optical return loss across the span, and span length. For more details, please refer to page 41, "Summary Tab."

Steps to Set the Default View:

1. In the "Main Menu," select the "User Preferences" button.
2. Select the "General" tab.
3. In the "Default View" dropdown list, select the desired view.



4. Tap "OK" to return to the main window.

The next time you perform data collection or open an existing file, the application will automatically switch to the selected view.

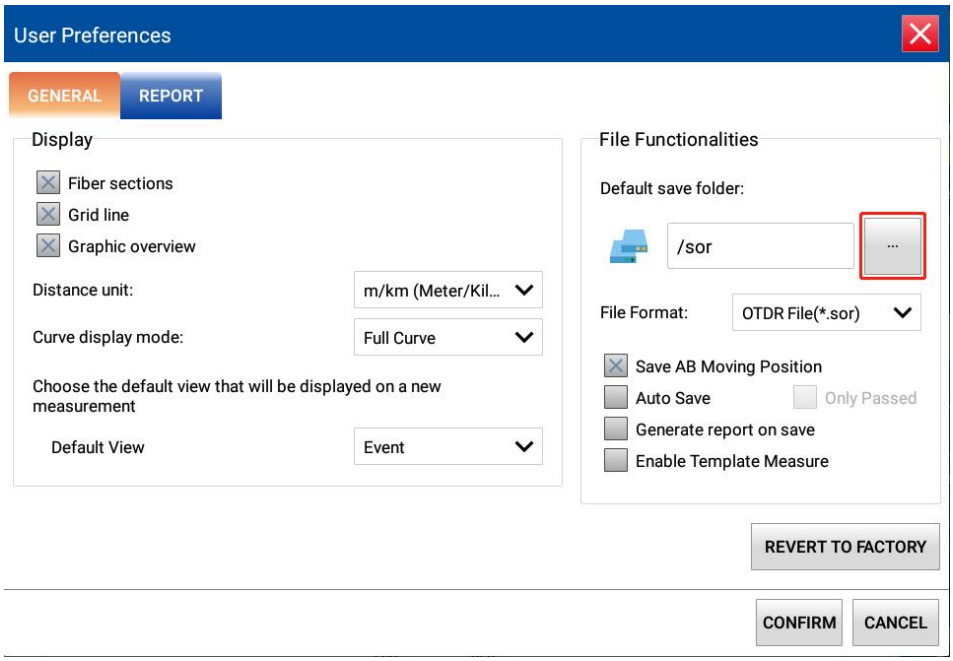
4.7 Set Default Storage Folder

The default storage folder is /sor. You can change this folder as needed or use a USB drive. If the USB drive is not connected when saving, the data collection results will be saved in the default storage folder.

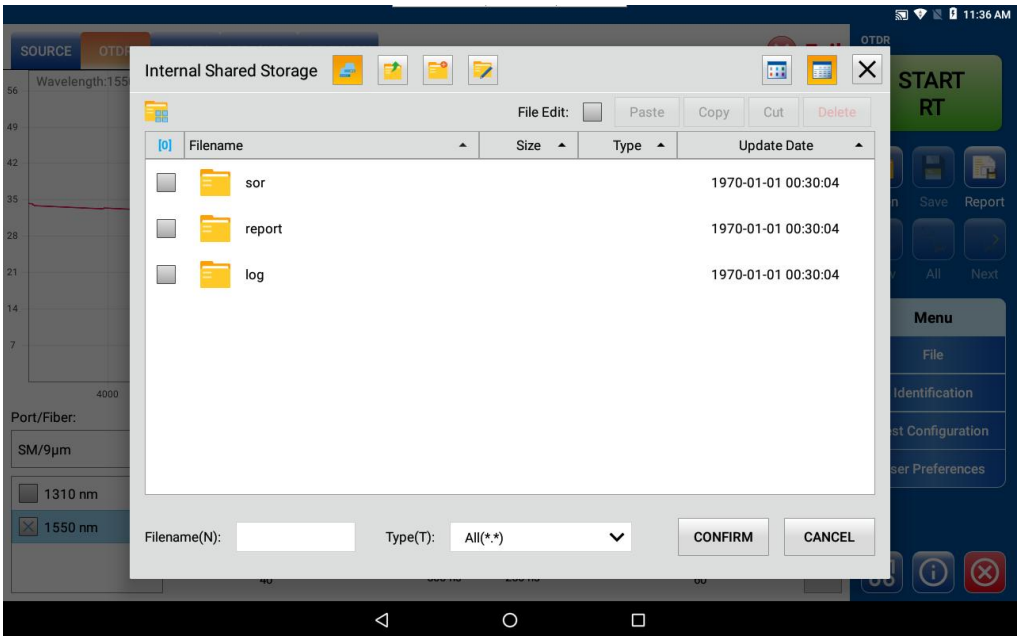
Steps to Set the Default Storage Folder:

1. In the "Main Menu," tap on the "User Preferences" button, then select the "General" tab.

2. Under "File Functions," tap the "[...]" button next to "Default Save Folder".



3. In the "Browse Folders" window, select the location where you want to save the files.



4. Tap "OK" to close the "Browse Folders" window.

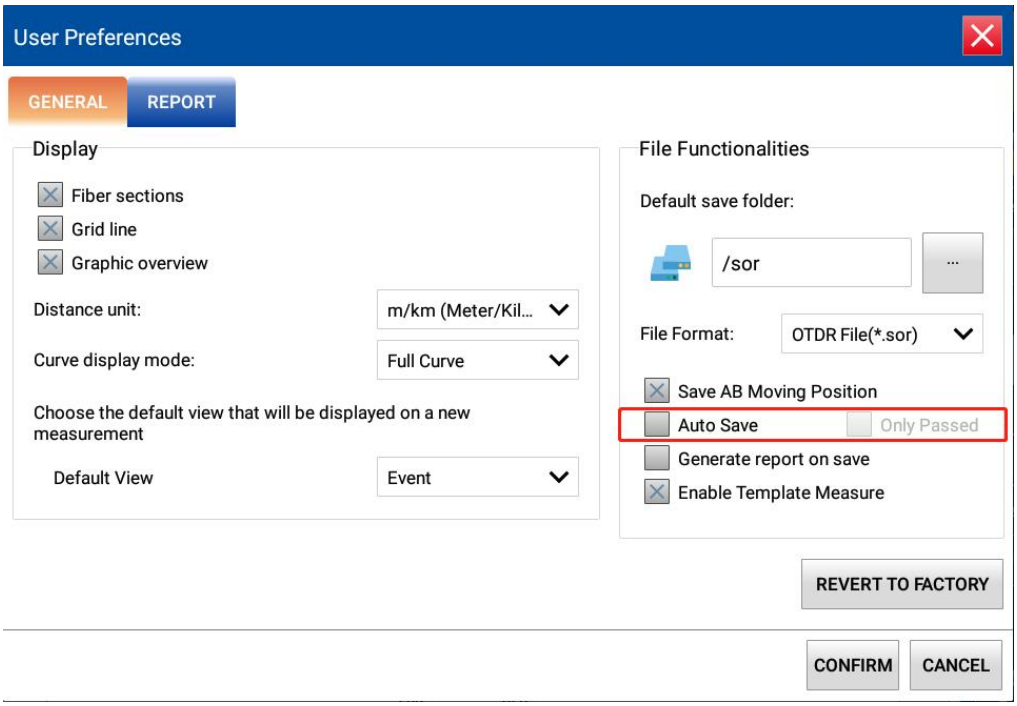
5. Tap "OK" to return to the main window.

4.8 Enable or disable the "Auto-Save Measurement" feature.

By default, the application does not automatically save measurements after analysis. However, you can configure it to auto-save measurements. You can also specify whether you want to save all measurements regardless of the outcome or only save measurements when the result is in a "pass" state.

Steps to enable or disable the "Auto-Save Measurement" feature:

1. In the "Main Menu," tap the "User Preferences" button.
2. Select the "General" tab.
3. Specify whether you want to save all measurements regardless of the outcome, or only save measurements when the result is in a "pass" state.



Note： If the required measurements are not automatically saved, you will need to save them manually.

4. Tap "OK" to return to the main window.

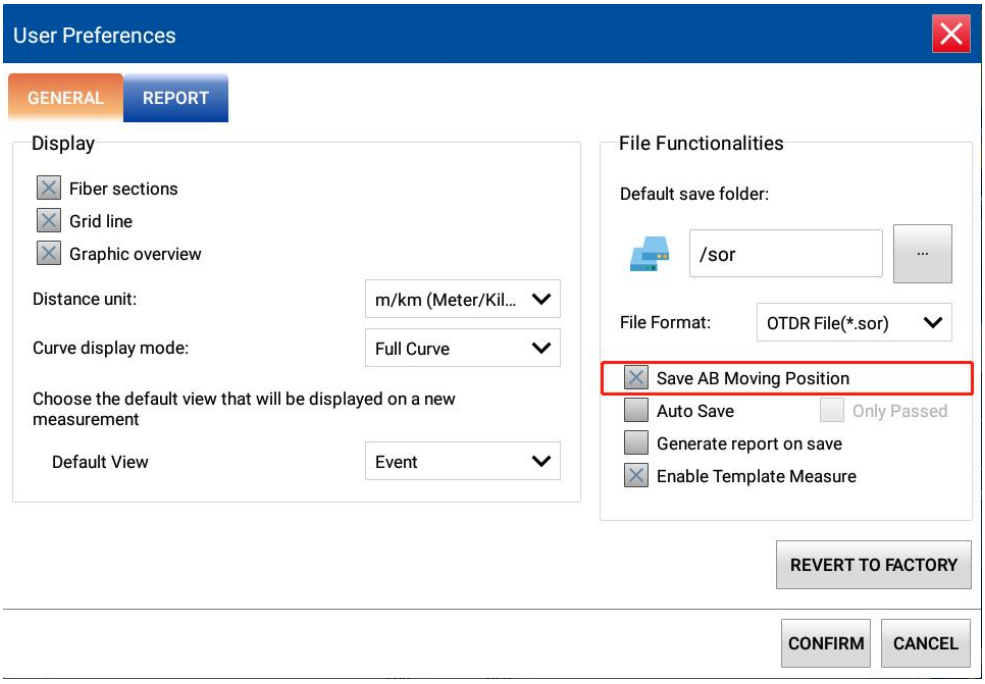
The application will automatically apply the changes made.

4.9 Enable or disable the "Log AB Cursor Movements" feature

By default, the "Log AB Cursor Movements" feature is enabled. Moving the AB cursor will be recorded in a file, and upon reopening, the cursor will be positioned at the last moved location.

