

PROLITE-53B

**Extra large touch screen single-mode and
multimode quadruple wavelength OTDR
User Manual**




03-2022



SAFETY NOTES

Read the user's manual before using the equipment, mainly SAFETY RULES paragraph.

The symbol  on the equipment means SEE USER'S MANUAL. In this manual may also appear as a Caution or Warning symbol.

WARNING AND CAUTION statements may appear in this manual to avoid injury hazard or damage to this product or other property.

ISO9001 Certification

Produced to ISO9001 International Quality System Standard as part of PROMAX, is objective of continually increasing customer satisfaction through improved process control.

SAFETY RULES

- * The safety could not be assured if the instructions for use are not closely followed.
- * This is a class I equipment, for safety reasons plug it to a supply line with the corresponding ground terminal.
- * When using some of the following accessories use only the specified ones to ensure safety.
 - Mains power supply PL-05.
 - Clock Battery.
- * Observe all specified rating both of supply and measurement.
- * Remember that voltages higher than 70 V DC or 33 V AC rms are dangerous.
- * Use this instrument under the specified environmental conditions.
- * The user is only authorized to carry out the following maintenance operations:
 - Any other change on the equipment should be carried out by qualified personnel.
- * Follow the cleaning instructions described in the Maintenance paragraph.

Specific precautions

**CLASS 1
LASER PRODUCT**

CAUTION



It is recommended do not watch directly the laser beam.

The use of devices that are not the specified ones in this manual as well as internal manipulation of the equipment can be cause of dangerous radiation.

CAUTION



The battery used can present danger of fire or chemical burn if it is severely mistreat. Do not disassembly, cremate or heat the battery above 100 °C under no circumstances.

GENERAL

This product is a Safety Class 1 instrument. The protective features of this product may be impaired if it is used in a manner not specified in the operation instrument.

Environmental Conditions

It is designed to operate at a maximum relative humidity of 95% and at altitudes of up to 2000 meters. Refer to the specifications tables.

Before Applying Power

Verify that the product is set to match the available line voltage, the correct fuse is installed, and all safety precautions are taken. Note PROLITE-53B's external markings described under Symbols.

Do Not Remove PROLITE-53B Cover

Operating personnel must not remove instrument covers. Component replacement and internal adjustments must be made only by qualified service personnel.

Instrument that appears damaged or defective should be made inoperative and secured against unintended operation until they can be repaired by qualified service personnel.

Safety Terms Used in This Manual

The **WARNING** sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personnel injury. Do not proceed beyond a WARNING sign until the indicated conditions are fully understood and met.

The **CAUTION** sign denotes a hazard. It calls attention to an operating procedure, or the like, which, if not correctly performed or adhered to, could result in damage to or destruction of part or the entire product. Do not process beyond a CAUTION sign until the indicated conditions are fully understood and met.

The **NOTE** sign information that may be beneficial during the use and maintenance of PROLITE-53B.

Laser Safety Announcements

PROLITE-53B is a laser instrument. Users should avoid looking directly into the optic output.















- Always avoid looking directly into the optical output port, when PROLITE-53B is working. And the use of microscope or magnifier should also be avoided, for the use of such devices can focus a highly intense beam onto the retina, which may result in permanent eye damage.
- Always replace protective dust cap on the probe port when PROLITE-53B is not being used.
- Always avoid looking directly at unconnected end of optic fiber in testing and make the unconnected end pointing at a non-reflective object if available.

Electric Safety Announcements

If needed to ensure the instrument through an outage, please pull up the power line and take the battery out.

- ◆ AC/DC adaptor should be used only indoors.
- ◆ The ambient air of PROLITE-53B place should be free flow.
- ◆ Any using of electric tools near inflammable gas or smog will be a big safety threat.
- ◆ In order to avoid electric shock, please don't use instrument if there is damage on any outside surface part (top cover, panel, etc.)
- ◆ Only qualified professional staff can do electrified adjustment, maintenance and repair to the operating instrument.
- ◆ Even PROLITE-53B power is cut off; the capacity in PROLITE-53B might be electrified in some time after that.

* Symbols related with safety:

	DIRECT CURRENT		ON (Supply)
	ALTERNATING CURRENT		OFF (Supply)
	DIRECT AND ALTERNATING		DOUBLE INSULATION (Class II protection)
	GROUND TERMINAL		CAUTION (Risk of electric shock)
	PROTECTIVE CONDUCTOR		CAUTION REFER TO MANUAL
	FRAME TERMINAL		FUSE
	EQUIPOTENTIALITY		EQUIPMENT OR COMPONENT TO BE RECYCLED


Descriptive Examples of Over-Voltage Categories

- Cat I** Low voltage installations isolated from the mains.
- Cat II** Portable domestic installations.
- Cat III** Fixed domestic installations.
- Cat IV** Industrial installations.

Agreement and Statement

Button or menu: The operating units in GUI that can be clicked by stylus, indicated by letters in square brackets, e.g. **[Setup]** and **[Start]**.

Key: The function key on front panel, indicated by letter or icon in quotation marks, e.g.

“” (POWER).

Option label: Indicated by letters in brace, e.g. {Event} and {Trace Parameter}.

Label and subordinate specific options: Indicated by letters in angle brackets and square brackets, e.g. <Mode> [Average], which stands for averaging mode option; <Wavelength> [1310nm], which stands for 1310nm wavelength option.

Mode or module: Indicated by letters in quotation marks, e.g. “OTDR” and “OCI”.

Conversation: Indicated by letter in quotation marks e.g. “ Confirm ” and “ Cancel ” .

The **NOTE** sign information that may be beneficial during the use and maintenance of PROLITE-53B.

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1 General Information

1.1 Scope of this Manual

Thank you for choosing the PROMAX instrument. Please read this manual carefully before using any of PROMAX fibre-optic instruments. Always observe the warnings and cautions appearing throughout this manual.

This manual contains the necessary information for proper operation and maintenance of PROLITE-53B OTDR, troubleshooting instructions as well as the information regarding of obtaining services.

1.2 Introduction

The PROLITE-53B is a compact multi-functional platform with Linux OS. It is convenient and accurate for auto/manual testing, multi-wavelength testing, integrated intelligent and multi-functional analysis.

The PROLITE-53B is easy to handle with a smart user interface and large color LCD touch screen, large built-in and extended memory enable convenient test data storage, access and transfer to PC via USB for further analysis and reporting. Management software on the PC can be used for post-testing data analysis.

Features:

- 8-inch color LCD touch screen of sharp display, adjustable brightness;
- Touch-screen, easy and flexible handling;
- Large-capacity data storage;
- USB data interface, Supports a variety of data backup;
- PC software for test data analysis, filing and reporting;
- Auto screensaver feature for power saving;
- AC/DC dual power supply;
- Optimized power management: 10 hours continuous operation.

Optional Built-in Functional Modules

- OTDR function module, detail specification for later chapters
- Stabilized Laser Source Module (as OTDR)
- Optical Power Meter Module
- Optical Connector Inspector Module, detail specification for later chapters
- Remote control Module
- Link Image Module



1.3 Product Appearance

Front View

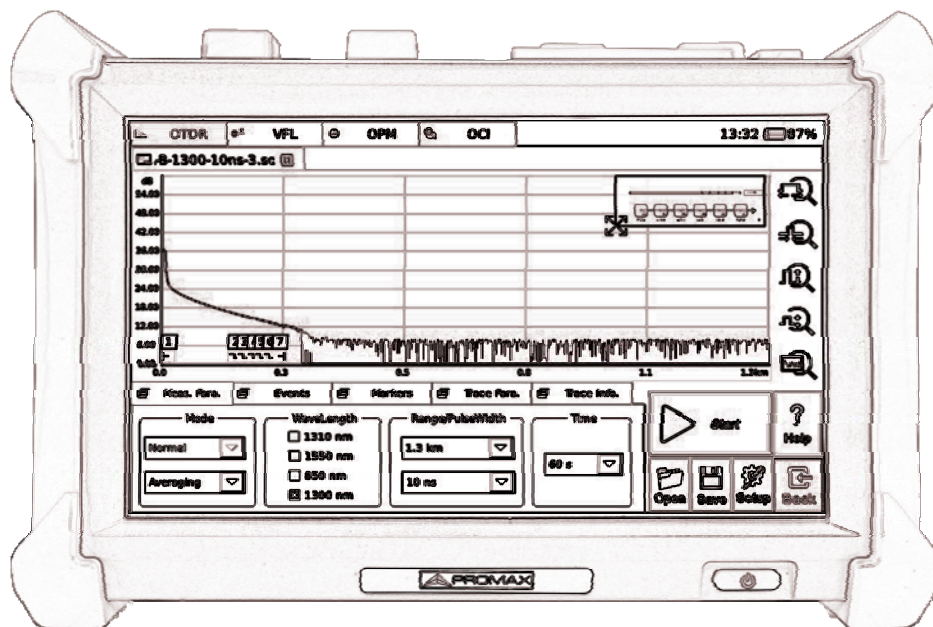


Fig. 1.1 Front View



Power On/Off key is lower than other keys to avoid misoperation.

Top View

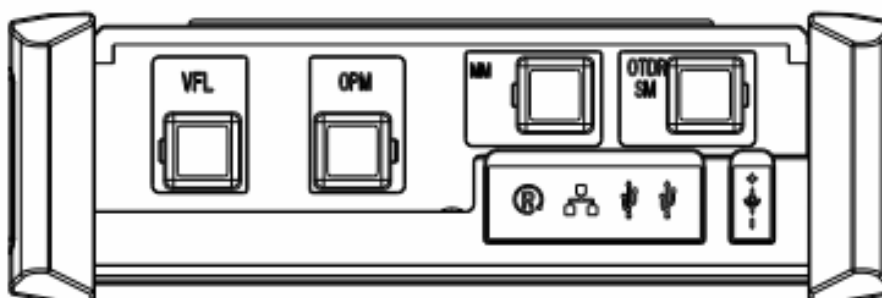



Fig. 1.2 Top View




1.4 Front Panel Indicators Introduction

Icon	Status	Meaning
 Power On/Off	Off	System off
	Green	System is on or battery is fully charged when power off
	Orange	System is on or battery is charging when power off
	Red	Laser or OTDR or VFL is beaming

Tab. 1.1 Front Panel Indicators Introduction

1.5 Front Panel Keys Introduction

Name	Function
 POWER	When system is off, press and hold 1 second to power on system.
	When system is on, press and hold 3 seconds to power off system.

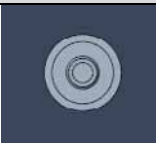




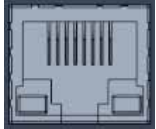


Tab. 1.2 Front Panel Keys Introduction

1.6 Instrument Interfaces Introduction

Interfaces on Top Panel


PROLITE-53B is equipment with FC/PC connectors (Interchangeable SC, ST and LC).



Name	Appearance	Icon	Description
VFL		VFL	Visual Fault Locator Port
OPM		OPM	Optical Power Meter Port
OTDR(SM)		OTDR(SM)	OTDR Port (Single Mode)
OTDR(MM)		OTDR(MM)	OTDR Port (Multi-mode)
Reset			Revert to factory settings and format the meter
RJ 45 port			10/100Mbps Ethernet port, (Standby Port)
USB			Connect OTDR with USB devices
Power			Connect OTDR with AC/DC adaptor

Tab. 1.5 Optical Ports

The amount of optical ports depends on OTDR specification, not all models are equipped with above mentioned optical ports.









The PROLITE-53B is a laser instrument.  Users should avoid looking directly into the optic output. And the use of microscope or magnifier should also be avoided, for the use of such devices can focus a highly intense beam onto the retina, which may result in permanent eye damage.



Laser Radiation: To avoid serious eye injury, never look directly into the optical outputs of fiber optic network equipment, test equipment, patch cords, or test jumpers.

- Always avoid looking directly into the optical output port, when PROLITE-53B is working.
- Always close protective dust cap on the detector port when PROLITE-53B is not being used.
- Always avoid looking directly at unconnected end of optic fiber in testing and make the unconnected end pointing at a non-reflective object if available.

1.7 GUI Icons Instruction

Icon	Status	Operation	Description
	Appear	--	Power adaptor plugged.
	Green part change	--	Showing battery power level with percentage behind.
	Appear	--	Battery unplugged or connection is poor.
	---	Tap	Start selected function.
	---	Tap	Enter Setup interface, including Interface style, Language and System setting etc.
	---	Tap	Enter Help of current interface
	---	Tap	Enter "About" interface.
	---	Tap	System off.

