S2102 OTDR

A high performance & multifunction OTDR unit for FTTx / PON fiber networks

Key Features

- Event dead zone: <1 m
- Dynamic range: up to 45 dB
- Wavelengths: 1300, 1310, 1490, 1550, 1625 and 1650nm
- Battery autonomy: >8 hours
- High-speed auto measurement & analysis
- Unique PON testing capability
- Multiple wavelengths and model testing capabilities
- 0.05m high distance resolution, 128k sampling point
- Communication light check automatically
- Visible fault locating (VFL)
- Supporting Bellcore GR196 &SR-4731 file format
- Abundant external interface
- Remote function via Ethernet

Typical Applications

- Access Network Testing
- LAN/WAN Characterization
- Private Networks
- Data Centers
- FTTx, CATV, LAN, Access and Metro Networks

S2102 OTDR is ideal for access and FTTH network testing. It enables the user to test through 1x32 and even 1x64 splitters for PON testing. The S2102 OTDR can provide single mode and/or multimode testing capabilities. It is designed to test up to four wavelengths in a single unit (ex. a combination of 1300, 1310, 1490, 1550, 1625 and 1650nm wavelengths). The S2102 can be used for long range to FTTx, CATV, LAN, Access and Metro networks.

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S2102 OTDR

A high performance & multifunction OTDR unit for FTTx / PON fiber networks

Features To Boost Your Efficiency

Extra-short Event Dead Zone

Due to its high resolution, S2102 OTDR has 1m extra-short event dead zone, which is suitable for testing short optical fiber and pigtail optical fiber.

High-speed Auto Analyzation

The S2102 can quickly determine and locate the events and faults and pinpoint issues. It lists all events in an event table, so it is very useful for maintainers to improve efficiency. Relative background knowledge is not required for use.

Multiple Wavelengths and Models

The S2102 OTDR can provide single mode and/or multimode testing capabilities, designed to test at up to four wavelengths in a single unit.
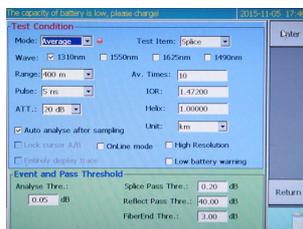
Convenient VFL Function

The built-in 650nm VFL function, by CW, 1Hz and 0.5Hz three working models makes it easier for the user to identify bad splices and connectors.

Unique PON Testing Capability

Ideal for access and FTTH network testing, it enables the user to test through 1:8 ~ 1:64 splitters for PON testing.The S2102 offers an exceptional 1m event dead zone and 0.05m high distance resolution. The user can characterize all events between the transmitter and the central office's fiber distribution panel.
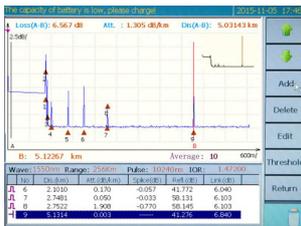
Auto Light Check

The S2102 OTDR can automatically detect if the communication light is present after the fiber is connected. Once the light is verified, simultaneously, a warning message will be displayed and an internal OTDR protection will activate instantly.
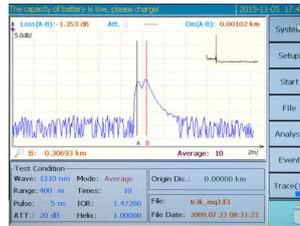
S2102 OTDR

A high performance & multifunction OTDR unit for FTTx / PON fiber networks

WORK FROM ANY WHERE, ANY TIME

The S2102 has abundant external interfaces, such as USB, Mini-USB, Ethernet, Earphone and SD. With these options, it can provide the following functions:

- Short training time via multimedia for operators enables you to become a measuring expert in no one.
- Implementing remote control through Ethernet allows troubleshooting from long distances.   Printing trace and event table
- Allows printing of trace and event table.
- Easily update application software on-line.

S2102 OTDR

A high performance & multifunction OTDR unit for FTTx / PON fiber networks

Technical Specifications

Wavelength (nm)	1300, 1310, 1490, 1550, 1625 and 1650
Distance Range (km)	Singlemode: 0.4,0.8,1.6,3.2,6.4,16,32,64,128,256,512
Pulse Width (ns)	Singlemode: 5,10,30,80,160,320,640,1280,5120,10240,20480
Linearity (dB/dB)	±0.05
Loss Threshold (dB)	0.01
Loss Resolution (dB)	0.001
Sampling Resolution (m)	0.05,0.1,0.2,0.5,1,2,4,8,16,32
Sampling Points	Up to 128k
Distance Uncertainty (m)	±(0.75m + sample space + measurement distance×0.0025%)
Distance Unit	km, m, kft, ft
Memory Capacity	≥ 800 traces(build-in),
Group Refractive Index Setting	1.00000 to 2.00000 (0.00001steps)
VFL (Optional)	650nm±30nm, 2mW(typical); CW/1Hz
Optical Power Meter (Optional)	Wavelength range: 1200nm to 1650nm Measurement range: -60 to 0dBm Measurement accuracy: ±5% (-25dBm, CW)

General Information

Dimensions (WxHxD)mm	295×186×75
Weight	2.5kg Approx.
Display	640×480, 6.5 inch TFT-LCD (touch screen)
Interface	USB, Mini-USB, Ethernet, Earphone, SD
Optical connector	FC/UPC (ST/UPC or SC/UPC are available)
Environment	Operating: −10 ℃ to 50 ℃ (14 ℉ to 122 ℉) Storage: −20 ℃ to 60 ℃ (−4 ℉ to 140 ℉) Relative humidity : 0 % to 95 % non-condensing
Power supply	AC adapter: 100～240V, 50/ 60Hz,2A) DC: 19V(3.42A) Built-in Lithium battery: 4400mAh, 14.8V Operating time ≥8 hours ((Low brightness, exclude measuring)

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S2102 OTDR

A high performance & multifunction OTDR unit for FTTx / PON fiber networks

Ordering Information

Model[a]	Operating wavelength	Fiber type	Dynamic Range[b](dB)	Event Dead zone[c](m)	Attenuation dead zone(m)
S2102-01	1625nm	SMF	38	1	10
S2102-02	1625nm(build-in filter)		36	1	10
S2102-03	1650nm		38	1	10
S2102-04	1650nm(build-in filter)		36	1	10
S2102-05	1300nm	MMF	36	2	13
S2102-06	1310/1550nm	SMF	42/40	2/2	10/10
S2102-07	1310/1550nm		40/38	1/1	10/10
S2102-08	1310/1550nm		37/35	1/1	10/10
S2102-09	1550/1625nm		38/38	1/1	10/10
S2102-10	1550/1625nm(build-in filter)		36/36	1/1	10/10
S2102-11	1550/1650nm		38/38	1/1	10/10
S2102-12	1550/1650nm(build-in filter)		36/36	1/1	10/10
S2102-13	1310/1490/1550nm		39/34/38	1/1/1	10/10/10
S2102-14	1310/1550/1625nm		39/38/36	1/1/1	10/10/10
S2102-15	1310/1550/1625nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-16	1310/1550/1650nm		39/38/36	1/1/1	10/10/10
S2102-17	1310/1550/1650nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-18	1310/1490/1550/1625nm		35/32/34/34	1/1/1/1	10/10/10/10
S2102-19	1310/1490/1550/1625nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10
S2102-20	1310/1490/1550/1650nm		38/36/36/36	1/1/1/1	10/10/10/10
S2102-21	1310/1490/1550/1650nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10

a: One and only one module of above must be selected.

b: Pulse width 10240ns, average times≥300,SNR=1, 23℃±2℃(73.4 ℉±3.6 ℉);

c: Dead zone mode, distance range: ≤3.2km, pulse width: 5ns, terminal

  reflection loss: ≥40dB, typical;

Note 1: Standard LCD brightness, enhanced brightness is optional

Note 2: The standard OTDR interface type is FC/UPC, type of FC/APC is

     optional.

Note 3: OPM & VFL function are optional, not standard configuration.

Standard Accessories

NO.	Name	QTY
1	Power line	1
2	AC/DC adapter	1
3	Trace analyzing software(CD)	1
4	Hard Carrying case (Including gallus)	1
5	Special gallus of instrument	1

S2102

Optical Time Domain Reflectometer

User's Manual

PREFACE

Thank you for using the Optical Time Domain Reflectometer (OTDR) produced by Saluki Technology. This product integrates high-grade, high-precision and advanced technology. Please read this Manual carefully for convenient use. We will assume trying our best to meet your needs as our responsibility to provide high quality measuring instruments for you and also bring you first-class after-sale services. We always persist in "Customer-Centric" and promise to offer satisfied products and service for you.

Product maintenance agreements and other customer assistance agreements are available for Saluki Technology. For any inquires, please contact us as below:

Tel: **+886 2 2175 2930**

Web: **http:// www.salukitec.com**

Email: **sales@salukitec.com**

Address: **8F., No.367, Fuxing N. Rd., Taipei 105, Taiwan**

STATEMENT

This Manual is the first edition of the S2102 OTDR. The version number is UM.S2102.01.

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

The explanation right of all the contents and terms in this Manual belongs to Saluki Technology Inc.

Saluki Technology makes no warranty of any kind to this Manual, including but not limited to the implied warranties of merchantability and adaptability for a particular purpose. Saluki Technology shall not be liable for errors contained herein or for incidental or consequential damages due to the practicability of this material or version.

The copyright of the Manual belongs to Saluki Technology. Other entities and individuals can't change or juggle it without our permission, and don't copy, and spread (including electronic filling, retrieval or translating it into another language) for business benefits. If discovered, we have the right for legal action.

👉 STATEMENT Please don't attempt to disassemble or modify any part unspecified in this Manual. Self-disassembly may lower electromagnetic shielding efficiency and cause damage to the instrument, etc. to affect the reliability of the product. If under warranty, we will not provide free repair.

---

1. Manufacture's Name: Saluki Technology Inc.

Manufacture's Address: No.367 Fuxing Rd, Taipei, 105 Taiwan (R.O.C)

2. Description of the machine

Name：	Optical Time Domain Reflectometer　(OTDR)
Function:	Measure the length, transmission loss, splice loss, etc. for physical characteristics of optical fibers and cables.
Model/type：	S2102
Dimension:	295×186×75mm
Options:	This declaration covers all options of the above product(s)

3. DECLARE of the factory:

The above-mentioned manufacture declares that machine is conform to the requirements as the following directives:

EC Directive applied:

Low Voltage Directive 2006/95/EC

Electromagnetic Compatibility 2004/108/EC

4. Harmonized standard applied

EN61010-1:2010, EN61000-3-2:2014,

EN61000-6-3:2007+A1:2011,

EN61000-3-3:2013,EN61000-6-1:2007

5. Identification of subscriber:

Surname and family name:　Tao Yu

Position: Quality Manager

Date: Dec.20ᵗʰ, 2015

Signature: _____

CONTENTS

Safety Requirements

The following general safety precautions must be taken during all the phases of operation of this instrument. Failure to comply with these precautions or with the warnings and precautions specified elsewhere in this Manual will violate the safety standards of design, manufacture and intended use of the instrument. Saluki Technology assumes no liability for the customer's failure to comply with these requirements.

➢ Environmental Conditions

Refer to the "Chapter 10 Technical Parameters" for the operating and storage environment of the instrument.

➢ Power Supply

Refer to "Chapter 10 Technical Parameters" for the requirements for working power supply of the instrument. Before power-on, please make sure the instrument has been set to match available supply voltage and all safety precautions have been taken.

➢ Don't Operate in an Inflammable and Explosive Atmosphere

Do not operate the instrument in the presence of flammable gases or fumes.

➢ Don't Remove Any Part of the Instrument Without Approval

Please don't remove any part of the instrument without approval, other than as explained in this Manual. Component replacement and internal adjustments must be made only by Saluki Technology or its authorized service personnel.

Safety Terminology

| Warning! | : It calls user's attention to a procedure, operation mode, or the like. Failure to correctly operate or adhere to rules could result in personal injury or damage to the instrument. |

| Caution! | : It calls user's attention to a procedure, operation mode, or the like. Failure to correctly operate or adhere to rules could result in damage to all or part of the instrument. |

| Note! | : It gives the information helpful for the use and maintenance of the instrument. |

Warnings for Use of Instrument

➢ **External DC Power Supply**

External DC power supply must meet the following requirements: 17V~21V, >2.5A, polarity: positive core. Use of over high voltage may damage the instrument.

➢ **Internal Battery**

(1) The battery inside the instrument is special lithium battery. Use of other batteries may damage the instrument and endanger the personal safety of users.

(2) For safety, don't disassemble battery pack to avoid short circuit; even don't fiercely impact or put the battery into or close to fire and strong heat to avoid explosion.

➢ **Laser Safety**

(1) The safety class of the laser of this instrument is: CLASS1 LASER PRODUCT: 21 CFR 1040.10 or CLASS 3A LASER PRODUCT: IEC 60825-1:Ed.2:2001.

(2) Although up to safety standards, the output intensity of the laser of the instrument still may damage eyesight, so it shall be prevented from directly shooting at eyes. Please don't directly look into the optical output connector of OTDR with eyes, or even the optical fiber tail during testing. When the VFL function of the instrument is activated, please don't directly look into the output port of VFL optical source, or even the optical fiber tail at VFL port.

➢ **Use of OTDR**

Never connect an optical fiber carrying any kind of optical signal to the test port of OTDR, otherwise, it could result in inaccurate measurement result and even permanent damage to the instrument. Please make sure that all the optical fibers under test are inactive.

Precautions for Use of Instrument

➢ **AC/DC Adapter**

Please use the adapter provided by Saluki Technology for power supply. Use of other type of adapter can damage the instrument.

➢ **Internal Battery**

(1) For the best battery performance, the instrument shall be powered with internal battery first at the beginning of use until the battery is exhausted, and then it can be charged 2~3 times.

(2) If the battery has been in storage for a long time, it shall be charged and discharged circularly as above for the first time use to achieve an optimum performance.

(3) In order to prolong the life of internal battery, remove external power supply after charging. For a long-time use of external power supply, please remove the internal battery and keep it properly, before that, please charge it first, and make charge-discharge cycle once every 3 months to ensure battery performance.

(4) If the instrument has not been used for a long time, please charge the battery to make charge-discharge cycle before use. For a long-time storage, remove the battery, before that, please charge it first. During storage, make charge-discharge cycle once every 3 months to ensure battery performance, otherwise excessive self-discharge of battery may cause damage to it.

(5) The temperature range for long storage time (the storage time is longer than 6 months) of battery is: -20℃~45℃. The temperature range for short storage time (the storage time is shorter than or equal to 6 months)of battery: -20℃～60℃.

(6) The temperature range of charging battery is 5℃~40℃. If ambient temperature is too high or too low, charging will stop automatically, which will cause unfilled charge.

(7) The time of charging may not be too long, otherwise, it will reduce battery life and even damage it.

(8) To achieve better performance and more accurate battery capacity indicator, please maintain a complete charge or discharge process, i.e. don't discharge during charging; don't charge during discharging.

➢ LCD Display

(1) Don't use any sharp object to press LCD, don't give heavy impact to LCD, otherwise it may damage it.

(2) Don't pollute LCD with any organic solvent or contaminant such as acetone, motor oil, anti-freezing fluid, factice, etc., otherwise, it will cause LCD works abnormally.

(3) Clean LCD with silk cloth or soft cloth. Don't use organic solvent to clean it, otherwise, it may damage the LCD.

➢ Use of OTDR

(1) There is precise and fragile ceramic locating core inside the optical output connector of the instrument, so please be sure to insert optical fiber plug gently and parallelly and align it with locating pin and then tighten it.

(2) When performing measurement with this instrument, you must keep the inside and end face of optical output connector clean and avoid polluting the optical output connector with factice, etc. contaminant, otherwise, it will cause measurement error and even that the instrument is incapable of testing optical fiber.

(3) If possible, please make the end of the optical fiber under test point to an unreflected object during testing.

Maintenance

(1) Please pack this instrument in original packing material when shipping to avoid serious impact and vibration.

(2) Before using this instrument, please carefully check and make sure the instrument model is S2102 OTDR, the instrument has not evident damage on the surface and all accessories are complete.

(3) Store the instrument under the ambient temperature range of -20℃~60℃ (please see "Internal Battery" for detailed storage temperature range of battery) in a dry and ventilating place without direct sunshine. When the instrument will be stored for a long time, please remove the battery and perform regular check with power on, and meanwhile, make charge-discharge cycle once every 3 months.

(4) In order to prolong battery life, make charge-discharge cycle once every 3 months for long-time storage, for which, please discharge the battery completely first and then recharge it.

Calibration Requirements

Validity of technical parameters depends on environmental conditions. Calibration validity period can be longer or shorter depending on the intensity, environmental conditions and instrument maintenance. You should determine an appropriate calibration validity period according to your needs.

Under normal use, we recommend to calibrate the OTDR once every year. Please dial service telephone for details.

Warranty and Maintenance of Instrument

(1) Warranty for the entire instrument (except battery and the following consumables) is **18 months** and the warranty for battery is *3 months*. The gifts given during product promotion are not within the scope of warranty.

(2) The optical output connector, etc. parts of the instrument are consumables, so they are not within the scope of warranty.

(3) Damage to the instrument or lower performance due to force majeure and human factor is not within the scope of warranty.

(4) Lowering battery performance with the use of the instrument for a period belongs to normal battery loss, which is not within the scope of warranty.

(5) The repair of instrument should be done by Saluki Technology or its authorized repair company. The disassembly and repair of this instrument by any other company or individual are all illegal, which will void warranty to the instrument, and meanwhile, Saluki Technology reserves the right to pursue offender's legal responsibility.

(6) Unauthorized disassembly will void the warranty of the instrument automatically. Removal of fastening screws or seals will void the warranty of the instrument.

Note:

Saluki Technology reserves the right to make any change in the design or construction of the OTDR at any time without any obligation or responsibility to perform free improvements or replacements whatsoever on products purchased. Accessories, including but not limited to indicator lamps and batteries etc. used for this product are not covered by the warranty herein.

Caution! If the instrument must be returned to Saluki Technology for repair, calibration or other maintenance, please pay attention:

(1) If the instrument has memory test data, please do a backup of these data to avoid loss.

(2) Please pack the instrument in its original case when shipping.

(3) In case of use of other case, please make sure there is at lease 3cm thick soft padding around the instrument to absorb the impact of external force.

(4) Please write the address, telephone, description, etc. in detail when returning.

(5) Please secure the case with tape well before shipping.

(6) The damage due to improper packing during returning is not within the scope of warranty.

Chapter 1 Overview

1. Overview of Instrument

S2102 OTDR is a kind of multifunctional test instrument with high performance designed for FTTx network. This product is mainly used to measure the length, transmission loss, splice loss, etc. for physical characteristics of optical fibers and cables, and also can exactly locate the event and fault in fiber circuits. It is widely used for the engineering construction, maintenance test & emergency repair of optical fiber communication system and research & development and production test, etc. of optical fibers and cables.

The appearance of the OTDR adopts the most advanced integrative double-color double-material mould design technology in the industry, novel and beautiful, solid and durable, and also adopts the duplex operation mode of touch screen and key-press, simple and convenient, easy-to-learn and easy-to-use; there is advanced antireflection LCD display unit inside and the operating interface is also visible even outdoor; the whole instrument has 4 optical ports to realize the optical power meter, VFL and single mode & multimode testing functions, the types of which can be changed at random in convenience for cleaning of optical fiber end face. This product has abundant external ports to externally connect with USB disk & printer and realize data communication with PC by two different USB ports. Test results can be stored in the instrument and also can be stored in SD card by SD port. There is lithium battery with large capacity inside the instrument so the instrument can work for more than 8 hours, suitable for long-time outdoor work.

Besides the functions of OTDR, S2102 OTDR also can have the optional functions of optical power meter, optical source, visible fault locator (VFL) and audio detection, etc.

Main functions and features of instrument:

- Event dead zone: <1 m

- Dynamic range: up to 45 dB

- Wavelengths: 1300, 1310, 1490, 1550, 1625 and 1650nm

- Battery autonomy: >8 hours

- High-speed auto measurement & analyzation

- Unique PON testing capability

- Multiple wavelengths and model

- 0.05m high distance resolution, 128k sampling point

- Communication light check automatically

- Visible fault locating (VFL)

- Supporting Bellcore GR196 &SR-4731 file format

- Abundant external interface

2. Composition of Instrument

2.1 Basic Composition

The basic composition of S2102 OTDR is shown in Table 1-1.

Table 1-1 Basic Composition of S2102 OTDR

Item	Name	Quantity
Mainframe	OTDR	1
Standard Accessories	Power adapter	1
	Power line	1
	User's Manual	1
	Trace analyzing software(CD)	1
	Multifunctional fiber adapter SC, ST	1
	Engineering plastic case	1

2.2 Optional OTDR Modules

The optional modules of S2102 OTDR are showed in Table 1-2.

Table 1-2 Optional Modules of S2102 OTDR

Model[a]	Operating wavelength	Fiber type	Dynamic Range[b](dB)	Event Dead zone[c](m)	Attenuation dead zone(m)
S2102-01	1625nm	SMF	38	1	10
S2102-02	1625nm(build-in filter)		36	1	10
S2102-03	1650nm		38	1	10
S2102-04	1650nm(build-in filter)		36	1	10
S2102-05	1300nm	MMF	36	2	13
S2102-06	1310/1550nm	SMF	42/40	2/2	10/10
S2102-07	1310/1550nm		40/38	1/1	10/10
S2102-08	1310/1550nm		37/35	1/1	10/10
S2102-09	1550/1625nm		38/38	1/1	10/10
S2102-10	1550/1625nm(build-in filter)		36/36	1/1	10/10
S2102-11	1550/1650nm		38/38	1/1	10/10
S2102-12	1550/1650nm(build-in filter)		36/36	1/1	10/10
S2102-13	1310/1490/1550nm		39/34/38	1/1/1	10/10/10
S2102-14	1310/1550/1625nm		39/38/36	1/1/1	10/10/10
S2102-15	1310/1550/1625nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-16	1310/1550/1650nm		39/38/36	1/1/1	10/10/10
S2102-17	1310/1550/1650nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-18	1310/1490/1550/1625nm		35/32/34/34	1/1/1/1	10/10/10/10
S2102-19	1310/1490/1550/1625nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10
S2102-20	1310/1490/1550/1650nm		38/36/36/36	1/1/1/1	10/10/10/10
S2102-21	1310/1490/1550/1650nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10

a: One and only one module of above must be selected.

b: Pulse width 10240ns, average times≥300,SNR=1, 23℃±2℃ (73.4 °F±3.6 °F);

c: Dead zone mode, distance range: ≤3.2km, pulse width: 5ns, terminal reflection loss: ≥40dB, typical;

Note 1: Standard LCD brightness, enhanced brightness is optional

Note 2: The standard OTDR interface type is FC/UPC, type of FC/APC is optional.

Note 3: OPM & VFL function are optional, not standard configuration.

2.3 Optional Accessories

The options of S2102 OTDR are shown in Table 1-3.

Table 1-3 Options of   OTDR

No.	Name	Model or Specification
1	USB disk	2GB
2	SD card	2GB
3	Data synchronization transmission line	
4	FC/SC, FC/ST adapter	
5	Optical fiber patch cord	FC/UPC to FC/APC
6	Optical fiber patch cord	FC/UPC to SC/UPC
7	Optical fiber patch cord	FC/UPC to ST/UPC

Note!

(1) The optional modules and options of S2102 OTDR are subject to

change without notice. Please dial service consulting phone for relevant details.

(2) The bold font in this Manual indicates emphatic prompt.

3. Description of Instrument Panel

3.1 Front Panel of Instrument

Figure 1-1 Instrument panel

3.2 Right Panel of Instrument

Figure 1-2 Right flank of instrument

3.3 Back Panel of Instrument

Gallus mounting hole

Handle mounting hole

Angle support

Speaker sound hole

3.4 Description of Panel Keyboard and Active Display

(Please see section 4 "Description of OTDR Panel Key Function" of Chapter 7 for details)

4. Description of Rechargeable Battery

The battery in S2102 OTDR is special lithium battery.

4.1 Battery Indicator and Charge Indicator
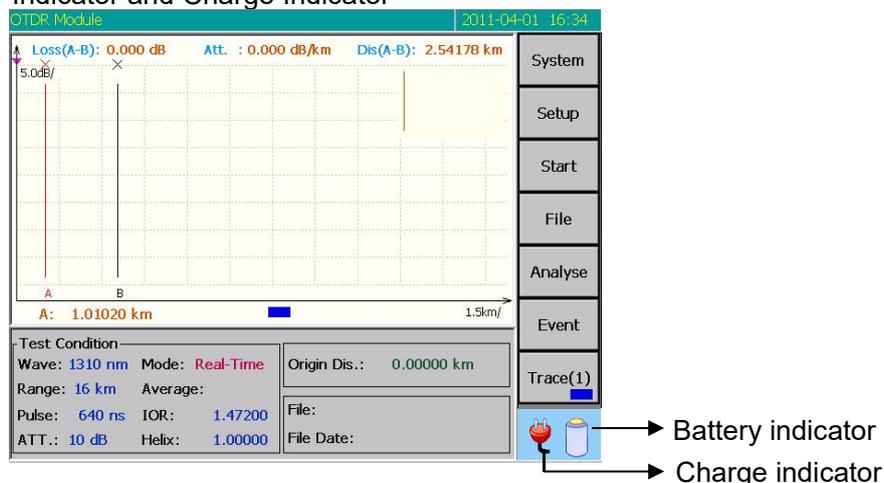
When the instrument is powered on, the battery indicator at lower right shows the current remaining capacity of battery, and charge indicator also appears. Meanwhile, the system information window also shows the percentage of current remaining capacity of battery.