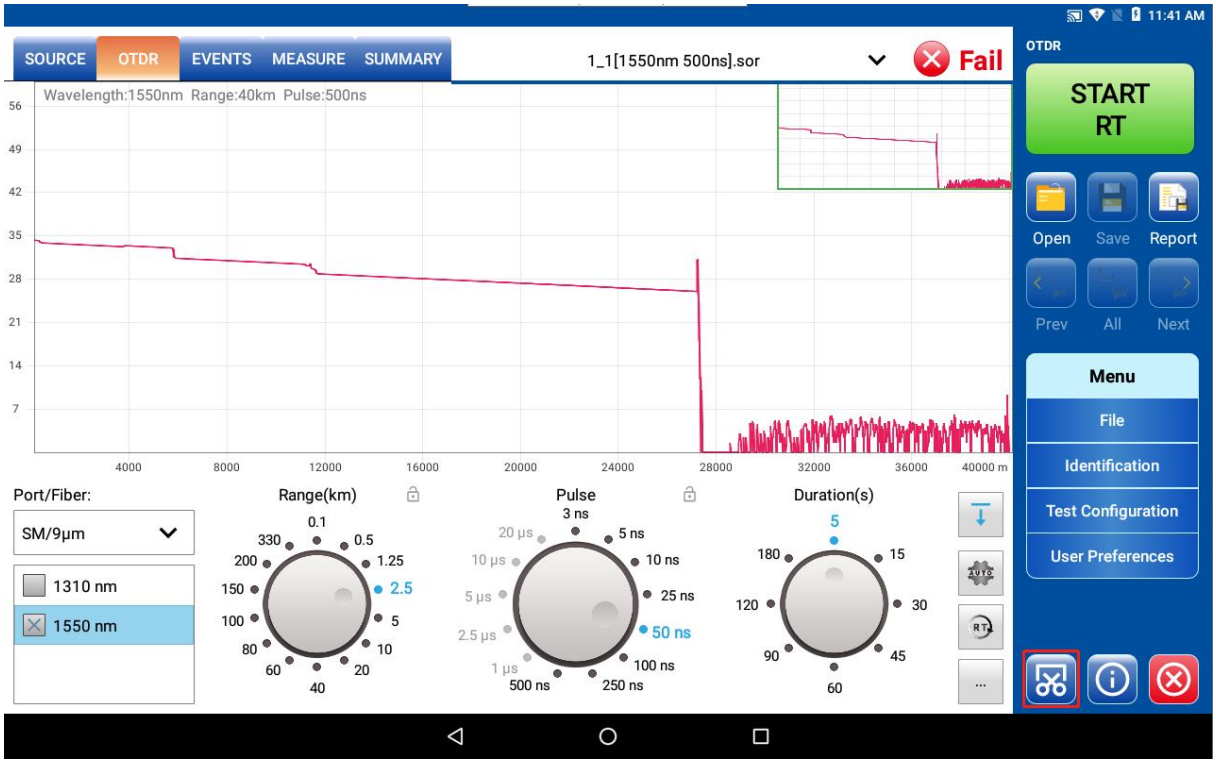
Steps to enable or disable the "Log AB Cursor Movements" feature:

1. In the "Main Menu", tap the "User Preferences" button.
2. Select the "General" tab.
3. Specify whether to log the AB cursor movements.
4. Tap "OK" to return to the main window.



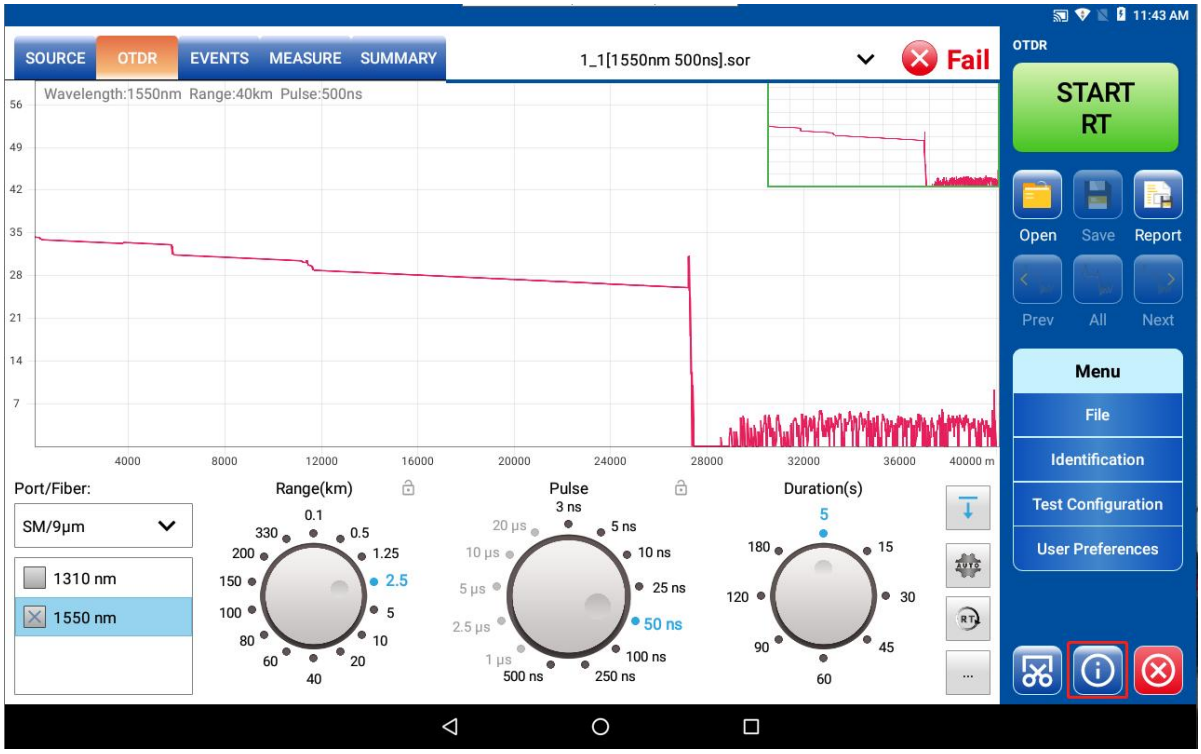
4.10 Screenshot function

You can use the screenshot function when needed by clicking "  ", which will capture the entire screen. To view the screenshot files, please check in the "screenshot" folder in the file manager.



4.11 Query module version information

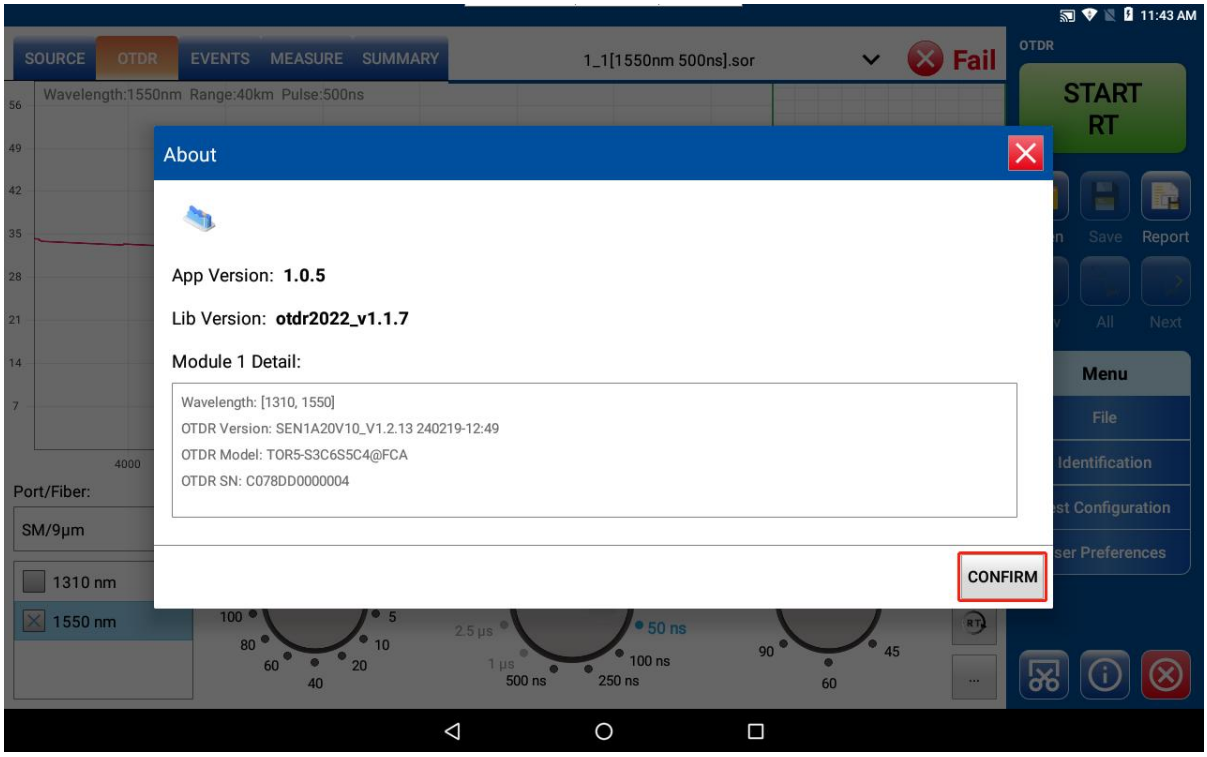
Querying module version information allows you to view the program version of the OTDR card.



Steps to query module version information:

1.In the "Main Menu," tap the "  " button.

2.Tap "OK" to return to the main window.



V. Analyze curves and events

After analysis, the obtained curves will appear in the graph, and the events will be listed in the event table at the bottom of the screen. The graph and event table will be introduced in subsequent chapters. You can also reanalyze existing curves. For information on the file formats that the application can open, please refer to page 59, "Opening Measurement Files."