Tab. 1.6 GUI Icons Introduction

1.8 Power Instruction

PROLITE-53B uses following power supplies:

- PL-05 AC adaptor (Connect to standard outlet – Indoor use only).
- Li-ion rechargeable battery (Auto power supply when AC adaptor is unplugged).
- Battery dock cover must be closed properly when PROLITE-53B is working.
- AC adaptor and battery power supply can be switched without affecting operation.



- After AC/DC power adaptor is connected, built in Li-ion battery will be automatically charged.

When only using Li-ion battery as power supply, following situations may cause PROLITE-53B automatically power off or dysfunction.

- The battery power indicator displayed on LCD screen will turn red (Low battery) when the battery power is insufficient and PROLITE-53B may automatically power off.
- If unused for a long time, PROLITE-53B may not power on properly, please connect power adaptor and recharge the battery.

1.9 Use of Rechargeable Battery

- Battery for PROLITE-53 B is a Lithium rechargeable battery.
- 3.5 hours for full charge.
- When PROLITE-53B is charged by AC/DC power adaptor, charging indicator on the front panel will turn red and turn green after charge is complete.
- When PROLITE-53B is powered on and being charged, LCD will also indicate charging status.



75%: Showing battery power level with percentage behind, 75% indicates the current battery power is 75% of the total battery power.



: Battery unplugged or connection is poor.



: Power adaptor plugged.

PROLITE-53B battery is rechargeable Li-ion battery. If unused for a long time, please charge the battery to 50%-70% before conservation.

Keep the battery off from fire and intense heat; do not open or short circuit the battery.




2 Basic Operation

2.1 Foreword


This part introduces the basic operation of the PROLITE-53B. Please read this manual carefully for optimal operation. Should you encounter any problems during operation, you are welcome to contact the technical staff of our company or representatives.

2.2 Power On/Off

Power on:

Press  button and hold 1 second till the LED power indicator is on.

Power off:

Press  button and hold 3 seconds till the LED power indicator is off.

Power off PROLITE-53B will completely shut down. When powering it on, PROLITE-53B will restart.

2.3 Enter and Exit Power Saving Mode

When power is on, the user can set PROLITE-53B to power saving mode and return to normal status. In power saving mode, the LCD backlight will turn off.

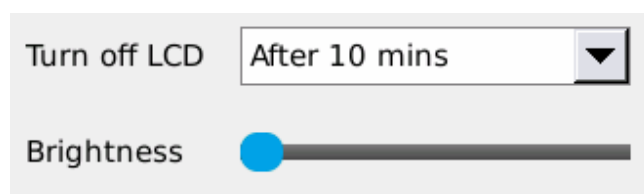
- When power is on, PROLITE-53B will automatically enter power saving mode after its idle time exceeds pre-set value.

2.4 Adjust LCD Brightness

The LCD lightness can be adjustable.



Tap the "Setup" button to open "Settings" and drag the blue dot to move left and right. The brightness is lowest on the far left and highest on the far right.





2.5 Start Application

When PROLITE-53B is power on, the system will load the main program of MTP-Linux (Application software package) and enter the main window, as shown in Fig. 2.1



Fig. 2.1 Main Window

Launch OTDR program:

1. Select the "Module" label and choose "OTDR" in the main window, the icon will be highlighted.



2. Then tap to start the program.

Launch another application program:

1. Select "Module" label, and then choose "VFL", "OPM", "OCI" or "SLS".



2. Then tap to start the program.
(Note: Double-tap the module label to start the application)

The application program is available only when the optional function is purchased.



3 Common Settings and Special Settings

3.1 Main Setting Menu

In the setting menu, the user can set up many settings, including language, power saving, and load default.

Enter main setting menu:




When power is on, press the  button to enter the “Setup” menu, as shown below:




Fig 3.1 Setup Menu

3.2 Select language

Switching language:



1. Tap  to enter into setting menu.
2. In language area, choose the requiring language.
3. Press “OK” to confirm modification




3.3 Automatic Power Saving Setting

The feature is designed to save the battery power.

When power is on, PROLITE-53B will automatically enter in power saving mode after its idle time exceeds pre-set value.

Setting Power Saving Mode:



1. Tap  to enter into the setting menu.
2. Choose the preferred option in “Turn Off LCD”.
3. Press “OK”, Exit setup menu and open power saving-mode.


Power saving mode is on by default, and the LCD backlight turn off automatically in 10 minutes.

3.4 Load Default

This function is used to set system settings to factory default. Those parameters include Interface style, language, power-saving and OTDR features.

Load default:



1. In the main interface, Tap .
2. In the setting menu, Tap [**Load Default**], system promotes a warning message: “Restore factory settings?”
3. Tap “Yes” to continue, Tap “No” to cancel.

Unless were necessary please, do not load default because it will erase your existing settings.

4 Basic Information of OTDR Module

4.1 Principle of OTDR Module

OTDR (Optical Time Domain Reflectometer) is a measurement instrument used for identifying optic fibre transmission features. It is mainly used to measure the attenuation of a whole optic fibre chain, and provide attenuation details relating to the length, namely



to detect, locate and measure any event in the optics fibre chain. (Events refer to faults caused by splicing, connectors and bending). Its non-destructive, one-end connection and rapid measurement features have made the OTDR module an indispensable tool for testing the application of optic fibre manufacture, construction and maintenance.

The faults and heterogeneity of optic fiber itself cause Rayleigh scattering of light pulse transmitted in optic fiber. Part of light pulse is scattered in the reverse direction, and this is called Rayleigh backward scattering, which actually provides attenuation details relating to length.

The information relating to distance obtains through time information (That's why there is a "Time Domain" in the name of OTDR). Fresnel reflection occurs at the boundary between two media of different IOR (For example, connections of faults, connectors, or optic fibre end). This reflection is to locate the discontinuous points on optic fibre. The reflection magnitude depends on the difference between IOR and the smoothness of the boundary.

The OTDR sends out a light pulse into the connected optic fibre and receives reflections of events and the backward scattering power of the pulse in time. Locus displayed on LCD. The Y-axis is the dB value of backward scattering power, and the X-axis is the distance.

4.2 OTDR Measurement and Trace Analysis

The OTDR displays power relating to the distance of returning signals. This information is used to identify the main properties of an optic fibre chain, such as the optic transmission, characteristics of the fibre, connector etc.

Full auto trace analysis will realize the following measurement:

- Event location (Distance), end or rupture of optic fiber chain.
- Attenuation coefficient of the fibre.
- Loss of a single event (e.g. one optic tie-in), or total loss from upper end to end.
- Range of a single event like reflection of connectors (or grade of reflection).
- Auto measurement of cumulative loss of a single event.
- Events list: event type, loss, reflection and distance.



4.3 Basic Definition and Classification of Events

Events refer to any abnormal points causing attenuation or sudden change of scattering power besides the normal scattering of optic fiber, which include all kinds of losses like bending, connections and ruptures.

Events points displayed on LCD are abnormal points that cause traces to deviate from straight line.

Events can be classified as reflection events and non-reflection events.

4.3.1 Reflection Events

When some pulse energy is scattered, reflection events happen. When reflection event occurs, peak shows on trace, as shown below:

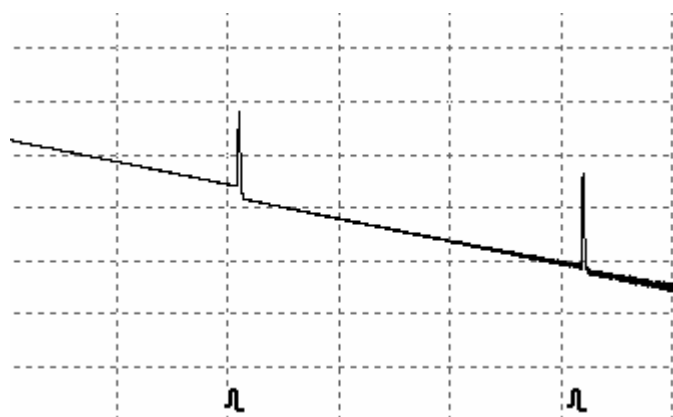


Fig.4.1 Reflection Event

4.3.2 Non-reflection Events

Non-reflection events happen at certain points where there is some optic loss but no light scattering. When non-reflection event occurs, a power decline shows on trace, see below:

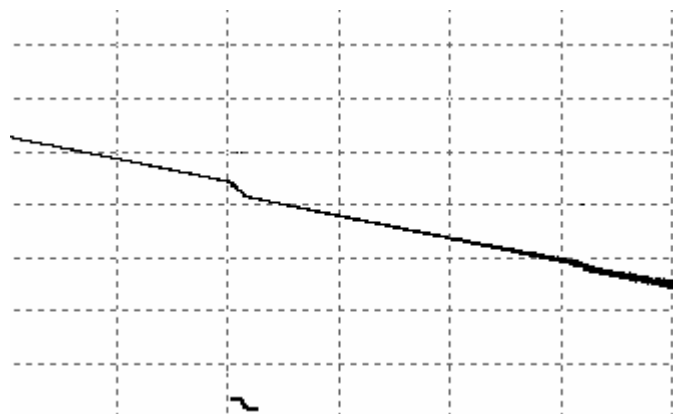






Fig.4.2 Non-reflection Event



4.4 Optic Fiber Link and Event Types

Optic fiber link and event type:

Event Type	Description
	Beginning of optic fiber link
	Reflection event
	Non-reflection event
	End of optic fiber link

Tab.4.1 Optic fiber link and event type

The end of optic fiber can be identified through scanning the first loss event that is greater than the end threshold.

5 Instruction of OTDR Modules of PROLITE-53B

5.1 Main Features of OTDR Module

- High dynamic range and short dead zones.
- Complete sampling under low noise, realize accurate low loss locating.
- The resolution is accurate to 10 cm.
- Multiple test models, convenient to meet the requirement of any test condition.

Make sure that the optical fiber or cable is **not in use** and there is **no laser beam** in the fiber before testing via OTDR. Otherwise, it may result in imprecise test trace, even permanent damage for the OTDR.

5.2 Measurement Mode of OTDR module

For customer convenience use, the OTDR offer many kinds of measurement mode. These modes can use in combination.

5.2.1 Auto Mode and Manual Mode

Auto mode: Calculate the length of the fibre, set Sampling parameters, get and show the trace, analyze the events.

Manual Mode: Advanced Mode in which the user can control all OTDR parameters to test.



5.2.2 Averaging Mode and Realtime Mode

Realtime Mode: The OTDR will undertake real-time measurement for the connector of exterior fibre and refurbish the measured trace. Under real-time mode, unless the user stops measurement, it will measure all along.

Averaging Mode: Under Averaging mode, OTDR will average the data within the measured time which is set by the user while exceeding the set time; it will stop automatically and display the result.

Generally, we suggest averaging mode.

5.3 OTDR Interface

When powering on, it will show the main menu automatically.

In main menu, select “OTDR module”, Tap  to enter OTDR user interface, as follows:

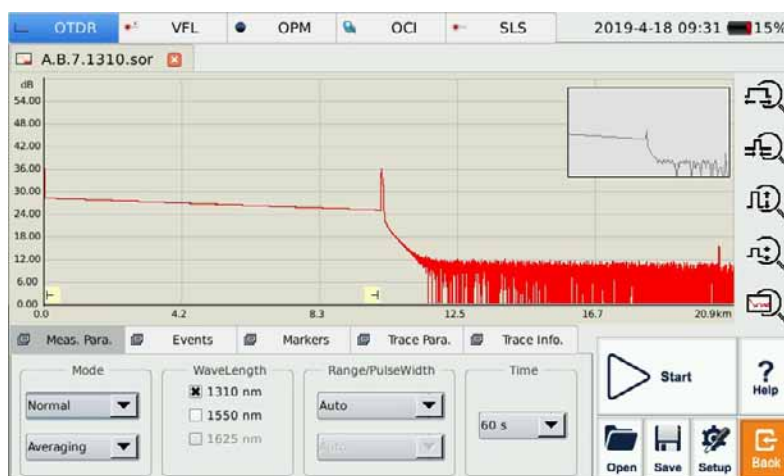
















Fig. 5.1 OTDR Main Interface



5.4 Icons Instruction in OTDR Interface

Tab.5.1 Buttons and icons in OTDR main interface.