When the charge indicator ⚡ appears, it indicates the instrument has been connected with external power supply and is using the external power supply to work, and meanwhile the battery is charged. When the charge indicator ⚡ does not appear, it indicates the instrument is using internal battery to work.

When the instrument is working with external power supply for charge, the power button is red; when the battery is charged fully, the power button is green; when the external power is cut off, the power button indicator lamp goes out.

4.2 Charging the Battery

(1) The temperature range of battery charge is: 5℃~40℃. It will stop charging automatically in case of exceeding the temperature range during charging, which will cause that the battery is not fully charged. Over high temperature will cause damage to the battery and affect its life.

(2) The charging time is less than or equal to 6 hours when this instrument is off.

(3)The charging time is less than or equal to 8 hours when the instrument is on.

(4) Overlong charging time will affect battery life and even cause damage to it.

4.3 Precautions

In order to prevent the rechargeable battery from excessively discharging, the battery inside the instrument should be charged in time through external power adapter .

Long-time excessive discharge of the rechargeable battery will affect battery life and even cause damage to it.

Chapter 2 Main Screen

S2102 OTDR can have the optional functions of optical power meter, optical source, visible fault locator (VFL) and audio detection, etc. as required. When function modules return to the main screen, the screen for function module selection will appear as shown in Figure 2-1.
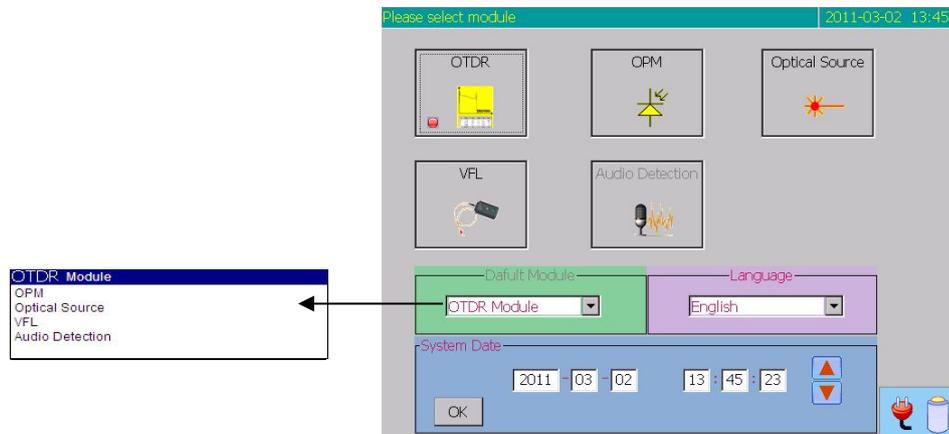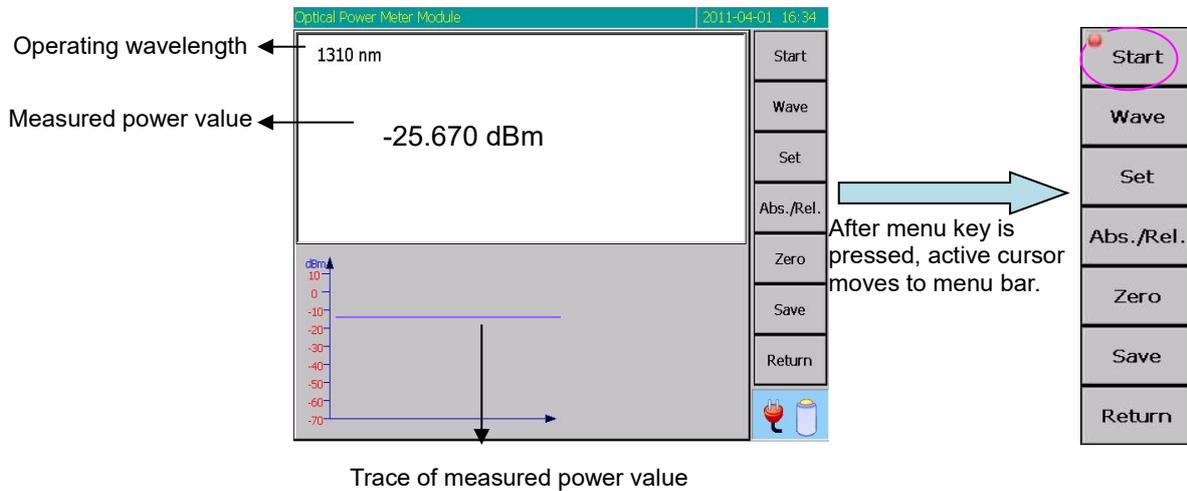

Figure 2-1 Main screen

- Touch screen Operation: Press any one of the five buttons, i.e. OTDR, OPM, Optical Source, VFL or Audio Detection (If the function is build-in) in the screen to enter the operating interface of corresponding module so as to achieve its corresponding function. Press the drop-down button of default module to eject a selection box as shown at the left of the above figure, press the item required, so that the operating interface of the selected module can be entered directly after power on next time.

- Default Module: After selection, the selected module interface will be entered after power on next time.

    ◇ Key Operation: Press ◄/► to select any one of the five buttons in the screen, and then press Enter to enter corresponding module operating interface. Use ◄/► to move active cursor to the drop-downs of default module and then use ▲/▼ to select a module as default one for next power on, after selection, the operating interface of the selected module can be entered directly for next power on.

    ◇ Directly press the drop-down box of default module on the touch screen to select one.

- Language Selection: Select the language of interface. Operate the touch screen and keys as above.

- System Date: Change system date and press Enter to confirm the change.

    ◇ Press the time item to be changed in the touch screen, a small button will appear below the item, and then press the up and down button via touch screen to change the selected time item.

    ◇ Use ◄/► to select the time item to be changed and then a small button will appear below the item; press ▲/▼ to change the selected time item.

   ◇ After change, press 【Enter】 or Enter to confirm the change.

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Chapter 3 Optical Power Meter Module

If your instrument has the function of optical power meter, please press the button【OPM】as shown in Figure 2-1 to enter the operating interface of optical power meter as shown in Figure 3-1.


Operating wavelength

Measured power value

After menu key is pressed, active cursor moves to menu bar.

Trace of measured power value

The functions and operations of all menu buttons are described as follows:

● 【Start】: Start or stop power meter test with the following three methods.

✧ Press this button to start the power meter module for test, meanwhile, the button turns to【Stop】, press this button again to stop power meter test, then, this button turns to【Start】.

✧ Pressing the key ^{Start} on the keyboard can realize the above function.

✧ Press the key ^{Menu} on the keyboard to move active cursor to menu bar as shown in the figure below, and then menu item will show a small button. Then, pressing ^{Enter} will start or stop power meter test function.

● 【Wave】: Change the test wavelength of power meter.

✧ Press this button to change the test wavelength of power meter.

✧ Press the key ^{Menu} on the keyboard to move active cursor to menu bar, and then menu item will show a small button. Use ▲/▼ to move the small button to this menu item and then press ^{Enter} to confirm wavelength change.

● 【Set】: Enter set sub-menu as shown in the figure below. Press the menu button via touch screen or use the keyboard to realize the function of each button with the same method as above. Setup sub-menu is also available by pressing the key ^{Set} on the keyboard.

Setup sub-menu.
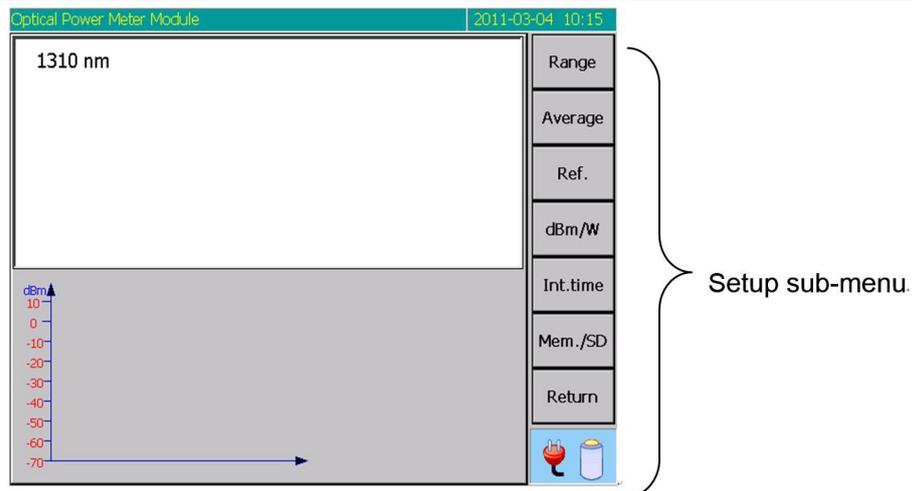
♦ 【Range】: Press this menu button to eject a drop-down box for range selection.
Select the range by pressing touchscreen or ▲/▼.

Selecting <Auto> indicates the instrument will judge test range automatically.

Select an appropriate range for test; if other fixed range is selected, the instrument will lock the range in test.
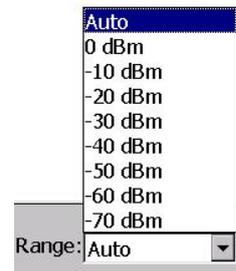
♦ 【Average】: Press this menu button to eject a drop down box for average.
Select the range by pressing touch screen or ▲/▼

♦ 【Ref.】: Set the current measured value as reference value.

♦ 【dBm/W】: Set the current test mode as dBm test or mw test.

♦ 【Int.time】: Press the menu button to eject the drop-down box for times selection, and select times by pressing touch screen or ▲/▼

♦ 【Mem./SD】: Set storage path as memory or SD card.

♦ 【Return】: Return to previous menu.

● 【Abs./ Rel.】: Set the current data realization mode as relative or absolute mode.

● 【Zero】: Reset the power meter to zero.

● 【Save】:Used to save the test data of power meter. This menu item is only available in test state. In the test state of power meter, press this button (or use keyboard to select this item and then press Enter to confirm) to save the data obtained in current test to file according to the set interval and save path.

● 【Return】: Exit from the operating interface of power meter to return to the main screen.

Notes: The memory only can save a power meter data file -OPM.dat, therefore, when selecting memory as storage path, please pay attention to timely outputting data to SD card or USB disk, otherwise, the original file will be covered for next saving.

Chapter 4 Optical Source Module

If your instrument has the function of optical source, please press the button【Optical Source】as shown in Figure 2-1 to enter the operating interface of optical source as shown in Figure 4-1.

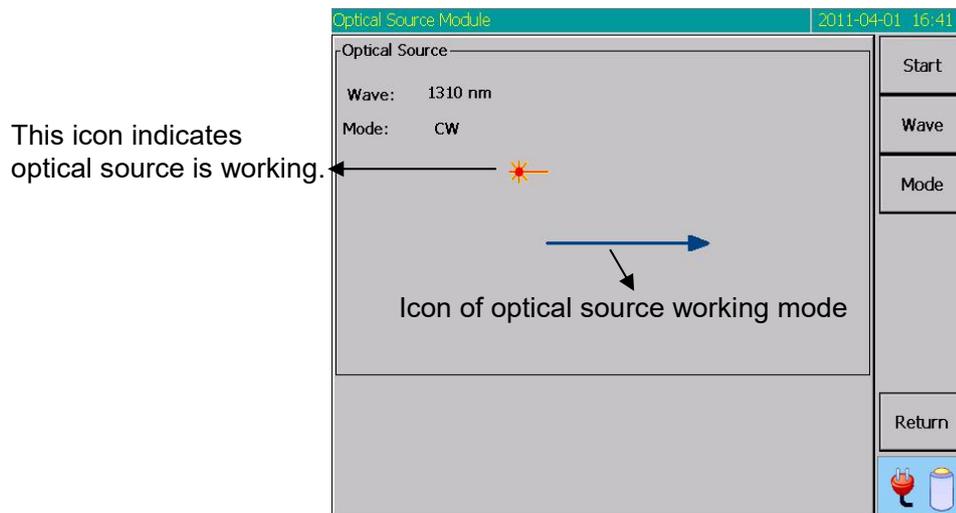Figure 4-1 Operating interface of optical source

The functions and operations of all menu buttons are described as follows:

- 【Start】: Start or stop optical source test with the following three methods.

    ✧ Press this button to start the optical source module for test, meanwhile, the button turns to 【Stop】, press this button again to stop optical source test, then, this button turns to【Start】.

    ✧ Pressing the key ⟨Start⟩ on the keyboard can realize the above function.

    ✧ Press the key ⟨Menu⟩ on the keyboard to move active cursor to menu bar as shown in the figure below, and then menu item will show a small button. Then, pressing ⟨Enter⟩ will start or stop optical source test function.

- 【Wave】: Change the test wavelength of optical source.

    ✧ Press this button to change the test wavelength of optical source.

    ✧ Press the key ⟨Menu⟩ on the keyboard to move active cursor to menu bar, and then menu item will show a small button. Press ⟨▲⟩/⟨▼⟩ to move the small button to this menu item, then, press ⟨Enter⟩ to confirm wavelength change.

- 【Mode】: Change the working mode of optical source. The working mode of optical source is CW, 270Hz, 1kHz and 2kHz

    ✧ Pressing this button will change the working mode of optical source.

    ✧ Press the key ⟨Menu⟩ on the keyboard to move active cursor to menu bar, and then menu item will show a small button. Press ⟨▲⟩/⟨▼⟩ to move the small button to this menu item, then, press ⟨Enter⟩ to confirm the change of working mode.

- 【Return】: Exit from the operating interface of optical source function to return to the main screen.

Chapter 5 Visible Fault Locator Module

If your instrument has the function of VFL, please press the button【VFL】 as shown in Figure 2-1 to enter the operating interface of VFL as shown in Figure 5-1.
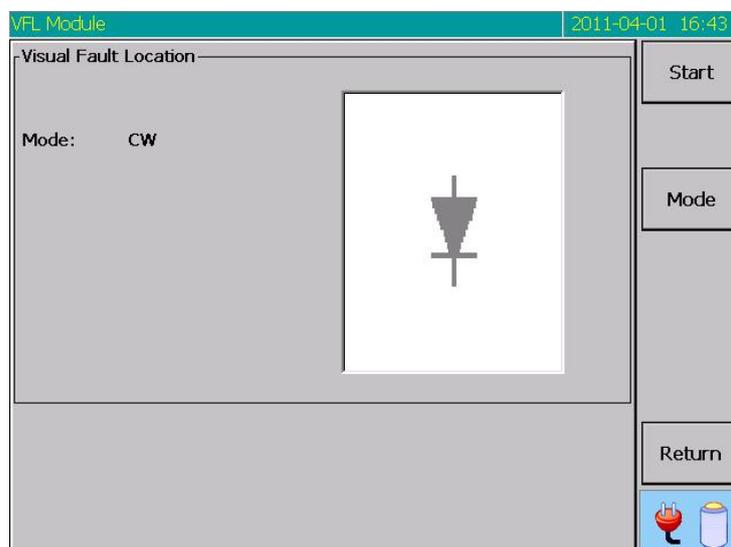

Figure 5-1 Operating Interface Schematic of VFL Module

The functions and operations of all menu buttons are described as follows:

● 【Start】: Start or stop VFL module test with the following three methods.

  ✧ Press this button to start the VFL module for test, meanwhile, the button turns to【Stop】, press this button again to stop VFL test, then, the button turns to 【Start】.

  ✧ Pressing the key (Start) on the keyboard also can realize the above function.

  ✧ Press the key (Menu) on the keyboard to move active cursor to menu bar as shown in the figure below, and then menu item will show a small button. Then, pressing (Enter) will start or stop VFL test function.

● 【Mode】: Change the working mode of VFL. The working mode of VFL is CW, 1Hz and 0.5Hz

  ✧ Pressing this button will change the working mode of VFL.

  ✧ Press the key (Menu) on the keyboard to move active cursor to menu bar, and then menu item will show a small button. Press (▲)/(▼) to move the small button to this menu item, then, press (Enter) to confirm the change of working mode.

● 【Return】: Exit from the operating interface of VFL function to return to the main screen.

Chapter 6 Audio Detection Module

If your instrument has the function of audio detection, please press the button 【Audio Detection】as shown in Figure 2-1 to enter the operating interface of Audio Detection Module as shown in Figure 6-1.
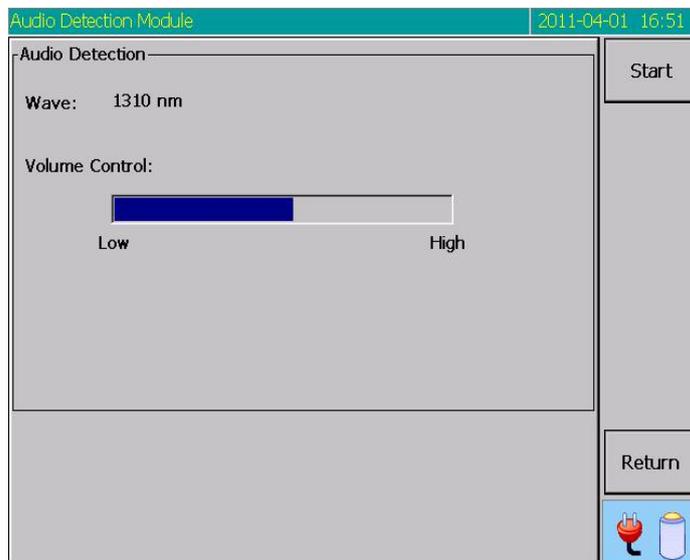

Figure 6-1 Operating Interface Schematic of Audio Detection Module

The functions and operations of all menu buttons are described as follows:

● 【Start】: Start or stop audio detection module test with the following three methods.

✧ Press this button to start the audio detection module for test, meanwhile, the button turns to【Stop】, press this button again to stop audio detection test, then, the button turns to 【Start】.

✧ Pressing the key (Start) on the keyboard also can realize the above function.

✧ Press the key (Menu) on the keyboard to move active cursor to menu bar as shown in the figure below, and then menu item will show a small button. Then, pressing (Enter) will start or stop audio detection test function.

● Volume Control: Press the key ▲/▶on the keyboard to increase volume; press the key ▼/◀on the keyboard to reduce volume.

● 【Return】: Exit from the operating interface of audio detection function to return to the main screen.

Chapter 7 OTDR Operating Instruction

Press the button 【OTDR】as shown in Figure 2-1 to enter the operating interface of OTDR as shown in Figure 7-1.

The operating interface of OTDR is composed of main screen and operating sub-window. After the instrument enters the operating interface of OTDR module, the display will show the main screen of OTDR as shown in Figure 7-1.

The menu bar in the main screen shows menu items. Press different menu buttons to enter corresponding sub-menus or finish corresponding functions.

1. Description of Main Screen

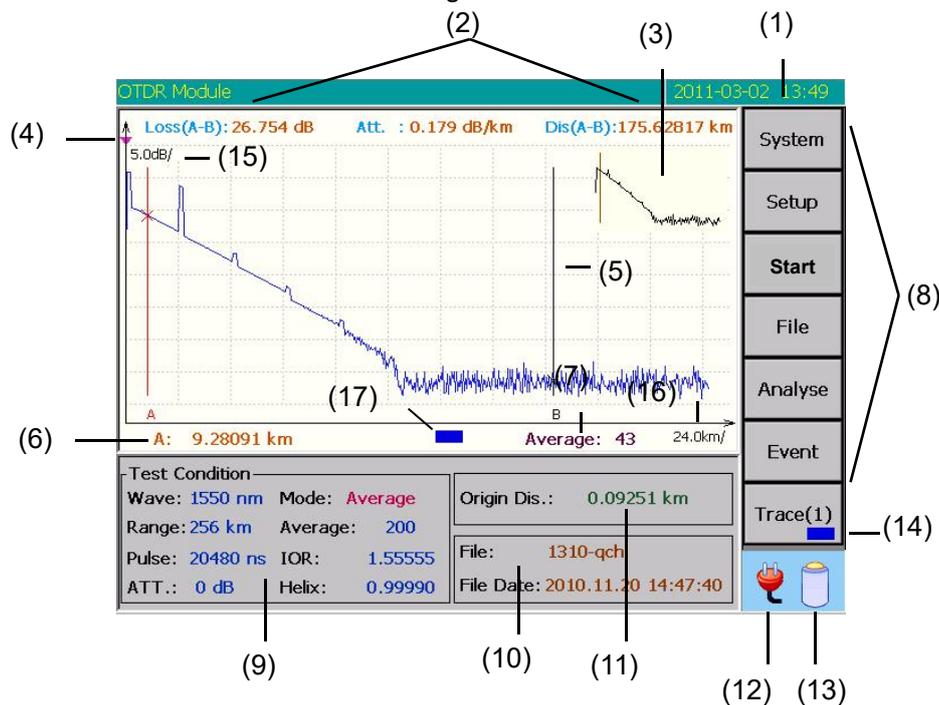The schematic of main screen is shown in Figure 7-1.

Figure 7-1 Main Screen

(1): Current system clock

(2): Display of test results. The contents of displaying correspond to test items. Test results are calculated according to the position of current cursor.

(3): Entirely display trace. It always displays the entire waveform of trace.

(4): Reference point

(5): Current active cursor. Active cursor is red, which can be moved by ◀/▶ or pressing touch screen. The other cursors are black. Active cursor can be set circularly by Enter among the cursors on the screen.

(6): The distance between active cursor and reference point

(7): Display of current average times. No average times are displayed in real-time test mode.

(8): Menu bar. In the main interface, the menu bar displays menu items.

(9): Display of test conditions: It displays the current test range, wavelength, pulse width, test mode, etc. test conditions.

(10): Name and storage date of current file. If the current trace is that saved in the current file, it will display the name and storage date of current file.

(11): Origin distance position. The distance between the current set reference origin and the test port of OTDR [*1]

(12): Indicator of connection of external adapter. It indicates external adapter has been connected and the instrument is using external power supply to work.

(13): Indicator of current battery capacity. It indicates the current remaining battery capacity.

(14): Indicator of current test trace color. It indicates the line color of trace of current serial number. [*2]

(15): Vertical scale (dB/)

(16): Horizontal scale (m/ or km/ or ft/ or kft/)

(17): Icon of indicating current active test trace: Blue color indicates the current active trace is Trace 1; Dark green color indicates the current active trace is Trace 2; Red color indicates the current active trace is Trace 3.

> **Note！**
>
> 1. The distance of current active cursor and the distance of event point in event table are both calculated with reference origin as originating location, the distance display at the left of reference origin is negative value and the distance at the right is positive value.
>   - ➢ The factory default reference origin is the test port of OTDR, i.e. test origin.
>   - ➢ If a reference origin is set, the instrument will save it automatically, and it will call out the position of saved reference origin at startup next time.
> 2. Three traces are available simultaneity on the instrument, respectively represented by Trace 1, 2 & 3.
>   - ➢ The analysis, movement and calculation of trace only point to current active trace.
>   - ➢ The serial number of current active trace is consistent with that displayed on trace switch button (Trace(1)).
>   - ➢ The line color of the trace of current serial number is consistent with the graph color on button and the icon color as shown in figure (17) above.
>   - ➢ Using the trace switch button in the menu bar can switch among Trace 1, 2 & 3.
>   - ➢ Only the traces with the same test range can be displayed at the same time.

2. Description of Event List Window

In the main screen displayed in Figure 7-1, press the button【Analyse】to analyze the current trace and display event list. If the current event table has contents, press the button 【Event】 to show event list. The event list window is shown in Figure 7-2.

Figure 7-2 Event list window

Test condition of current trace

All the contents in the event list are shown as follows:

(1) Event Type: ⌐L: indicates this event point is down event point.

⌐: indicates this event point is up event point.

⌐L: indicates this event point is reflection event point.

⌐: indicates this event point may be the end of optical fiber.

(2) No: The serial number of current event point.

(3) Dis (km): The distance between this event and reference origin.

(4) Att. (dB/km): The average loss of the optical cable before the current event point.

(5) Splice (dB): The splice loss measured at current event point, "∗" indicates the current tested splice loss value is larger than the set pass threshold of splice loss.

(6) Refl. (dB): The reflection loss measured at current event point, "∗" indicates the current tested reflection loss value is larger than the set pass threshold of reflection loss.

(7) Link (dB): The total loss of the fiber section from current event point to reference origin.

Note!   1. For data analyse, there will be three kinds of threshold settings: loss analyse threshold, loss pass threshold (including splice loss pass threshold and reflection loss pass threshold) and optical fiber breakpoint threshold.

2. In event list, only the event point with splice loss larger than the set loss analyse threshold can be displayed and the event with splice loss less than the set loss analyse threshold will be ignored.

3. The value with * indicates this value is larger than the set loss pass threshold.

4. If the calculated splice loss is larger than the set breakpoint threshold, this point will be taken as the breakpoint of optical cable, all the event points after that will be ignored and not be displayed.