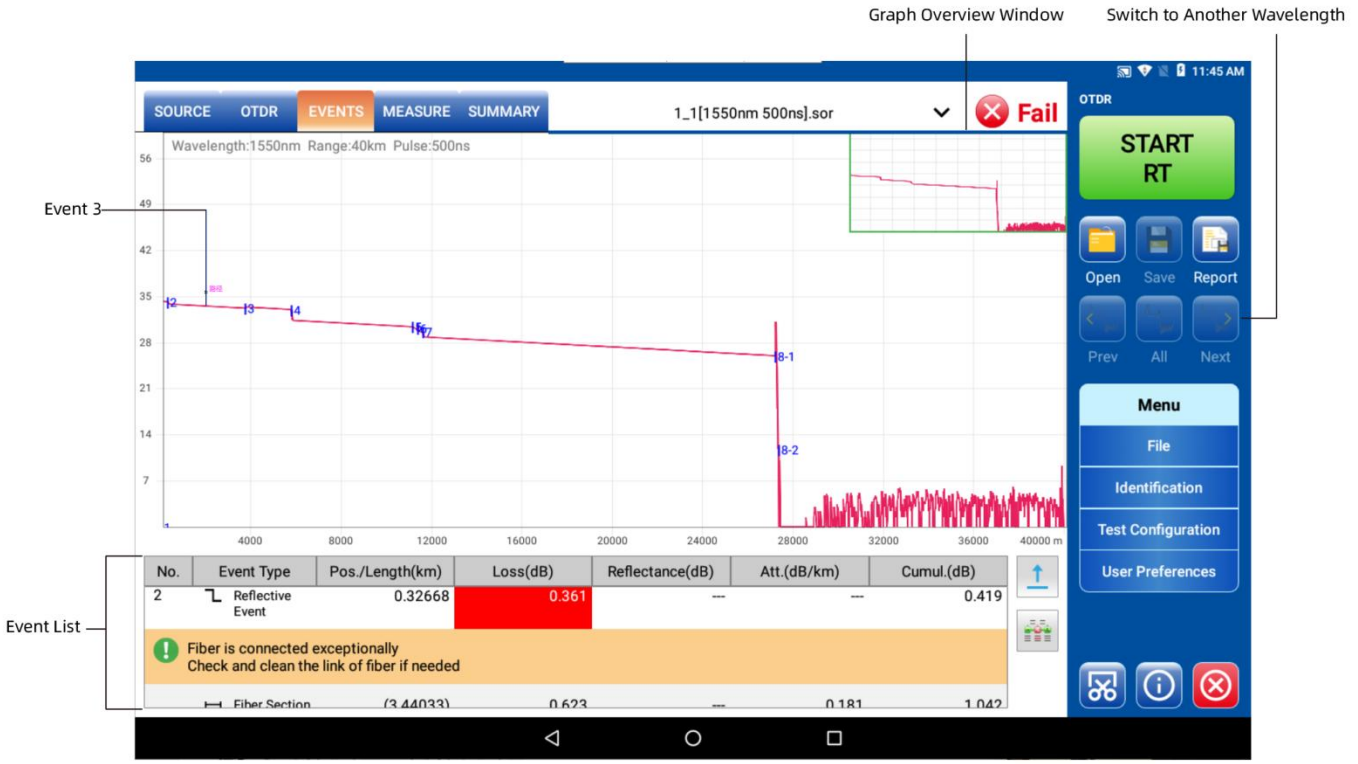
There are several ways to view the results:

- Graphical view
- Summary table
- Event table
- Measurement table
- Linear view

Additionally, you can generate curve reports directly on the device. For more details, please refer to page 71, "Generating Reports". For information on event types, please see page 78, "Description of Event Types".

5.1 Graph

The events listed in the event table (for more details, please refer to page 47, "Events Tab") are also marked numerically on the curve.



In the curve graph, some content is always visible, while other content only appears when selected for display.

You can change the display parameters of the curve, such as grid lines. For more details, please refer to page 29, "Setting Event Tables and Graph Display Parameters."

Using the navigation buttons, you can sequentially view all the curves in the graph. For more details, please refer to page 53, "Selecting Displayed Wavelengths."

5.2 "Summary" tab

The "Summary" tab displays the segment loss, segment optical return loss values for each wavelength, and the overall status of the results.:

- Passed: All results are within the threshold limits.
- Failed: At least one result exceeds the threshold.

The online fiber power values displayed in the "Summary" tab correspond to the residual light that passes through the external and internal OTDR filters and is detected by the OTDR detector from the network under test. This affects the dynamic range performance of the module. Measurements can still be performed by the OTDR when the power level is above -40 dBm.

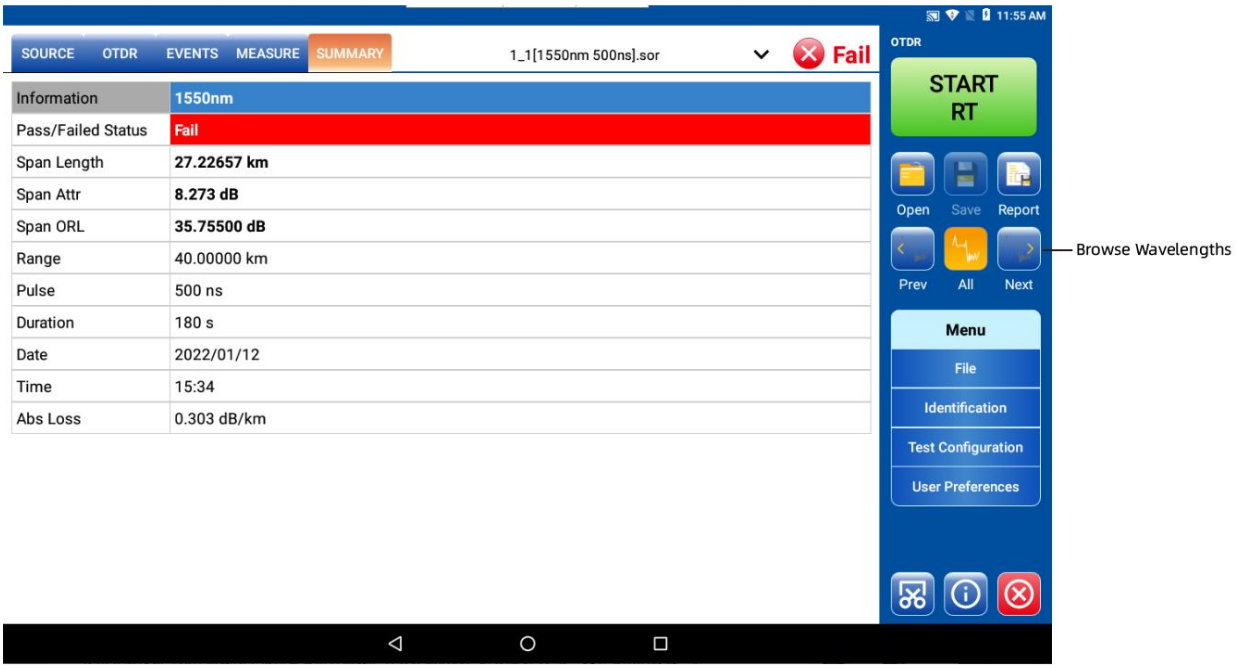
However, it is important to remember that the impact on dynamic range is smaller when using short pulses, while using long pulses can significantly affect the dynamic range. When the power level is as low as -70 dBm, the dynamic range with long pulses will be noticeably affected.

Please note the following information based on the module and port you are using:

- The SM Live port is used for out-of-band testing and is equipped with a bandpass filter that can suppress incoming light from the network. The width and suppression characteristics of the filter depend on the OTDR model you choose. High online fiber power values may indicate two scenarios:

  A.The bandpass filter is insufficient. To reduce the online fiber power values, an external filter can be added. However, remember that when using this method, the rated wavelength tolerance of the laser must be considered.

  B.Too much noise is transmitted through the network into the OTDR's optical band, such that the internal bandpass filter is unable to suppress the noise. This noise may originate from laser sidebands or amplifiers, or it could be a result of Raman scattering.
- The single-mode and multi-mode ports do not have filters capable of suppressing incoming light from the fiber under test. There should not be any transmitters emitting light at the far end.



- The curve must be analyzed before it will be displayed in the "Summary" tab. Real-time curves cannot be analyzed. The application will always display summary information, but it may be incomplete.

To display the "Summary" tab:

In the main window, select the "Summary" tab.

Note： To have the "Summary" tab displayed by default after the data collection and analysis for all selected wavelengths are complete, refer to page 36, "Selecting the Default View," for more details

5.3 "Events" Tab

By scrolling through the event table, you can view information on all events detected on the curve and the fiber sections.When displaying the graph, if an event is selected from the event table, a marker line will appear at the selected event on the curve. If the selected event is a fiber section, this section will be defined by two marker lines.For detailed information about marker lines, please refer to page 61, "Using Marker Lines."

The marker lines correspond to either events or fiber sections, depending on what is selected in the event table. By selecting elements in the event table or on the graph, you can move the marker lines.

The event table lists all events detected on the fiber. An event is a point where there is a measurable change in the transmission properties of light. Events include losses caused by transmission, splices, connectors, or breaks. If an event exceeds the set threshold, its status will be set to "Fail".

The event table displays the following information:

- Number: Event number (assigned in sequence by the OTDR testing application)
- Type: This column displays symbols and the names of event types. For a detailed description of each symbol, please refer to page 78, "Description of Event Types."
- Location / Length: The distance between the OTDR and the measured event, or the distance from the event to the starting point of the fiber span, or the length of the fiber segment (the distance between two events), indicated in parentheses.
- Loss: The loss of the event or fiber segment, measured in dB (calculated by the application).
- Reflectance: The reflectance of reflection events measured on the fiber.
- Attenuation Rate: The attenuation measured on a fiber segment (loss per distance). The "Attenuation" column can be viewed only when a fiber segment is displayed. For more details, please refer to page 29, "Setting Event Table and Graph Display Parameters."

Note： Even if the selected distance unit is not kilometers, the attenuation rate is always measured in dB/km, following the standard practice in the fiber optics industry where attenuation values are expressed in dB/km.

- Cumulative Loss: The total loss accumulated from the starting point to the endpoint of a fiber span. This value is displayed in the last column for each event or fiber segment.

The application calculates cumulative loss only for events that are displayed in the event table and does not calculate for events that are hidden.

- Event Diagnostic Information: For "Fail" events, diagnostic information is displayed below in black text on a yellow background.The diagnostic function provides additional relevant information for detected issues or ambiguous measurement situations, such as the possible root causes that may have led to the failure status of link elements. This helps in identifying and addressing specific problems within the fiber optic network more effectively.The diagnostic function helps in troubleshooting connector failures, understanding why link elements are marked as failed, and indicating any anomalies in the instruments or tests.

Quick Event Localization Methodology:

1. In the main window, open the "Events" tab.
2. Tap on an event in the event table, and the curve will automatically scroll to the selected event.

5.4 Linear View

In the linear view, events are displayed in order from left to right. You can scroll through the linear view with your finger.

- Each box represents an event.
- Each horizontal line connecting two boxes represents a fiber segment.
- he colors of the boxes and horizontal lines can indicate status: green means pass, red means fail, and gray or black indicates that the event or fiber segment is not within the current fiber span. Events or fiber segments whose pass/fail status has not been tested are also displayed in gray.
- The fiber span (and) icons are displayed on the boxes. The color of the box corresponds to the event status, with green indicating pass and red indicating fail.
- You can also select a box or horizontal line in the linear view, and the corresponding item in the event table or graph will be selected.
- The linear view always displays the current curve.
- When the event table is empty, the linear view is not displayed. To view the curve in the linear view, curve analysis must be completed first.
- In standard mode, you can view the graph in the upper half of the main window and the event and fiber segment information in the lower half of the main window simultaneously.