No.	Icon	Description
1		Start testing
2		Stop testing
3		Parameter settings
4		Save trace file
5		Open trace file
6		Zoom in trace horizontally
7		Zoom out trace horizontally
8		Zoom in trace vertically
9		Zoom out trace vertically
10		Full-trace view
11		A/B marker switch
12		Move marker or marking point left/right
13		Toggle between marking points
14		Close trace
15		Return to previous menu

Not all icons can display in one interface icons can see in different functional interfaces.



5.5 Trace Processing

The “OTDR Trace Manager” software in MTP-Suite is for trace review and analysis on PC after acquisition without connecting to PROLITE-53B.

Trace processing includes:

- Trace editing (Single trace, multi traces).
- Printing (Single trace printing, batch printing).
- Trace reanalysis.
- Trace format conversion.

5.6 Available OTDR Module

The details of the OTDR module is in the appendix, including wavelength, dynamic range, dead-zone etc.



6 Prepare to Use OTDR

6.1 Connectors Instruction

The optical ports equipped on PROLITE-53B are FC/PC (Interchangeable SC, ST and LC).

6.2 Cleaning and Connecting to Optical Fiber

To ensure measurement accuracy, please clean and connect fibre properly before testing.

Connecting fibre to the OTDR port is tool-free.

- Please refer to “Maintenance and Calibration” for optical port and connector cleaning.
- Clean connectors and check if fibre connector type is FC/PC.
- Connect fiber to OTDR port.

Improperly connected fibre may cause serious loss and reflection.

Please refer to Safety Instructions of this manual before testing to ensure personal safety.

- ◆ When testing with OTDR, unless connected to the specific optical port, please make sure there is no working laser in the fibre under test that may cause incorrect results and even permanent damage test instrument.
- ◆ Please not screw connectors too tight, or it may damage the fibre and optical port.

7 Test with OTDR

7.1 OTDR Quick Test

1. Check the connection between fibre and OTDR optical port, make sure it's well connected.



2. Tap  icon to start testing.

3. Tap  icon to stop testing.

Fig 7.1 shows the OTDR interface after trace acquisition:

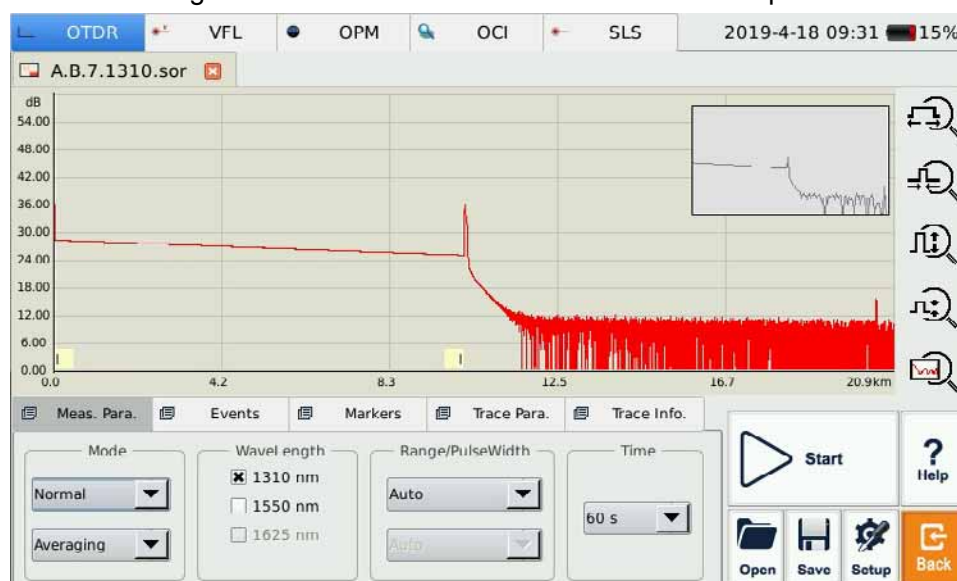


Fig. 7.1 OTDR Trace Acquisition Interface

- ◆ Tap the [Start] button.
- ◆ During testing, the averaging trace shows in the trace display area and refresh at certain intervals, the trace after testing finishes is the final trace.
- ◆ Users can stop testing at any time, the application will show all the information when test stops.
- ◆ After the test is finished or interrupted by the user, system will perform automatic analysis which takes about 5 seconds or longer before the user can start a new test.
- ◆ In Averaging mode, the interface will show the remaining the time of the test.
- ◆ In Real-time mode, the test will keep going until user stops it.

7.2 Trace Processing

After the test and automatic analysis are complete, event types will display below the



Trace area; the user can review all events information in the events list where is the {Events} label. After the test and automatic analysis are complete, the user can save traces. Please refer to the “Save Trace”.

After the test and automatic analysis are complete, the user can view the trace detail and manually analysis. Please refer to “Trace Viewing and Analysis Operation”.

After the test and automatic analysis are complete, the user can start a test new after trace acquisition.

The application will suggest the user to save or unsaved the trace before starting a new test.


7.3 Unsaved Traces

Unsaved traces will be titled as “*U_xxxx” (xxxx stands for the current testing wavelength) which is displayed on the left upper corner of the trace display area.

7.4 Save Trace

Once the test finishes, the user can save the trace with parameters information. The content includes trace parameters etc.

Procedure:

1. Tap [**Save**] on the right lower corner of the main interface, then save the dialogue window will pop up.
2. File type: User can choose file format as “.sor”, “.jpg” or “.pdf”.
3. User can Tap  the button on the top of the save file dialogue to choose a saving directory.
4. Users can edit the name of the file to save, the file name consists of letters and numbers that can be input by a soft keyboard.
5. File saving: In the save dialogue window, Tap the [Save] button to save the file.
6. Tap [**Cancel**] to cancel file saving.

Save dialogue window and options are shown below in Fig 7.2:

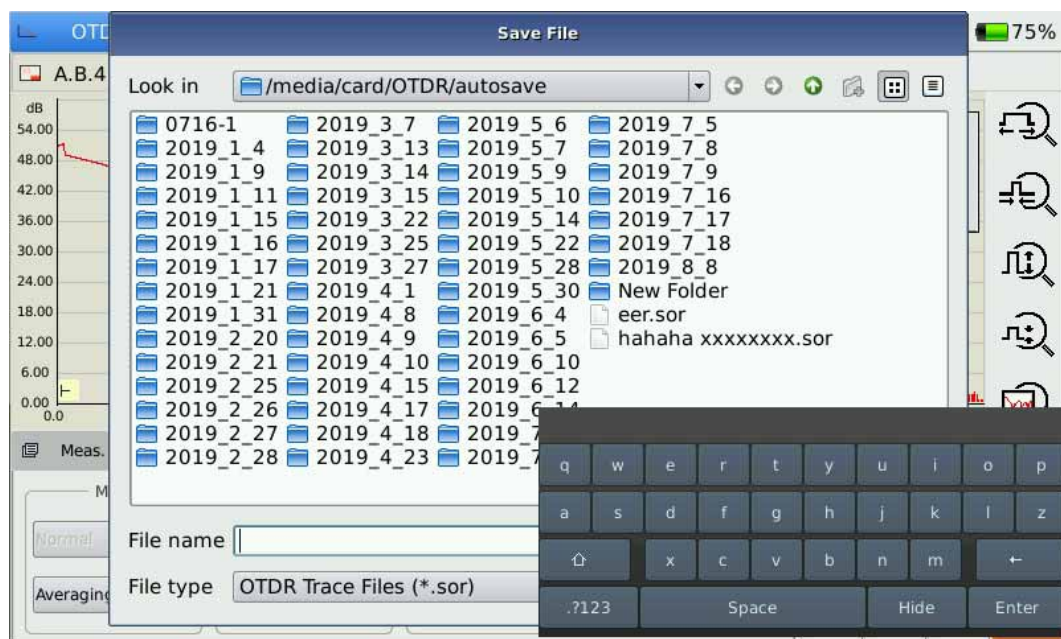


Fig. 7.2 Save dialogue window

- ◆ The title bar shows the current folder path, as shown in Fig 7.2: “\SDMMC_DISK\Traces\”.
- ◆ The system will automatically enter the newly created folder.
- ◆ Once the saved file, the file name will display on the left upper corner of the trace display area. Please note only the ten first characters of the file name will display, and the rest will abbreviate as a “~” mark.
- ◆ If the file name to save already exists, the system will promote a warning message.

7.5 Open Saved Trace

Tap the [**Open**] button on the right lower corner in the OTDR interface to open the saved trace.

1. When a new trace in the single trace display mode is open, the currently-display trace will close.
 2. In Multi-trace display mode, the user can open and display up to four traces at a time.
- ◆ Enable/disable Multi-trace display mode in OTDR Setup by checking / unchecking “Multi-trace” in Display Option.
 - ◆ “.jpg” format trace need to be loaded to PC for viewing.



7.6 Trace Viewing and Analysis Operation

Users can zoom in/out the trace using markers and marking points for trace characterization, including loss, attenuation, reflection etc. Normal trace viewing and analysis included.

1. Zoom in/out trace, touch operation.
2. Show marker, touch operation.
3. Move marker, touch operation.
4. Switch marker, touch operation.

Specific operations are as follow.



Zoom in/out trace:

- Draw selection frame from right lower corner to left upper corner to zoom out a trace.

Show A/B marker:

- Tap **{Markers}** label in the OTDR main interface marker labels will show in trace display area.

Move marker quickly:

- Select and hold the marker, drag it left or right to move quickly.
- Or Tap   button on **{Markers}** label to move active marker left or right.

Switch A/B markers:

- Tap the button to switch A/B markers on **{Markers}** label.
- Or Tap the marker button to select in trace display area.
 - ◆ When holding and moving markers, please apply adequate force because the operation may not be successful. Please try several times to get used to it.
 - ◆ Marker operation and re-analysis are not applicable to '.jpg' format trace.
 - ◆ For more information, please refer to "Trace Analysis and Event Operation".

7.7 Information and Function Windows

Information and function windows are located at the bottom of OTDR interface.

Information includes: Event list, measurement parameters, markers information (A/B



marker, marking points etc.), trace parameters and trace information.

Information and function windows description:

Label	Function
Meas. Para.	Measurement parameters: Mode, Wavelength, Range, Pulse Width, Averaging Time etc.
Events	Add event, modify event, delete event and analyze event.
Markers	A/B switch, move, lock, loss and reflection analysis.
Trace Para.	Trace testing parameters
Trace Info.	Cable and fiber information viewing and editing.

Tab. 7.1 Information and Function Windows Description.

Note: For detail information, please refer to “Trace Analysis and Event Operation”.

7.7.1 Switch Information and Function Windows

Tap the labels of information and function windows to switch.

7.7.2 Events info reference

Tap **{Events}** information window changes into events information.

Tap in scroll bars to look over events information.

7.7.3 Reanalyze

When not satisfied with the threshold, change it, then reanalyze the trace by this function to get satisfactory.

Reanalyze the trace:

1. If possible, look over or reset the threshold.
 2. In **{Events}**, Tap **[Analyze]**, system will reanalyze the trace.
 3. When the analysis finishes the events list will show the new results.
- ◆ Reanalyzing trace may cause added events deleted, events revised are resumed, and recover deleted events etc.
 - ◆ For more operation on events, please refer to “Trace Analysis and Event Operation”.



7.8 Upload Trace to PC

On the computer, the user can manage the trace file flexibly.

Copy or move the trace to computer:

1. User's can copy the saved trace to the computer via USB by PC software.
2. Or can copy and move the saved trace to the computer by mobile hard disk drive/ USB flash disk.

For more operation, please refer to "Manage files and data".

7.9 Get help on OTDR

Tap **[Help]** or **"?"** (HELP) to get detailed help, Tap  (BACK) to exit.



8 Testing Optical Fiber in Auto Mode

8.1 Instruction of Auto Testing Mode

When not knowing the optical fibre length, use the auto testing function to get the trace and analyze it?

After the auto mode start, OTDR will automatically estimate the optical fibre length, set sampling parameters, get traces and display the event list.

Under Auto Mode, user can set follow parameters directly.

- The wavelength is used for testing (at least one wavelength).
- Testing time span.

After Auto mode starts, according to the situation of the optical fibre link, the application program will estimate the optimum setting automatically will need around 5s. If the testing is cutting off, any data won't be displayed.