3. Overview of Menu Structure and Function

3.1 Structure and Function of First Menu

Main screen displays main menu bar by default, including seven menu buttons as shown in Figure 7-3.

Figure 7-3

All menu buttons of first menu bar

All the button functions on the menu bar are described as follows: (Pressing corresponding menu item will realize the following function. See "Chapter 8 How to Use OTDR Module)

【System】: Enter system sub-menu to realize the functions of system information display, touch screen calibration, system program update, help information display and return to main screen (interface of operating module selection), etc.

【Setup】: Enter parameter setup sub-menu to realize the functions of OTDR test condition setup, reference origin setup, optical cable information setup, etc.

【Start】: This button is used to control optical fiber test of OTDR or stop test. Pressing this button turns the button to 【Stop】, then, OTDR will test the optical fiber under test according to the set test condition; Pressing this button again turns the button to【Start】and OTDR will stop test If in average test, auto test and dead zone test mode, the test is finished, this button will turn to 【Start】automatically and meanwhile OTDR stops test.

【File】: Enter file operation sub-menu to realize the functions of reading, saving, deleting file, printing and transferring file and clearing the trace displayed on screen, etc.

【Analyse】: Analyze the current trace to give event list. If event point is unavailable, a prompt will be given.

【Event】: Displaying event list and event operation sub-menu to realize the functions of deleting, adjusting and adding event point and modifying event analyse threshold, etc.

【Trace 1】: Display trace selection window in which the trace number can be selected to switch the current active trace among Trace 1, 2 & 3. Trace 1 is blue; Trace 2 is dark green and Trace 3 is red.

### 3.2 Brief Introduction of Operating Sub-window Menu

Press menu buttons in the main menu bar to enter different sub-menus (or executing corresponding function), press different sub-menu buttons in each sub-menu bar to eject corresponding operating window to finish different functions, such as, saving, reading, deleting and copying file and viewing event list, setting OTDR test parameters, displaying system and help information, etc. Please see "Chapter 8 How to Use OTDR Module" for details.

4. Description of OTDR Panel Key Function

Figure 7-4 Schematic of OTDR Panel Keys

(Zoom) Press this key, a magnifier icon appears on the trace display area of the main screen as shown in Figure 7-5, then, the trace enters zooming state so the trace can be zoomed in and out around active cursor. Then, press the key ◀/▶ in navigation keys to zoom out and in race horizontally; press the key ▲/▼ in navigation keys to zoom in and out trace vertically.
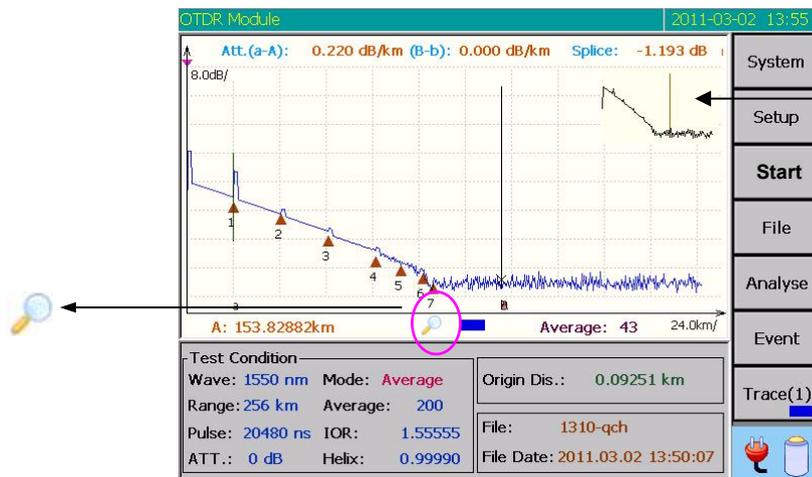
Pressing this area will make trace recover to overall display state.

Figure 7-5 Schematic of Trace Zooming State

Figure 7-5 Trace Zooming State

Press this key again, the magnifier icon disappears, then, trace exits from zooming state and the key ◀/▶ in navigation keys will move cursor left and right horizontally, and the key ▲/▼ in navigation keys will move cursor up and down vertically.

Note!   1. Zooming trace in can display the local details of test trace.

2. Pressing the area of entirely display trace in the screen will recover trace

to the initial entire display state.

(Save) : Press this key to directly enter file saving window.

(System) : Press this key to directly enter system information window.

(Setup) : Press this key in the operating interface of OTDR module to directly enter the setup window of OTDR test condition; press this key in operation of optical power meter module to directly enter power meter setup sub-menu.

(Menu) : Press this key to move active cursor to menu bar, and meanwhile it selects the first menu button in the current menu bar by default, then, the selected menu item shows a red small button. Press the key (▲)/(▼) in navigation keys to select the previous or next menu item and press the key (Enter) to execute the current selected menu item. Press (Esc) to make active cursor exit from menu bar and return to the trace display area of screen or operation sub-menu.

(Start) : Start key When the operating interface of OTDR module shows main screen (as shown in Figure 7-1), press this key to start OTDR module to test the optical fiber under test and display trace in the operating window.

Note!　**(1)** The test modes of OTDR include: **auto test, real-time test, average test and dead zone test.**

(2) The test modes can be set in OTDR parameter setup window.

(Esc) : Return key. This key has three functions: **stop test, return to previous menu, abandon current operation and return.**
- When OTDR module is in real-time test or average test state, press this key, OTDR will stop test.
- When OTDR is in non-test state and operating interface is main screen, press this key, the menu in the menu button display will return to the previous menu bar.
- When OTDR operating interface is operating sub-window, pressing this key indicates abandoning the current operation and returning to main screen.

(◄)/(►): **(See Chapter 8 How to Use for details)**
- In the main screen, the two keys are used to move current active cursor left and right by default.
- In the main screen, the two keys are used to zoom in or out current trace horizontally in zooming state.
- In sub-window, the two keys are used to move active cursor to select different operation item backwards and forwards
- In character input sub-window, the two keys are used to move left and right to select small button one by one.

(▲)/(▼): **(See Chapter 8 How to Use for details)**
- In the main screen, the two keys are used to move current active cursor up and down by default.
- In the main screen, the two keys are used to zoom in or out current trace vertically in zooming state.
- In sub-window, the two keys are used to modify the contents of operation item selected by current active cursor
- In character input sub-window, the two keys are used to move left and right to select small button quickly.

Enter : **(See Chapter 8 How to Use for details)**

- In main screen, it is used to switch active cursor.

- In character input window, Enter key is used to input the character of currently selected small button to the place of quadrate cursor in edit window.

- In file transfer sub-window, Enter key is used to mark the file selected by the cursor bar in current active window (source disk).

- Besides above, Enter key is used to confirm current operation and return to main screen.

Note!   1. The current active cursor is red and inactive cursor is black.

2. In file transfer subwindow, only the file with mark "*" can respond to copying deleting, etc. Operations.

: Power key. When the instrument is off, press this key for about 4 seconds to start the instrument and enter OTDR operating interface to show main screen after system startup. When the instrument is on, press this key for about 4 seconds to stop the instrument. In ON state, if external power supply is used, this key is red, if internal battery is used and battery is fully charged, this key is green or blue.

: Brightness adjustment key. Press this key to adjust LCD brightness circularly. When VFL is on, this key is continuous red or blinking red in consistent with VFL working mode.

Chapter 8 How to Use

1. Testing Optical Fiber Chain

Operation steps are as follows:

● Select test wavelength.

● Set test mode, etc. test conditions.

● Clean the optical fiber under test.

● Connect the optical fiber under test to corresponding OTDR optical output port.

● Press (Start) to obtain the waveform trace of the optical fiber under test.

● After test stops:

✧ If in *auto test* mode or *auto analyse after sampling*, the instrument will analyze trace automatically, mark event points according to the set loss analyse threshold and give an event list.

✧ Otherwise, please press the button 【 Analyse 】 in main menu bar, the instrument will analyse trace and then it will mark event points according to the set loss analyse threshold and give a event list.

● After trace analyse is finished, view test results in event table.

Caution
1. Before test, it must make sure the optical fiber under test without carrying any kind of active signal, otherwise, it could result in permanent damage to the OTDR.

2. The OTDR module has two optical output ports, please pay attention to the optional OTDR module number, please insert the optical fiber under test into correct test port. Otherwise, it could result in inaccurate test results.

Note!
(1) When the test mode is *auto test*, it will perform analyse automatically and give event list after test stops.

(2) After trace analyse is finished:

✧ The event point with splice loss larger than loss analyse threshold will be displayed, the event with splice loss less than loss analyse threshold will be ignored automatically.

✧ In event list, the event point with splice loss and reflection loss larger than the set loss pass threshold will be marked with "∗".

✧ When the splice loss of event point is larger than the set optical fiber breakpoint threshold, this event point is taken as the breakpoint of optical fiber; all the events after the event point will not be displayed in list.

1.1 Description of Test Modes, Parameters and Items

Before testing optical fiber link, please set the test mode of OTDR and all test parameters first. The setup window of OTDR test conditions are as shown in Figure 8-1.
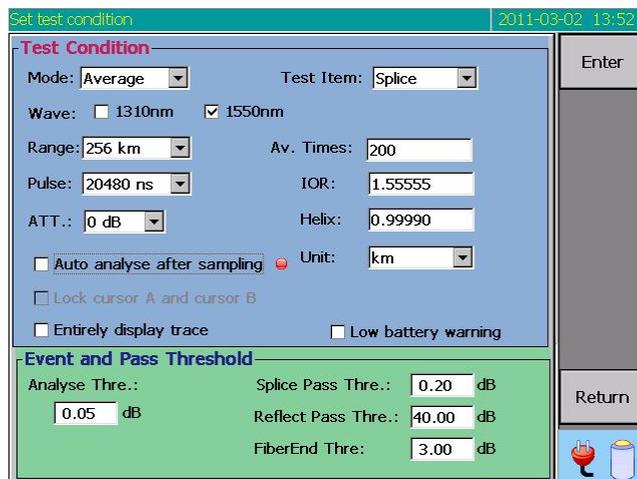

Figure 8-1 OTDR test condition setup window

1.1.1 Test Modes of OTDR

The test modes of OTDR include: **Auto test, Real-time test, Average test and Dead zone test**.

Note!

(1) The Real-time and Average test modes are all manual ones, which requires users to set test conditions by themselves (i.e. range, pulse width and attenuation), the instrument will perform test according to the user's set test parameters.

(2) In Auto test mode, the instrument will automatically set and adjust test conditions according to the conditions of optical fiber under test.

(3) In Dead zone test mode, the test conditions are set to 400m, 5ns and 20dB fixedly. This mode is mainly used to test shorter optical fiber, such as optical fiber jumper.

● Auto Test:

In Auto test mode, press (Start) , OTDR will automatically adjust test conditions to test the link of optical fiber under test, after which it will automatically analyze trace and then display trace and event list in main screen.

● Real-Time Test:

In Real-time test mode, press (Start) or press the button 【Start】 in main menu bar (then, the menu button 【Start】 turns to 【Stop】), OTDR will perform real-time scanning test to the link of optical fiber under test according to currently set test conditions, the trace in main screen will be refreshed continuously, and until (Start) is pressed again or (Enter) is pressed or 【Stop】 in main menu bar is pressed (then, the menu button 【Stop】 turns to 【Start】, OTDR stops test.

- Average Test:

  When OTDR is in Average test, press ⬭Start or press the button【Start】in main menu bar (then, the menu button 【Start】 turns to 【Stop】), OTDR will perform average test to the link of optical fiber under test according to set test conditions. The trace in main screen will be averaged continuously, and until the average times displayed on interface is equal to ⬭Start set one, OTDR stops test (the ⬭Esc e menu button 【Stop】 turns to 【Start】. also can be pressed again or is pressed or 【Stop】in main menu bar is pressed (then, the menu button 【Stop】 turns to 【Start】) to stop test.

- Dead Zone Test:

  The test conditions are fixedly set to: range of 400m, pulse width of 5ns and attenuation of 20dB. Minimum test dead zone can be obtained in this test mode, but the distance that can be tested is also the shortest one. Usually, use this test mode to measure shorter optical fiber, such as optical fiber jumper.

Note!

1. Use real-time test mode to realize real-time observation of the conditions of optical fiber under test.

2. Use average test mode to obtain more smooth trace with higher SNR, in favor for data analysis and more accurate test results.

3. In the process of average test, pressing ⬭Start or ⬭Esc or pressing the button【Stop】 in main menu bar (then, the menu button 【Stop】 turns to 【Start】) will stop OTDR at any time.

4. In auto test mode, the instrument will analyze trace and give event list after finishing test. In other test modes, only after "*Auto Analyse after Sampling*" is selected, the instrument will stop test to analyze trace, otherwise, only when button【Analyse】 in main menu bar must be pressed, the instrument will analyze trace and give event list.

1.1.2 Test Parameters of OTDR

The test parameters of OTDR include: wavelength, range, pulse width, attenuation, average times, index of refraction, helix, etc.

- WL: Used to set the test wavelength of OTDR.

  ✧ The number of wavelengths available for OTDR is determined by the module of the instrument, which is 4 for selection maximally.

  ✧ In Average, Auto and Dead zone test mode, it is allowed to select more than one wavelength. In test, the instrument will perform test in turn under each selected wavelength until all the selected wavelengths are tested before it stops. The instrument allows three wavelengths to be selected for test maximally simultaneity.

  ✧ When the module of instrument has single mode and multimode modules at the same time, please pay attention to connecting the optical fiber under test into corresponding test port to ensure correct trace.

- Range (km): Used to set the range of scanning trace. S2102 OTDR ranges include:

  400m, 800m, 1.6km, 3.2km, 8km、16km, 32km, 64km, 128km, 256km and   512km (Max. Optical range is related to the module selected).

Caution! Range must be larger than the length of optical fiber under test (it is best to set it to be more than twice the optical fiber under test).

- Pulse (ns): Used to set the width of laser pulse. Longer pulse width can test longer fiber and provides better SNR, smoother trace and lower resolution; shorter pulse width provides higher resolution, but it tests shorter distance and results in worse SNR.

Note! The pulse width setting is related to the range selected.

- Att. (dB): Used to set attenuation of signal. Attenuation can be set to 0dB, 5dB, 10dB, 15dB and 20dB. If value of Att. is minimum (such as 0dB), the fiber length to be tested is maximal, but the near end of fiber may be saturation (A straight line is displayed in screen); If the value of Att. is maximal (such as 20 dB), the fiber length to be tested is minimum and trace SNR is worse but dead zone will be smaller.

Note! (1) If the length of the optical fiber under test is very long, in Manual mode, larger value of Att. can be used to test proximal optical fiber and smaller value of Att. can be used to test distal optical fiber section by stages.
  (2) Test mode also can be set to auto test. The instrument will set and adjust test conditions (i.e. range, pulse width and attenuation) and display test waveform on LCD completely.
  (3) When test range is larger than or equal to 64km, *entirely display trace test mode* can be selected. Then, the instrument will automatically adjust pulse width and attenuation in the current range and display test waveform on LCD completely.

- Times:

  It is used to set the max. average times of average and auto test. The value of times is between 1 to 4000 in average mode. The value of times is between 5 to 20 in auto test mode. When entirely display trace test function is selected, the average times is 1 or 10 multiple, such as 1, 10, 20, 30, etc.

Note! (1) The larger the average times is, the smoother trace is (i.e. SNR is higher especially it is helpful for test of longer fiber.

  (2) Higher trace SNR is more beneficial for OTDR to test smaller event point.

  (3) In auto test mode, more average times will affect auto test speed.

- **IOR**:

  The IOR of optical fiber and optical cable can be obtained from production factory. The value of IOR is set to: 1.00000~2.00000.

Caution! Inaccurate IOR setup will result in inaccurate optical fiber length.

- Optical Cable Correction:

The setup of optical cable correction coefficient depends on the errors between optical fiber length and optical cable length after optical fiber is made into cable. It can be obtained from optical cable production factory. It can be set to: 0.80000-1.00000. The default value is 1.00000.

Caution! Inaccurate optical cable correction setup will result in inaccurate optical

cable length.

- **Length Unit:**

  The instrument allows users to set length unit to km or kft. The default length unit is km.

- **Auto Analyse after Sampling:**

  When this item is selected, in Real-time, Average and Dead zone test mode, the instrument will analyze trace, mark event point and give event list automatically after stopping test.

  If this item is not selected, in Real-time, Average and Dead zone test mode, the instrument will not analyze trace after stopping test, only after the button 【Analyse】 is pressed in the first menu, the instrument will analyze trace, mark event point and give event list.

- **Locking Maker A & B:**

  Selecting this item will lock the distance between marker A and B, so moving one of them will move both and meanwhile they will keep the distance unchanged.

  If this item is not selected, when moving one cursor, the other cursor will not move.

  If this item is only valid during average loss test and reflection loss test, during testing splice loss, four cursors will appear and this item become invalid. In the edit state (adding or adjusting event point) of event table, cursor will be unlocked automatically.

- **On-line Test:**

  This item is only valid in the module with filter. When it is selected, the instrument will connect the filter in optical assembly, and the time, the optical fiber link with active optical signal can be measured in wavelength of 1,625nm or 1,650nm.

- **Low Battery Alarming:**

  In use of battery, when this item is selected, it will give alarm message to remind users of too low battery capacity if the batter capacity is less than 5%.

● **Entirely Display Trace Test Mode:**

If this item is selected, in measurement of longer optical fiber, larger attenuation (such as 10dB or 15dB) can be used to measure the optical fiber trace near the link under test (i.e. near OTDR test port), but the distal trace will be submerged in noise; smaller attenuation (such as 0dB) can be used to measure the optical fiber trace far away from the link under test, when the proximal trace is saturated to a straight line, the proximal trace can not be displayed as shown in Figure 8-2.
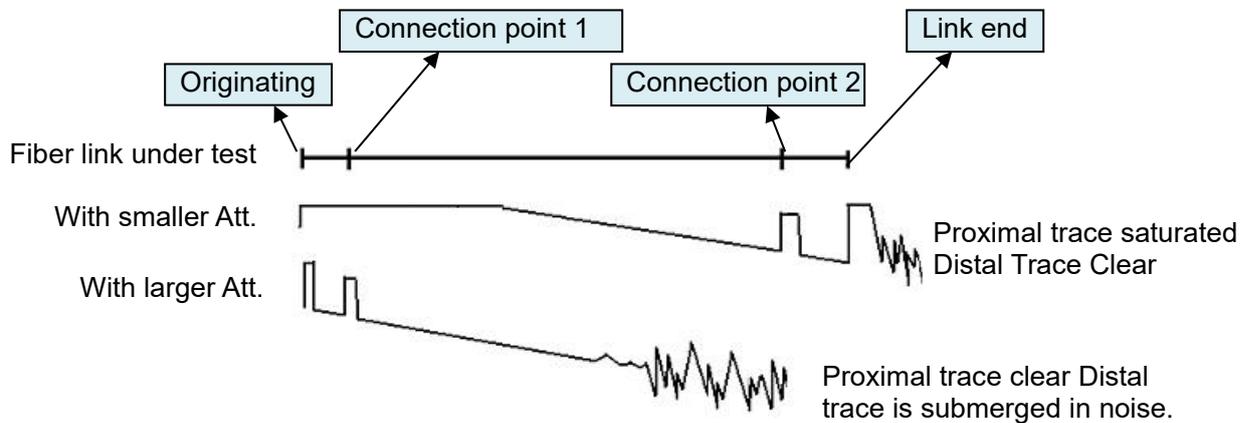
Figure 8-2 Fiber Link measurement in not entirely display trace test mode

After this item is selected, the instrument will adjust test pulse width and attenuation automatically and display the complete trace of fiber link under test from proximal end to distal end on screen as shown in Figure 8-3.
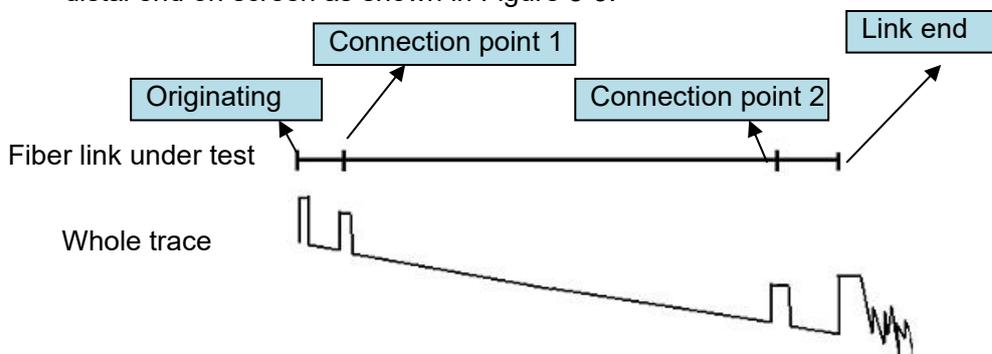
Figure 8-3 Fiber link measurement in full range trace test mode

1.1.3 Test Items of OTDR

The test items of OTDR can be: average loss, splice loss and reflection loss.

Note! After test item is selected, corresponding test results will be displayed in display.

● Average Loss:

Then, the test results displayed on OTDR main screen are: loss between A and B, distance between maker A & B and average loss of fiber section between marker A & B as shown in Figure 8-4.
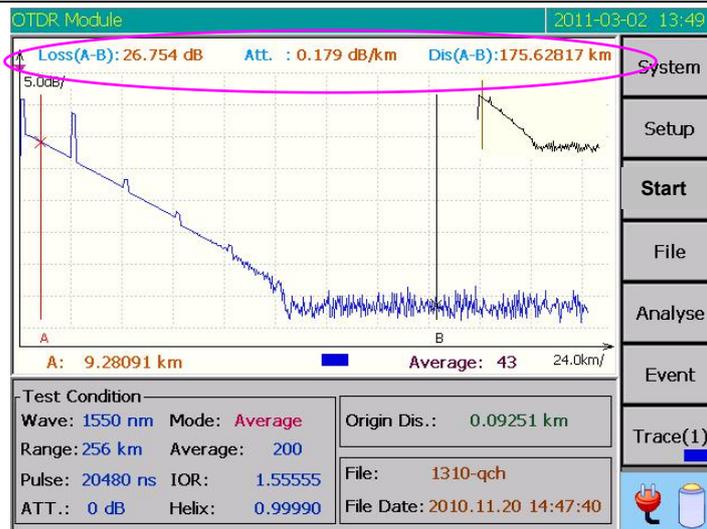
Figure 8-4　Average loss test

Loss (A-B):26.754dB　　: Loss between marker A & B

Att. : 0.179dB/km　　　: Average loss of fiber section between marker A & B

Dis(A-B):175.62817km　: Distance between marker A & B

Note　In average loss test, marker A & B must be placed on the linear area of fiber trace (as shown in Figure 8-4 above, otherwise the calculated average loss will have bigger error.

- Splice Loss:

Then, the OTDR main screen will display four markers, and meanwhile test results will include the splice loss at the connection point of marker A, the average loss of previous fiber section before connection point and the average loss next fiber section after connection point as shown in Figure 8-5.

Figure 8-5 Splice loss test

Att.(a-A): 0.220dB/km　　:Average loss of fiber section of marker a & A

(B-b):0.000dB/km　　　　:Average loss of fiber section of marker B & b

Splice: -1.1193dB　　　　:Splice loss of connection point of marker A

Note! 1. During splice loss test, four markers will appear: marker a, A, B and b in turn.

2. During test, place marker a & A on the linear area of fiber trace before connection point, with marker A near the connection point.

3. During test, place marker B & b on the linear area of fiber trace after connection point.

● Reflection Loss:

OTDR main screen displays the reflection loss of fiber reflection peak of marker A & B and the distance between marker A & B.
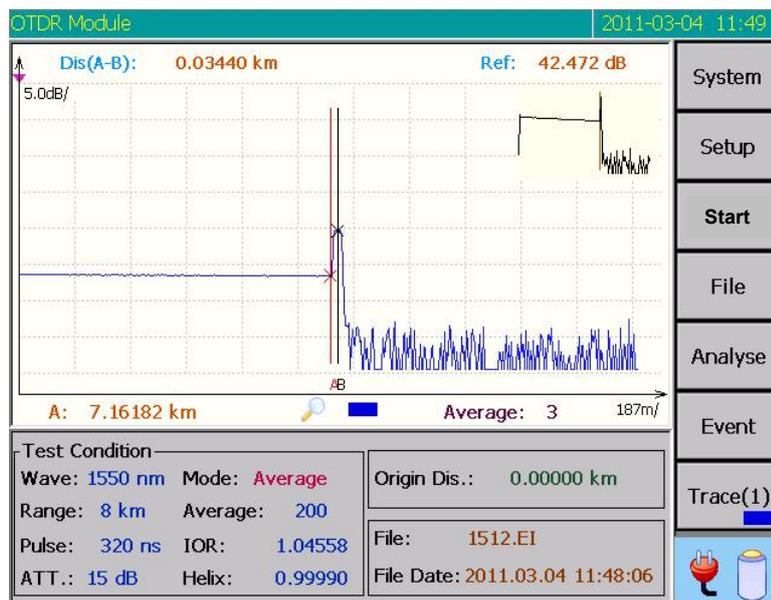
Dis(A-B): 0.03440km : Distance between marker A & B

Ref: 42.472dB :Reflection loss of reflection peak of marker A & B

Note 1. During test, place marker A before the reflection peak under test and near the jump of the peak.