To display the linear view:

1. In the main window, open the "Events" tab.
2. Tap " " to open the linear view.

5.5 "Measurements" tab

The application can display four marker lines: a, A, B, and b.
The positions of these marker lines on the curve can be changed to calculate loss, attenuation, reflectance, and Optical Return Loss (ORL).
You can change the positions of all marker lines as needed using the controls. You can drag the marker lines directly on the curve graph, or use the left/right arrow keys to move them.
For detailed information on manual measurements, please refer to page61, "Manual Analysis Results."

To display the "Measurements" tab:
In the main window, tap the "Measurements" tab.
Note： To have the "Measurements" tab displayed by default after the data collection and analysis of all selected wavelengths are completed, please refer to page 36, "Selecting the Default View," for more details.

5.6 To switch between full-screen view, compact view, and split view

You can switch between the available display modes to change how information is presented:

- Default View: Located in the "Events" tab, it includes a view with graphs and an event table.
- Compact View: Displays both graphs and the event table, with the graphs scaled down to take up less space.
- Full Screen View: Located in the "Events" tab, it exclusively displays the event table, maximizing its visibility.

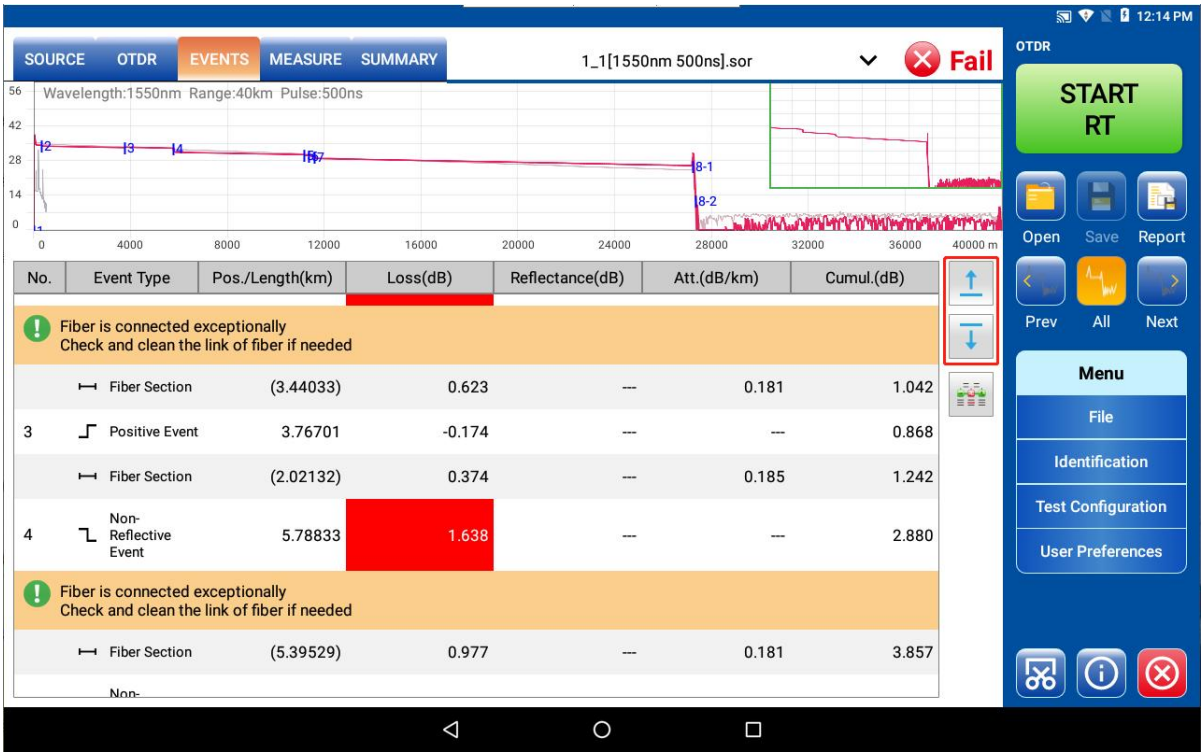
The application supports displaying graphs in full screen at any time, including during data collection. The full screen view uses the same display settings as the normal view, such as grid lines and file names.

In the full screen view, you can directly start data collection without needing to return to the normal view. Additionally, during real-time data collection mode, you can switch wavelengths. After displaying curves from new data collections or existing files, you can adjust the display scale of the curves. For more details on how to change the scale of the curves, please refer to page 52, "Changing the Scale of Curves."

After all data collection is complete, the application automatically switches to the specified default view. To continue displaying graphs after data collection is finished, ensure that the default view is set to "OTDR." For more details, please refer to page 36, "Selecting the Default View."

To switch between available views:

Use the up and down arrows to switch between views.



5.7Change the display scale of the curve.

You can manually adjust the graph using two fingers, or let the application automatically adjust the zoom scale for selected events in the event table (only displayed in the "Events" tab).
Selected events can be quickly zoomed in or out.
The zoomed graph can also be restored to its original size.

To view a specific part of the graph:

- Tap the screen and drag to specify the part of the graph you want to view.
- You can choose to zoom the graph along two axes: the horizontal axis and the vertical axis.
  A. Sliding two fingers horizontally relative to each other can achieve zooming along the horizontal axis of the graph.
  B. Sliding two fingers vertically relative to each other can achieve zooming along the vertical axis of the graph.

Note： In the graph overview, you can preview the current area you are viewing. For detailed information about the graph overview, please refer to page 29, "Setting Event Tables and Graph Display Parameters."

To restore the full graph view:

Double-click anywhere on the graph view to restore the full graph view.

5.8 "Select the Displayed Wavelength"

You can switch between different wavelengths and also view all the opened curve files.

The table below indicates the colors of the curves.

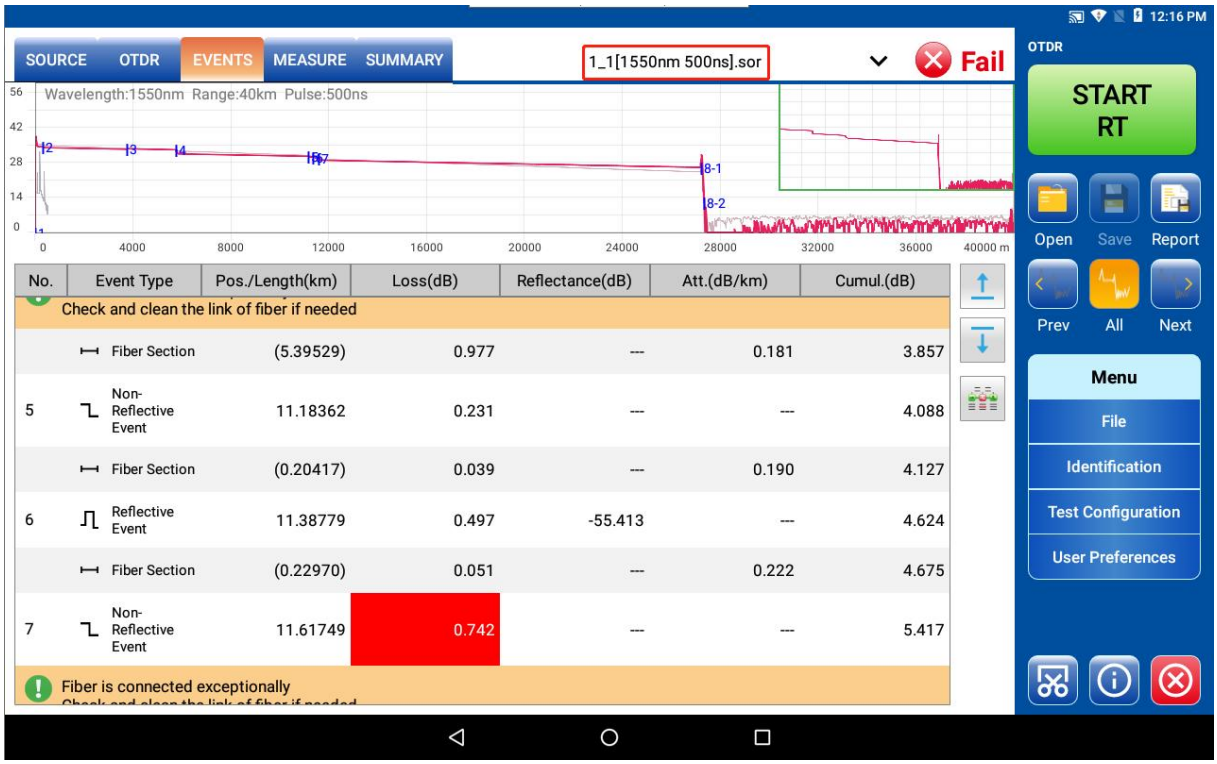
Current Curve	Current Curve Reference Curve (Template Mode Only)
When a curve is selected, it turns red.	The color of the reference curve is yellow.
When a curve is not selected, it appears in gray.	

To display the curves in sequence:

Tap on  or  to switch between available curves.

To select a curve for display:

To display the desired curve, tap on the wavelength list menu bar at the top and select the curve you want to show.



To display only the current curve or to display all curves:

Tap on  to toggle between single curve view and multi-curve view.

Note： The information displayed in the "Events" and "Summary" tabs changes according to user actions.

Note： Hiding the curve will not affect the pass/fail status or the result values.