Except for the specific light port (light port used for online testing), do not connect the optical fibre which loads the signal to the OTDR port to any external signal over -30 dBm, which will affect the OTDR sampling and cause permanent damage to the OTDR.

8.2 The procedures of auto testing mode

Test and get trace in Auto mode:

1. Connect the optical fibre to the right OTDR light port.
2. Set parameter: set the "Range" to "AUTO".
3. Set testing time span.



4. Start testing: Use Tap
5. After the test, can save the trace, check the trace, re-analyze the trace etc. As to the detailed operation way, please refer to the relative paragraph previous.

- ◆ When testing automatically, Range is "AUTO".
- ◆ When setting the parameter, if the optical fiber parameter is not clear, can directly use the default value, but it may cause a bigger testing error.



9 Testing the optical fiber in Manual mode

Manual mode can set various test parameters more precisely.

If the general situation of optical fiber is known, users can set parameters precisely and get more ideal test result.

Correct parameters setting is the essential condition of accurate optical fiber measurement. Then necessary parameters must be set according to requirements when conduct manual mode.

9.1 Common using parameters for OTDR testing

Following testing, parameters display on {Meas. Para.} option card on the OTDR surface, users can set conveniently..

Parameter	Definition
Range	Distance range of the testing
Pulse Width	The width of laser pulse launched to an optical fiber by OTDR
Averaging Time	Testing time, choose the proper testing time
Wavelength	Laser wavelength, testing laser wavelength selecting
Mode	Testing mode, the testing mode selecting

Tab. 9.1 OTDR common use parameters sheet.

9.2 OTDR test parameters Configuration



Testing parameters in this section are in “OTDR Setting“, Tap on the OTDR surface to enter.

These testing parameters include Optical fibre general setting, analysis parameters setting etc.



Parameter	Definition
IOR	IOR of the optic fibre, which affects the transmission speed of the laser, needs to be set separately according to the relatively wavelength working.
Scatter Coefficient	Also be called back scatter, which affects backward scatter power of laser in fiber.
Non Reflection Threshold	Also called a splice loss detection threshold. Non-reflection events with insertion loss greater than this threshold will display on the trace.
Reflection Threshold	Also called reflectivity. Reflection events with insertion loss greater than this threshold will display on the trace.
End Threshold	Also be called optical fiber end detecting threshold. The first event with insertion loss greater than this threshold is identified as the end of fiber, and all following events will ignore on the trace.
Default	Revert to the values when leaving the factory

Tab. 9.2 OTDR test parameters setting sheet.

9.3 OTDR display and other Configuration

It is including setting of save method, testing display area and etc. Parameters setting in this part won't affect the testing result.

Setting	Content
Display grid line	If it is selected, the gridline will be displayed when the trace is displayed.
Support multi traces	If it is selected, then support multi trace testing and display, otherwise only test single trace and display.
Navigator window	If it is selected, there will be a trace navigator window on the upper right of the trace window easier to check the contracted drawing of the whole trace. Meanwhile, can check or move magnify the position of the window. If not be selected, can't see the navigator window and the system default select "navigator window.
Display the zoom toolbar	If it is selected, there will be a zoom toolbar on the right side of the trace window; if not be selected, there will be no zoom toolbar but a bigger trace display zone.
Length unit	Set the length unit displayed.

Tab. 9.3 OTDR display or other parameters setting.



9.4 Real time and average test mode

The user can select “Real-Time” test mode and “Averaging” test mode as per its requirement.

1. Under Real-Time mode, the instrument test the external optical fibre connection in real-time, and refresh display testing trace in real-time. When the instrument is working under the real-time mode, the user Tap [Stop] or presses (Start/Stop), the test will stop, or the test will resume all the time.
2. Under average mode, the instrument accumulates and averages the testing data according to the time that the user sets. Test time is equal to or greater than the test time that the user sets, the trace will display after finishing the time.

Under normal conditions, the user chooses the average mode.

Operating instructions

- ✓ Real time mode and average mode are controlled by **[Real time/Average] in {test setting} <test mode>**.
- ✓ When the button highlights display “Average”, it means average mode; when the button displays “Real-time”, it means real-time mode.
- ✓ When taping the button, it will change between average and real-time.

9.5 Range Configuration

Under general condition, the Range setting is to select relative scope according to the optical fiber real length; it will guarantee the test accuracy.

Range options: Auto, 1.3 km, 2.5 km, 5 km, 10 km, 20 km, 40 km, 80 km, 160 km, 240 km etc.

Operation:

Tap on the right range settings.

- ◆ “Auto” is the Autotest mode of OTDR; select this function, the PROLITE-53B will choose a correct test range intelligently and the proper pulse width to test. The user doesn't need to set any parameters.
- ◆ Default value is “Auto”.



9.6 Pulse Width Configuration

Pulse width selection affects the trace dynamic and resolution, selecting the smaller width to test can get a higher distance resolution and smaller dead zone, but the dynamic certainly is damaged; oppositely, the wider pulse width can get higher dynamic, test longer optical fibre, but it will affect the resolution and dead zone, the user must select between dynamic and dead zone.

Operation:

Tap the pulse width number in the pulse width parameter zone.

- ◆ Default value: Auto
- ◆ When the distance range is “Auto”, the pulse width will be “Auto”, no need for the user to set it.
- ◆ There will be different pulse width options according to different distance range.

9.7 Averaging Time Configuration

Test times affects the test trace SNR, the test time longer, the SNR higher and get a dynamic bigger; so, when testing a long-distance optical fibre and checking the far end event, it is needed to select a test time longer.

Operation:

Tap the time span number in the time span zone.

- ◆ Averaging time: Auto, Quick, 15 s, 30 s, 45 s, 60 s, 90 s, 120 s, 180 s etc.
- ◆ The default value is 60 s.

9.8 Laser Wavelength Configuration

Select certain single wavelength or multi select up to the entire wavelength.

The effective wavelength will be different according to the modules purchased.

9.9 IOR Setting

The IOR is a key factor that affects the speed of laser transmission in optic fibre, in this case, the IOR configuration has a direct impact on the accuracy of measurement. Generally speaking, the IOR parameter is provided by the optic fibre manufacturer, and it can be set to the accuracy of five digits after a decimal point between 1.00000 and 1.99999.



9.10 Scatter Coefficient (Back Scatter) Setting

Scatter coefficient determines the value of backward scatter power. The configuration affects the calculation of reflection value.

The configuration zone is from -10 to -70 dB.

9.11 Non-reflection Threshold (Splice Loss Detecting Threshold) Setting

This configuration has direct impact on the listing of insertion loss events. Only insertion loss event which is greater than this threshold will be listed.

The default value is 0.20dB.

9.12 Reflection Threshold (Reflection Detection Threshold) Setting

This configuration has direct impact on reflection events listing. Only event reflection which is greater than this threshold will be listed. The value configuration zone is -10 dB to -65 dB.

The default value is -52.00 dB.

9.13 End Threshold (Optical Fiber End Detecting Threshold) Setting

This threshold is the end threshold of optic fibre. If the end threshold equals 3.0 dB, then the first event with insertion loss greater than 3 dB will be considered as the end of the optic fibre.

The value configuration zone is 0.0 dB to 30.0 dB.

The default value is 3.00 dB.



9.14 Load Default

In OTDR Setup surface, there are 3 “default” buttons, corresponding to IOR, scatter coefficient (back scatter), non-reflection threshold (splice loss detecting threshold), reflection threshold (reflection detecting threshold) and end threshold (optical fiber end detecting threshold).

10 Use OTDR to Test FTTx Network

The FTTx-PON network optical fibre link, it's different from the normal optical fibre link, there is a branching unit in the link. So, it needs to know and note the following items when using this instrument to test FTTx-PON network.

10.1 Use PON Optimized OTDR Instrument

Some models optimized specifics to FTTx-PON network optical fibre links can get a fairly ideal result.

To get the ideal result, it needs to correctly set distance range, end threshold (optical fibre end detecting threshold), reflection threshold (reflection detecting threshold) etc.

10.2 Select the Proper Distance Range

As there is a branching unit in the FTTx-PON network optical fibre link, there will be a big attenuation event of tens dB autotest that may get the wrong distance. Suggest manually selecting the parameters like correct distance range, pulse width and etc according to the expected optical fibre link length.

10.3 End Threshold (Optical Fiber End Detecting Threshold)

As there is branching unit in FTTx-PON network optical fiber link, there will be a big attenuation event of tens dB, if the end threshold configuration is not proper, end event may be analyzed inaccurate.

For normal optical fiber link, end threshold configuration can be 3.0dB, as to PON network optical fiber link with branching unit, it need to set the end threshold to a proper value and then PROLITE-53B can locate the end event correctly. Please refer to follow end threshold configuration sheet.



10.4 Test parameter recommendation value

Splitter type	Loss reference value	End threshold configuration reference value	Recommend test pulse width
1:8	≥9dB	12dB	100ns, 300ns
1:16	≥12dB	15dB	100ns, 300ns
1:32	≥15dB	18dB	300ns, 1us
1:64	≥18dB	21dB	300ns, 1us


Tab. 10.1 Recommended parameter values for PON network optical fiber link

11 Trace Analysis and Event Operation

11.1 Open Trace File

Open trace file:



1. Press down  in button column in OTDR surface.
2. Select the file needs to be opened in the files dialogue box.
If necessary, change the file position to search saved files.
If necessary, Tap the scrollbar on the right side, check the listed files.




3. Tap  and the file opened.
If Tap **[Cancel]**, the file can't be opened and quit dialogue box.
4. The file name displayed on the surface top left.



Fig. 11.1 Trace file opened



- ◆ Check or open the “.jpg” format trace file, please use the “File Manager” in {Program}. Or open it into a PC after load.
- ◆ If It can't open the bidirectional trace file on the instrument, use the bidirectional analysis program provided by MTP-Suite installed on the computer.

11.2 Simultaneous Display Multi Traces

To let the user compare trace files, the PROLITE-53B support opening and displaying multi traces.

When opening multi-trace, the current trace is red, the icon in front of the file name is red, other icons are grey.

Open single trace or multi trace, user need to set.

Open multi traces setting:

In OTDR **[Setup]**, in the options of test, select the “Support multi traces”.

System can open 4 traces at the same time. When need to open other traces, please close some opened traces.

11.3 Close Trace File

Close trace file:

Tap **[Close trace]** button on the upper right corner of the interface to close the trace file.

Using tip: when under single trace mode (none multi traces mode), is open a new trace will close the opened trace automatically, this will reduce the operating steps and make it easier to use.

11.4 Trace Display and Operating Instruction

Once opened the trace, the application program will display the trace and the analysis results in a trace window. The events on the trace will mark by small icons, these events marked, will display below the trace.

X axis shows the relative distance from the testing point.

The number on the Y axis shows the reflection power value (relative power) and its range.



After getting the trace, the trace display parameters can be revised (like grid line and zoom window screen). Please refer to the paragraphs of “trace display parameters configuration”.

The trace contents not displayed on the screen can be displayed when selecting them or switching the options from one to another.

Event Options:

In {Event} options, there are various parameters of events listing, including event type, number, position, insert loss, reflection loss, attenuation and accumulation etc.

When switching to {Event}, the application program will display a marker on the tracing graph.

When some event in the event list is selected, the marker will move to that event position and show the information.

When opening the multi-trace event option, only it will display the current trace.

Markers Options:





When switching to {Markers} options, the application program displays two Markers A and B or include some gauge points. Particular cases depend on the function button in the button area.

Move these Markers along the trace to calculate loss, attenuation, reflection etc.

Can use the buttons in the Markers area to relocate all Markers and also can drag them in the trace display window.

11.5 Switch and Move Markers

There are many ways can switch and move Markers users can choose one from them or use them in a combination way to increase efficiency.

- In the buttons area on the bottom of the surface, Tap [A-B] to switch between A and B.
- After selecting Markers, continuously Tap [] or [] to move Markers.
- After selecting marked point, Tap [], [], towards left or right to move the Markers.






- ◆ For easier use, the position of Markers will remember when opening. The markers will maintain the position operated last time.
- ◆ There is a marked point when proceeding with the loss or reflection analysis.

11.6 Switch and Move the Marked Point

When proceeding with loss or reflection analysis, there will be a marked point used for an auxiliary test near the selected Markers.

