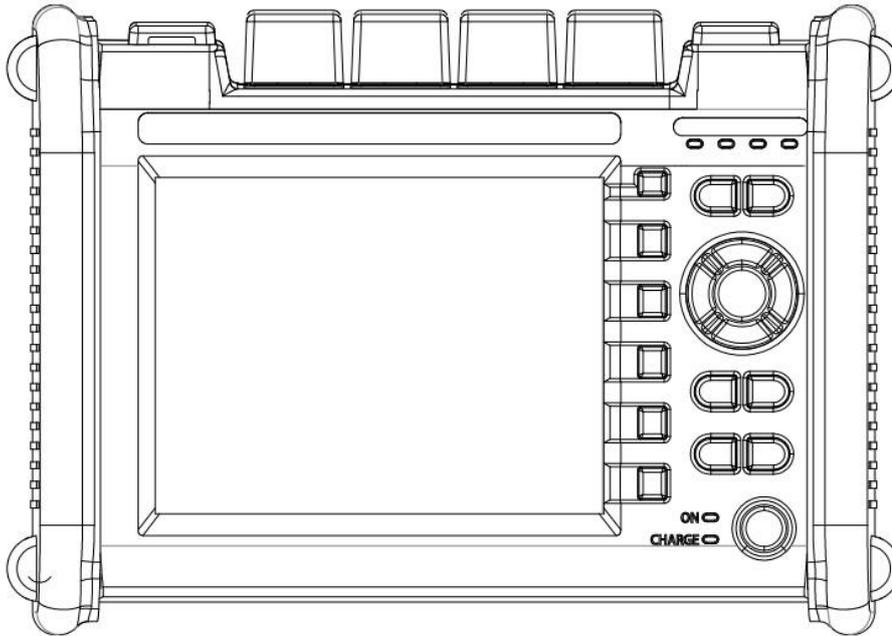


# SMARTCORE Optical Time Domain Reflectometer

## User guide



# Catalog

Preface .....	3
Security Warning .....	4
Product features: .....	5
User guide: .....	6
1、 System setting .....	7
2、 OTDR Function module .....	8
2.1 Setting .....	8
2.2 Test .....	10
2.3 File storage .....	12
2.4 Event map .....	13
2.5 Computer software .....	15
3、 Other function module .....	17
3.1 VFL Module .....	17
3.2 OPM Module .....	18
3.3 Laser source .....	19
3.4 Loss Test Module .....	21
4、 Software upgrade .....	22
5. Instrument maintenance and trouble shooting .....	23
6.Common faults and treatment methods.....	24

# Optical Time Domain Reflectometer

## Preface

Buy and use this series of handheld optical time domain reflectometer. This manual mainly contains the operation and maintenance information of the instrument, as well as the troubleshooting guide and other information. For your convenience, please read the manual carefully before operating the instrument and follow the instructions correctly

This manual is only used in conjunction with this instrument. Any unit or individual shall not tamper with, copy or disseminate the contents of this manual for commercial purposes without authorization of the company.

The contents contained in this manual are subject to modification without prior notice. If you have any questions, please call the supplier, we will wholeheartedly provide you with the best quality service!

## Security Warning

### Power adapter

**Input:** AC 100V ~ [240V, 50/60Hz; @1.6A](#)

**Output:** DC 12V,3A~4A

Use the power adapter in strict accordance with the specifications, or it may cause damage to the device

### Battery:

Inside the instrument is dedicated lithium battery. In order to give full play to the performance of the battery, when using the instrument for the first time, please use the internal battery power supply, the battery will be exhausted, and then charge the battery, the first charge time should not be less than 4 hours. The charging temperature range of the battery in the machine is  $-10^{\circ}\text{C} \sim 50^{\circ}\text{C}$ . When the ambient temperature is too high, please terminate the charging for your safety. When the instrument is idle for more than 2 months, it should be charged in time to maintain the battery power. Do not take out the battery without permission; Please do not let the battery near the fire source, strong heat; Do not open or damage the battery; The temperature range of battery for long-term storage is  $-20^{\circ}\text{C} \sim 45^{\circ}\text{C}$ .