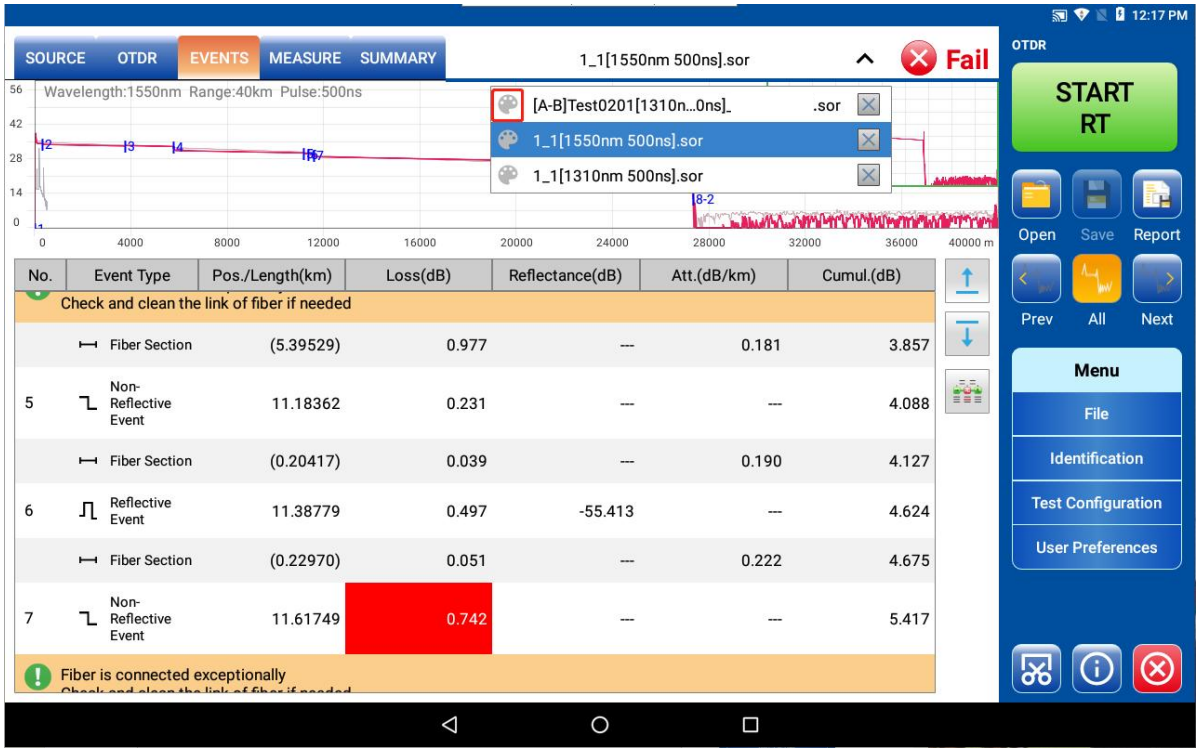
Note： If you need to view the wavelength of this curve, you can check it in the upper left corner.

5.9 Set Curve Color

You can set curves in different colors to distinguish them.

To set the curve color:

1.To change the color of the current curve, tap the wavelength list menu bar at the top, and then click the " " button for the curve whose color you want to change.



2.Select to change the color.

Note："White" indicates no color set.

3.Tap "CONFIRM".

Once the curve color settings are complete, the set colors will be displayed in the wavelength list menu bar.

5.10 Use the template curve

When a curve is set as a template, the application uses this curve as a reference to create all the curves that will be acquired during the given work session. This ensures that the acquired curves have the exact same number of events at the same positions as the reference curve.

The option to use template curves is disabled by default. You must activate this option before you can set up reference measurements (either newly acquired and saved curves or opened curve files).

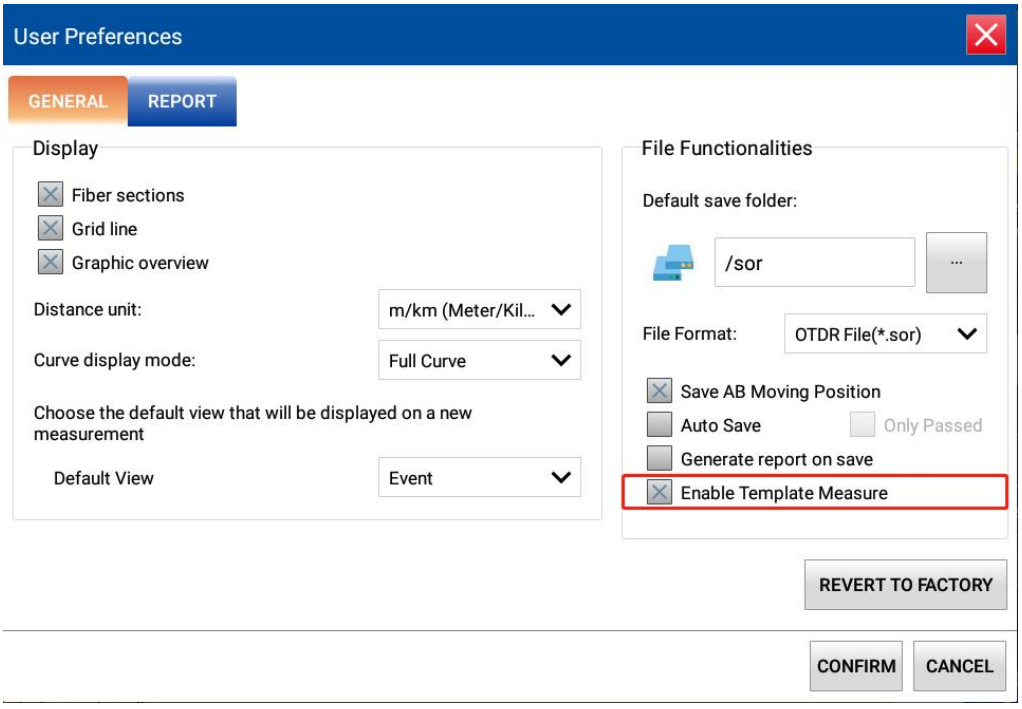
If the reference measurement includes multiple wavelengths, the application will set the wavelength of the current curve to match that of the reference curve. Whether it is a single-mode module or a multi-mode module, the functionality to set the wavelength of the reference curve must be supported.

Note： You cannot change or reanalyze the reference curve.

Note： The template curve will not be hidden when reopening a new file or starting a new measurement. It will only be removed from the chart after the template is canceled.

Steps for Measurement Using a Template:

1. In the "Main Menu," select the "User Preferences" button.
2. Select the "General" tab.
3. Under "File Functions", check the box for "Allow Template Measurement".



4. Tap "CONFIRM" to return to the main window.

You can now use the template curve.

Steps to Set the Current Curve as the Reference Curve:

1. If the curve you want to use is already open, please proceed directly to step 2.

   or

   To open a measurement file, please do the following:

   1a. In the main window, tap the "  ".

   or

In the "Main Menu", select "File", then tap "Open".

1b. Select the file from the list to be used as the reference curve.

1c. Tap "Open" to confirm.

2. To set up a template in the "Main Menu," tap the "Set Template" button. A confirmation popup will appear, and upon confirming, the setting will be successfully applied.

Steps to Turn Off the Measurement Reference Curve:

1.In the "Main Menu," tap the "Cancel Template" button.

5.11 View current measurement configuration

You can view and modify the curve settings at any time.
The settings that can be changed fall into the following two groups:

- Fiber Settings: Index of Refraction (IOR, also known as the group index) and Rayleigh Backscatter (RBS) coefficient.
- Detection Thresholds: Detection thresholds for joint loss, reflectivity, and fiber end.

When viewing the curve configuration, the application displays the following parameters:

- Wavelength: Test wavelength.
- Refractive Index: The refractive index of the curve (also known as the group index). Modifying this parameter will change the results of the curve's distance measurements.
- Backscatter: The curve's Rayleigh backscatter coefficient. Modifying this parameter will change the curve's reflectivity and the results of optical return loss measurements.
- Detection Threshold:

  A.Connector Loss: Configuration of the current analysis curve, used to detect small non-reflective events.

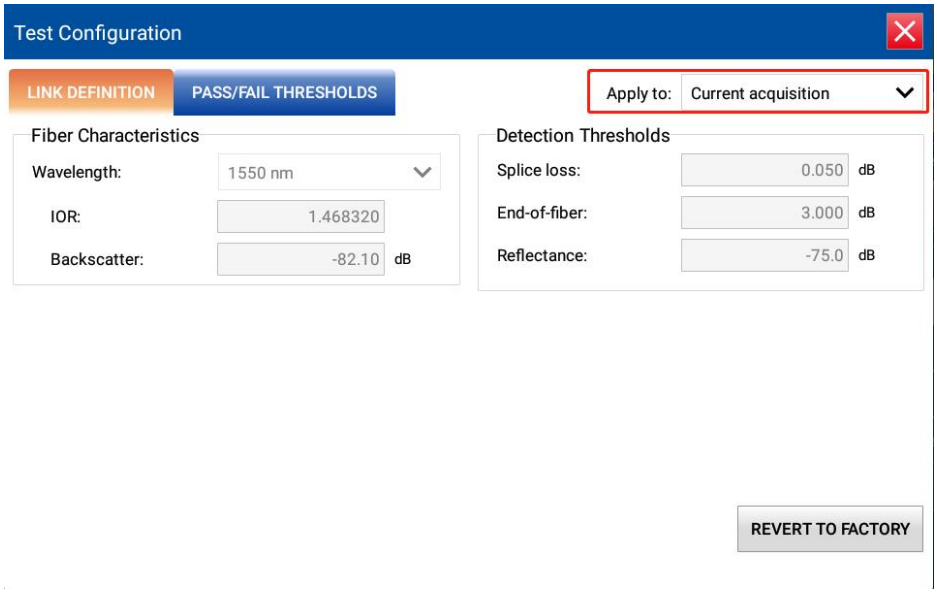
  B.Reflectance: Configuration of the current analysis curve, used for detecting small reflective events.

  C.Fiber End: Configuration of the current analysis curve, used to detect significant event losses that affect signal transmission.

For more details, please refer to page 14, "Setting Analysis Detection Thresholds."

View or modify measurement configuration steps:

1. In the "Menu," tap on "Test Configuration."
2. In the "Apply to" list, select "Current Data Collection".



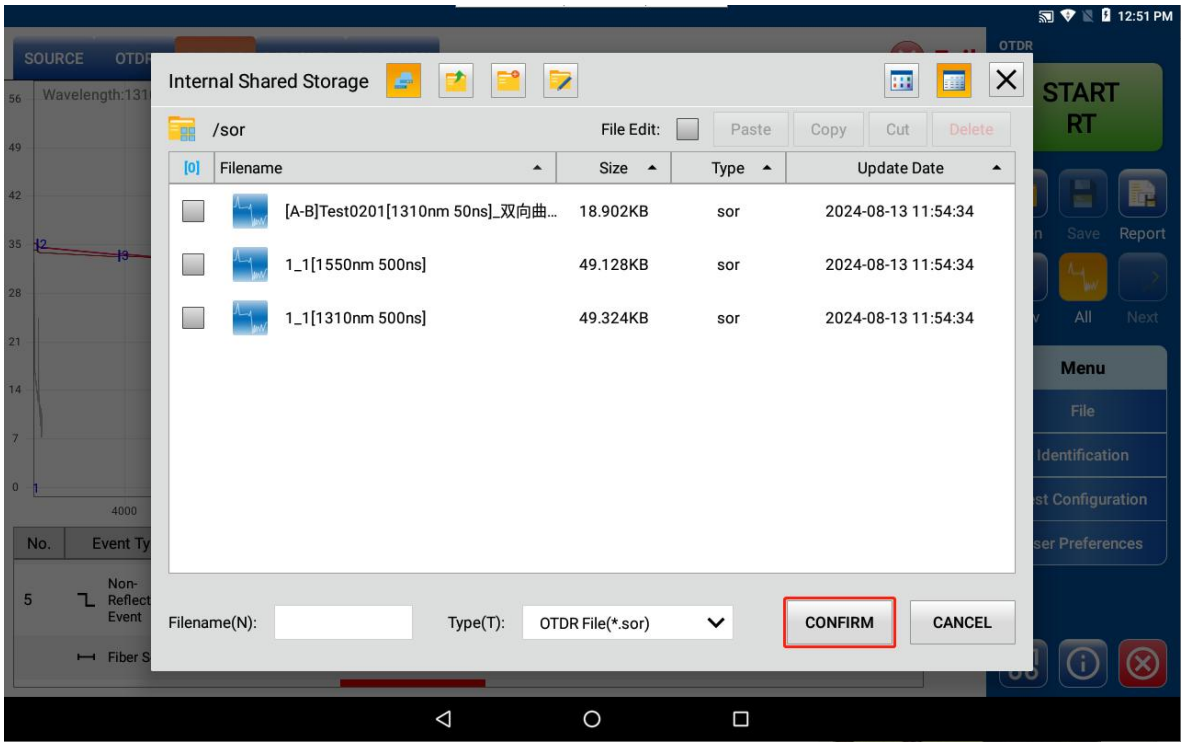
3. In the “Test Configuration” window, open the “Link Definition” tab to view the test settings.