There are various ways to switch, move the marked point, user can use one of them or use the combination to increase efficiency.

- Select the marked point in the trace displaying area. Then can press on and drag the marked point to move in the trace service area to the target position.
- In the buttons area on the interface, Tap  to switch circulated between the marked points under current Markers.
- After select the point, continuously Tap  or  can move the point.

The points under each Marker in the process of movement:

- ◆ Marked points on the left side can't cross the Markers to the right side.
- ◆ Marked points on the right side can't cross the Markers to the left side.

11.7 Fast Move the Markers outside the Window

When magnifying the trace, Markers may be positioned outside of the window.

When the Markers are on the left side outside the window, there will be a sign on the left margin of the window: A← or B←

When the Markers are on the right side outside the window, there will be a sign on the right margin of the window: →A or →B

Drag the signs above mentioned can move the Markers into the current window.

11.8 Lock AB Markers

On the surface of {Markers}, press down [A-B], A and B Markers will lock.

After AB Markers are locked, when moving one Marker, the other one will move with it and the distance maintains the same.



For some special tests, this function may be more convenient.

When one Marker moves to the trace boundary, the distance between AB won't maintain. But it will revert when it do not be on the trace boundary.

11.9 Zoom the Trace

To check the event or detail in the trace, it needs to zoom the trace.

The System provides two ways to zoom the trace to make it easier to use.

1. Zoom the trace by cross frame, operation is smooth and fast.
 2. Use the zoom toolbar on the right side, operation is easier and directly perceived.
- ◆ After magnifying operation, Markers may disappear from the current trace window.
 - ◆ Method 2 needs to open the option of "display zoom toolbar".

11.10 Cross Frame to Zoom the Trace

To magnify the traces crossing the frame from upper left to lower right.

To contract the trace from upper right to lower left.

Repeat the operation mentioned to magnify or contract the trace continuously.

- ◆ Outside of the trace display area, any touch operation won't have a response.
- ◆ The trace can't magnify unlimited it has a limit.
- ◆ The trace can't contract more after contracted to 1:1 size.
- ◆ Application program will maintain the zoom situation for further test and check of similar trace.

11.11 Use Zoom Toolbar to Zoom the Trace

On the right side of trace window, there is a zoom toolbar vertical ranked. Can use the zoom toolbar to zoom the trace to check the event detail on the trace.

- ◆ Press the magnify button for the first time the trace window will display the trace in the centre position.



- ◆ After magnifying the trace, to move the trace window, tap the place outside the area magnified trace window will move around this place. Also can use the direction key to move the trace.

11.11.1 Revert to the Whole Trace View



Tap [] to revert to the whole trace view.

11.11.2 Zoom In Trace Horizontally



Tap [] to zoom in the trace horizontally.

11.11.3 Zoom Out Trace Horizontally



This function is to zoom out trace horizontally. Tap [] to zoom out trace.

11.11.4 Zoom In Trace Vertically



Tap [] to Zoom in trace vertically.

11.11.5 Zoom out Trace Vertically



Tap [] to Zoom out trace vertically.

11.12 Remember the Zoom Status Automatically

In the testing or opening trace process, the magnified proportion and position will be remembered temporary. When testing under the same distance again, the enlarged status of the window will remain the same for the continuous test.

- ◆ Once the user turns off PROLITE-53B, zoom info won't be saved. Turn on PROLITE-53B again; the trace window will revert to the whole trace status.



- ◆ When the user changes wavelength, pulse width and time, as long as the distance is not changed, auto memory of zoom status will be efficient.
- ◆ When the user changes the distance, the trace window will revert to the whole trace status.

11.13 Move the Magnified Trace Window

After magnifying the trace, the trace window will only display part of the trace.

To move the magnified trace window in the navigation window.

In the navigation window, it can see the position of the current window on the whole magnified trace. Tap someplace outside the area in the navigation window, the trace window will move to the place correspondingly.

In the navigation window, if tap the shadow region (display scope of magnified window), the operation will be invalidated.

When display the whole trace, the trace window can't be moved.

11.14 Operation of Event Options

The event sheet lists all the events tested on the trace. The event can be defined as the point where optical transmission occurred change. Events are constituted loss caused by transmission, splice, connector or crack. If the event was not at a certain threshold, it was a defect event.

Meas. Para.		Events		Markers		Trace Para.		Trace Info.	
ID	Location	Ins.Loss	Refl.	Atten.	Cum. Loss				
1	0.00000 km	-,---	-38.533 dB	0.000 dB/km	0.000 dB	Add			
2	10.19231 km	-,---	-31.640 dB	0.323 dB/km	3.288 dB	Delete			
						Analyze			

Fig. 11.2 Events options

Every event display follows info:

- Type: Different indicators used for different event type instruction. As to the detailed indicator instruction, please refer to the paragraphs previous.
- ID: Event number (one number designated by OTDR application program).



- Location: Distance between OTDR and event or event and starting point of optical fiber link.
- Insert Loss: The loss of every event by the unit of dB (calculated by the application program)..
- Reflection value: Calculated value for each event.
- Attenuation: The attenuation for each optical fibre length (loss/distance).
- Accumulation: The accumulating loss from the link starting point to the end of the link.

Accumulating loss calculates the events listed in the event sheet and doesn't calculate the hidden events. About the more accurate link loss, please refer to the loss result displayed in {**Markers**}.

11.14.1 Display the Event on the Trace and Locate Event

The user can check the relative info about all events tested on the trace. When an event is selected, there will be Markers appearing on the trace above the event.

- ◆ When the trace is under magnification status, the event and its Markers may not be in the current window.
- ◆ It is better to locate the event under whole trace status and then magnify to see the detail.

11.14.2 Add Event

Users can insert events into the event window at any time manually. For example, when there is a splice point on some given position, but whether it is hidden in the noise or the splice loss is lower than the minimum value of the non-reflection detecting threshold, then the analysis didn't test that point. In this case, the operation will be useful. Users can manually add this event to the event window. This event will add a number to the insertion position but won't modify the trace.

Important Hint!: When reanalyzing the trace, the event inserted will be removed.



Add event:

2.1. Press[Add] on {Event} label;

Meas. Para.		Events		Markers		Trace Para.		Trace Info.	
ID	Location	Ins.Loss	Refl.	Atten.	Cum. Loss				
1	0.00000 km	-,---	-38.533 dB	0.000 dB/km	0.000 dB	<div>Add</div>			
2	10.19231 km	-,---	-31.640 dB	0.323 dB/km	3.288 dB	<div>Delete</div>			
						<div>Analyze</div>			

Fig. 11.3 Add event

2.2. Fill in the event information in the add event dialog window.

Add Event

Event Type: NRefl.

Location: 63.24035 km

Refl.: -63.697 dB

Atten.: 0.190 dB/km

Ins. Loss: -0.005 dB

Cum. Loss: 11.890 dB

OK Cancel

Fig. 11.4 Add Event Dialog Window

2.3. Press [Enter] to save and back to main window after edit finished, the event will appear in the event list. If pressed [Cancel], it will quit without save.

There are reflection event and non-reflection event for inserted event.

11.14.3 Delete event

Except following events, almost all of the events can be deleted from event sheet.

- Analysis finished
- Starting point of the link
- End point of the link



Important hint: The only way to recover the deleted items is to reanalyze the trace, like analyze new traces. Please refer to the part “analyze or reanalyze trace”.

Delete event

1. Select the event need to be deleted
2. Tap the **{Delete}** on the right side
3. Press “Yes” when the program hint or press “No” don’t delete event and go back to main interface.

Meas. Para.		Events		Markers		Trace Para.		Trace Info.	
ID	Location	Ins.Loss	Refl.	Atten.	Cum. Loss				
1	0.00000 km	-	-38.533 dB	0.000 dB/km	0.000 dB	Add			
2	10.19231 km	-	-31.640 dB	0.323 dB/km	3.288 dB	Delete			
						Analyze			

Fig. 11.5 Delete Event

11.15 Analysis Detecting Threshold Configuration

In order to optimize the event detection, user can set follow analysis detecting threshold:

- Change non-reflection threshold (splice loss threshold): It can display or hide small non reflection event.
- Change the reflection threshold (Reflection threshold): It can hide the fake reflection event caused by noise, turn the harmless reflection event to loss event or check the event which may cause damage to network and other optical fiber equipment.
- Change the finish threshold (optical fiber end threshold): It can analyze the important loss event (like breakpoint) and stop the event analysis after that event.

“Auto” mode and “Manual” mode can use these thresholds.

Set analysis detecting threshold

- 1.1. Press **[Setup]** in the button area which in the lower right area to enter setting surface.
- 1.2. Set these parameters in the parameters analysis part. In the relative edit frame, enter value needed or press **[Default]** revert the default value.

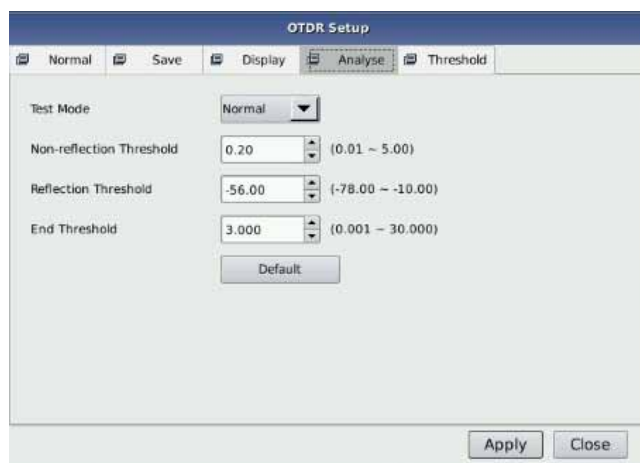


Fig. 11.6 Parameters analysis edit frame

- 1.3. Press [Apply] to save setting and then quit setting surface; If press [Close], it will quit without setting saved.

Analysis detecting threshold just set it will use for trace tested after the set and reanalysis of the trace.

11.16 Reanalyze the Trace

User can reanalyze the trace. Reanalyze the trace has follow effects:

- Create a new event sheet for trace.
- Reanalyze the trace got by the software of last version.
- Re-found the original event sheet (if the event sheet has been modified).

The application program will analyze the newest tested trace. User can check the analytic result in the event options.

Reanalyze the trace:

1. In the [Event] options, press [Analysis], it will reanalyze the whole trace;
 2. After the analysis is finished, the new analytic result will be listed in the event sheet.
- ◆ If user wished to find some new events or filter some events he didn't pay attention, please change the analysis detecting threshold first and then to proceed the analysis.





- ◆ Effected by instrument features or detecting threshold, the analytic result may be inconsistent to the result user preconceive.

11.17 Analyze the Optical Fiber in Specific Optical Fiber Link

As the PON optical fibre link has a splitter, it needs to set the proper finish threshold (optical fibre end detecting threshold) to analyze the end event through the splitter. Please refer to the sheet “Recommend parameters value of PON network optical fibre link”.

Please change the analysis detecting threshold first and then analyze.
It will analyze events after splitter correctly.

11.18 Set Trace Display Parameter

Users can modify the following trace display options before or after the test and trace opened:

- Gridline: It can display or hide the gridline displayed on the Fig background; it will display the gridline under default status.
- Navigation window: It can display or hide the window used for the whole trace survey on the upper right position of the trace window.
- Length unit: it can select the length unit which will be used in the application program.

Before opening the trace, it can change the following trace display options:

- Multi traces: Control whether to open multi traces at the same time.
- It can display or hide the zoom area icon on the right side; it will get maximized trace display area after hiding the zoom toolbar. The zoom toolbar displays under default status.

For the first time entering the OTDR functions surface, the help information for simple operation displays in the trace area and can't see the navigation window and grid line. Only after the test or after the trace open it can display the gridline and navigation window.



Setting the trace display parameters:

1. To press **[Setup]** in the button bar on the lower right of the OTDR menu.
2. In the options of test display area, select and modify the display options.
3. Press **[Apply]** and make change become effective, then quit the setting dialog box; or press **[Close]** to quit the setting dialog box without setting save.