2. During test, place marker B on the top of reflection peak under test.

1.1.4 Event Analyse and Pass Threshold

In the setup interface of OTDR test conditions, event analyse and pass threshold can be set.

✧ Loss Analyse Threshold: During trace data analyse, when the calculated splice loss of event point is larger than loss analyse threshold, this event point will be marked, and otherwise, it will be ignored automatically.

✧ Splice Loss Pass Threshold: In event list, when the calculated splice loss of event point is larger than the set splice loss pass threshold, the splice loss value will be marked with ∗.

✧ Reflection Loss Pass Threshold: In event list, when the calculated reflection loss of event point is larger than the set reflection loss pass threshold, the reflection loss value will be marked with ∗.

✧ Fiber Breakpoint Threshold: If the splice loss of event point is larger than the set fiber breakpoint threshold, this point will be taken as fiber breakpoint, all the event points after that will be ignored and not be displayed in the list.

1.2 Set OTDR Test Conditions

Note! Set OTDR test conditions at the stopping test state.

1.2.1 Enter OTDR Test Condition Setup Window

Enter OTDR test condition setup window through three methods:

✧ Press the test condition display area in the main screen to enter OTDR test condition setup window.
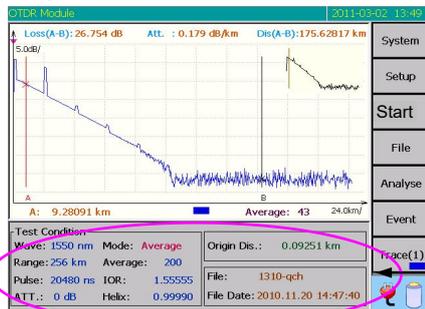
Press this area to enter test condition setup window

Figure 8-7

✧ Press the 【Setup】menu in the main menu bar to enter the setup sub-menu, and then press 【Condition】menu to enter OTDR test condition setup window.
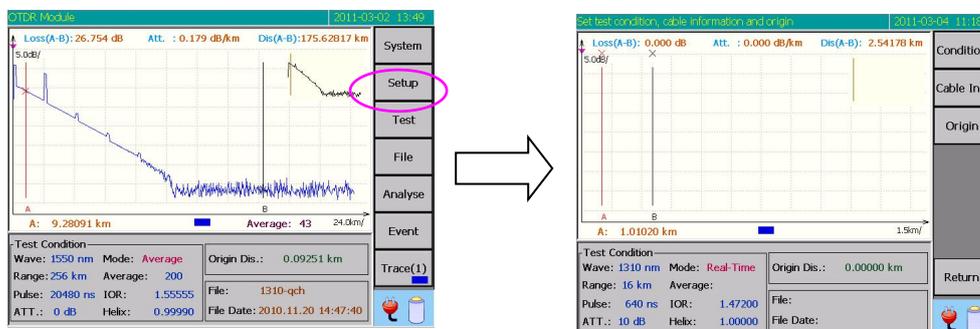

Figure 8-8

✧ Press the 【Setup】key on the following panel to enter OTDR test condition setup window.

Figure 8-9

1.2.2 Set Test Mode

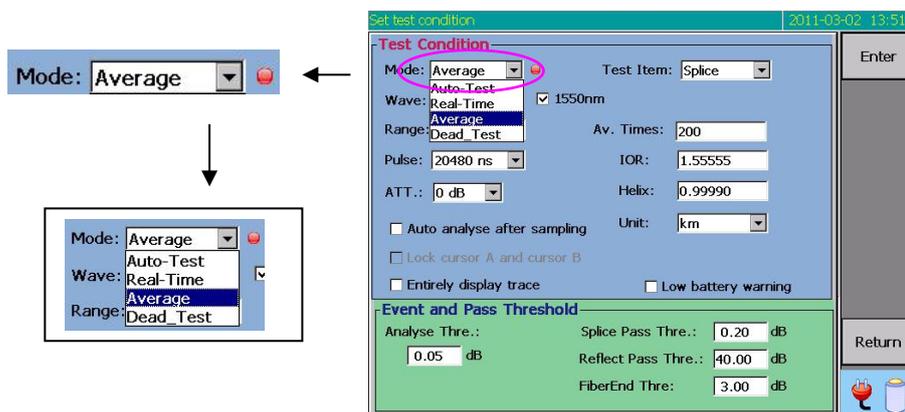Modify and set test mode through the following description:

Figure 8-10 Set test mode

✧ Touch screen Operation: Press "Mode" option bar, the active cursor will jump to this option bar; press the ▼ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the 【Enter】 menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press【Return】menu on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

✧ Key Operation: use ◀/ ▶ to move active cursor (🔴) to "Mode" option; then use ▲/▼ to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the modification and return to the main screen.

Note   Once the *Real-Time* test is selected, the average times setting is invalid.

1.2.3 Set Test Item

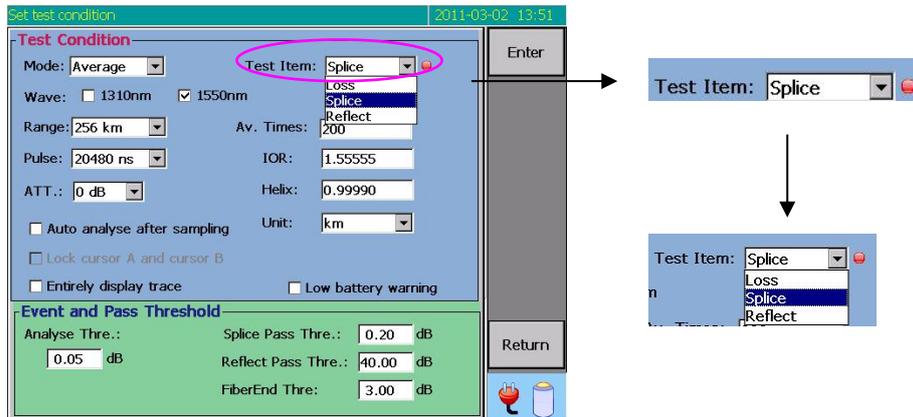Modify and set the OTDR test item through the following description:

Figure 8-11Set test item

◇ Touch screen Operation: Press "Test Item" option bar, the active cursor will jump to this option bar; press the ▼ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the【Enter】 menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press 【Return】menu on the option bar to cancel the setting and exit from the setup interface back to the main screen.

◇ Key Operation: use ▶/◀ keys to move active cursor (🔴) to "Item" option; then use ▲/▼ keys to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the modification and return to the main screen.

| Note! | (1) There are two markers (marker A and marker B) when the test item is set as average loss or reflection loss. |

(2) There are four markers (marker a, marker A, marker B and marker b) when the test item is set as splice loss.

1.2.4 Set Test Wavelength

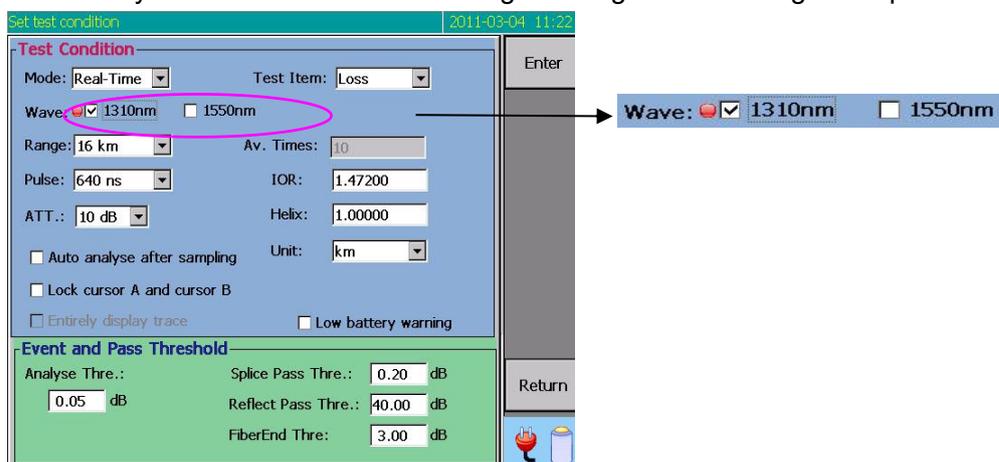Modify and set OTDR test wavelength through the following description:

Figure 8-12 Set test wavelength

Note! The currently displayed optional wavelength is different with the configurated module of the instrument, there are four wavelengths for optional at most.

✧ Touch screen Operation: press any one of wavelength among "Wave" options, the active cursor will jump to this wavelength option; if this wavelength is not be selected, the checkbox before wavelength will display □, after pressing, it indicates the wavelength is selected, the checkbox before wavelength displays ☑, it indicates to select this wavelength to test; on the contrary, before pressing, this wavelength has been selected, pressing indicates the selection has been cancelled. Then press 【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface back to the main screen; press 【Return】 menu on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

✧ Key Operation: use ▶/◀ to move active cursor (🔴) to the wavelength option to be selected; then use ▲/▼ to select or cancel selecting this wavelength. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc to cancel the modification and return to the main screen.

1.2.5 Se Test Range

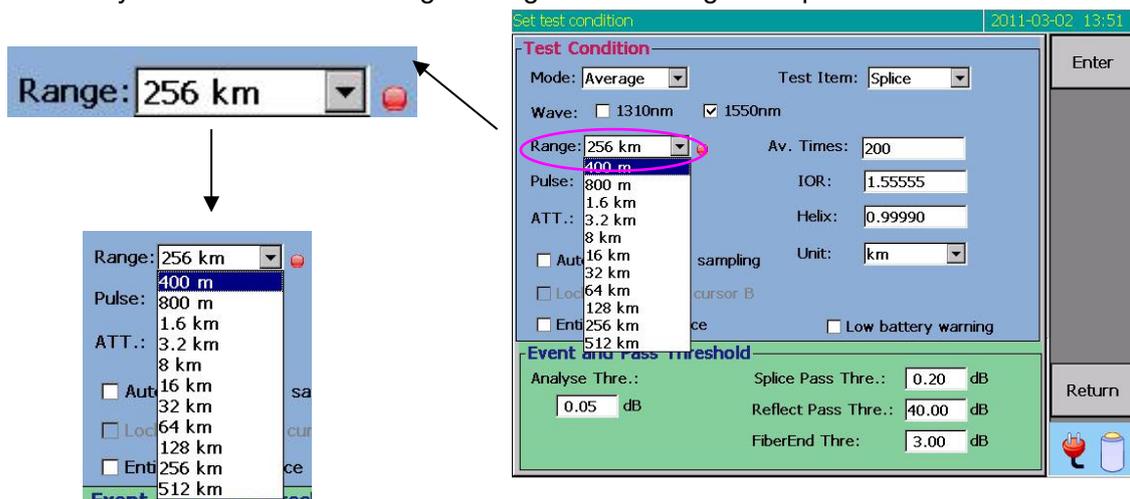Modify and set OTDR test range through the following description:

Figure 8-13 Set test range

✧ Touch screen Operation: Press "Range" option bar, the active cursor will jump to this option bar; press the ▼ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the 【Enter】 menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press 【Return】 menu on the option bar to cancel the setting and exit from the setup interface back to the main screen.

✧ Key Operation: use ▶/◀ keys to make active cursor (🔴) to "Range" option; then use ▲/▼ keys to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the setting back to the main screen.

Note! (1) The values of range are 400m, 800m, 1.6km, 3.2km, 8km, 16km, 32km, 64km, 128km, 256km and 512km.

(2) It should be increased to a value greater than the fiber length (best twice than the fiber length).

1.2.6 Set Test Pulse Width

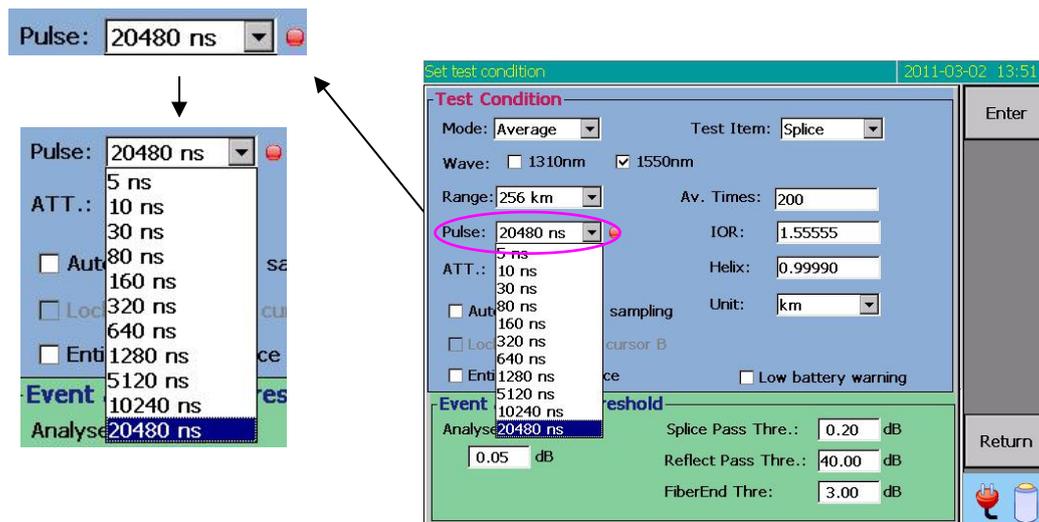Modify and set the OTDR pulse width through the following description:

Figure 8-14 Set test pulse width

◇ Touch screen Operation: Press "Pulse" option bar, the active cursor will jump to this option bar; press the ⏷ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the【Enter】menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press【Return】menu on the option bar to cancel the setting and exit from the setup interface back to the main screen.

◇ Key Operation: use ▶/◀ keys to make active cursor (●) to "Pulse" option; then use ▲/▼ keys to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the setting back to the main screen.

Note! (1) It is allowed that the selected pulse width is in relation with the test range.

(2) A larger pulse width can test the longer fiber, but resulting in less resolution.

A smaller pulse width provides higher resolution, but shorter test distance.

1.2.7 Set Test Attenuation

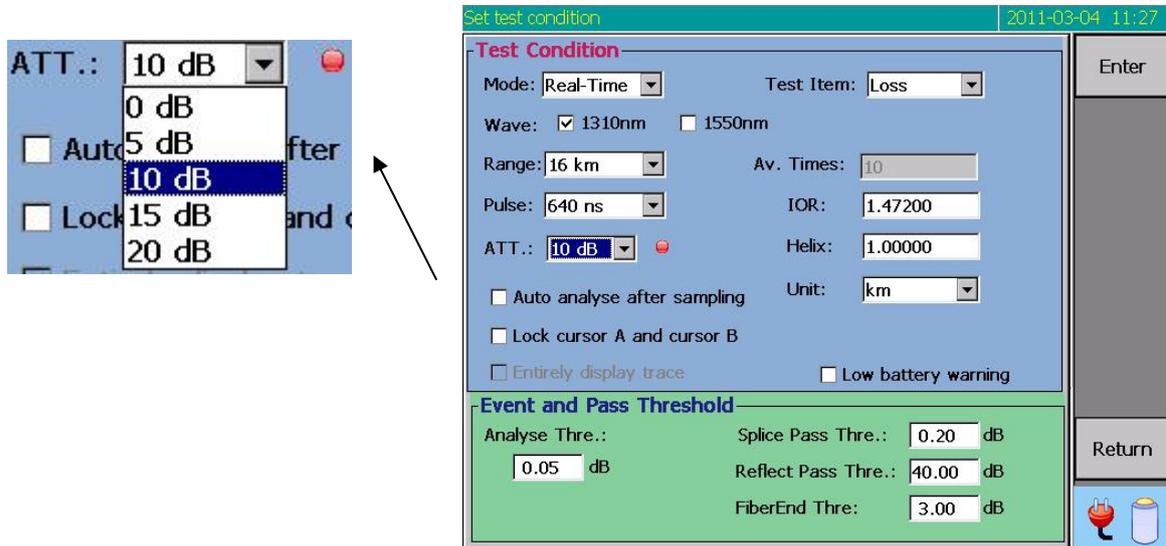Modify and set the OTDR test attenuation through the following description:

Figure 8-15 Set test attenuation

◇ Touch screen Operation: Press "Att." option bar, the active cursor will jump to this option bar; press the ▼ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the 【Enter】 menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press【Return】menu on the option bar to cancel the setting and exit from the setup interface back to the main screen.

◇ Key Operation: use ▶/◀ keys to make active cursor (🔴) to "Att." option; then use ▲/▼ keys to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the setting back to the main screen.

Note!

(1) When other test conditions are the same, the value of attenuation is set as 0dB, the testable optical fiber distance is longest, the signal to noise ratio of trace is relative good, but it may make the OTDR near-end trace saturated so that the near-end trace can not be observed.

(2) When other test conditions are the same, the value of attenuation is set as 20dB, the testable optical fiber distance is shortest, and the signal to noise ratio of trace is poor, but it can achieve smaller test blind zone.

(3) Under the Manual test mode (that means real-time test mode and average test mode), the test attenuation should be selected according to the optical fiber to be tested.

(4) When "Entirely display trace" is selected, and the test range is more than 64km (that means when measuring relative long optical fiber link), the instrument will automatically adjust attenuation setup and display the complete optical fiber link near-end and far-end trace on the display.

1.2.8 Set Average Times

Modify and set the OTDR average times through the following description:

Note! Only when the test mode is average test, Dead test or auto test, it is allowed to set average times.

Edit box ←

Prompt message about the range of the input value.
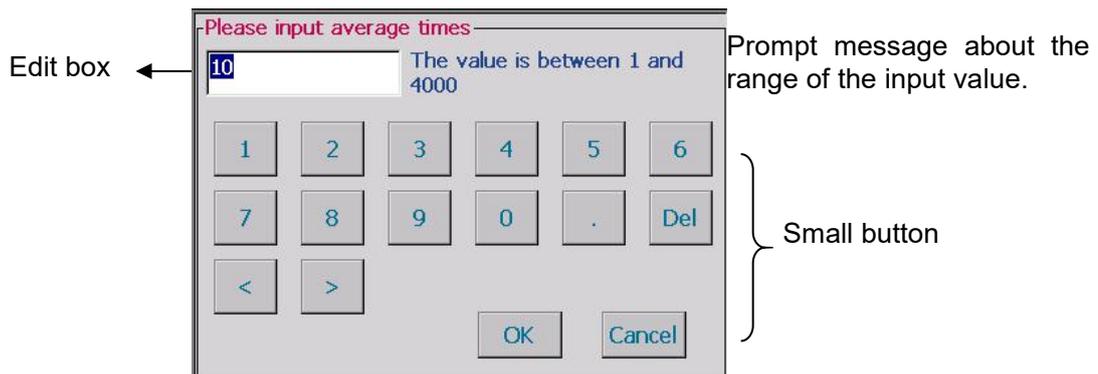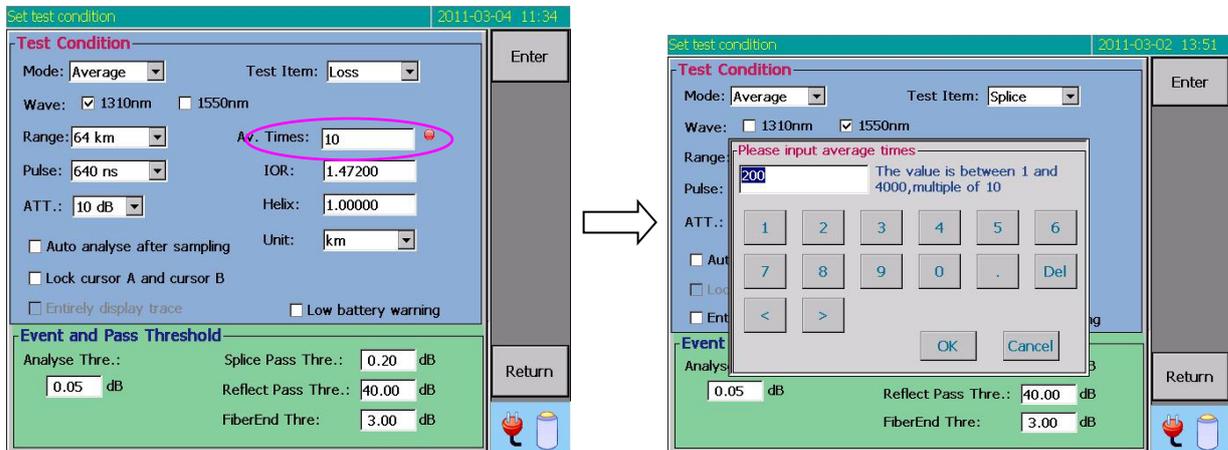
Small button

Value input interface

Figure 8-16 Set average times

✧ Touch screen Operation: press the edit box of "Av.Times" option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➢ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➢ < : Move the cursor in the edit box left.

➢ > : Move the cursor in the edit box right.

➢ 1 ~ . : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➢ Enter : Confirm the input value, exit value input interface and return to the OTDR

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test condition setup interface.

➢ **Cancel** : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

✧ Key Operation: use ▶/◀ keys to move active cursor to (🔴) "Av.Times" option; then use ▲/▼ keys to pop up value input interface; on this interface, select the number button to be input through ▶/◀ keys(at this time quick select can be realized through ▲/▼), press Enter key to input the character on the small button in the edit box or execute the corresponding function; execute **Enter** button function to confirm the modification of the value and exit from the value input interface to OTDR test condition setup interface; execute **Cancel** button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Note! (1) The value range of average test mode is from 1 to 4000.
(2) The value range of auto test mode is from 5 to 20.

1.2.9 Set IOR

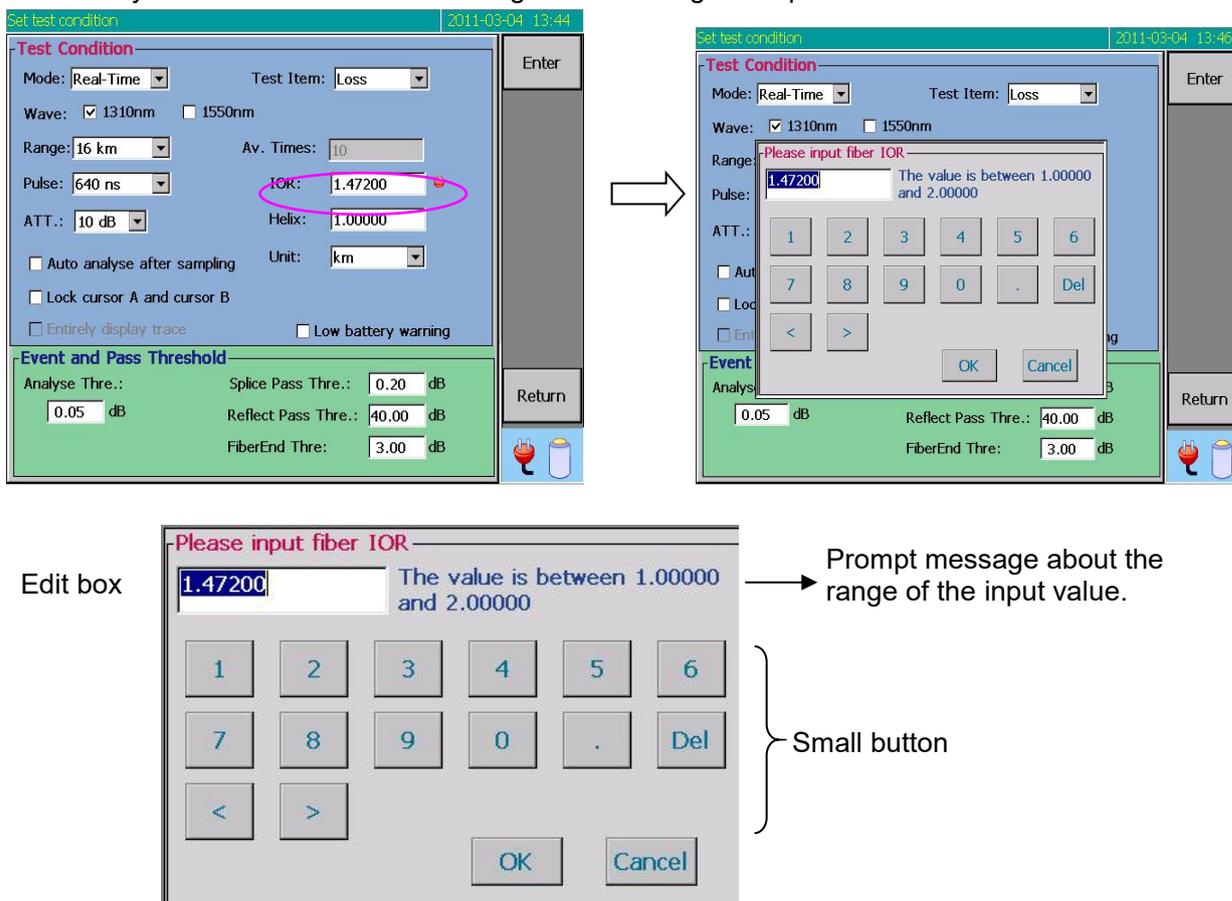Modify and set the OTDR IOR through the following description:

Figure 8-17 Set IOR

◇ Touch screen Operation: press the edit box of "IOR" option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➤ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➤ < : Move the cursor in the edit box left.