5.12 Open Measurement File

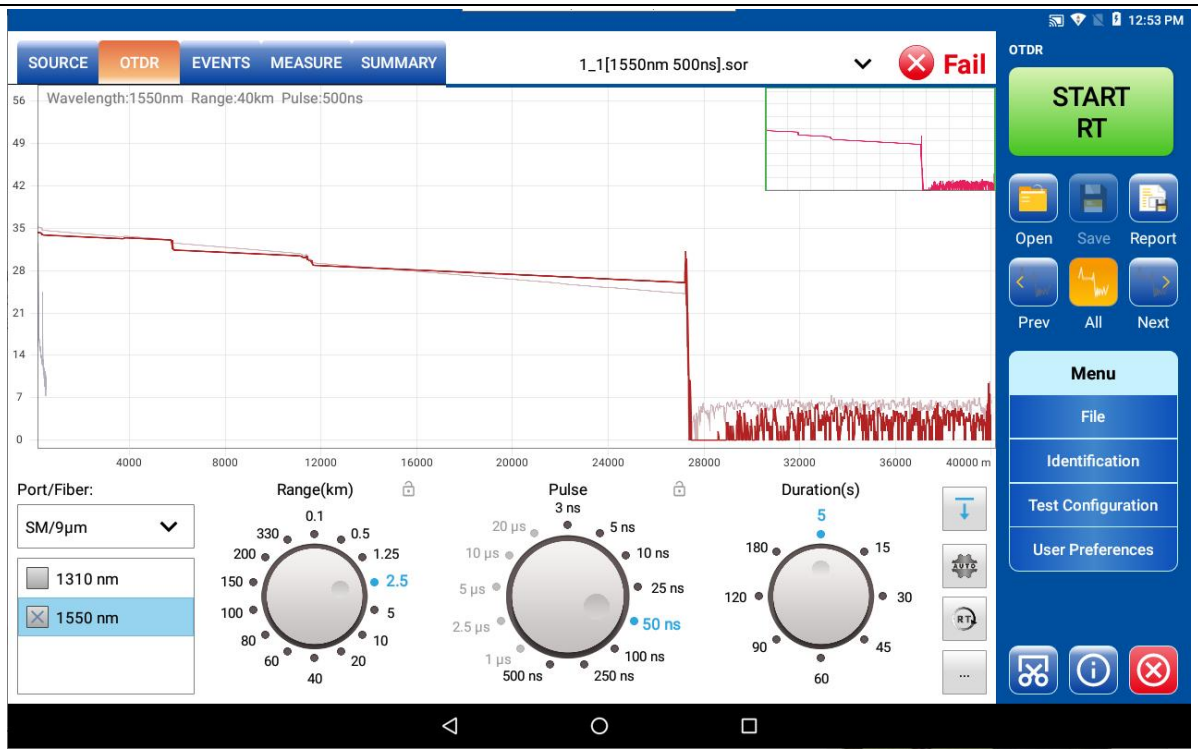
When you open a curve file, the application by default tries to match the wavelength in the curve file with the wavelength selected in the module. If the wavelength is not available on the module, the application will choose the wavelength closest to that in the opened curve file. Up to 30 files can be opened simultaneously. When opening files, the application displays the default view (for more details, please refer to page 36, "Selecting the Default View").
For detailed information on how to switch curves, please refer to page 53, "Select the Displayed Wavelength."

Steps to Open a Measurement File:

1. In the "Main Menu," tap "File," then select the file you need to open.
   or
   In the main window, tap the "  ".
2. Change the file path as needed.
3. Scroll through the file list and tap the checkbox to select the curve files you want to open.
4. Tap "CONFIRM".



The application returns to the main window.
For curves that have been acquired but not saved, the application will prompt you to save them. Tap "Save."
Now, you can open other curve files.


12:53 PM
SOURCE
OTDR
EVENTS
MEASURE
SUMMARY
1_1[1550nm 500ns].sor
Fail
Wavelength:1550nm Range:40km Pulse:500ns
56
49
42
35
28
21
14
7
0
4000
8000
12000
16000
20000
24000
28000
32000
36000
40000 m
Port/Fiber:
SM/9μm
1310 nm
1550 nm
Range(km)
0.1
0.5
1.25
2.5
5
10
20
40
60
80
100
150
200
330
Pulse
3 ns
5 ns
10 ns
25 ns
50 ns
100 ns
250 ns
500 ns
1 μs
2.5 μs
5 μs
10 μs
20 μs
Duration(s)
5
15
30
45
60
90
120
180
OTDR
START RT
Open
Save
Report
Prev
All
Next
Menu
File
Identification
Test Configuration
User Preferences

VI. Manual Analysis Results

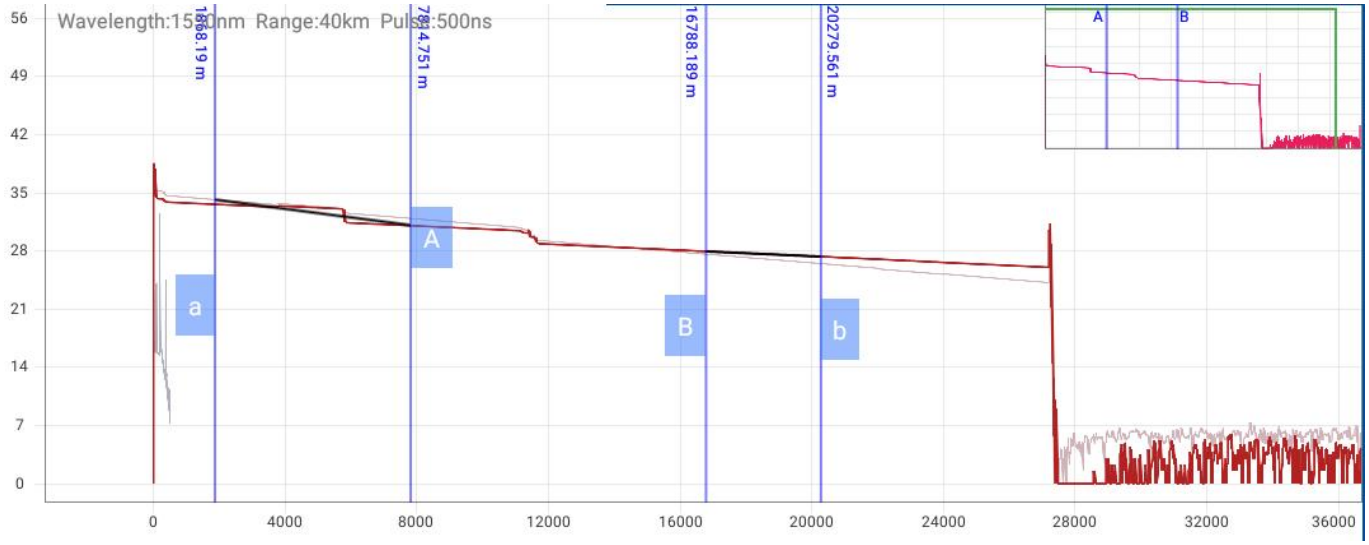
You can measure connector loss, fiber segment attenuation, reflectance, and optical return loss by moving the marker lines and zooming in on events or segments of the curve. This operation can be performed after acquiring the curve or opening a curve file, and can also be done during the data collection process.

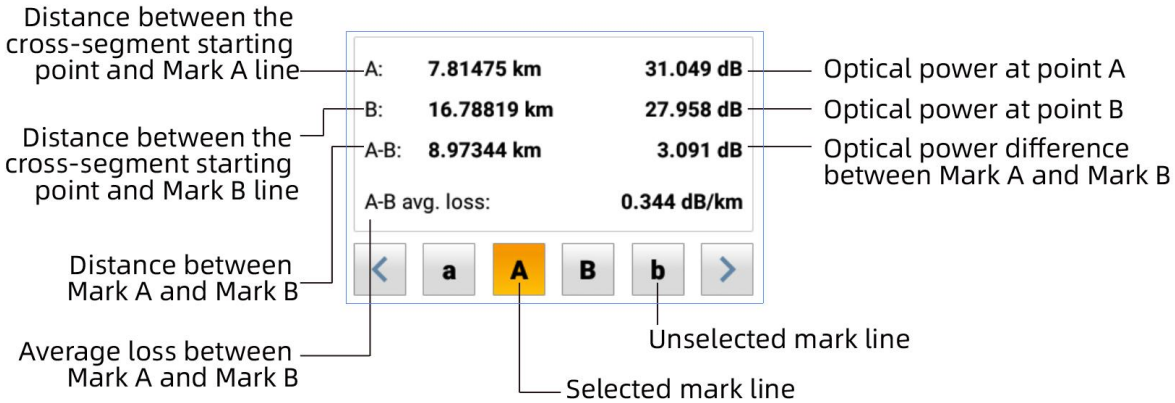
6.1Use marker lines.

You can use marker lines to view the position of events, relative loss, or reflectivity.
You can lock the distance between the four marker lines and move them as a whole, or you can unlock them. You can lock the distance between marker line pair A and a, and marker line pair B and b, and move each pair as a whole, or you can unlock them. You can also lock marker lines a, A, b, B, and then move them as a group.