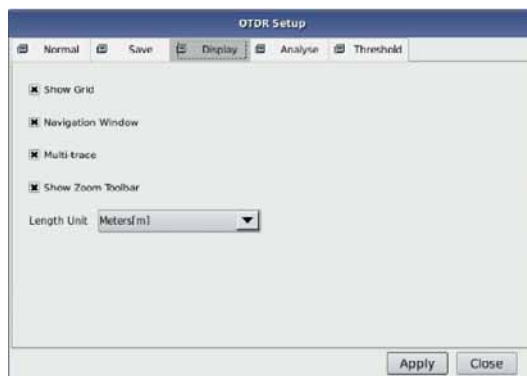


Fig. 11.7 Options of test display area

To hide or display the zoom toolbar must turn off all the trace opened. Otherwise the setting won't go into effect.

11.19 Set the Length Unit


In the OTDR parameters setting dialog box, select the length unit in the test display area options. The unit can be meter, feet or mile.

- ◆ The default length unit is meter.
- ◆ Some values such as pulse width, wavelength etc. won't change along with the distance. Pulse indicated by second, wavelength indicated by nm.
- ◆ When selecting m as a length unit, system will display km in some place.
- ◆ When selecting ft as a length unit, system will display kft in some place.
- ◆ When selecting mi as a length unit, system will display kmi in some place.



11.20 Display or Switch the Trace

In the OTDR test application program, when opening multi trace, there are two ways to switch the displayed trace:

1. To hide or display the trace: Tap the file name label on the upper left.
2. Or Tap the  **close trace** on the surface upper right to close current trace.

11.21 Check Current Trace Parameters

Check current trace information on {**Trace Info.**} label.

Parameters		Value
File Name		A.B.7.1310.sor
Date		2018-04-20 14:53:49
Wavelength		1310 nm
Pulse Width		300 ns

Total Length:	10.19231 km
Total Loss:	3.287 dB
Total Atten.:	0.322 dB/km
Total ORL.:	31.257 dB
Number of Events:	2

Fig. 11.8 Check the trace parameters

The content displayed is shown below:

File name, save date and time, test wavelength, test pulse width, test time, test distance, total loss, average loss.

- File name: The name of current trace.
- Date: Date and time of test.
- Wavelength: Laser wavelength used for test.
- Pulse width: Laser pulse width used for sampling.
- Averaging time: Continuous sampling time.
- Range: Distance used for test.
- IOR: Indicate the trace IOR (also called group coefficient). If this parameter is modified, it will adjust the trace distance test.
- Scat. Coef.: Rayleigh backscatter parameter setting of the displayed trace.
- NRefl. Threshold: Check the current setting of the small non-reflection event during the trace analysis.
- Refl. Threshold: Check the current setting of the small reflection event during the trace analysis.

End threshold: Check the current setting of the loss of important events (will affect the transmission performance during the trace analyzing).



The content displayed on the right:

Total Length, Total Loss, Total Atten, Total ORL, Number of Events

- Total Length: The length of the optical fibre link calculated after the test.
- Total Loss: The total loss of the link starting point to the ended link.
- Total Atten.: The average loss of the total link is indicated as a function of distance.
- Number of Events: Total number of events gotten from the current trace analysis according to test parameters.

Trace parameters options only display the selected trace even multi-traces are open. Please switch the trace if you want to show the parameters of other traces. The selected trace is in red.

12 Manual Trace Analysis

User can use markers and zoom tools to measure splice loss, attenuation and reflection, or use markers to locate event position and relative power level.

12.1 Use Markers

Tap **{Markers}** label in OTDR main interface to operate markers. To select or move markers, please refer to the previous section – Trace Analysis and Event Operation.

12.2 Event Location and Loss Information

OTDR application automatically calculates the event location and display the location in the events list. Users can manually check event location and distance between events. Loss information can be also displayed. The X-axis represents distance, and Y-axis represents relative power.



Fig. 12.1 Event location and loss information

To acquire event location and loss information

1. Tap **{Markers}** label in OTDR main interface.



2. Place marker A or B at the beginning of the event, the marker label will show distance.
3. Fig 12.1 shows the insertion loss of the current marker and A-B loss.

12.3 Measure Insertion Loss (2-point and 5-point method)

Insertion loss (unit: dB) is calculated by measuring the signal level of Rayleigh backscatter (RBS) and the magnitude of reduction. Insertion loss can be created by reflection and non-reflection events.

The system calculates real time the loss between Marker A and B and also it calculates the insertion loss at Marker A or B. Insertion loss is calculated in 5 point method.

2-point method (A-B Loss):

Insertion loss calculate as shown in Fig. 12.2.

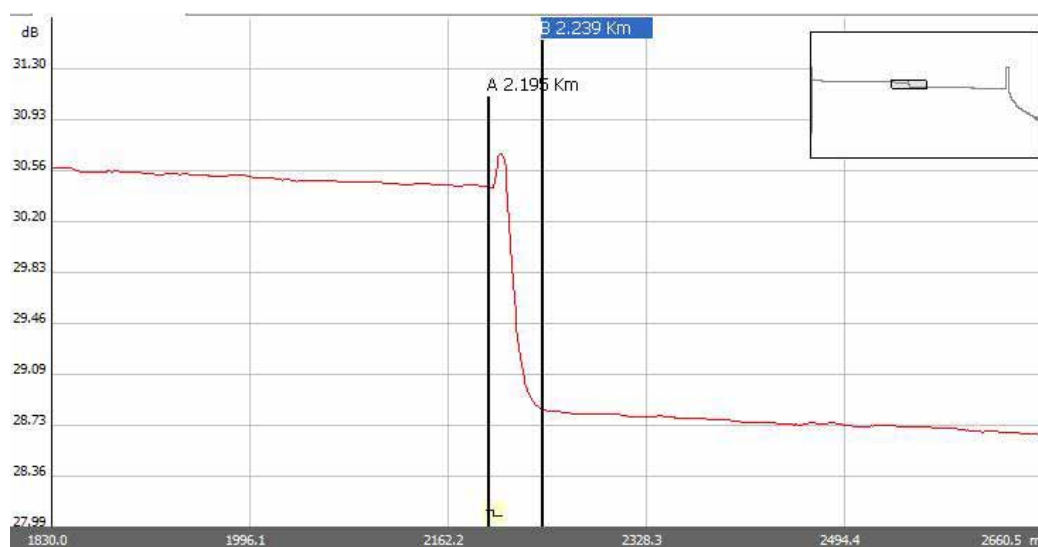


Fig. 12.2, 2-point Loss

The 2-point method is suitable for measuring splice loss but not applicable to measuring reflection events.

- ◆ "A-B Loss" is for quick loss measurement of a certain segment of the fiber marked between Marker A and B.
- ◆ "A-B Loss" is not applicable to measuring reflection events.



5-point method to measure event loss:

Event loss is measured by 5-point method. When the **[Loss]** button in “Markers” Label is not pressed, the marking points used by 5-point method will not display; however, the system use 5-point method by default.

When applying the 5-point method manually, the marker and its related four marking points divide the trace around the event into two areas: the left side to the active marker and the right side to the marker, the two marking points on the left and the two on the right, both form a straight line, move the two lines close to the event centre and the power difference between the two lines is the event insertion loss.

It also applies to the measurement of point A's or B's insertion loss.



Fig.12.3 5-point method

When the **[Loss]** button is pressed, the PROLITE-53B will show the marking points to measure the event loss. When Marker A is selected, the screen displays the four marking points related to Marker A. When Marker B is selected, the screen will display the four marking points related to Marker B. The Markers and marking points can move separately.

The procedure to apply the 5-point method:

1. In the main interface of the PROLITE-53B OTDR module, Tap the “Markers” label;
2. Press the **[Loss]** button, Marker A, Marker B and their related marking points will display on the trace;



3. Zoom the trace to view the event clearly, move Marker A to the end of the linear part of the trace before the event;
4. Move the first marking point to the beginning of the linear part of the trace before the event;
5. Move the second marking point to the end of the linear part of the trace before the event;
6. Move the third marking point to the beginning of the linear part of the trace after the event;
7. Move the fourth marking point to the end of the linear part of the trace after the event;

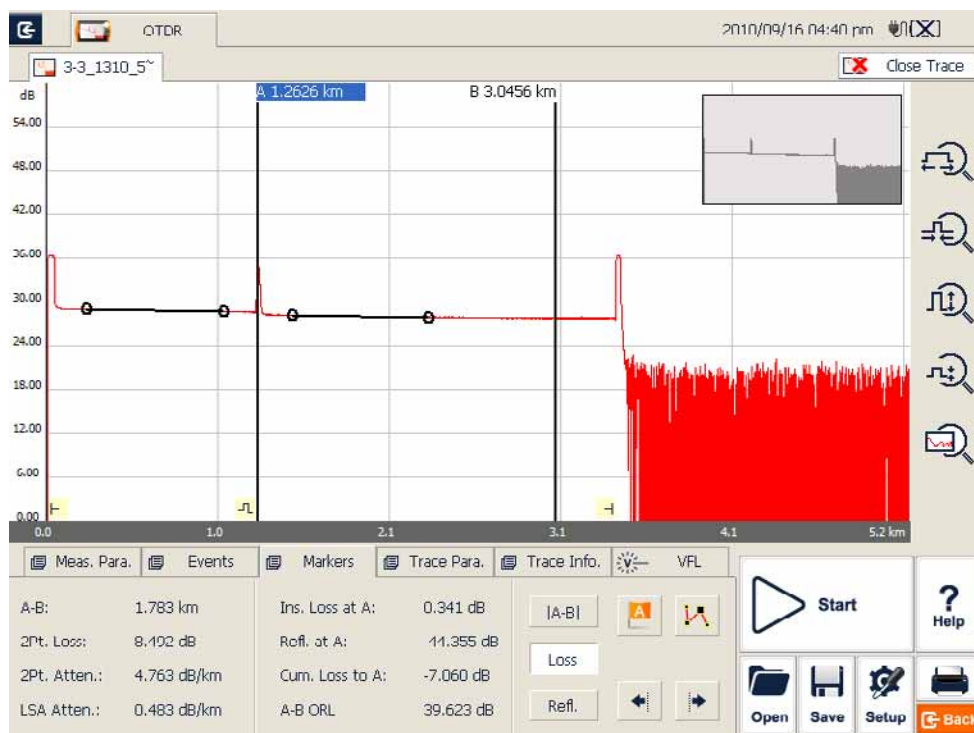


Fig. 12.4 Measure insertion loss in 5 point method

- ◆ The marking points on the left of the active marker cannot be moved right and vice versa.
- ◆ The loss shown in the Event List is measured by the 5-point method.



12.4 Measure Attenuation (2-point and LSA method)

The 2-point method measures the attenuation between Marker A and B calculated by all the loss over the distance, between Markers A and B (Unit: dB/Km). Use only these two points to calculate, and the average value does not exist.

LSA (least-squares approximation) method uses linear regressions that apply to the backscatter before and after an event (Between Marker A and B) to estimate the attenuation in the backscatter resulting from the event's loss. LSA method only measures the amplitude (decibel) change between the crossing points of the trace with Marker A and B.

Compared to 2 point method, the LSA method is more accurate because it is less sensitive to trace noise and suitable for measuring splice attenuation. However, the LSA method should not be applied to measure the attenuation, whether there are reflection events between Marker A and B.

Measure attenuation:

1. Tap **{Markers}** label in OTDR main interface to show Marker A and B.
2. Place Marker A and B at different points on the trace.
3. Zoom in the trace to adjust the marker position when necessary.
4. Check 2Pt. Atten. (2-point attenuation) and LSA Atten. (LSA attenuation) values, as shown in Fig. 12.5.



Fig. 12.5 View attenuation

There should not be any event between Marker A and B when measuring attenuation with the 2-point method.

12.5 Measure Reflectance

Reflectance is the ratio of reflected power (P_r) to incident power (P_i) of an event (such as a connector).



Reflectance = $10 \log (P_r/P_i)$.

1. Tap **{Markers}** label in OTDR main interface to show Marker A and B.
2. Tap **[Refl.]** button to show marking points.
3. Before measurement, zoom in trace and place Marker A to the end of linear part of the trace before the event.
4. Move the first marking point to the beginning of the linear part of the trace before the event and Marker A.
5. Move the second marking point to the end of the linear part of the trace before the event and Marker A.
6. Place the marking point behind Marker A to the peak of the reflection event to be measured.
7. View the reflectance.

The below process applies to measuring all reflection events' reflectance even they are very close to each other.