➤ > : Move the cursor in the edit box right.

➤ 1 ~ . : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➤ Enter : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➤ Cancel : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

◇ Key Operation: use ◀/▶ to move active cursor to (🔴) "IOR" option; then use ▲/▼ to pop up the value input interface; on this interface, select the number button to be input through ◀/▶keys(at this time quick select can be realized through ▲/▼, press Enter key to input the character on the small button in the edit box or execute the corresponding function; execute Enter button function to confirm the modification of the value and exit from the value input interface, return to the OTDR test condition setup interface; execute Cancel button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! (1) Inaccurate reflective index will result in inaccurate measured optical fiber length.

(2) Reflective index range: 1.00000～2.00000.

1.2.10 Set Helix

Modify and set the OTDR helix through the following description:
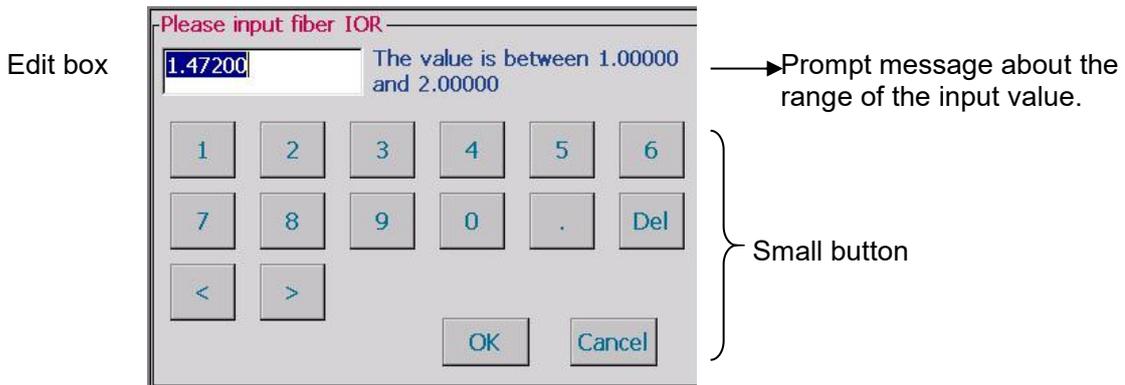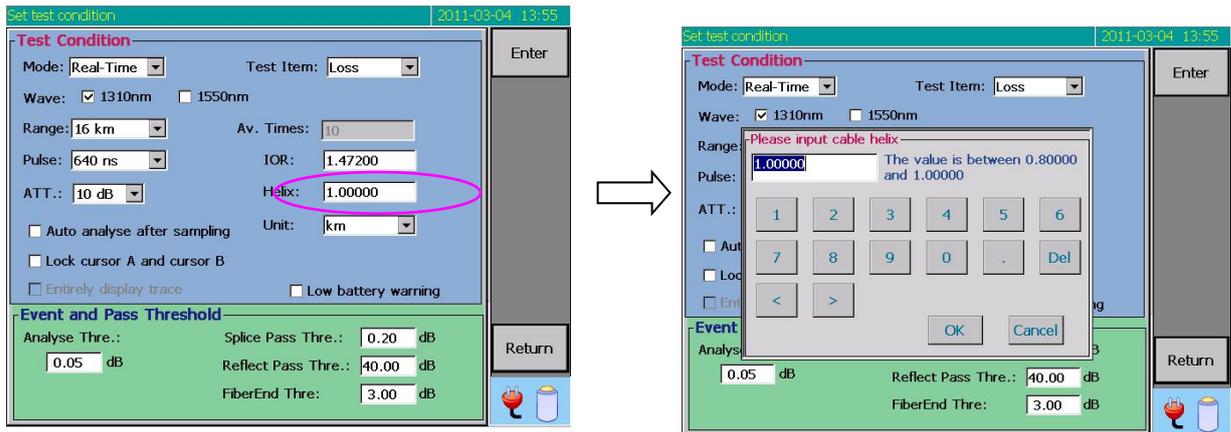
Value input interface

Figure 8-18 Set helix

✧ Touch screen Operation: press the edit box of "Helix" option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➤ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➤ < : Move the cursor in the edit box left.

➤ > : Move the cursor in the edit box right.

➤ 1 ~ . : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➤ Enter : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➤ Cancel : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the

modification and exit from the setup interface to the main screen.

✧ Key Operation: use ▶/◀ to move active cursor to (🔴) "Helix" option; then use ▲/▼ to pop up value input interface; on this interface, select the number button to be input through ▶/◀ (at this time quick select can be realized through ▲/▼), press Enter key to input the character on the small button in the edit box or execute the corresponding function; execute Enter button function to confirm the modification of the value and exit from the value input interface, return to the OTDR test condition setup interface; execute Cancel button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! (1) Inaccurate helix will result in inaccurate measured optic cable length.

(2) Helix range: 0.80000～1.00000.

1.2.11 Set Length Unit

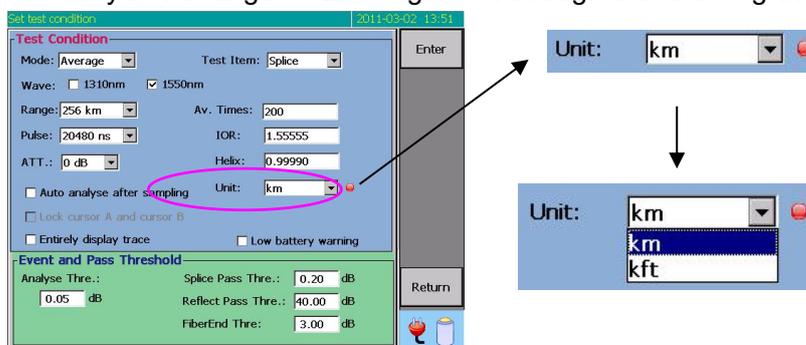Modify and change OTDR length unit through the following description:

Figure 8-19 Set length unit

✧ Touch screen Operation: Press "Unit" option bar, the active cursor will jump to this option bar; press the ▼ button on this option bar to eject a drop-down window with all options, as shown in the above figure. Now press the option to be set. Then press the 【Enter】 menu on the option bar to confirm setting and exit from the setup interface back to the main screen; press【Return】menu on the option bar to cancel the setting and exit from the setup interface back to the main screen.

✧ Key Operation: use ▶/◀ to make active cursor (🔴) to "Unit" option; then use ▲/▼ keys to change and set the mode option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc key to cancel the modification and return to the main screen.

1.2.12 Set Auto Analyse after Sampling

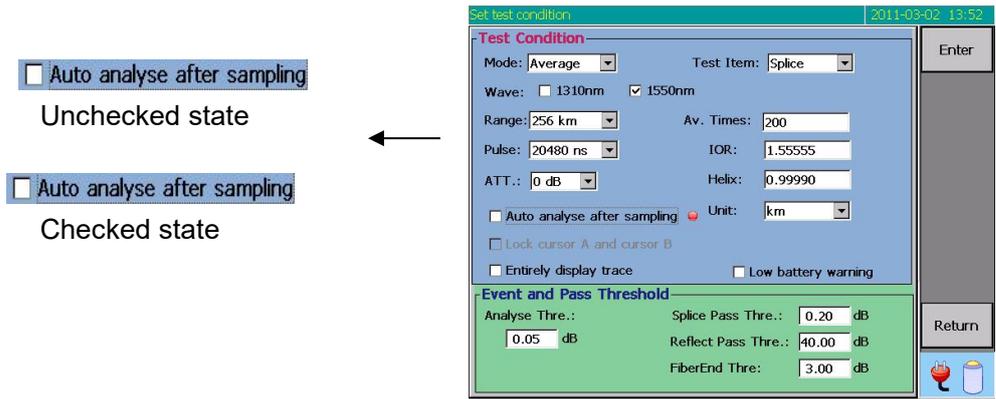Modify and set the OTDR auto analysis after sampling through the following description:

Figure 8-20 Set auto analyse after sampling

◇ Touch screen Operation: press "Auto analyse after sampling" option, the active cursor will jump to this option; if this option has not been selected before, the checkbox before it will display □, after pressing, it indicates the option is selected, the checkbox before it displays ☑, it indicates to select this option; on the contrary, before pressing, this option has been selected, pressing indicates the selection has been cancelled. Then press 【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface back to the main screen; press 【Return】 on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

◇ Key Operation: use ▶/◀ to move active cursor (🔴) to the "Auto analysis after sampling" option to be selected; then use ▲/▼ to select or cancel selecting this option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc to cancel the modification and return to the main screen.

| Caution! | After this option is selected, the instrument will analyze the test data after completing the test and give event list. |

1.2.13 Set to lock Marker A, B

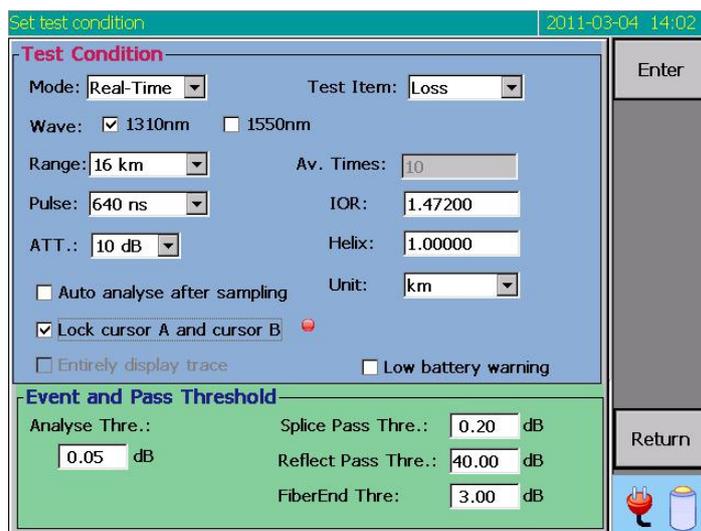Modify and set the OTDR lock of cursor A, B through the following description:

Figure 8-21 Set to lock cursor A, B

✦ Touch screen Operation: press "Lock Cursor A and Cursor B" option, the active cursor will jump to this option; if this option has not been selected before, the checkbox before it will display □, after pressing, it indicates the option is selected, the checkbox before it displays ☑, it indicates to select this option; on the contrary, before pressing, this option has been selected, pressing indicates the selection has been cancelled. Then press 【Enter】menu on the menu bar to confirm the setting and exit from the setup interface back to the main screen; press 【Return】menu on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

✦ Key Operation: use ▶/◀ to move active cursor (●) to the "Lock cursor A and Cursor B" option to be selected; then use ▲/▼ to select or cancel selecting this option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc to cancel the modification and return to the main screen.

Caution!
1. After this option is selected, distance between cursor A and cursor B will be locked, no matter cursor A or cursor B moves, the other cursor will follow to move to keep the distance of two cursors unchanged.

2. Only during testing average loss or reflection loss, this option is effective.

1.2.14 Set On-line Test

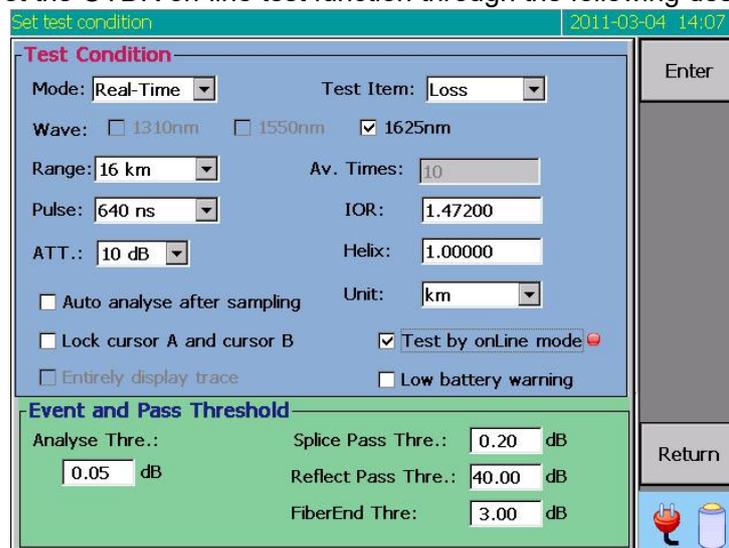Modify and set the OTDR on-line test function through the following description:

Figure 8-22 Set on-line test

✦ Touch screen Operation: press "Test by online mode" option, the active cursor will jump to this option; if this option has not been selected before, the checkbox before it will display□, after pressing, it indicates the option is selected, the checkbox before it displays ☑, it indicates to select this option to test; on the contrary, before pressing, this option has been selected, pressing indicates the selection has been cancelled. Then press 【Enter】menu on the menu bar to confirm the setting and exit from the setup interface back to the main screen; press 【Return】menu on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

✦ Key Operation: use ▶/◀ to move active cursor (●) to the "Test by online mode"

option to be selected; then use ▲/▼ to select or cancel selecting this option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc to cancel the modification and return to the main screen.

Caution! 1. After this option is selected, during testing the instrument, turn on the filter to perform test.

2. Only when the module that instrument configured has filter, this option is effective.

1.2.15 Set Entirely Display Trace Test Mode

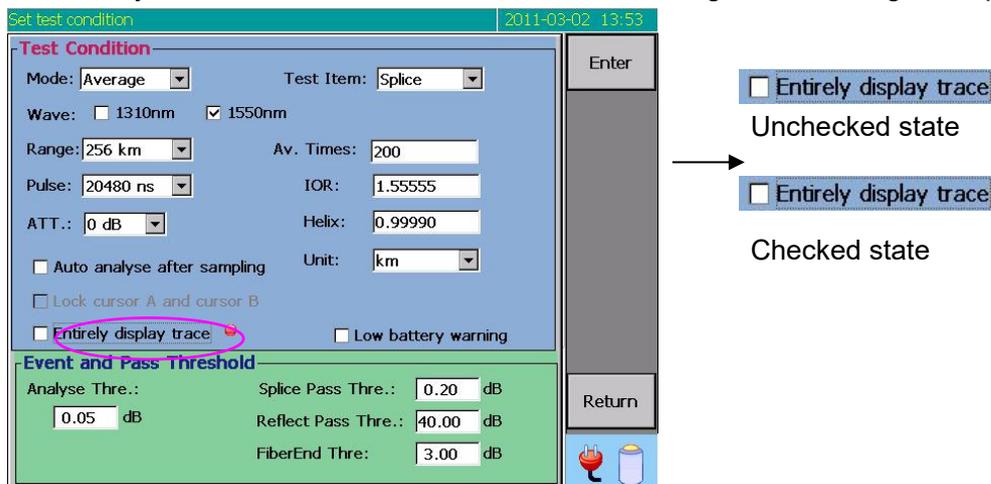Modify and set the OTDR on-line test function through the following description:

Figure 8-23 Set entirely display trace mode

✧ Touch screen Operation: press among "Entirely display trace" option, the active cursor will jump to this option; if this option has not been selected before, the checkbox before it will display ☐, after pressing, it indicates the option is selected, the checkbox before it displays ☑, it indicates to select this option to test; on the contrary, before pressing, this option has been selected, pressing indicates the selection has been cancelled. Then press 【Enter】menu on the menu bar to confirm the setting and exit from the setup interface back to the main screen; press 【Esc】 menu on the menu bar to cancel the setting and exit from the setup interface back to the main screen.

✧ Key Operation: use ▶/◀ to move active cursor (🔴) to the "Entirely display trace" option to be selected; then use ▲/▼ keys to select or cancel selecting this option. Finally press Enter key to confirm the setting and exit from the setup interface back to the main screen; press Esc to cancel the modification and return to the main screen.

Caution! Only when the test range exceeds 64km, this will be effective.

1.2.16 Set Loss Analyse Threshold

Modify and set OTDR loss analysis threshold through the following description:
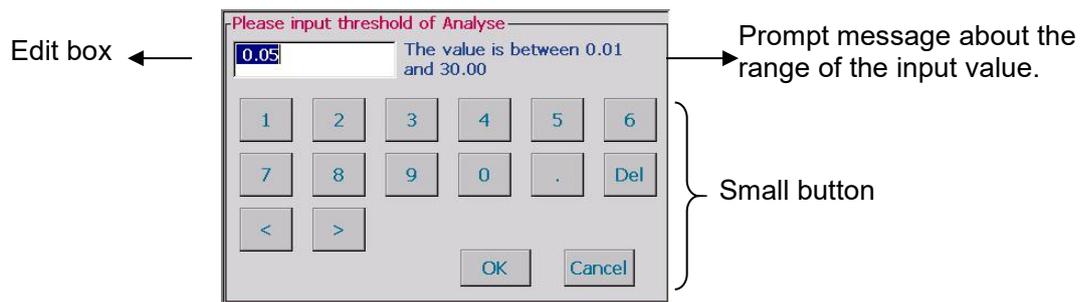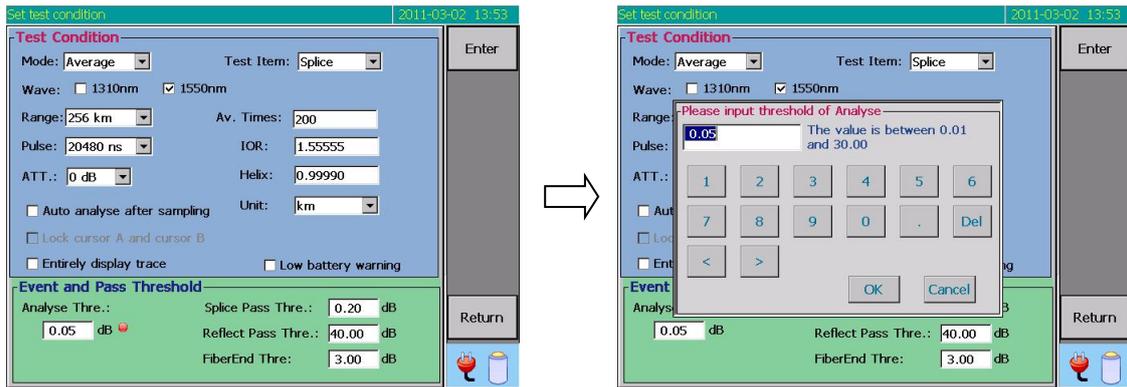
Value input interface

Figure 8-24 Set loss analysis threshold

◇ Touch screen Operation: press the edit box of "Analyse Thre." option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➢ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➢ < : Move the cursor in the edit box left.

➢ > : Move the cursor in the edit box right.

➢ 1 ~ . : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➢ Enter : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➢ Cancel : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

◇ Key Operation: use ▶/◀ to move active cursor to (🔴) "Analyse Thre." option; then use ▲/▼ to pop up value input interface; on this interface, select the

number button to be input through ▶/◀ (at this time quick select can be realized through ▲/▼, press Enter key to input the character on the small button in the edit box or execute the corresponding function; execute Enter button function to confirm the modification of the value and exit from the value input interface, return to the OTDR test condition setup interface; execute Cancel button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! During analyzing trace, if the calculated event point splice loss is bigger than the analysis threshold, this event point will be marked; or it will be neglected automatically.

1.2.17 Set Splice Loss Pass Threshold
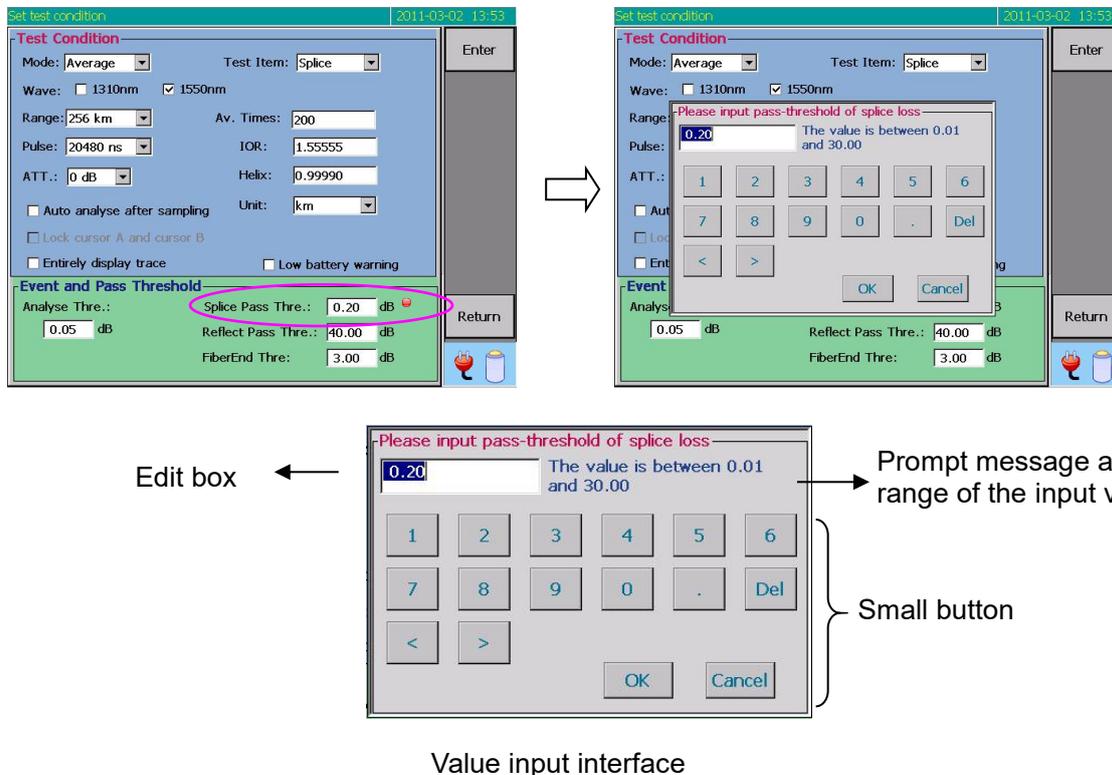
Modify and set the OTDR splice loss pass threshold:

Figure 8-25 Set splice loss pass threshold

✧ Touch screen Operation: press the edit box of "Splice Pass Thre." option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➢ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➢ < : Move the cursor in the edit box left.

➢   >   : Move the cursor in the edit box right.

➢   1   ~   .   : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➢   Enter : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➢   Cancel : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

✧   Key Operation: use ▶/◀ to move active cursor to (🔴) "Splice Pass Thre." option; then use ▲/▼ to pop up value input interface; on this interface, select the number button to be input through ▶/◀ (at this time quick select can be realized through ▲/▼), press Enter key to input the character on the small button in the edit box or execute the corresponding function; execute Enter button function to confirm the modification of the value and exit from the value input interface to OTDR test condition setup interface; execute Cancel button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! In the event list, when the calculated splice loss of the event point is bigger than splice loss pass threshold, splice loss value will be marked with *.

1.2.18 Setting Reflection Loss Pass Threshold

Modify and set the OTDR reflection loss pass threshold:
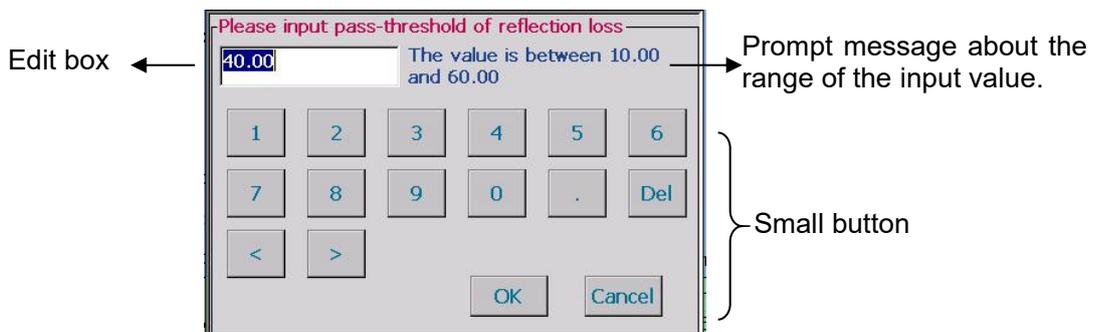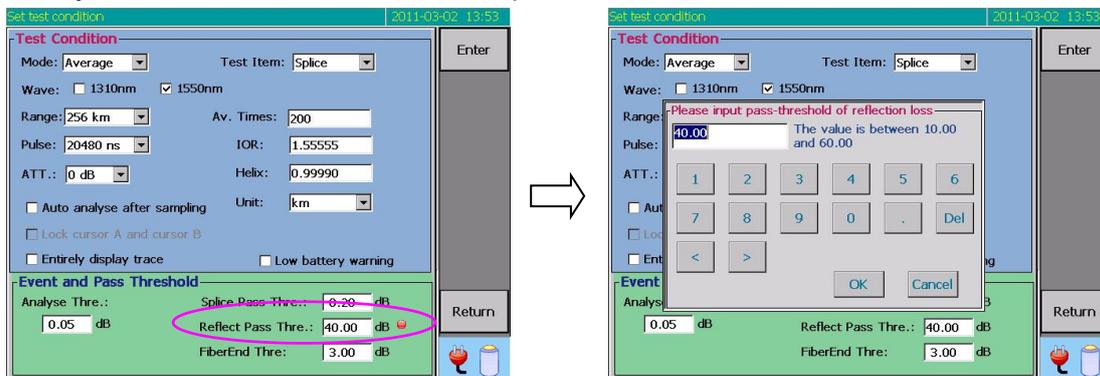
Value input interface

Figure 8-26 Set reflection loss pass threshold

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✧ Touch screen Operation: press the edit box of "Reflect Pass Thre." option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➢ Del : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➢ < : Move the cursor in the edit box left.