### Laser safety instructions:

**Laser safety level of this instrument is: CLASS III B, belong to the harmful to human body laser, in use process, please pay attention to safety.**

**When using this instrument, please avoid looking directly at the laser outlet or the end of the optical fiber. When the instrument is used, please cover the dust cap of the light outlet. When the visible red light function of the instrument is on, please do not look directly at the output port of the red light source or at the end of the optical fiber connected to the red light output end, so as to avoid damage to the eyes.**

### Product features:

- 1) Wavelength: single mode: 1310/1550/1490/1625/1650, Multimode: 850/1300
- 2) Measuring range: 100m~240km
- 3) Touch screen
- 4) Data format: Sor format
- 5) Integration capabilities: Power meter, Light source, VFL, Insertion loss tester, OTDR, Event map,

### FDO。

- 6) Keyboard input, edit save file name and line number
- 7) Support user upgrade
- 8) The 5.6-inch TFT screen, 640\*480 pixels, is clearly visible in the outdoor sunlight
- 9) Two 7.4v /2500mAh lithium batteries are used, which can be fully charged for more than 8 hours
- 10) Convenient screenshot function, instrument under any interface can be quickly screenshot

# User guide

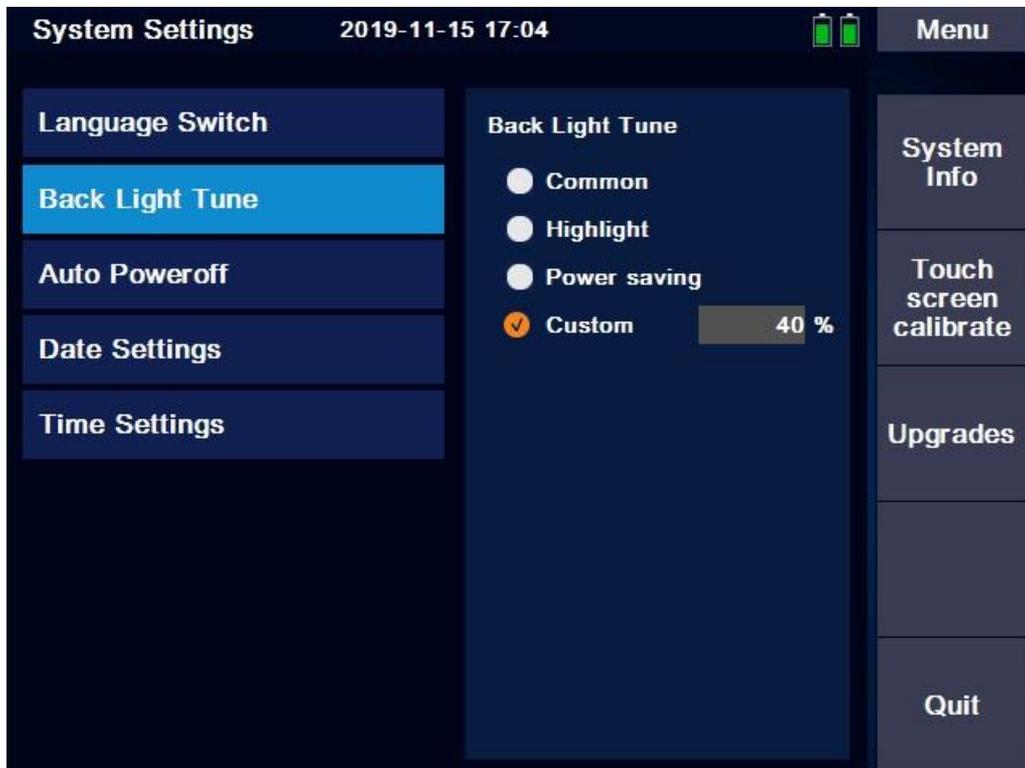


No	Name	Describe
I	<b>Optical interface</b>	VFL、 Power meter、 Light source、 OTDR
II	<b>Electrical interface</b>	Power port、 MINI USB
III	<b>Electrical interface</b>	USB2.0 (Type A) , SD card
IV	<b>Indicator light</b>	Indicates a functional module that is working
V	<b>Keys</b>	MENU ; F1~F5: Function keys; REAL/AVG: Manual testing; AUTO: Auto testing; ▲▼◀▶OK: Directional navigation key; A/B: The cursor switching; ESC: return SETUP:Enter the setting interface; FILE:Enter the file management interface

This series of fiber optical comprehensive tester is a multifunctional optical measuring instrument, which integrates OTDR, visual fault locator, optical power meter, light source, insertion loss tester, event map and other functions. It can load GPS module, WIFI module, IOT module, Bluetooth module and other communication auxiliary functions. Set touch screen and button as one of the operability of a very simple, friendly instrument, is the construction of optical cable, engineering acceptance, and on-site

repair and other effective assistant, whether used to import brand high-grade instrument, or not beginners, believe that the instrument is your most intimate choice.