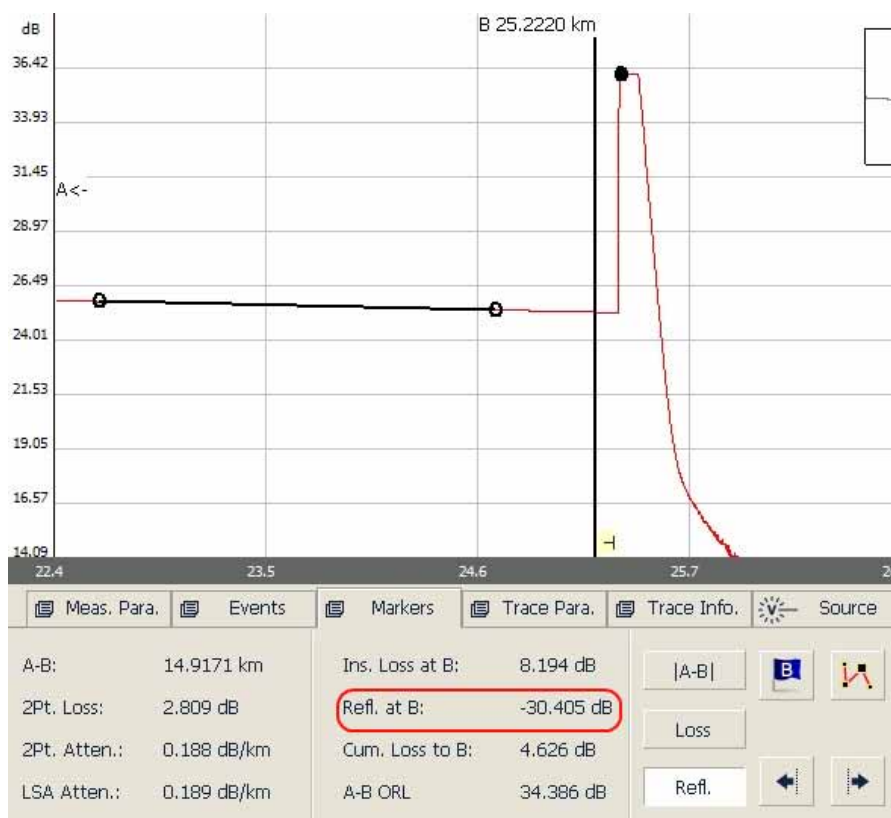


Fig 12.6 Measure reflectance

For non-reflection events, reflectance will show as “-----”.



13 Trace File Management

User can save, open, rename and delete trace file after acquisition.

User can save and open trace file in OTDR main interface.

User can rename, copy, move and delete file in **File Explorer**.

13.1 Save Trace in Different Formats

In OTDR main interface, the user can choose trace saving format as Bellcore (.sor) or JPEG (.jpg).

If saving trace as other formats, the user should copy the trace file to the PC and use the OTDR Trace Manager of MTP-Suite, previously installed on the PC.

13.2 Copy, Move, Rename and Delete Trace

There are two ways to copy, move, rename and delete trace.

Method one: Through File Explorer:

A. In PROLITE-53B main interface, Tap **{Program}** label and Tap **[File Explorer]** icon as shown in Fig 13.1:

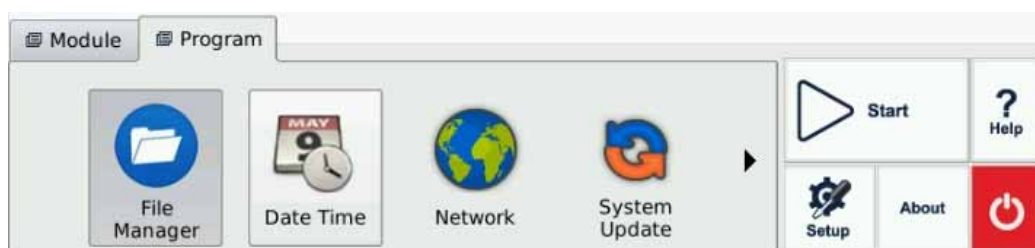



Fig 13.1 File explorer



B. Tap the  button or double Tap “File Manager” Icon to enter File Explorer.

C. Copy, move, rename and delete trace.

D. After operation, Tap the  button to return to main interface.

- ◆ User can move, rename and delete files saved in SD card but the disk itself cannot be moved, renamed or deleted.
- ◆ For more information, please refer to the Help file on PROLITE-53B.



Method two: User can connect PROLITE-53B to PC, PROLITE-53B will be recognized as a mobile device. Users can copy, move, rename and delete files in a PC's Windows System.

13.3 Check Disk Space

Users can check disk space utilization status (used space and free space) in **File Explorer**:

1. Enter **About** in PROLITE-53B main interface.
2. Select Platform.
3. "SD Card" space utilization status is shown below:

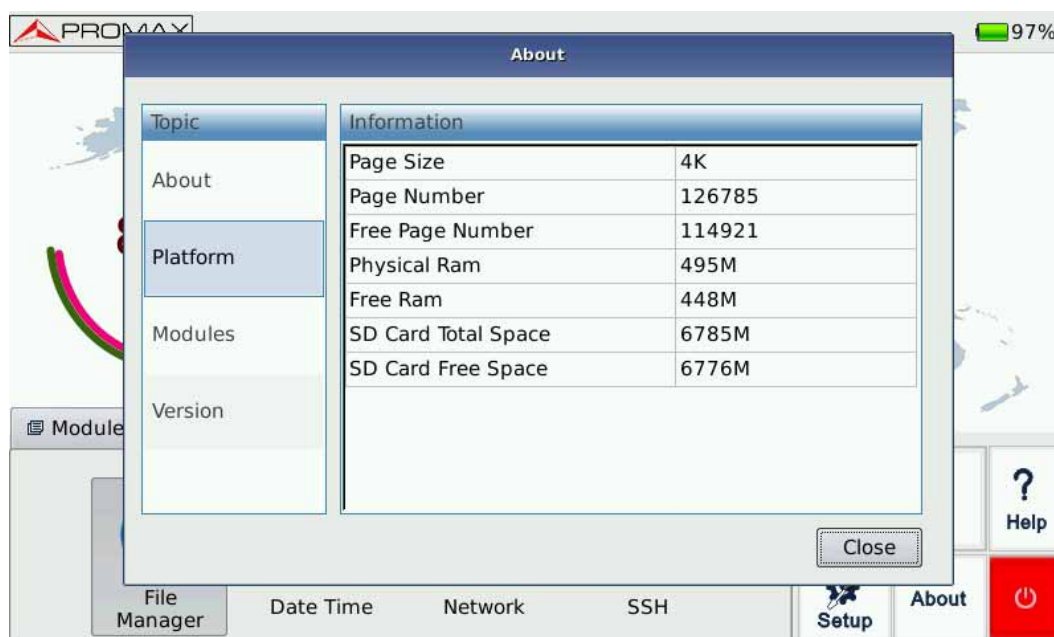


Fig. 13.2 Check disk space utilization

4. Tap "Close" to exit disk properties.

It's suggested to check disk space utilization status from time to time and transfer or backup files to avoid insufficient disk space when PROLITE-53B is in use.



14 Print OTDR Report

Users can manage saved trace files in PROLITE-53B and print reports.

For reference and report printing, it is necessary to update the trace information.

14.1 Trace Information

After trace acquisition, users can add or update tested fibre information which includes: Cable ID, Fiber ID, Fiber Type, Start Location, End Location and Operator.

Adding or updating the information can be completed in {**Trace Info.**}.

14.2 Check and Edit Trace Information

User can check and edit trace information in {**Trace Info.**} function window.

Users can also edit saved trace information and update it.

- ◆ After editing trace information of a saved trace, the updated trace file name will show a star sign ("*") to indicate the change. If the user closes the editing window without saving, the system will promote the user save.
- ◆ The update to trace information is effective only to the current active trace in Multi-trace display mode.
- ◆ Editing trace information does not affect measurement parameters and result.

Edit and save trace information:

1. Tap {**Trace Info.**} label in OTDR main interface.

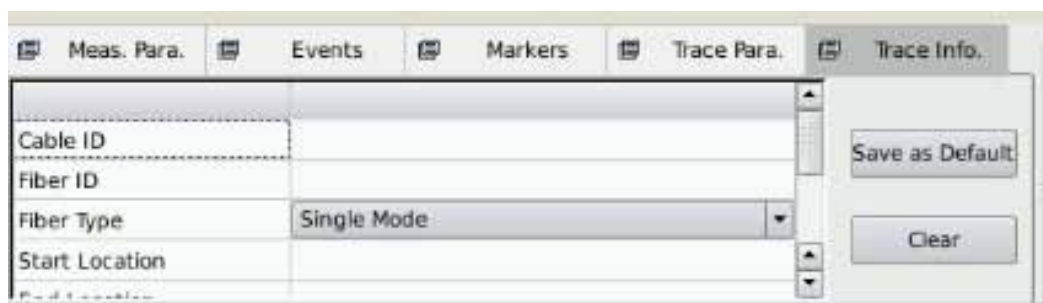


Fig. 14.1 Trace information and editing

2. Input trace information in the pop-up window.
3. Exit after the edition is finished.



4. Tap the [Save] button in OTDR main interface to save the trace again, and the information updated will be saved with the trace file.
 5. Can use the same steps to view or change the trace information at any time.
- ◆ Edited and saved traces can be used as a template for the user's preferences.
 - ◆ Users can also use MTP-Suite to edit and save trace information.

15 OTDR Module Built-in Optical Power Meter

Optical power meter operation:

Tap the “OPM” icon to enter the Optical Power Meter interface as shown in Fig 16.1.



Fig. 16.1 Optical Power Meter Module



After the setup, tap the button to start the measurement. Tap the button to stop the measurement.



- ◆ The function icon turns red while switching on this function module.

“**Unit**”: Shift between dBm and W.

“**Auto zero**”: This function provides an easy method of auto-zero of the power meter, which can use to rectify the instrument’s power value under the non-luminous state in daily testing. Put the protective cap on optical power testing output, and ensure that the tie-in is completely airtight.



“**Wavelength**”: Support 850, 1300, 1310, 1550 nm wavelengths selectable.

The OPM is only available with the OTDR module built-in. The OTDR port will issue a signal modulation.

Except for the specific light port (light port used for online testing), do not connect the optical fibre which load signal to the OTDR port, an external signal over -30 dBm will affect the OTDR sampling, and cause permanent damage to the OTDR.

OTDR built-in source:

1. Clean connector properly.
2. Connect tested fiber to OTDR port.
3. Tap **{Source/VFL}** in OTDR main interface.
4. Select the suitable wavelength.
5. Select the modulation.
6. Press the **[Open Source]** in the **{Source/VFL}**.
7. Press the **[Close Source]** to break off the source.

- ◆ If there is only one wavelength, the default is to select this wavelength.
- ◆ Under the modulation for loss measurement, please select the CW.
- ◆ Under the modulation for fibre identification, please select **1 kHz** or **2k Hz**.

For fibre identification easily, PROLITE-53B also offers a blink mode. When the user selects the blink mode, modulating signal (1 kHz or 2 kHz) will be emitted in 1s then, the next 1s signal will be closed, and then will be emitted in the next 1s, and so on. User can select

1 kHz + Blink or 2 kHz + Blink for the Blink Mode.



16 VFL Application

The built-in VFL of the OTDR module can shoot a red laser into the tested fibre. The red laser will glow at the Marco bend, breaking points and bare fibre end.


The maximum detection range for PROLITE-53B VFL is over 5 Km, it is a practical tool for fibre identification, detecting and highlighting breaks, tight bends, splices or defective connectors in optical fibres.

The VFL is a perfect complementary tool to OTDR for its visualized detecting method in close range like OTDR dead zone.

Fault locating with VFL:

Clean the connector properly.

Connect tested fibre to VFL port.

Tap {  **Source** } in OTDR main interface.

Check “CW” option to emitter laser continuously or check “Flash” to emitter modulated laser at 1Hz.

Press [**VFL On**] button to start VFL and the  icon will turn red.


When VFL is working, press [**VFL Off**] to turn off VFL and the  icon will turn back to grey.



Fig. 17.1 VFL operation



18 OCI (Optical Connector Inspector) Module

OP-05x-OI

The OP-05x-OI Optical Connector Inspector (OCI) can display connector surface enlarged view and find the dirty or damaged connectors. It is convenient for the operator to view the connector and remove any hidden troubles, which may affect the transmission quality.