➢ > : Move the cursor in the edit box right.

➢ 1 ~ . : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➢ Enter : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➢ Cancel : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press【Return】menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

✧ Key Operation: use ▶/◀ keys to move active cursor to (●) "Reflect Pass Thre." option; then use ▲/▼ keys to pop up value input interface; on this interface, select the number button to be input through ▶/◀ (at this time quick select can be realized through ▲/▼), press Enter key to input the character on the small button in edit box or execute corresponding function; execute Enter button function to confirm the modification of the value and exit from the value input interface to OTDR test condition setup interface; execute Cancel button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! In the event list, when the calculated reflection loss of the event point is bigger than reflection loss pass threshold, reflection loss value will be marked with *.

1.2.19 Set Fiber End Threshold

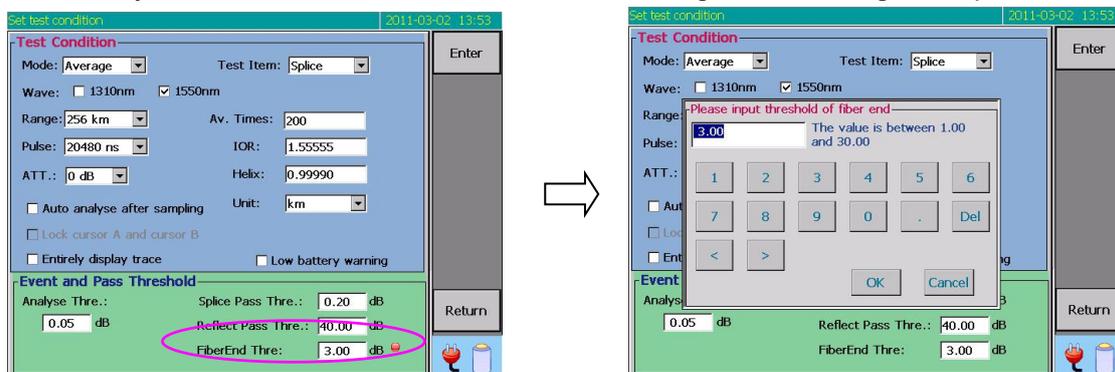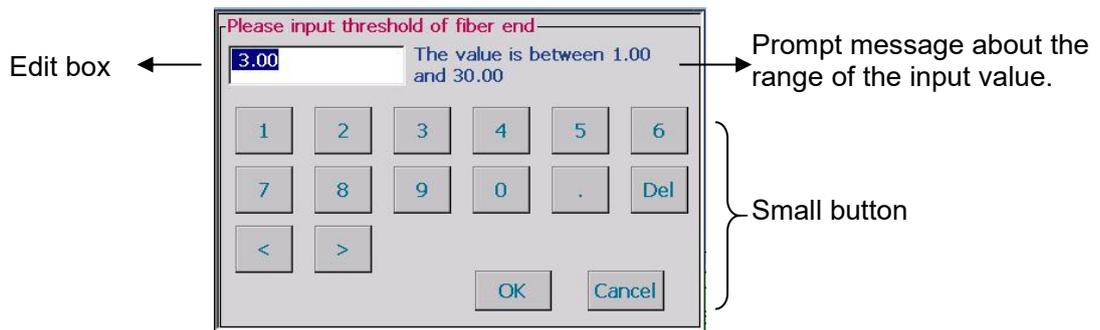Modify and set the OTDR fiber end threshold through the following description:

Figure 8-27 Set fiber end threshold

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Edit box ←

Please input threshold of fiber end

3.00 | The value is between 1.00 and 30.00

→ Prompt message about the range of the input value.

1	2	3	4	5	6
7	8	9	0	.	Del
<	>				

OK | Cancel

Small button

Value input interface

✧ Touch screen Operation: press the edit box of "Fiber End Thre." option, the active cursor will jump to this option bar, at the same time pop up value input interface; on this interface, press the small button, the character on the small button will be input into the position of cursor in the edit box, if the small button is not character, pressing will execute corresponding function:

➢ **Del** : If there is character after the cursor in the character edit box at this time, it will delete the character after the cursor; if there is not character after the cursor, it will delete the character before the cursor.

➢ **<** : Move the cursor in the edit box left.

➢ **>** : Move the cursor in the edit box right.

➢ **1** ~ **.** : The displayed character on the small button to be input into the position of the cursor in the character edit box.

➢ **Enter** : Confirm the input value, exit value input interface and return to the OTDR test condition setup interface.

➢ **Cancel** : Cancel modification, exit from the value input interface and return to OTDR test condition setup interface.

Press 【Enter】 menu on the menu bar to confirm the setting and exit from the setup interface to the main screen; press 【ESC】 menu on the menu bar to cancel the modification and exit from the setup interface to the main screen.

✧ Key Operation: use ▶/◀ to move active cursor to (■) "Fiber End Thre." option; then use ▲/▼ to pop up value input interface; on this interface, select the number button to be input through ▶/◀ (at this time quick select can be realized through ▲/▼), press Enter to input the character on the small button in edit box or execute corresponding function; execute **Enter** button function to confirm the modification of the value and exit from the value input interface to OTDR test condition setup interface; execute **Cancel** button function to cancel the modification of the value and exit from the value input interface to OTDR test condition setup interface; when back to OTDR test condition setup interface, press Enter to confirm the setting and exit from the setup interface to the main screen; press Esc to cancel modification and exit to the main screen.

Caution! When the splice loss of event point is bigger than the set optical fiber end threshold, this event point is optical fiber end; all events after this event point will be neglected and will not be displayed in the list.

1.3 Test Fiber Link

1.3.1 Auto Test

  ➢ Clean the tested optical fiber end face and connector, make sure the tested optical fiber is reliable and connected into the OTDR test port.

  ➢ Enter OTDR test condition setup interface. (See P27 for the detail of the operation)

  ➢ Use ▶/◀ to move active cursor (🔴) to "Mode" option or press "Mode" option directly through touch screen to select the OTDR test mode: *Auto Test.*

  ➢ Operate it the same as above, set *Times, Wavelength, IOR, Helix* and all *Threshold*.

  ➢ Confirm OTDR Parameter Setting and return to main screen. Press (Test) key, the instrument will automatically set test range, pulse width and attenuation, scan optical fiber to be tested and display the trace on the operating interface.

  ➢ After testing optical fiber trace, the instrument will automatically stop scanning and analyze the trace, analyze threshold value according to the setting loss, mark the event point on the trace, at the same time display the event point information on the event table.

  Note! (1) The bigger average times is set in the auto test, the longer time testing of trace needs, the signal to noise ratio of testing trace in convenience for the analysis of event point.

1.3.2 Manual Test

  ➢ Clean the end face of the optical fiber to be tested, make sure the optical fiber to be tested is connected into OTDR test port reliably.

  ➢ Enter OTDR test condition setup interface. (See P27 for the detail of the operation)

  ➢ Use ▶/◀ to move active cursor (🔴) to "Mode" option or press "Mode" option directly through touch screen to select the OTDR test mode: *Real-Time Test* or *Average Test* or *Dead Zone Test.*

  ➢ Operate it the same as above, set test *Wavelength, Pulse Width, Att. IOR, Helix* and all *Threshold*. When the test mode is average test or dead zone test, the average times should be set.

  ➢ Confirm OTDR parameter setting and return to main screen. Press (Test) key, the instrument will scan optical fiber to be tested according to the set test mode and test parameter and display the trace on the operating interface.

  ➢ Press (Esc) key to stop sweep test at any time. If the test mode is average test or dead zone test, the average times displayed in the trace displayer area is equal to the set average times, the instrument will automatically stop testing.

  ➢ Press【Analyse】menu item on the main menu bar, the instrument will automatically analyze the trace and give event table according to the set event threshold. If it is set "Auto analyse after sampling", when stopping test, the instrument will automatically analyze the trace.

  ➢ It can also set the proper mark point position through setting test item, check the distance and loss information of the optical fiber to be tested on the trace and result display area.

Note! (1) Under the real-time test mode, the instrument will make real-time scan for the change of the optical fiber to be test, but not make average handling for it.

(2) Under average test mode, after the instrument scanning tests the trace of optical fiber to be tested, make average super position treatment to the trace continuously according to the set average times.

(3) Average test mode can achieve trace of higher signal to noise ratio. Under the same condition, the noise content in the trace received from average test is lower than that of real-time test, and the test result is more precise.

1.4 Analyzing Waveform Trace and Checking Event Table

Under the mode of "Auto Test", after testing, it will conduct a trace analysis automatically and list the event information in the event table.

Under the modes of "Real Time Test", "Average Test" and "Dead Zone Test", after stopping the test, press 【Analyse】 in the main menu bar and it will conduct a trace analysis. If "Auto analysis after sampling" is set, after stopping test, the instrument will conduct a trace analysis about the trace. After the trace analysis is finished and the event point is found, it will display the event information in the event table of the main screen in accordance with the every set event threshold; and at the same time, it will mark the location of the event point in the test trace and display the sub-menu bar of the event table.

1.4.1 Event Table in Main Screen

The event table in the main screen is shown as follows (in Figure 8-28). Here press ⊙/⊙ key and you can check information of all events in the event table one by one.
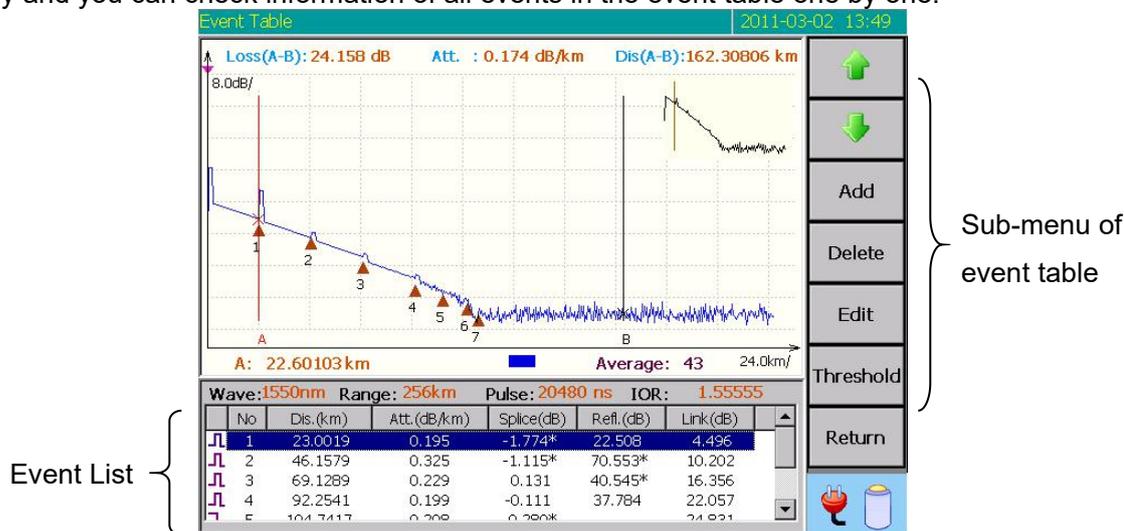

Figure 8-28 Event list window

1.4.2 Sub-window of Event List

After the trace analysis is done, you can check the content of the whole event table in the sub-window of the event list. (If after the trace analysis is done and no event point has been found then the event list will be blank.)

➢ Touch screen operation: Press the menu item of 【Event】 in the main menu bar and the display window for test conditions in the main screen will be hidden. And at the same place, there will be a popup sub-window of the event table, as shown in Figure 8-28. All the event points' information will be displayed in list in this window.

➢ Operation of pressing the key: Press ⓜ and the active cursor will be shifted into the main menu bar. Press ⓥ and it will shift the active cursor to the menu item of 【Event】; then press Ⓔ and the display window for test conditions in the main screen will be hidden. And at the same place, there will be a popup sub-window of the event table, as shown in Figure 8-28. All the event points information will be displayed in list in this window.

➢ Press ⓐ/ⓥ to move the cursor upward and downward to select different event points; or directly press the item in the event list and the cursor bar will select the pressed item; or press the menu item of 🔼 or 🔽 in the menu bar and move the cursor bar upward or downward to select different event points.

➢ Drag the move bar at the right of the event list and turn the page quickly forward or backward to display the content of the event list.

1.4.3 Add Event Points

Press the menu item of 【Add】 in the sub-menu bar of the event table and it will display the operating interface of adding event points, as shown in the following Figure 8-29.
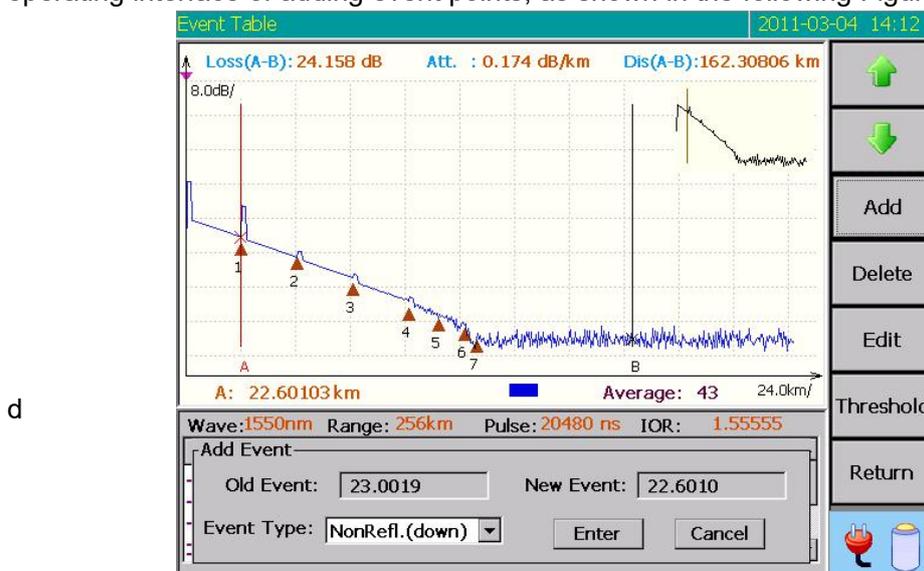
d

Figure 8-29 Operation interface of adding event points

➢ Press ⓐ/ⓥ to change the type of the event point, or press the drop-down list option of the event point type on the touch screen and select the type of the event point.

➢ Move the cursor to a location of a new event point.

➢ Press【Enter】 and it will add an event point at the place where the cursor locates in the event table and then it will go back to the event list interface. However, if after calculation and analysis, the splice loss of the new added event point is smaller than the set loss analysis threshold, or the location of the event point is wrong, the instrument will automatically give up the new added event point.

➢ Press 【Cancel】 and it will cancel the current operation and return to the event list interface.

➢ Under this status, the cursor lock will be relieved automatically.

1.4.4 Adjust Event Points

Press the menu item of 【Adjust】 in the sub-menu bar of the event list and it will display the operating interface of adjusting the added event points. The interface is as shown in Figure 8-29.

➢ Press ⊙/⊙ to change the type of the event point, or press the drop-down list option of the event point type on the touch screen and select the type of the event point.

➢ Move the cursor to a location of a new event point.

➢ Press【Enter】 and it will add a event point at the place where the cursor locates in the event table and then it will go back to the event list interface. However, if after calculation and analysis, the splice loss of the new added event point is smaller than the set loss analysis threshold, or the location of the event point is wrong, the instrument will automatically give up the new added event point.

➢ Press 【Cancel】 and it will cancel the current operation and return to the event list interface.

➢ Under this status, the cursor lock will be relieved automatically.

1.4.5 Set Threshold

Press the menu item of 【Threshold】 in the sub menu bar of event table and it will directly enter the setup interface of OTDR parameters. In this interface the event analysis threshold can be set.

2. Operation for Cursor and Test Trace

2.1 Move Cursor

➢ Under the main screen, press the display zone of the waveform trace on the screen and the current active cursor will jump to the point where you pointed on the screen.

➢ Under the main screen, press the ⊙/⊙ once and the current active cursor will move one data point to the left or right.

➢ Under the main screen, press the ⊙/⊙ without letting it go, and after it moves 10 data points continuously, the active cursor will move quickly with 10 data points every time. Let go of the key of ⊙/⊙ , and the active cursor will stop moving.

Note！ (1) Only the current active cursor can be moved.

(2) The current active cursor is red while the unactive cursor is black.

2.2 Set Active Cursor

Under the main screen, press the key of ⟨Enter⟩, and you can shift the active cursor among cursor A, cursor B, cursor a and cursor b. (Note: There are cursor a and cursor b only when testing splice loss)

2.3 Zoom in & out and Initialize Waveform Trace

➢ Press ⌾Zoom⌾ and it will display the symbol of zoom, as shown in Figure 8-30.
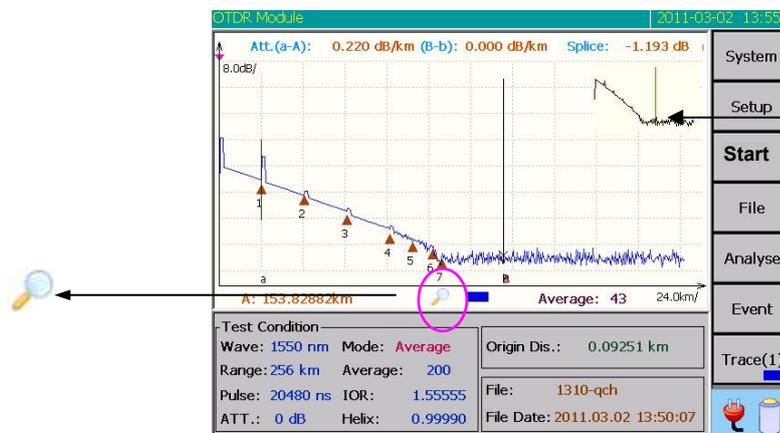
Press this zone and it will make the test trace get back to the status of overall display.

Figure 8-30 Zoom in & out trace

➢ At this moment press ◀/▶, then it will take the current active cursor as the center, zooming in or zooming out the test trace in a horizontal direction.

➢ At this moment press ▲/▼, then it will take the current active cursor as the center, zooming in or zooming out the test trace in a vertical direction.

➢ At this moment press wave form display zone and it will initialize the overall displayed test trace.

➢ Press ⌾Zoom⌾ again, and the zoom symbol will disappear and it will exit from the status of trace zoom.

2.4 Move Waveform Trace Vertically

When the instrument is at the main screen of OTDR and is not at the status of trace zoom, press ▲/▼ and it will move the waveform trace upward or downward in a vertical direction.

3. Measure Fiber Length and Loss

Besides pressing the 【Analyse】 button or setting "*Auto analysis after sampling*" to realize analyzing the length and loss information of the event point in the test trace automatically, you can also observe and analyze the length, loss, etc information of the tested fiber by the method of Manually setting the mark point.

3.1 Measure Fiber Length

To measure the length of any event point (or fiber end), the operation steps are as follows:

➢ Move the current active cursor around the event point (or reflection peak of the end of the fiber).

➢ Zoom the waveform trace to the maximum both in the horizontal and vertical direction.

➢ Well adjust the location of the active cursor and move it to the event point (or the take-off point of the reflection peak of the fiber end).

➢ The length of the mark point where the active cursor locates displayed on the screen is the distance between the event point (or the fiber end) and OTDR output terminal.
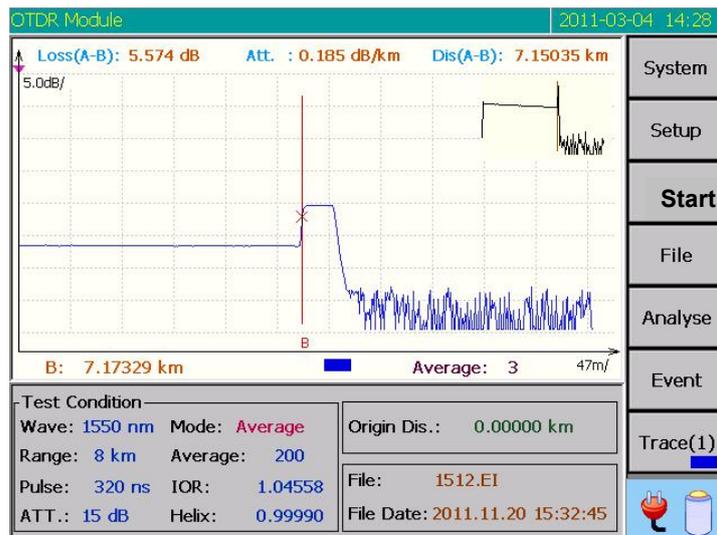
Figure 8-31 Fiber length test

3.2 Measure Fiber Average Loss

To test the average loss of some section of the fiber, the operation steps are as follows:

➢ Set the test item as average loss test. At this moment there will be two cursors in the main screen which are cursor A and cursor B.

➢ Move Cursor A and B to any two points in the linear zone of the tested fiber section. (In order to ensure the accuracy of the test result, when test relatively long fiber, please set that the distance between the two mark points should be at least greater than 500m.)

➢ At this moment the average loss value displayed on the operating window is the average loss of the fiber section which was to be tested.
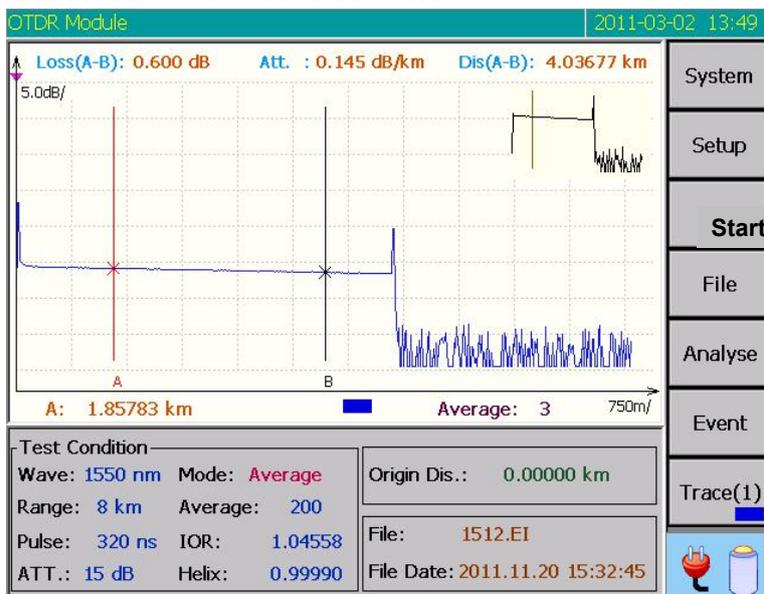

Figure 8-32 Average loss test

Loss (A-B):0.600 dB **:** The loss between cursor A and B

Att.: 0.145 dB/km**:** The average loss of the fiber section where cursor A and B locate.

Dis (A-B): 3.71491km: The distance between cursor A and B

3.3 Measure Splice Loss

To measure the splice loss, the operation steps are as follows:
- Set the test item as splice loss test. At this time there will be 4 cursors in the main screen (they are cursor a, cursor A, cursor B and cursor b in turn).
- Expand the wave form in the horizontal direction and locate the cursor A at the **end** of the fiber linear zone which is **ahead** of the tested connection point.
- Locate the small cursor (namely cursor a) which is ahead of the cursor A at the initial end of fiber linear zone which is **ahead** of the tested connection point.
- Locate the cursor B at the **end** of the fiber linear zone which is **ahead** of the tested connection point.
- Locate the small cursor (namely cursor b) which is after the cursor B at the end of fiber linear zone which is **after** the tested connection point.
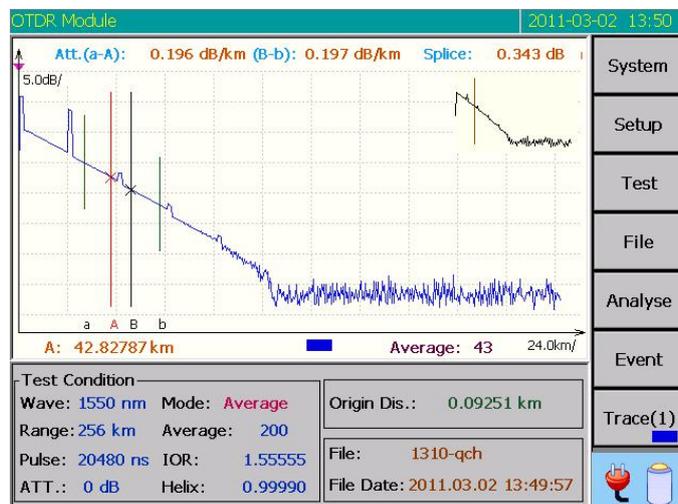

Figure 8-33 Splice loss test

Att. (a-A): 0.196 dB/km: The average loss of the fiber section of cursor a and A

(B-b): 0.175 dB/km: The average loss of the fiber section of cursor A and b

Splice: 0.343 dB: The splice loss of the connection point of cursor A

3.4 Measure Reflection Loss

To test the reflection loss of a certain connection point, the operation steps are as follows:

- Set the test item as splice loss test. At this moment there will be two cursors in the main screen which are cursor A and cursor B.