Steps for moving the marker line directly in the graph:

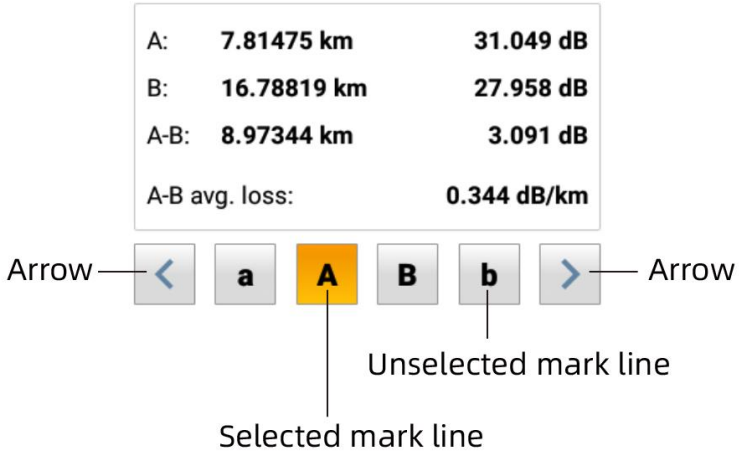
In the "Measure" tab, directly select the marker line on the curve and then drag it to the desired position.





Steps to move the marker line using the arrow buttons:

1. In the "Measure" tab, tap the button for the desired marker line.



2. After selecting the desired marker line, press the right or left arrow button to move the marker line along the curve.

Note： If multiple marker lines are selected, they will move simultaneously.

Note： Long press the left and right connectors for quick movement.

Steps to restore the marker line to the visible area:

1. Ensure that only the desired markers are selected.
2. Use the left/right arrow keys to move the marker along the curve.。

6.2 Obtain Event Distance and Relative Power

The OTDR test program automatically calculates the location of events and displays the distance in the "Events" tab.

You can manually obtain the positions of events and the distances between them, as well as view the readings of relative power levels.

The X-axis represents distance, and the Y-axis represents relative power.

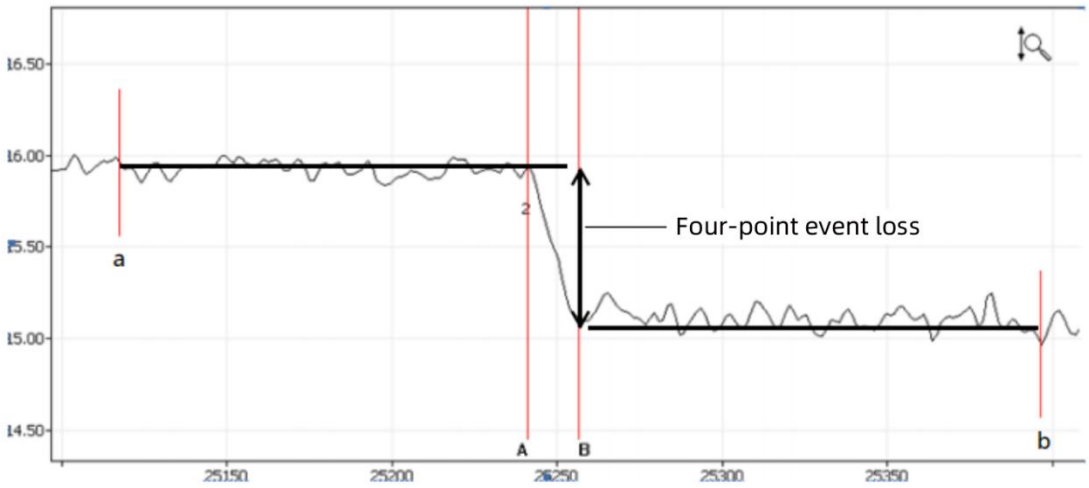
Manual acquisition of event distance and related relative power value operation steps:

1. In the main window, select the "Measure" tab.
2. Move marker line A to the starting point of the event. For more details, please refer to page 61, "Using Marker Lines."

6.3 Obtain event loss and maximum reflectivity

The application calculates event loss (in dB) by measuring the reduction in signal power during Rayleigh Backscattering (RBS). Both reflective and non-reflective events can cause event loss. The loss calculated by the application is the "four-point event loss," which is computed using the Least Squares Approximation (LSA) method. The loss values displayed in the "Event" tab are the four-point event losses.

- The four-point event loss is calculated using the least squares approximation method to fit the backscatter data within two regions defined by markers a, A and b, B into straight lines. These two regions are respectively the area to the left of marker A and the area to the right of marker B.



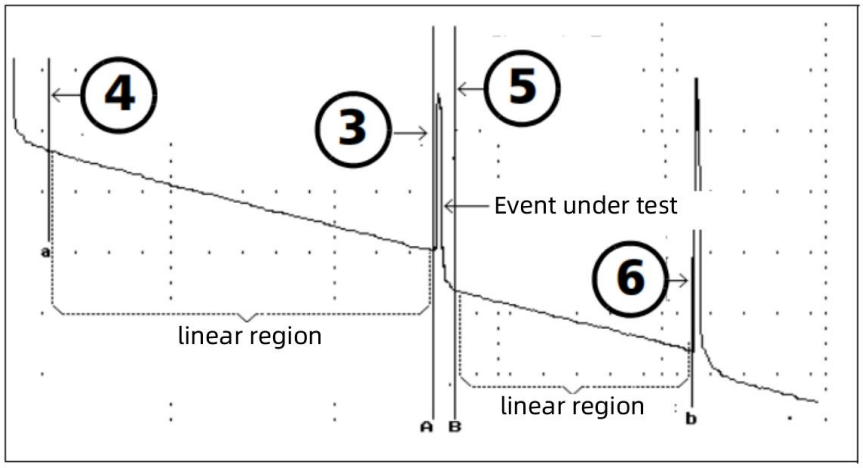
Then, extrapolate the two fitted lines towards the center of the event. The power difference between the two lines can be directly used to determine the event loss.

- Reflectance refers to the ratio of the reflected light to the incident light.

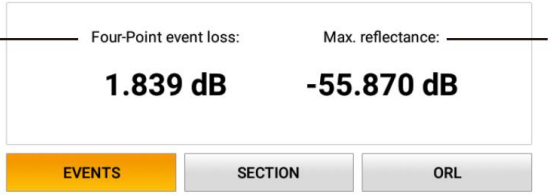
Note： The reflectance values obtained in "real-time" mode may not necessarily be accurate.

Steps to obtain event loss and maximum reflectivity:

1. In the main window, select the "Measure" tab.
2. At the bottom of the window, tap "Events". Mark lines a, A, B, and b will appear on the graph.
3. Zoom in on the graph and place marker line A at the end of the linear region before the event to be measured. For more details, please refer to page 52 "Changing the Display Scale of the Curve" and page 61 "Using Marker Lines".
4. Place the sub-marker line 'a' at the beginning of the linear region before the event to be measured (do not include any significant events).
5. Place marker line B at the beginning of the linear region following the event to be measured.
6. Place the sub-marker line b at the end of the linear region following the event to be measured (do not include any significant events).



The four-point event loss defined by the marker lines a, A, B, and b.



maximum reflectance

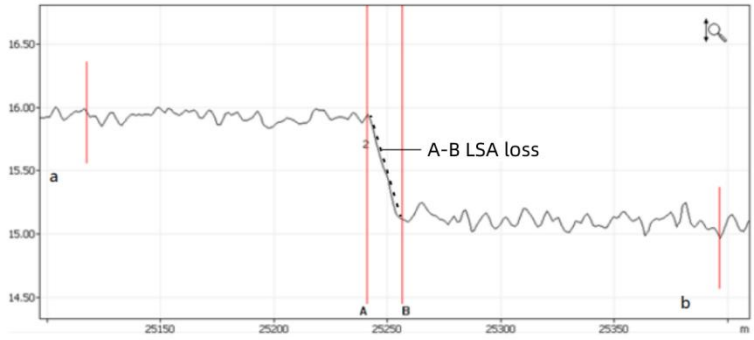
Note： For non-reflective events, "---" will be displayed.

6.4 Obtain Segment Loss and Attenuation

The Least Squares Approximation (LSA) method measures the attenuation (loss between distances) between two points by fitting a straight line to the backscatter data between markers A and B. The LSA attenuation corresponds to the power difference (Δ dB) over the distance between the two points.

Compared to the two-point method, the LSA method can provide average measurement values and is more reliable when the noise level is high. However, this method cannot be used when events such as echoes occur between the two marker lines.

The A-B LSA loss is the event loss defined by the markers A and B, obtained by fitting a straight line to the backscatter data between these two markers.



The reduction in optical power (in dB) between the two marker lines (i.e., the slope of the fitted line) is considered the event.

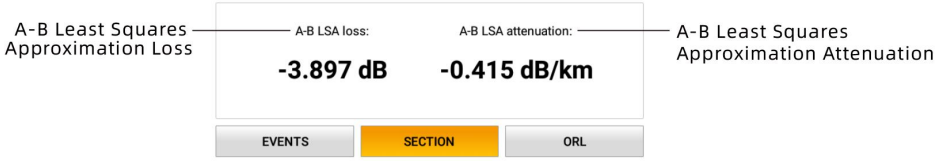
This method is suitable for calculating joint losses, but not for reflective events (specifically, it is not suitable for "direct line" events). The A-B LSA loss is mainly used for quickly calculating the loss over a given length of fiber segment.

Note： The A-B LSA event loss measurement method should only be used for fiber segments. Using it to measure events yields meaningless results.

Steps to obtain segment loss and attenuation:

1. In the main window, select the "Measure" tab.
2. Tap the "Segment" button. Marker lines A and B will appear on the graph.
3. Place marker lines A and B at any two points on the curve. For more details, please refer to page 61, "Using Marker Lines."
4. Zoom in on the curve and adjust the position of the marker line as needed. For more details, please refer to page 52, "Changing the Display Scale of the Curve."

Note： During measurement, there must be no events between marker lines A and B.



6.5 Obtain Optical Return Loss (ORL)

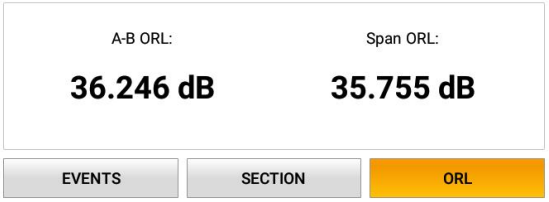
The calculation results of ORL include the following information:

- Mark the ORL between Line A and B

Optical Return Loss (ORL) refers to the total effect of multiple reflection and scattering events in an optical fiber system.

Steps to Obtain ORL Values:

1. In the main window, select the "Measure" tab.
2. At the bottom of the window, tap "ORL". Marker lines A and B will appear on the graph.