The OP-05x-OI connects with the OTDR via a USB port, and the LCD shows the fibre end image. Then the user can judge if it is qualified or not. To meet different tests, OP-05-OI offers kinds of specifications of male and female port adapters, including SC, FC, LC, MU, etc.

The **OP-05-OI** supports the following video fibre inspection probe for common functions:

- Zoom in control: Support 200x and 400x.
- Focus control: Fine tuning display quality.
- Image capture: Can capture and save the image which displays in the LCD.

The **OP-05-OI** is only available with the OTDR module built-in **OP-05-OI**.

18.1 Inspect the Optical Connector

1. Connect the probe to the USB port.
2. Insert the test fibre into the probe connector. (Please select a suitable size connector).
3. Tap the "OCI" icon to enter Optical Connector Inspector interface, as shown in Fig 18.1.

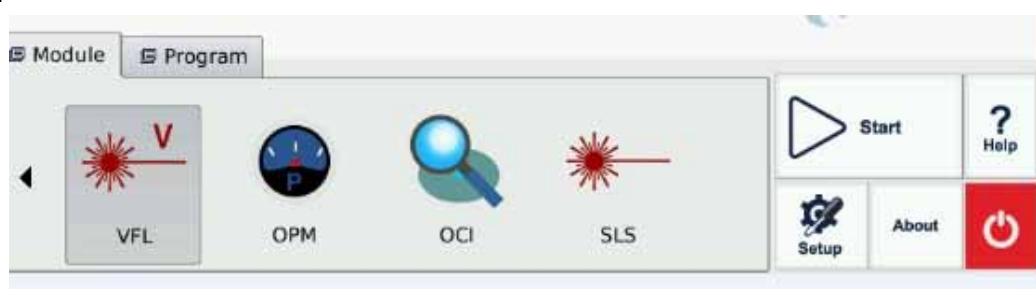



Fig. 18.1 Optical Connector Inspector Interface

4. Tap the  button to start the measurement. As shown in Fig 18.2

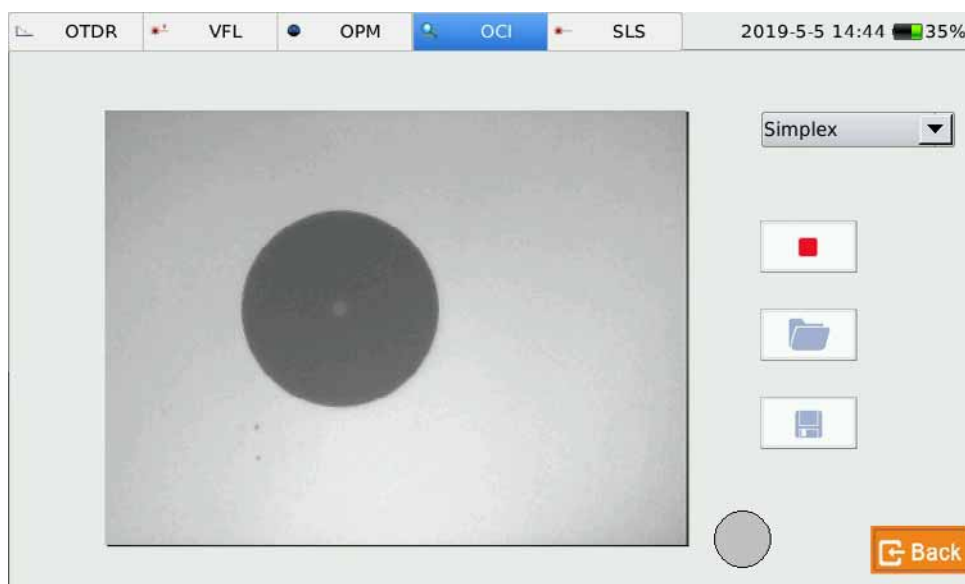



Fig. 18.2 Measurement



5. Tap the  button to stop the measurement.

6. Exit to the OCI interface: Tap the exit button in the upper left corner, and it will go back to the main interface.

- ◆ To obtain a clear image, the user needs to adjust the focal length of the probe and the brightness and contrast of the image.
- ◆ If the probe is connected to the OCI before starting the application, the user has to restart the application to initialize.

18.2 Focus Control


Control the focus by the focus control knob in the probe.

18.3 Capture Image


Inspection the fiber connector, the user can capture images and save images in BMP formats. Capture images can be view in the OCI or be sent to the PC to make a report.

Capture Image:



1. Press the  button, and view the image. Then adjust the focus, brightness and contrast until satisfied with the image.



2. Press the  icon to capture images. The files are saved on the SD card, enter the file manager folder. The files will store in the screenshot folder.
3. Choose the folder and select the socket needed and copy it to USB.
4. Press the [OK] button to save the image and back to the main interface.

18.4 View the saved Image


1. Tap the file manager of main interface program.
2. Open the folder which saves the captured image.
3. Double-tap the capture image file which you want to view.
4. Press the [File] <OFF> to exit the file manager after you are finished.



19 File Management

The user can directly copy, move, rename and delete files or folders on the PROLITE-53B.

Files can also exchange between PROLITE-53B and external storage devices like USB flash disk, USB hard drive and PC.

The PROLITE-53B is equipped with two USB ports:  for connecting with USB storage devices.

19.1 Transfer Files or Folders between PROLITE-53B and USB Storage Device

1. Connect the USB storage device to PROLITE-53B USB port.
2. Tap [**File Manager**] icon on {**Program**} label to enter **File Manager** where active drives including USB drives and folders are displayed for file management.
3. After file transfer, the user can directly unplug the USB storage device from PROLITE-53B.

In case of the USB storage device is not showing in File Manager, please close File Manager and enter again.

19.2 Delete Saved Files

1. Tap **File Manager** icon on {**Program**} label to enter **File Manager**.
2. Select the files or folders to be deleted.
3. Tap "Delete" in the "File" menu to delete.

20 Set Date and Time

The current date and time are displayed in the upper left part of the interface. Once the measurement results are saved, the file contains the corresponding date and time.

1. There is a dedicated clock. The inside equipment's battery can keep the accuracy of date and time.
2. Do not open the equipment to replace the clock battery.
3. Modification on time zone, date and time settings will affect some settings of the software system and operation. Please, don't modify these settings incorrectly.

**Set Date and Time**

1. Tap **Time and Date** icon on {**Program**} label.
2. Modify the settings.
3. Press "OK".

21. Maintenance and Calibration

21.1 Cleaning of Optical Interfaces

Interfaces must be kept clean. To clean optical outputs, use the proper alcohol. Close protective dust caps when the unit is not used, and keep the protective dust caps clean. In addition, flanges must be periodically clean.

21.2 The importance of Cleanliness

The core diameter of optic fibre is 9 μm , and the diameter of dust and other particulates ranges from 1/100 to 1/10 μm . Comparatively speaking, the size of dust and other particulates can cover part of the optic fibre end face and therefore degrade the performance of PROLITE-53B.

In addition, power density may burn dust into optic fibre and induce further damage (for example, 0dBm optic power may produce about 16,000,000W/m² power density in single-mode fibre). In this case, the measurement will be inaccurate and irreversible.

21.3 Safety Instructions before Cleaning

1. Make sure the PROLITE-53B is powered off when cleaning.
2. Any operations that contradicted the instructions may cause dangerous laser damage.
3. Make sure the laser source is powered off when cleaning any optic connectors.
4. When the PROLITE-53B is in operation, please avoid always looking directly into the optical output. Although laser radiation is invisible, it may do serious injury to eyesight.
5. Be careful with electric shock and always disconnect the AC power of the PROLITE-53B before cleaning. Use a dry or moist soft cloth to clean the outside of the PROLITE-53B, and never clean the inside.
6. Please do not add any accessories to the optic instrument or adjust. PROLITE-53B at discretion.
7. For maintenance, always address to qualified or certified professionals.



21.4 Cleaning Tools

1. Optic fiber cleaner (for cleaning of optic connectors)
2. Optic fiber cleaning rod (for cleaning of optic outputs)
3. Optic fiber cleaning tissue (for cleaning optic interfaces)
4. Isopropyl alcohol
5. Cotton ball
6. Paper tissue
7. Cleaning brush
8. Compressed air

21.5 Cleaning Procedure



1. Screw off the cap of flange
2. Clean the laser head carefully
3. Screw on the cap of flange

21.6 Battery Charging Instructions

Typically, PROLITE-53B Lithium battery supports over 7 hours of continuous working.

Charging status is indicated on the main system interface and the front panel indicator.

- a.1.** In the main system interface, the charging status is displayed on the right upper corner.

Icon	Description
	DC input is on
 70%	Battery remaining power

21.7 Battery Instruction

- ◆ The new battery is not fully charged, charge the battery before the first-time use, which takes approximately 3 hours.
- ◆ Charging time is subject to the type of functional modules in use, environment etc.
- ◆ After using the battery for some time, its capacity may not match the charging status indication (e.g. charging indicator indicates full, but PROLITE-53B may



power off due to low battery), at that time, the battery calibration is necessary (Please refer to 22.9 Battery Calibration).

- ◆ Please do not store the battery in an environment where the temperature is over 60°C (140° F).
- ◆ Use a specific charger to charge the battery.

21.8 Charge Battery

Plug the charger to PROLITE-53B and the main, the charging process automatically starts and finishes after the battery is fully charged.

21.9 Battery Calibration

After using the battery for some time, the battery gauge may not be accurate, e.g. it indicates the battery has run out of power. However, the battery can still provide energy, or battery power is zero, but the battery power can last a long time. Then the battery should be re-calibrated.

Procedure:

- 1.1.1.1. Run out of the battery completely.
- 1.1.1.2. Charge the battery until fully charged.

21.10 Change the Battery

1. Power Off the PROLITE-53B and unplug the power adaptor.
 2. Open the battery dock cover.
 3. Change the battery.
 4. Close the battery dock cover.
- ◆ Please note if the power indicator on the front panel is off before changing the battery; make sure PROLITE-53B is completely off before changing the battery.
 - ◆ Only the factory can change the clock battery.

21.11 Calibration Requirements

The Calibration of PROLITE-53B is recommended every two years. Please, contact our representatives or nearby customer service centres for proper calibration.



21.12 Shipment

During shipment, please keep PROLITE-53B in the prescribed temperature range.

Please note the following points to protect PROLITE-53B during shipment:

- Use the original packaging materials.
- Avoid excessive temperature and humidity changes.
- Avoid direct exposure to sunlight.
- Avoid shock and vibration.



22 Troubleshooting

22.1 Common Problems and Solutions

Problem	Possible Reason	Solution
Power on failure		
Battery power ran out.		
◆ Charge the battery.		
◆ Change a new battery.		
◆ Connect the PROLITE-53B to an external power supply.		
The external power supply is not connected.		
Connect the PROLITE-53B to the external power supply.		
The external power supply is unplugged.		
Make sure the external power supply connects on both ends.		
The battery dock cover is not closed rightly.		
Close the battery dock cover properly.		
Black Screen		
The screen backlight is off, but the power indicator is on.		
Press any key to exit the power saving mode.		
The battery ran out, PROLITE-53B is off, power indicator is off.		
◆ Charge the battery.		
◆ Change a new battery.		
◆ Connect the PROLITE-53B to external power supply.		
Screen display blurs		
Brightness is not set rightly.		
Adjust brightness		
OTDR Application is no response		
Problem error.		
Restart PROLITE-53B and run the application.		
Operation time is short.		
Battery ran out.		
Change the battery.		
The battery is not fully charged.		
◆ Charge the battery.		
◆ Re-calibrate the battery.		



The PROLITE-53B indicates low battery after battery is fully charged

The battery is not fully charged.

Re-calibrate the battery

22.2 Trace Measurement Problems and Solutions

Problem	Possible Reason	Solution
Expected events are not shown in the trace	Events are too close to each other.	<ul style="list-style-type: none"> ◆ Try again with short pulse width ◆ Try testing from the other end of the fiber
	SNR is poor	Try again with wide pulse width or increase averaging time.
	Wrong configuration	Check OTDR parameters, such as Reflection threshold, non-reflection threshold and end threshold; and then re-analyze or test again.
Special events appear at the end of the trace	Wrong configuration, e.g. wrong end threshold setting.	Adjust configuration and test again.
	The fiber under test is too long to exceed the range.	Select proper range and test again.

Tab. 23.2 Trace Measurement Problems and Solutions