- Expand the wave form in the horizontal direction and set the mark point A at the end of the linear zone which is ahead of the tested reflection point.

- Locate the mark point B at the top of the reflection event point, as shown in Figure 8-34.

- At this moment the reflection loss value displayed on the operating window is the reflection loss of the tested reflection point.
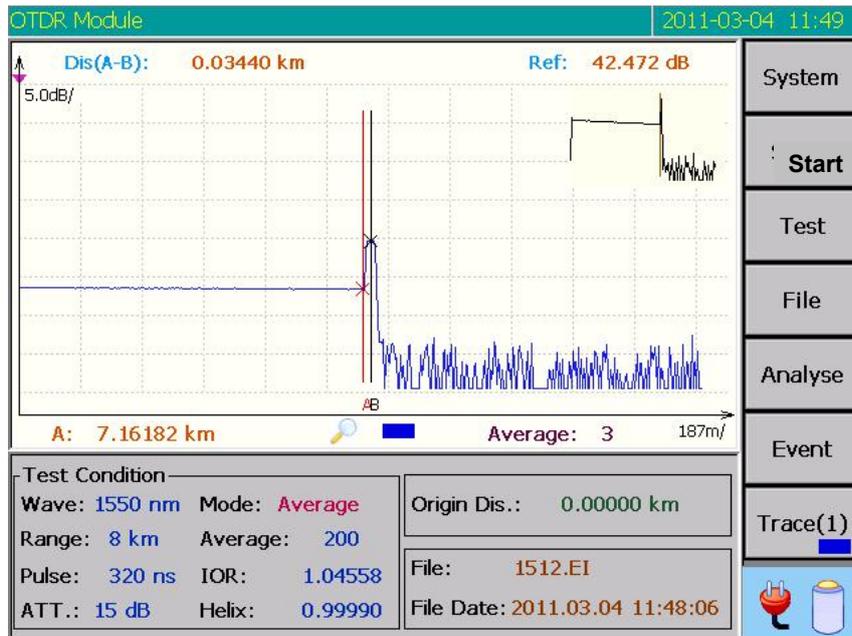
Figure 8-34 Reflection loss test

Dis (A-B): 0.03440 km: The distance between cursor A and cursor B

Ref: 42.472 dB: The reflection loss of reflection peak of cursor A and cursor B

4. File Management

Under the main menu bar of the main screen, press the menu item of 【File】 and it will enter the sub-menu item of file operation. As shown in Figure 8-35.
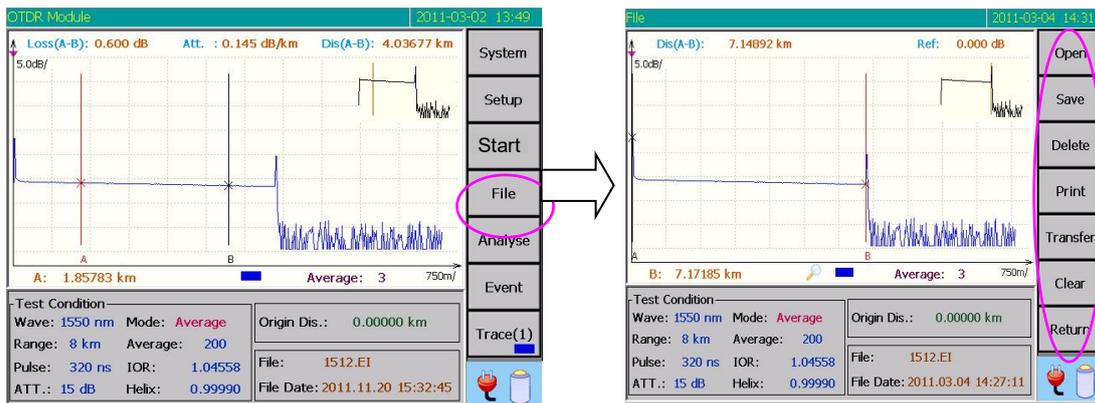

Figure 8-35 Sub-menu of file operation

4.1 Save Waveform File

Under the sub-menu bar of the file operation, press 【Save】 or press (Save) and it will pop an operating window for file save, as shown in Figure 8-36.
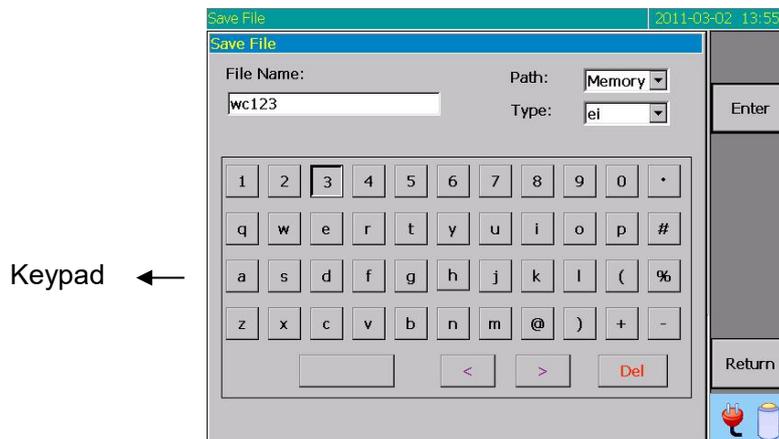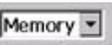

Figure 8-36 Operating window for file storage

➢ Press ▶ in the navigation key and it will move the active cursor to the right. Select the keys on the keypad by turn. When the active cursor moves to the small button Del , press ▶ again, and the active cursor will move to the selection item Memory ▾ of storage path; press ▶ again, and the active cursor will move to the selection of the file format, and then move to the small button 1 and this can form a circulation.

➢ Press ◀ in the navigation key and it will move the active cursor to the right. Select the keys on the keypad by turn. When the active cursor moves to the small button 1 , press ◀ again, and the active cursor will move to the selection ei ▾ of file format; press ◀ again, and the active cursor will move to the selection of the storage path, and then move to the small button Del and this can form a circulation.

➢ When the active cursor locates at the small button, press ▲/▼ and the active cursor can be quickly moved to select different small buttons.

➢ When the active cursor locates at storage path or file format, press ▲/▼ and the storage path or the file format can be changed.

➢ When the active cursor locates at the keypad, press Enter and enter the characters selected on the small buttons to the location where the cursor locates in the input window of the file name. If the selected button at this moment is Del , then at first delete the characters afer the cursor. If there is no character after the cursor, delete the characters which are ahead of the cursor.

➢ When the active cursor is not at the keypad, press Enter and it will save the file based on the selected storage path, file format and set file name.

➢ Press 【Save】 button and it will save the file based on the selected storage path, file format and set file name.

➢ Press 【Return】 or press (Esc) and it will give up this operation and go back to the main screen of OTDR.

Note! (1) The storage path can be selected as: Memory, U-Disk and SD card.

(2) The file format can be selected as: .EI or .SOR (standard Bellcore

format). SOR format only allows one trace data while EI format allows multi

amplitude trace data of saving multi wavelength test.

(3) If no file name is entered, it will take the current time as default file name.

(4) | < | is used for move the cursor to the left in the input window; | > | is

used for move the cursor to the right in the input window.

4.2 Read Waveform File

Under the sub-menu bar of the file operation, press the menu item of 【Open】 and it will display the operating window of reading file on the screen. As shown in Figure 8-37. After entering the operating window of reading file, the default active cursor locates at the file list.
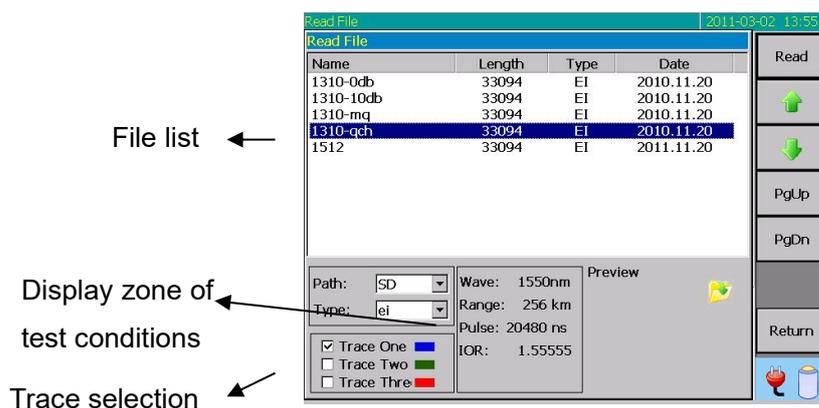
File list ←

Display zone of
test conditions

Trace selection

Figure 8-37 Operating window of reading file

The explanation of every part of the operating interface of reading file is as follows:

✧ File list: this list displays the trace file of the compound file formats saved in the current path.

✧ Read path: memory, USB disk and SD card can be selected.

✧ File format: the format of .EI or .SOR can be selected.

✧ Display zone of the test conditions: display the test conditions saved in the file which is selected by the current cursor bar.

✧ Trace preview zone: preview display the test trace saved in the file which is selected by the current cursor bar.

The operation method is as follows:

➤ Press ◀/▶ to circularly switch the active cursor among file list, read path, file format and trace selection.

➤ When the active cursor locates in the file list, press ▲/▼ to select files by moving the cursor bar upward or downward; when the active cursor locates in the read path and the file format, press ▲/▼ to change the read path or file format; when the active cursor locates in the trace selection zone, press ▲/▼ to select different trace serial numbers.

➤ When there are lots of files in the file list, you can drag the scroll bar in the file list to quickly turn the pages forward or backward to display the files.

➤ Press Enter or press the menu item of 【Read】 and it will read the file selected by the current cursor bar based on the selected trace serial number, and at the same time go back to the main screen of OTDR.

➤ Press the menu item of 【🡑】 or 【🡓】 and it automatically shift the active cursor to the file list window and move the cursor bar upward or downward to select different files.

➤ Press the menu item of 【Page up】 or 【Page down】to display file by turning the pages forward or backward.

➤ Press Esc or press the menu item of 【Return】 and it will give up reading the file and go back to the main screen.

4.3 Delete Waveform File

Under the sub-menu bar of the file operation, press the menu item 【Delete】 and it will display the operating window of deleting files on the screen as shown in Figure 8-38. The operating interface is the same as the one of reading file and the only difference between them is the different icon indication, as shown in the following figure.
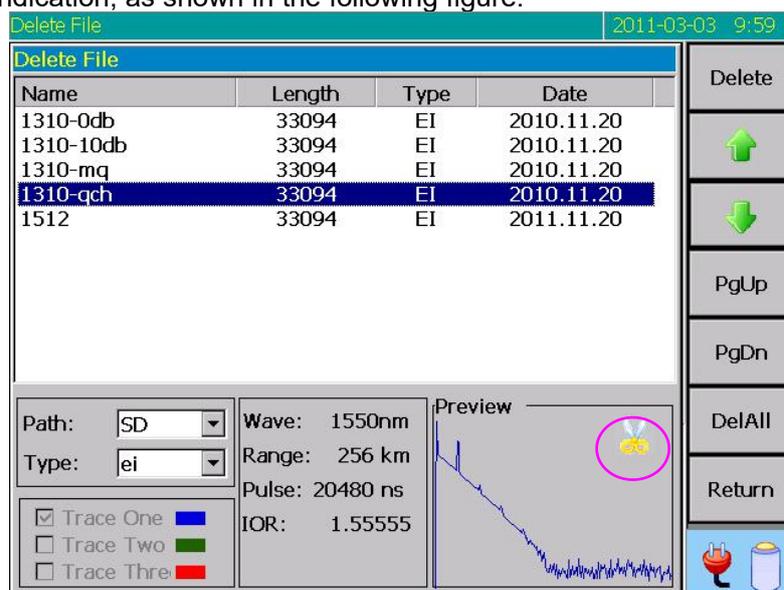

Figure 8-38 Operating window of deleting file

The operation steps are as follows:

➢ Press ◀/▶ to circularly switch the active cursor among file list, read path and file format.

➢ When the active cursor locates in the file list, press ▲/▼ to select files by moving the cursor bar upward or downward; when the active cursor locates in the read path and the file format, press ▲/▼ to change the read path or file format; when there are lots of files in the file list, you can drag the scroll bar in the file list to quickly turn the pages forward or backward to display the files.

➢ Press Enter or press the menu item of 【Delete】 and it will delete the file selected by the current cursor bar.

➢ Press the menu item of 【⬆】 or 【⬇】 and it automatically shift the active cursor to the file list window; and move the cursor bar upward or downward to select different files.

➢ Press the menu item of 【Page up】 or 【Page down】to display file by turning the pages forward or backward.

➢ Press the menu item of 【Delete All】 and it will delete all the files in the file list.

➢ Press Esc or press the menu item of【Return】and it will give up reading the file and go back to the main screen.

4.4 Copy the Files between Memory and USB Disk/SD Card

Under the sub-menu bar of the file operation, press the menu item 【Transfer】 and it will display the operating window of transferring file on the screen as shown in Figure 8-39.
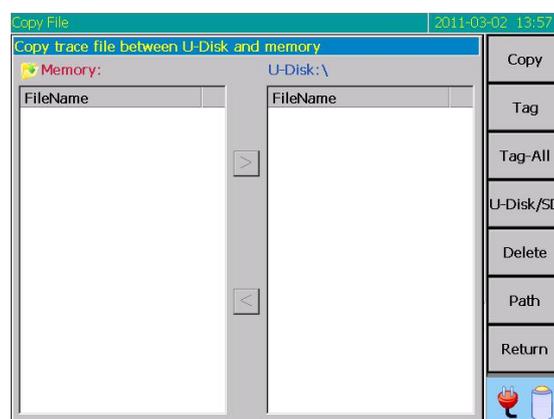

Figure 8-39 Operating window of file transfer

The source disk in the file copy:

It is the current active window and there is " 📂 " before disk name, at the same time there will appear a cursor bar in the file list in the window and you can mark "*" on the file selected by the cursor bar. As shown in the figure above, you can select memory or USB disk/SD card as the source disk for copy by pressing the file list window on the touchscreen or by pressing ◀/▶.

The target disk in the file copy:

There is no mark before disk name and there is no cursor bar in the window either, as shown in the figure above.

The operation steps are as follows:

➢ Press ▲/▼ to select the file by moving the cursor bar upward or downward in the current active window.

➢ Press Enter and it will add or cancel the mark "*" in front of the file selected by the current cursor bar.

➢ Press ◀/▶ and it will switch current active window between memory and USB disk/SD card.

➢ Press 【Copy】 and it will copy the file. The files with "*" in the source disk will be copied to the target disk.

➢ Press 【Mark】 and it will add or cancel the mark "*" in front of the file selected by the current cursor bar.

➢ Press【Mark-All】 and it will add or cancel the mark "*" in front of all the files in the current active window.

➢ Press the menu item of 【U-Disk/SD】 and it will switch and display the files in the USB disk and SD card in the file lists above. The user can transfer the files in the memory to the USB disk or SD card.

➢ Press 【Delete】 and it will delete the files marked with "*" in the current active window.

➢ Press 【Content】 and if at this time the cursor bar locates at the name of the content, it will enter this content.

➢ Press【Return】 or press Esc and it will exit from the transfer window and go back to the main screen of OTDR.

Note! (1) When the source disk is the memory, there will be a cursor bar in the memory file list. Mark the files needed to be copied with "*".
(2) When the source disk is USB disk or SD card, there will be a cursor bar in the U-Disk/SD card. Mark the files needed to be copied with "*".
(3) When copying, it will only copy the files marked with "*".

4.5 Clear the Traces Displayed on the Screen

Under the sub-menu item of the file operation, press the menu item of 【Clear】and it will clear the tested trace and event point information displayed on the screen.

5. Set Fiber Information

Under the main menu bar of the main screen, press【Setup】to enter the sub-menu item of

setting. Press 【Cable Inf.】 and it will display the operating window of fiber information setup, as shown in Figure 8-40.
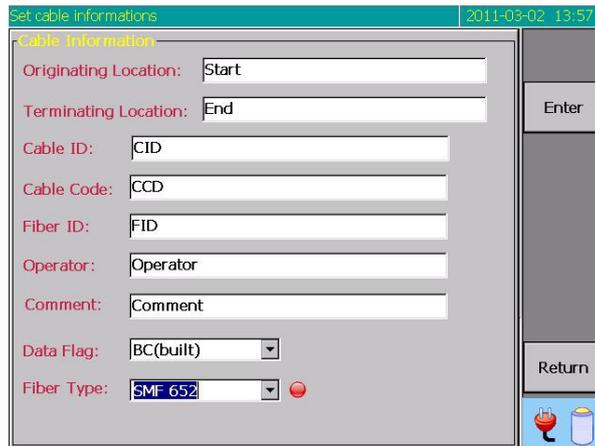

Figure 8-40 Window of cable information setup

➢ Press ◀/▶ to move the active cursor (red small button) to every setup item.

➢ When the active cursor locates at the fiber type and data status, press ▲/▼ to change the setup of this item; when the active cursor locates at other setup items, press ▲/▼ to display the input window as shown in Figure 8-41.
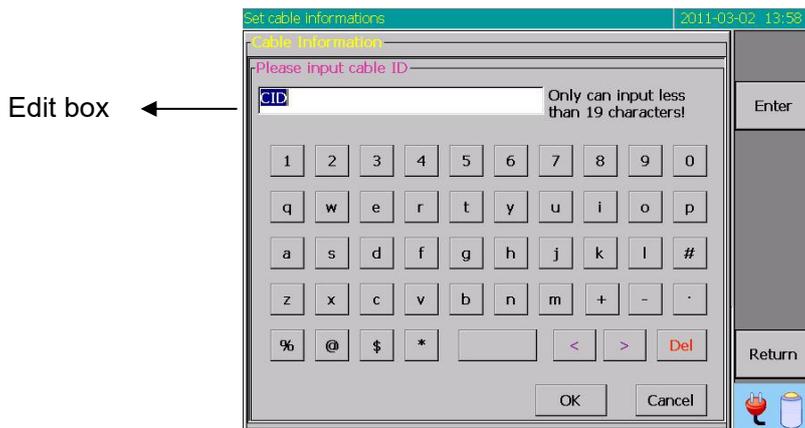

Figure 8-41 Input window of fiber information

✦ Press ◀/▶ to select the small buttons circularly by moving the active cursor to the left or right.

✦ Press ▲/▼ to quickly move the active cursor to select the small buttons.

✦ Press Enter to input the characters on the small buttons selected currently to the location where the cursor locates in the edit box, or conduct the functions of the buttons.

✦ You can also complete character input and conduct the functions of the buttons by pressing each buttons on the touch screen.

✦ [<] : Move the cursor in the edit box to the left.

◇   `>` : Move the cursor in the edit box to the right.

◇   `Del` : If there is any charaters behind the cursor in the edit box at this moment, press this button and it will delete the characters behind the cursor one by one and then delete the charaters ahead of the cursor.

◇   `Enter` : Confirm entering and go back to the setup interface of the fiber information. At this time the new input content will replace the content in the former operation items.

◇   `Cancel` : Give up the current input and go back to the setup interface of the fiber information. At this time the content in the former operation items remains the same.

➢ Press the menu item of【Enter】 and it will confirm the current information setup and go back to the main screen of OTDR.

➢ Press the menu item of【Return】 and it will give up the current modification and keep the former set content and go back to the main screen of OTDR.

Note!   When save the file in the format of .sor, the fiber information will be saved into the files.

6．Set Reference Origin

Press 【Setup】menu in the first menu bar of main screen into the Setup Sub-Menu. Here, press 【Origin】, and prompt window appears, prompting user to set the reference origin, as shown in Figure 8-42.

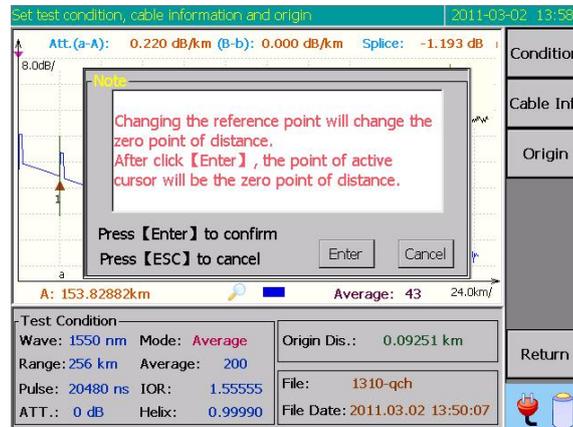Figure 8-42 Prompt Message for Setting Reference Point

➢ Press【Enter】 button in prompting message box or press Ⓔⁿᵗᵉʳ to set the position of currently active cursor as reference origin, and close the prompting message box meanwhile.

➢ Press 【Cancel】button in prompting message box or press Ⓔˢᶜ to cancel current operation, and close the prompting message box meanwhile.

7．Trace Selection and Comparison

User is allowed to display three traces on instrument to make trace comparison. But test range of the three traces must be the same, otherwise comparison is not allowed.

User is allowed to set multiple wavelength tests on instrument. As user selects multiple wavelength at one time on OTDR parameters setting window, the instrument will accomplish tests of the selected wavelength in sequence during test and display the test trace of each wavelength on screen meanwhile. But in preconditioning test mode (i.e. the real-time test mode), it only allows single wavelength test.

When reading test trace, user may read three traces at a time and make comparison through selecting trace number, but test range of the three traces must be the same.

Current test result calculation and trace analysis are only stated for the currently active trace. Color of the currently active trace is the same with the icon color displayed on screen and the icon color on trace selector button. Trace number is in accordance with that displayed on trace selector button.

Press trace selector button, the trace number selection window appears. Trace selected will become the currently active trace, as shown in the following figure 8-43.
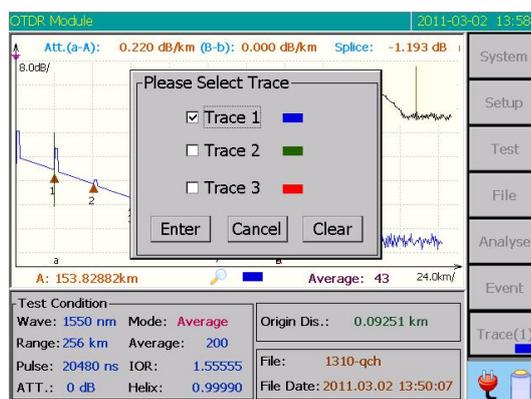

Figure 8-43 Trace Selection Window

➢ Press ▲/▼ or press on touch screen to select different trace number.

➢ Press Enter or press 【Enter】 button to determine selection and exit from the trace selection window.

➢ Press Esc or press 【Cancel】 button to cancel selection and exit from the trace selection window.

8. View System Information

Press【System】 in the first menu bar of main screen into system sub-menu. Press【Sys.Inf.】 menu in the sub-menu bar, system information sub-window appears as shown in Figure 8-44, which displays basic information about the instrument.
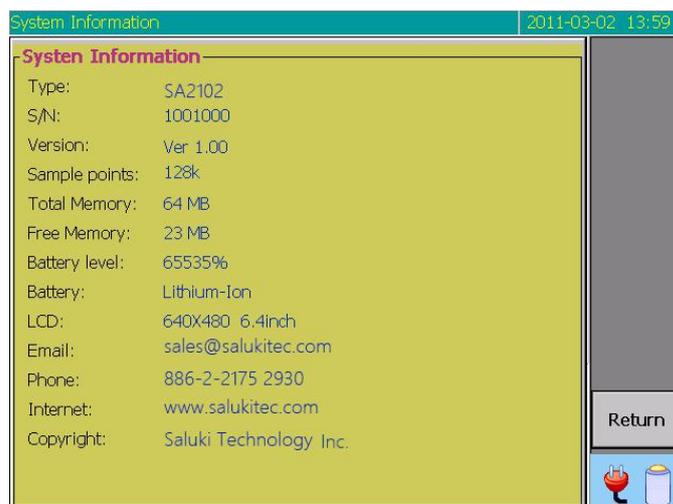
Figure 8-44 System information window

9. Print Test Report

Caution! (1) The instrument only supports printers which support PCL language format. If instrument is connected with printers not supporting PCL language format, it will not be able to print.

(2) User may copy waveform files to PC and use simulation analysis software to print the test report.

➢ Connect printer to USB port of instrument. Peruse the notices abovementioned before use.

➢ Press 【File】 in the first menu bar of main screen into file sub-menu, and then press 【Print】 into the print setting window. See Figure 8-45.
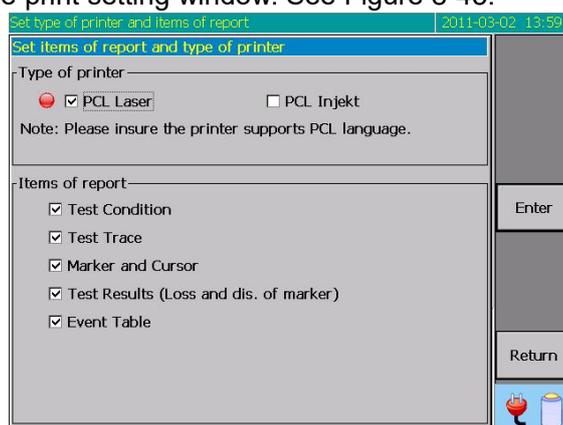

Figure 8-45 Print setting window

➢ Press ◀ / ▶ to move active cursor (the red small button) to select different operating items.