## 1、 System setting



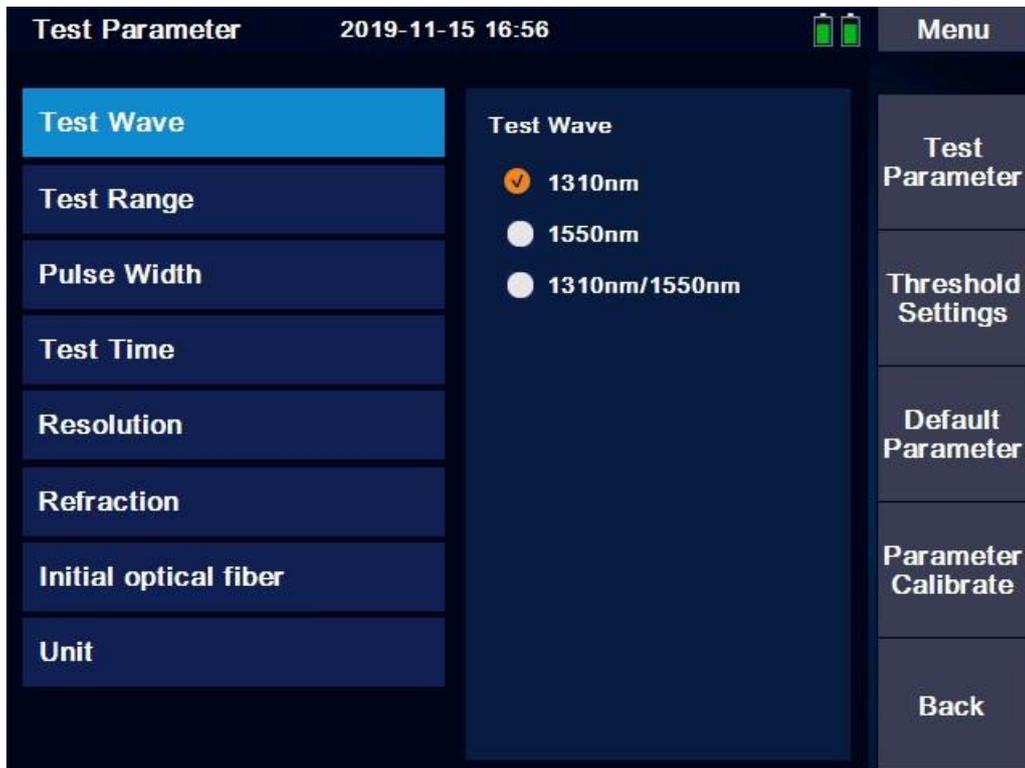
Press [F3] in the interface of the main menu to enter the system setting interface, and the following Settings can be performed:

- ❖ **Language selection**
- ❖ **Backlight adjustment**
- ❖ **Automatic shutdown**
- ❖ **Date Settings**
- ❖ **Time Setting**
- ❖ **Touch screen calibrate**
- ❖ **Upgrades**
- ❖ **System information (Series no, Instrument model, Hardware and software version number)**

## 2、 OTDR Function module

### 2.1 Setting

Under the main interface of the meter, press [SETUP] button to quickly enter the setting interface :(or press F1 to enter parameter setting on the main interface of OTDR)



“Test parameter”Menu

#### 2.1.1 Test Parameter

- **Wavelength:** 1310nm, 1550nm (Optional: 1490nm, 1625nm, 1650nm online test and 850nm/1300nm multimode) .
- **Measuring range:**
- **AUTO mode:** The device will automatically set the most appropriate parameters for the current measurement, and the measurement range and pulse width selected values cannot be modified at this time.
  - **Manual mode:** The range and pulse width can be set manually.
- **Pulse Width:** Pulse width refers to the time width of emitting German optical pulse signal during measurement. The wider the pulse width is, the stronger the optical power injected into the fiber, the stronger the backscattering signal of the fiber, and the farther the OTDR can effectively detect, but the wide pulse width will cause saturation of the initial reflection signal, resulting in large blind area. Therefore, the selection of pulse width is related to the

- measurement of fiber length. The longer the length is, the wider the pulse width is. It can only be modified in the automatic measurement mode, which defaults to "automatic configuration".
  
- **Measuring time:** In the mean measurement mode, the longer the detection time is, the better the signal-to-noise ratio is improved, and the more accurate the test results are. The user should reasonably select the detection time, which is proportional to the dynamic measurement.
  
- **Resolution:** High resolution will have more sampling points and higher accuracy, but it will also increase the amount of data collected.
  
- **Refractive index :** Is the essential characteristics of optical fiber, different manufacturers of optical fiber, slightly different, refractive index is the key parameter to calculate the distance, can not be arbitrarily set.
  
- **Unit: km/kfeet/miles.**

OTDR will automatically select the most appropriate reference pulse width when manual measurement range is set in automatic mode.