3. Move markers A and B to define the area for obtaining the ORL (Optical Return Loss) value.

VII. Manage curve files using the OTDR testing application

After obtaining the curve or when processing the curve after data collection, you will need to save, open, rename, or delete the curve files.

To rename, copy, move, and delete curve files, you must use the file manager utility.

Through the OTDR application, you can open curve files and save them in Bellcore format (.sor).

To save the OTDR curve file in another format:

Use a computer that has OTDR Assistant for PC installed.

VIII. Create and Generate Report

or future reference, you can add the location of the tested optical fiber, the type of task performed, and general comments in the curve report.

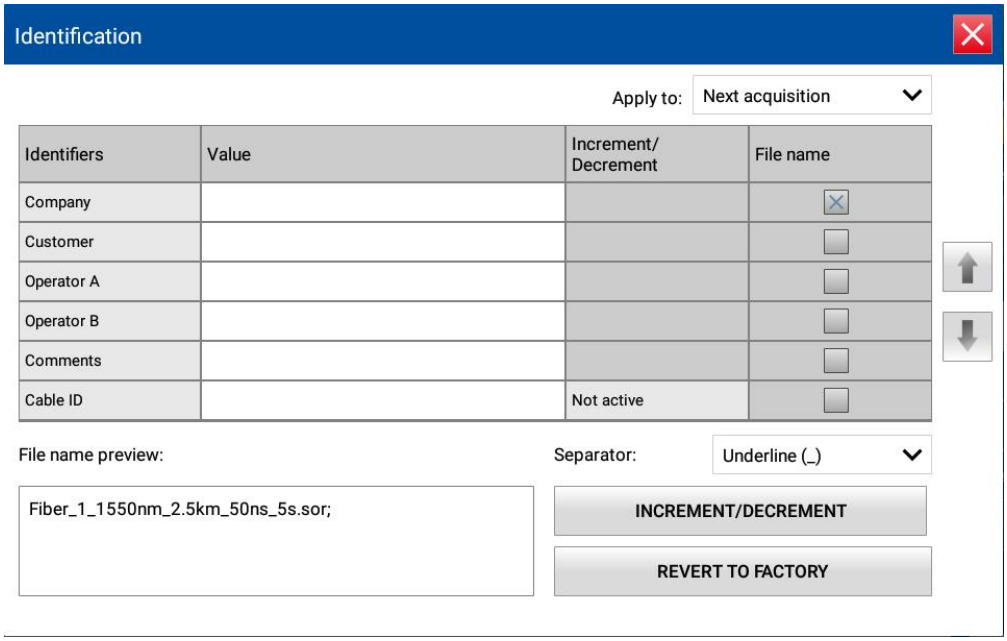
8.1 Add information to the test results

Before or after acquiring the curve, you might want to add or update information about the tested optical fiber and the task, or add notes. The application supports saving the entered information to the currently opened curve file or to the file for the next data acquisition.

Different wavelengths within the same file contain the same information (including Location A and B, cable identification, fiber identification, etc.). If the information in the "Identification" window is cleared, the identification information will not be saved in the file.

Steps to Add Information in the Test Results:

1. In the "Main Menu", tap "Identify".
2. In the "Apply to" list, select either "Current Data Collection" or "Next Data Collection".
3. Enter the required information. For details, please refer to page 8, "Automatically Naming Curve Files."



Note： The information in the "Serial Number", "Model", and "Calibration Date" fields is provided by the application and is not editable. Wavelength, pulse, and duration cannot be edited in the "Identification" window, but can be set in the "OTDR" tab before performing data acquisition.

4. Tap "  " to return to the curve graph.

The input information will be saved along with the curve and can be viewed or changed at any time through the steps mentioned above.

To clear the information in the "Identification" window:

For detailed information about clearing the "value", please refer to page 9, "Procedures for Automatic Profile Naming."

Note： The information in the "Wavelength", "Pulse", "Duration", and "Serial Number" fields cannot be deleted.

8.2 Generate Report

You can choose the report generation mode, which includes the following options:

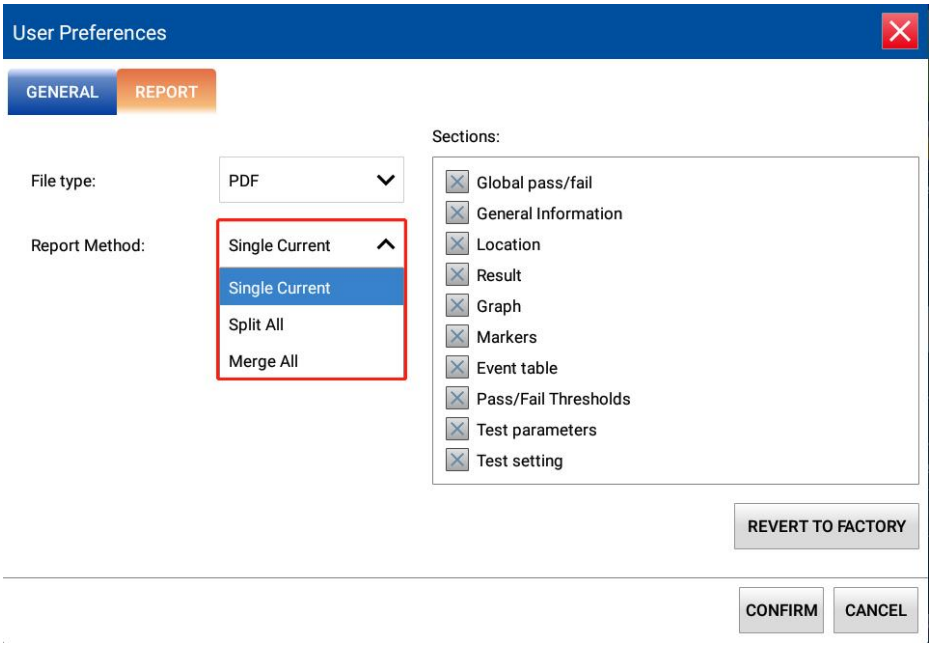
- Current Only:Export only the currently selected measurement file.
- Split All:Export all currently opened or measured and saved measurement files, generating one report for each file.
- Merge All:Export all currently opened or measured and saved measurement files, and compile all file data into a single report.

You can generate a curve report in PDF format directly on the device. The report by default includes all curves, but you can also generate a report that only includes the current curve. Below are the information options that can be included in the PDF report. All options are selected by default.

- Comprehensive Pass/Fail Status:The display shows whether the results pass the test. This status is displayed in the top right corner of the report.
- General Information: Includes file name, test date and time, comments, customer, company, optical cable identification, task identification, fiber identification, and other information.
- Location:The current curve displays information such as locations A and B, operators A and B, device model, serial number, and calibration date.
- Result:The current curve displays link measurement information such as span length, span loss, average loss, average splice loss, maximum splice loss, and span optical return loss, among others.
- Graph:Generate graphics that are exactly the same as those on the screen. All curves (wavelengths) in the same file use the same scaling factor. The graph will also display marker lines.
- Mark Line:Display marker line information, including the positions of A and B, the distance from the current position, and the dB value.
- Event Table:Values with the status "Failed" are displayed with a red background and white text. Values with the status "Passed" are not highlighted. If the application detects a macrobend event at two wavelengths, it will be recorded in the event table.
- Pass/Fail Threshold:The current curve displays the thresholds set in the "Pass/Fail Thresholds" tab of the "Test Configuration" window, including splice loss, connector loss, reflectance, fiber segment attenuation, span loss, span length, and span optical return loss thresholds.
- Test Parameters:Display wavelength, range, pulse, and duration.
- Test Settings:Display refractive index, backscatter coefficient, splice loss threshold, reflectance threshold, fiber end threshold, macro bend wavelength, and macro bend loss change value.

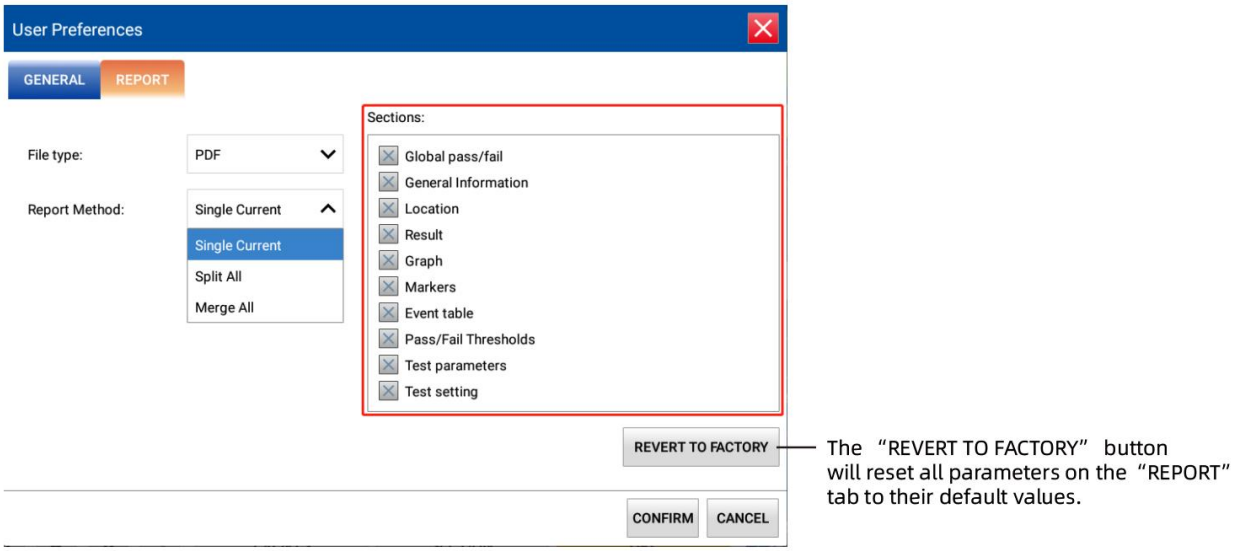
Steps to select the report generation mode:

1. In the "Main Menu," tap the "User Preferences" button.
2. Select the "Report" tab.
3. In the dropdown window of the report mode, select the mode you need to set.



Steps to Specify Report Content:

1. In the "Main Menu", tap the "User Preferences" button.
2. Select the "Report" tab.
3. Select the contents to include in the report.



4. Tap "OK" to return to the main window.

Manual Report Generation Steps:

In the main window, tap "  ". The application will export the report and automatically return to the main window.

Steps for the application to automatically generate a report:

1. To automatically generate a report when saving, tap the "User Preferences" button in the "Main Menu".
2. Select the "General" tab.
3. Check the "Generate report after saving" checkbox.