➢ Press ▲/▼ to modify content of the selected operating items.

➢ After selecting printer type and printing content, press 【Enter】 or press ⓔⓝⓣⓔⓡ to print test report.

➢ Press 【Cancel】 or press (Esc) to cancel operation and return main screen.

If printing operation fails, it may be due to one of the following:

● Instrument does not support printer of this type.

Please replace with printers of other types (printers connected to instrument must support PCL language) and try again.

It is suggested to copy the waveform files to PC and use the stimulation analysis software to print the test report.

● Defects in connecting cable of printer.

Please replace the printing cable and retry printing operation.

● Incorrect setting of printer.

Please check if the indicator light of printer is indicating error; retry printing operation after removing error.

10. Help

Press 【System】 in the first menu of main screen into system sub-menu. Press 【Help】 in this sub-menu bar, the Help Information sub-window appears as shown in Figure 8-46. This window displays brief help information and precautions
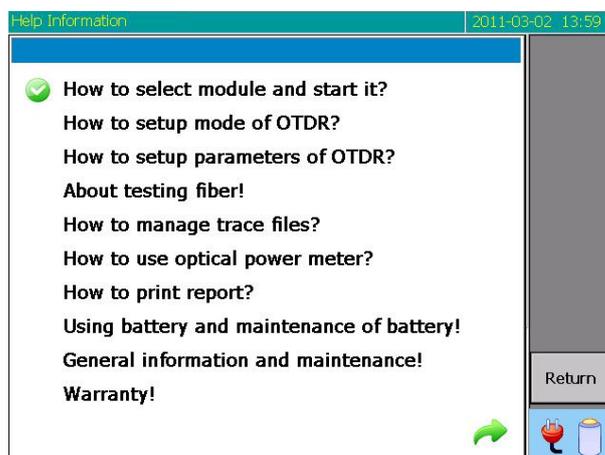

Figure 8-46 Help information window

➢ Press (▲)/(▼)to move up or down small button to select different help topics. Then press (Enter) into the selected help topic, and relevant content appears.
➢ Press (◄)/(►) or press 🔙 / 🔜 to page backward or forward to display different Help Sub Topics, as shown in Figure 8-47.
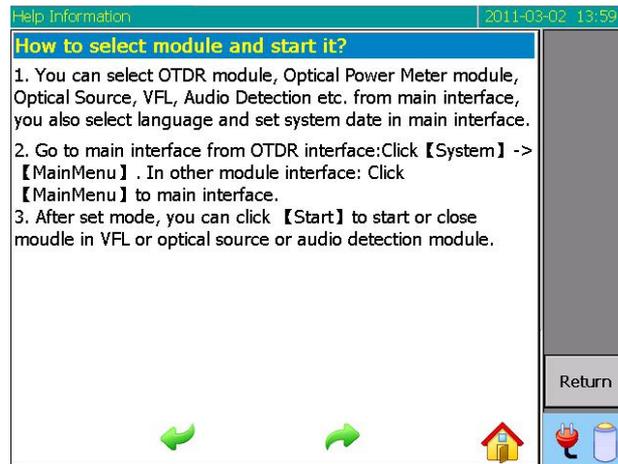
Figure 8-47 Help sub topics

➢ Press 🏠 to return help topics screen, as shown in Figure 8-46.
➢ Press 【Return】 or ⒺⓈⒸ to return main screen.

11. System Upgrade

Operational procedures for system upgrade are as follow:

➢ Create a folder named OTDR under the root directory of USB disk or SD card.

➢ Save the system upgrading files in the folder named OTDR abovementioned. Connect USB disk or SD card to USB port or SD card slot of the S2102 OTDR.

➢ Press 【System】 menu in the first menu of main screen into setup sub-menu. Press 【Update】 in the sub-menu bar, upgrade prompting message box appears.

➢ Press【Enter】 button in prompting message box or press Ⓔⓝⓣⓔⓡ into system upgrading interface.

➢ According to prompt on display interface, press Ⓔⓝⓣⓔⓡ, system upgrade will act to upgrade and update system files of instrument. After upgrade, user has to power up again.

| Caution | Do not power off or pull USD disk or SD card out during system upgrade, otherwise it will cause system upgrade failure and make instrument incapable of operating normally. |

12 Calibrating touch screen

Operational procedures for calibrating touch screen are as follow:

➢ Press 【System】 menu in the first menu of main screen into setup sub-menu. Press 【Touch-Cal.】 in the sub-menu bar.

➢ Click the center of cross cursor with touch pen when the cross cursor is displayed.

➢ Click the touch screen, then calibrating touch screen is finished.

13. Common Faults and Treatment

Below are the possible faults of instrument and solutions:

Table 8-1 Fault and Treatment

Faults	Causes	Solutions
Instrument fails to start	Out of battery	Charge the battery
	Not connected to external power supply	Use AC/DC Adapter to supply power.
Button fails to respond	Check if any button is kept pressed.	Make sure no button is kept pressed.
Length of optical fiber measured is not accurate	a. Refractive index of optical fiber is not set accurately b. Fiber cable's coefficient of correction is not set accurately	a. Set the refractive index of optical fiber to the refractive index calibrated by fiber manufacturer. b. Set fiber cable's coefficient of correction to 1.0000 or to the coefficient of correction calibrated by fiber cable manufacturer.
Average loss value of optical fiber measured is not accurate	a. Large error in length of the tested optical fiber. b. Front end of the test trace tails too long	a. Refer to the above item to measure the length of optical fiber accurately. b. Clean splice of the tested optical fiber or add in a little matching fluid and retest the trace afterwards.
There isn't test waveform displayed on screen, except for the front end reflection peak; or the front end reflection peak has long tailing	Fiber end is polluted;	Wipe the fiber end with absolute ethyl alcohol.
	Fiber end inside the optical output port connector of instrument is polluted	Take down the optical output port connector and wipe it with the absolute ethyl alcohol.
	Ceramic core inside optical output port connector (flange) is damaged, which causes crack or breakage.	Replace the flange.
	Type of optical fiber splice does not match	End type of the optical fiber splice tested must match with that of the OTDR light output splice. Otherwise it must use the patch cord for switch over.

12.1 Trace test and failure cause analysis

If the result of trace test and analysis is widely different from expected, or the expected result is not achieved, it may be caused by one of the following:

➢ Failed to obtain the test trace of optical fiber

If the test trace only shows front end reflection peak, but fails to obtain the linearity trace which may reflecting characteristics of optical fiber, please check:

● If the type of tested fiber end matches with the type of fiber end at OTDR optical output port.
● If the fiber end is polluted.
● If the optical output flange of OTDR is cracked.
● Check the near end of tested fiber link for high loss with the VFL function.

Note! If the fiber link you are measuring is very short, such like less than 100m, it is suggested to adopt below test mode and test condition:

Please set: average test mode, range less than 800m, pulse width less than 80ns and attenuation of 15dB or 20dB, and set certain average time.

Setting an attenuation of 15dB may obtain a test trace with better signal to noise ratio, which is of advantage to make trace analysis. Setting an attenuation of 20dB may obtain a smaller test dead zone, but the signal to noise ratio will be relatively poor, there requires setting a larger average time to obtain a trace of better noise ratio.

➢ Near end of the test trace has severe tailing.

Try in case severe tailing is observed on falling edge of the near end reflection peak of the test trace:

● Use absorbent cotton ball with proper amount of absolute ethyl alcohol to clean the tested fiber end and optical output port end of OTDR.

● Adopt smaller pulse width to retest the trace (note: please select average test mode and set certain average time here).

● Under the pulse width currently set, use larger attenuation to retest the trace (note: please select average test mode and set certain average time here).

➢ Distance between event points on test trace is too small.

Try if finds that adjacent event points have been omitted:

● Adopt smaller pulse width to retest the trace (note: select average test mode and set certain average time here).

● Set certain average time and adopt average test mode to perform test so as to raise the signal to noise ratio of trace.

➢ Poor signal to noise ratio of the test trace

Poor signal to noise ratio of test trace will affect the accuracy of trace analysis. Here please try:

● In automatic test or average test mode, appropriately increase the value of average time.

● In average test mode, after setting proper test range, select larger test pulse width to test again.

● In average test mode, after setting proper test range and test pulse width, please select smaller test attenuation to test again (such as 10dB attenuation).

➢ OTDR test parameters are set incorrectly.

If the optical fiber length, etc. values are measured materially different from the actual value, please check:

If refractive index and fiber cable's coefficient of correction are set in conformity to standard values of the tested optical fiber or fiber cable

Unconformable set of the refractive index has a strong impact on test value of the length of tested optical fiber.

Any problem can't be solved, please do not hesitate to contact us. (See preface of the Manual for contact information)

Chapter 9 Operating Principle

1. Operating Principle

As light is transmitting in optical fiber, small fluctuation of fiber's refractive index may cause Rayleigh scattering, and abrupt change on refractive index of fiber end or fault point may result in Fresnel reflection. It may ascertain the loss distribution and splice loss, etc. through observing optical power of Rayleigh backward scattering, also may ascertain the break point and fault point, etc. of optical fiber by observing Fresnel reflection.

2. Description of Event Point Type

Event type on the trace of tested optical fiber generally includes reflective event and non-reflective event.

Reflective event, appears as a peak, usually is caused by the fracture plane of fixed connector or fiber end. See the following figure.

Reflective fiber end
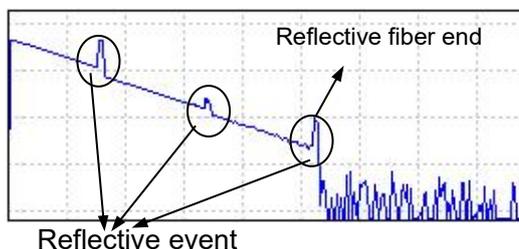
Reflective event

Non-reflective event generally includes: (shown as the following figure)

● Down event
● Up event
● Non-reflective fiber end

Up event

Down event

Non-reflective end
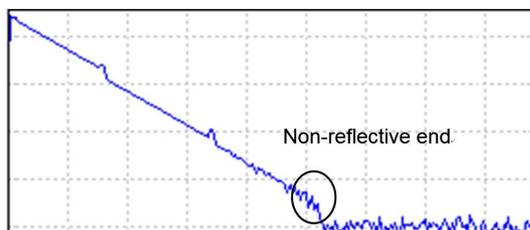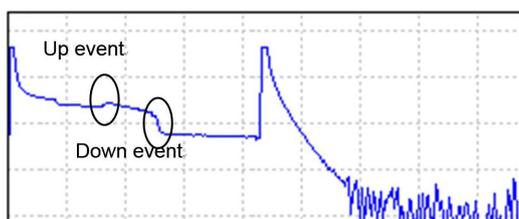
Chapter 10 Technical Parameters

1. General Characteristics of OTDR

Wavelength (nm)	1300, 1310, 1490, 1550, 1625 and 1650
Distance Range (km)	Singlemode: 0.4,0.8,1.6,3.2,6.4,16,32,64,128,256,512
Pulse Width (ns)	Singlemode: 5,10,30,80,160,320,640,1280,5120,10240,20480
Linearity (dB/dB)	±0.05
Loss Threshold (dB)	0.01
Loss Resolution (dB)	0.001
Sampling Resolution (m)	0.05,0.1,0.2,0.5,1,2,4,8,16,32
Sampling Points	Up to 128k
Distance Uncertainty (m)	±(0.75m + sample space + measurement distance×0.0025%)
Distance Unit	km, m, kft, ft
Memory Capacity	≥ 800 traces(build-in),
Group Refractive Index Setting	1.00000 to 2.00000 (0.00001steps)
VFL (Optional)	650nm±30nm, 2mW(typical); CW/1Hz
Optical Power Meter (Optional)	Wavelength range: 1200nm to 1650nm Measurement range: -60 to 0dBm Measurement accuracy: ±5% (-25dBm, CW)

Dimensions (WxHxD)mm	295×186×75
Weight	2.5kg Approx.
Display	640×480, 6.5 inch TFT-LCD (touch screen)
Interface	USB, Mini-USB, Ethernet, Earphone, SD
Optical connector	FC/UPC (ST/UPC or SC/UPC are available)
Environment	Operating: −10 °C to 50 °C (14 °F to 122 °F) Storage: −20 °C to 60 °C (−4 °F to 140 °F) Relative humidity : 0 % to 95 % non-condensing
Power supply	AC adapter: 100～240V, 50/ 60Hz,2A) DC: 19V(3.42A) Built-in Lithium battery: 4400mAh, 14.8V Operating time ≥8 hours ((Low brightness, exclude measuring)

2. Other Technical Specification

2.1 VFL Function (Option)

(1) Output wavelength: 650nm±10nm；

(2) Output power: ≥1.5mW (Typical), detection range: ≥ 5km;

(3) Operating mode: CW / 1Hz / 0.5Hz

2.2 Optical Power Meter Function (Option)

(1) Wavelength range: 1,200nm ~ 1,650nm；

(2) Power range: -60 ~ 0dBm；

(3) Calibrated point power testing uncertainty: over 0.22dB (-25dBm, CW, 1,310/1,550nm);

(4) Power testing uncertainty in optical path range: over ±1.5dB.

2.3 Optical Source Function (Option)

(1) Output wavelength: the same as the operating wavelength of OTDR;

(2) Output power: ≥ -25dBm (23℃± 2℃);

Appendix A Cleaning Optical Output Port

During using the instrument, please pay attention that:

➢ Always keep the optical output port clean by using absolute ethyl alcohol regularly.

➢ Please cover the dust cap after use, and the dust cap must be kept clean as well.

➢ User must clean the flange connector of optical output port regularly. In case of finding any crack on the ceramic core inside flange, please replace flange in time.

Effect of cleaning fiber splice and optical output port

➢ Optical fiber cores are very small in size. Dust and particles adhering to fiber splice and optical output port may cover a part of fiber core at output port, as a result will reduce the performance of instrument.

➢ Dust and particles may result in wear and tear of the fiber splice end at output port, which will reduce the test accuracy and repeatability of instrument.

Following below safety principles before cleaning

➢ Make sure that you have disabled power supply of instrument when you are cleaning.

➢ Disobeying stipulated procedures for control, regulation and operation may cause dangerous radiation injury.

➢ Make sure the laser source is in non operating state when cleaning any optical interface.

➢ Do not view any optical output port directly when instrument is operating so as to prevent ocular damage.

Tools used for cleaning optical output interface and splices

➢ You may use tools such as optical fiber cleaner and optical fiber cleaning stick to clean the optical output port and splices.

➢ If there is a lack of the abovementioned professional tools, please prepare:

Absorbent cotton ball and absolute ethyl alcohol, etc.

Procedures for cleaning optical output interface and splices

➢ Turn off power supply of instrument.

➢ Fully unscrew the flange cap.

➢ Gently draw the flange outwards, see as following figure:

Flange cap

Optical output connector end face

VFL

OTDR2
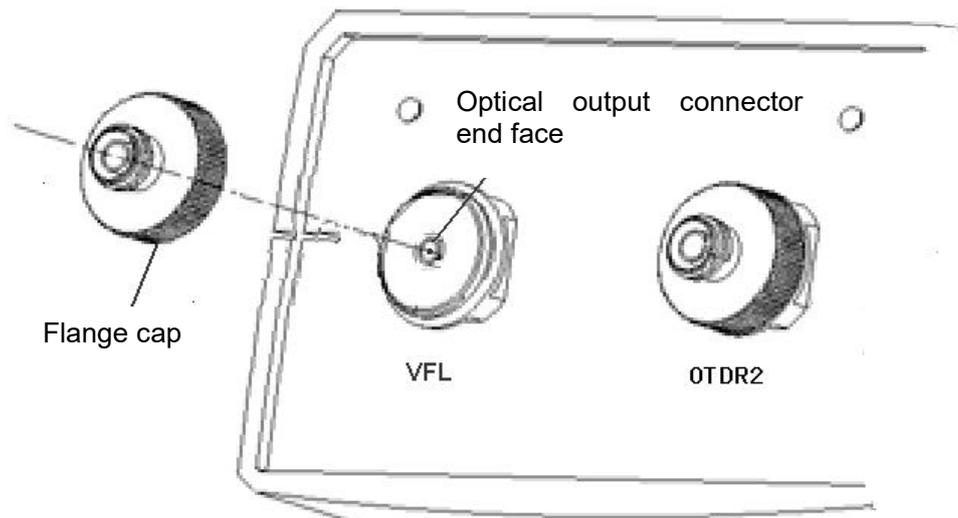
> After cleaning, gently connect the flange to optical output port and screw the flange cap down.

Caution!
- Evenly put forth your strength when taking out and connecting the flange, do not overexert to avoid damaging optical output port end.
- Gently wipe the fiber end when cleaning to avoid damaging fiber end.
- Guarantee the cleanness of absorbent cotton ball and absolute ethyl alcohol when cleaning, otherwise they will pollute the fiber end and result in inaccuracy of the test

Appendix B Direction for Use of the Stimulation Analysis Software

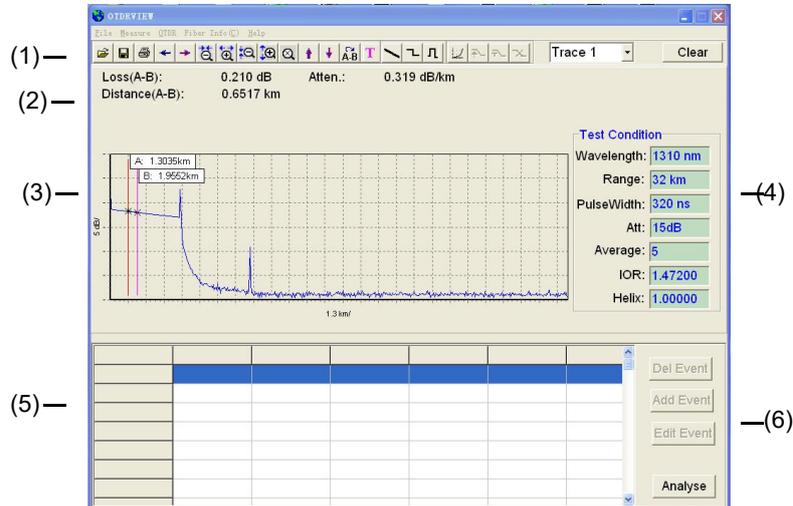Interface schematic of the otdrview.exe stimulation analysis software

Figure B-1 Interface of stimulation analysis software

(1): Menus and shortcut buttons.

(2): Test result display area.

(3): Waveform trace and cursor display area.

(4): Test condition display area of the current waveform trace.

(5): Event table display area.

(6): Trace analysis and event table editing function area.
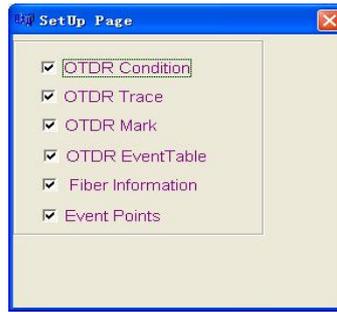
Functional description of shortcut buttons
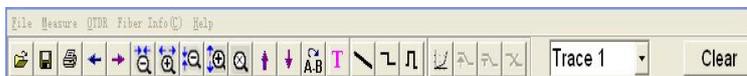
: Open files. Used to open the files of EI format or SOR format stored for S2102 OTDR test

: Save files.

: Print test report.

Press 【File】— 【Set Page】 to set contents of the test report, See follow figure.

After setting the content of test report, press this shortcut button or press【File】－【Print】 to print test report.

←: Move current active cursor left. Moving pace is one data point. (Active cursor is red)

→: Move current active cursor right. Moving pace is one data point.

: Zoom out on the wiggle trace horizontally. (Around active cursor)

: Zoom in on the wiggle trace horizontally. (Around active cursor)

: Zoom out on the wiggle trace vertically. (Around active cursor)

: Zoom in on the wiggle trace vertically. (Around active cursor)

: Wiggle trace init display.

↑: Move up the wiggle trace.

↓: Move down the wiggle trace.

A-B: Change the currently active cursor. (Active cursor is red)

Note!

a. User may press the left mouse button in waveform display area to jump active cursor to the position pressed by mouse.

b. User may implement moving cursor and trace zoom in /out etc., abovementioned functions through options in 【Trace Operation】 menu.

T: Display parameter setting window for editing time threshold and cable information, etc. User may also use the menu【Cable Parameter】-【Parameter Setting】to set relevant parameters of optical fiber and fiber cable. See the following figure:
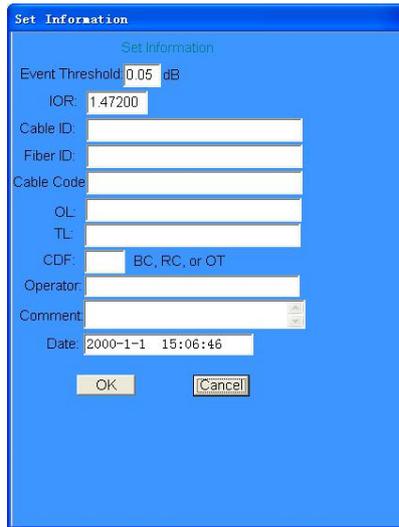
: Set current test item to measure average loss

Loss(A-B):	15.135 dB	Atten.:	0.336 dB/km
Distance(A-B):	46.5003 km		

   Test result displayed when measuring average

: Set current test item to measure splice loss

Loss(A-B):	15.135 dB	Atten.:	0.332 dB/km(a-A)	1.439 dB/km(B-b)
Distance(A-B):	46.5003 km	Splice:	-51.916 dB	

    Test result displayed when measuring splice loss

: Set current test item to measure reflection loss

Loss(A-B):	15.135 dB		
Distance(A-B):	46.5003 km	Ref:	0.000 dB

   Test result displayed when measuring reflection loss

: Automatically analyse wiggle trace and display analysis result in event table.

: Add an event point behind the event point currently selected by cursor bar. (Will display the input window for setting type and distance of event point)

: Edit the distance between event points currently selected by cursor bar.

: Delete event point currently selected by cursor bar.

Display Area of Wiggle Trace and Cursor
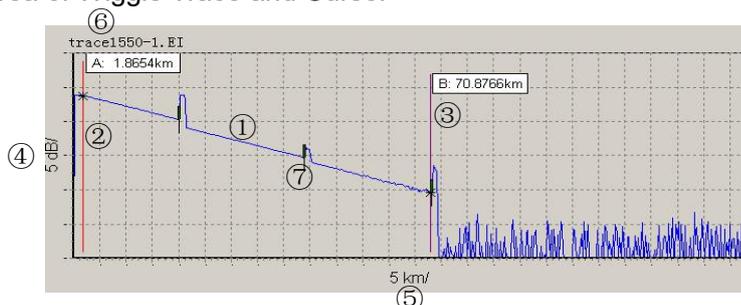
①: Wiggle trace

②: Cursor A (Red cursor indicates it is active cursor)

③: Cursor B

④: Vertical scale (dB/)

⑤: Horizontal scale (km/ or m/)

⑥: Name of the file currently read

⑦: Event points marked on trace after analyzing trace.

Function Area of Trace Analysis and Event Table Edit

`Analyse` : Implement the function of test trace automatic analyse. After finishing analysis, it will display the information of all the event points in event table.

`Del Event` : Delete event point selected by cursor bar in event table.

`Add Event` : Add an event point behind the event point selected by cursor bar in event table.

User may set type and distance of this event point

`Edit Event` : Edit type and distance of the event point selected by cursor bar in event table.

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Appendix C Ordering information

Model[a]	Operating wavelength	Fiber type	Dynamic Range[b] (dB)	Event Dead zone[c] (m)	Attenuation dead zone (m)
S2102-01	1625nm	SMF	38	1	10
S2102-02	1625nm(build-in filter)		36	1	10
S2102-03	1650nm		38	1	10
S2102-04	1650nm(build-in filter)		36	1	10
S2102-05	1300nm	MMF	36	2	13
S2102-06	1310/1550nm	SMF	42/40	2/2	10/10
S2102-07	1310/1550nm		40/38	1/1	10/10
S2102-08	1310/1550nm		37/35	1/1	10/10
S2102-09	1550/1625nm		38/38	1/1	10/10
S2102-10	1550/1625nm(build-in filter)		36/36	1/1	10/10
S2102-11	1550/1650nm		38/38	1/1	10/10
S2102-12	1550/1650nm(build-in filter)		36/36	1/1	10/10
S2102-13	1310/1490/1550nm		39/34/38	1/1/1	10/10/10
S2102-14	1310/1550/1625nm		39/38/36	1/1/1	10/10/10
S2102-15	1310/1550/1625nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-16	1310/1550/1650nm		39/38/36	1/1/1	10/10/10
S2102-17	1310/1550/1650nm(build-in filter)		37/36/34	1/1/1	10/10/10
S2102-18	1310/1490/1550/1625nm		35/32/34/34	1/1/1/1	10/10/10/10
S2102-19	1310/1490/1550/1625nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10
S2102-20	1310/1490/1550/1650nm		38/36/36/36	1/1/1/1	10/10/10/10
S2102-21	1310/1490/1550/1650nm (build-in filter)		36/34/34/34	1/1/1/1	10/10/10/10