The range and pulse width can be adjusted manually in manual mode. The following list is for reference only:

Range Pulse Width	500m	2km	5km	10km	20km	40km	80km	120km	200km	240km
3ns	√	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
5ns	√	√	Δ	Δ	Δ	Δ	Δ	Δ	Δ	Δ
10ns	√	√	√	Δ	Δ	Δ	Δ	Δ	Δ	Δ
20ns	√	√	√	√	Δ	Δ	Δ	Δ	Δ	Δ
50ns	Δ	√	√	√	√	Δ	Δ	Δ	Δ	Δ
100ns	Δ	Δ	√	√	√	Δ	Δ	Δ	Δ	Δ
200ns	Δ	Δ	Δ	Δ	√	√	Δ	Δ	Δ	Δ
500ns	Δ	Δ	Δ	Δ	√	√	√	Δ	Δ	Δ
1us	Δ	Δ	Δ	Δ	Δ	√	√	√	Δ	Δ
2us	Δ	Δ	Δ	Δ	Δ	Δ	√	√	√	Δ
5us	Δ	Δ	Δ	Δ	Δ	Δ	√	√	√	√
10us	Δ	Δ	Δ	Δ	Δ	Δ	Δ	√	√	√
20us	Δ	Δ	Δ	Δ	Δ	Δ	Δ	√	√	√

### 2.1.2 OTDR Parameter Settings

Various event measurement thresholds, including attenuation/reflection/slope/optical fiber end refractive index and scattering coefficient Settings

The refractive index is selected by the user, and changing the refractive index setting will change the ranging result. The refractive index is provided by the fiber optic cable or fiber optic manufacturer. Users are advised to calibrate the group refractive index with a known length of fiber and remember it.

The scattering coefficient is usually obtained from the fiber optic cable manufacturer

### 2.1.3 Restore the default

Restore to factory default Settings.

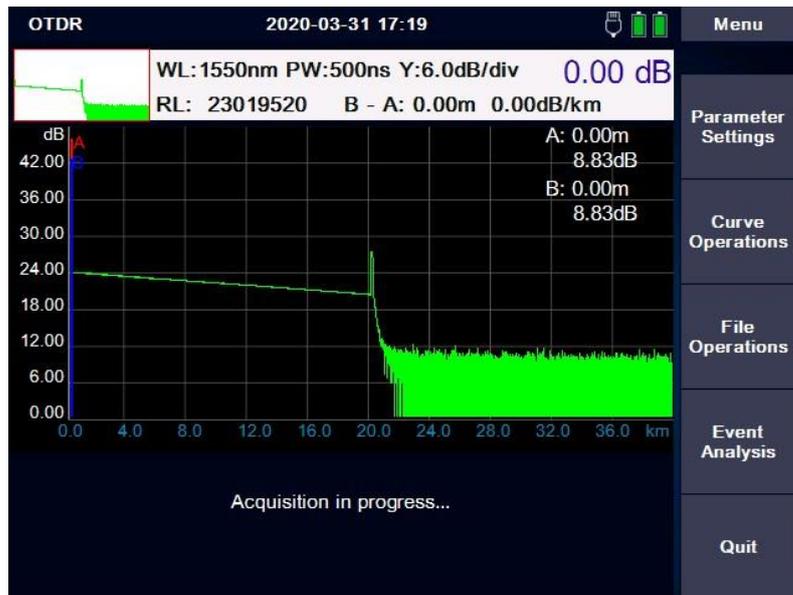
## 2.2 Test

Press the [F1] key on the control panel to enter the measurement interface。 The following is the meaning of each label in the measurement interface:

- **Main menu** General section operation function menu
  - **Parameter Settings:**
  - **Measurement parameter Settings submenu**
  - **Curve operation:**
  - Curve manipulation sub-menu, including: cursor, zoom and curve translation
  - **File operations**
  - File operation submenu, including: open file, save file, multi trace operation and save file Settings.
  - **Event analysis**
  - Curve analysis sub-menu, including: cursor, curve zoom, event list view, add and delete events
  - **More (multi-trace operation and event analysis function description)**
- Add event :** The event list is added accordingly
- Delete events:** The event list will delete the event accordingly
- Clear choice:** **When multitrace line loads, clear the selected curve and event list**
- Remove other:** **When multitrace lines are loaded, clear the list of curves and events other than the selected curve**
- Clear all:** Clear all measurement curves and event lists in the current measurement interface

### REAL TIME MODE:

Parameter settings->Test time->Average mode; press **【REAL/AVG】** key enter the real-time measurement mode, The current circuit is measured in real time, and the measurement parameters cannot be modified in the measurement mode. If the parameters need to be modified, the test needs to be stopped first. Event analysis will not be conducted during the real-time test, and event analysis will only be conducted after the test is stopped.



REAL TIME MODE

**Average mode**

Parameter settings/Test time/XX seconds; Press **【REAL/AVG】** key enter the real-time measurement mode, The curve consisting of the average values measured over a period of time can be displayed. The length of time can be edited in the "measurement time" option in [SETUP].



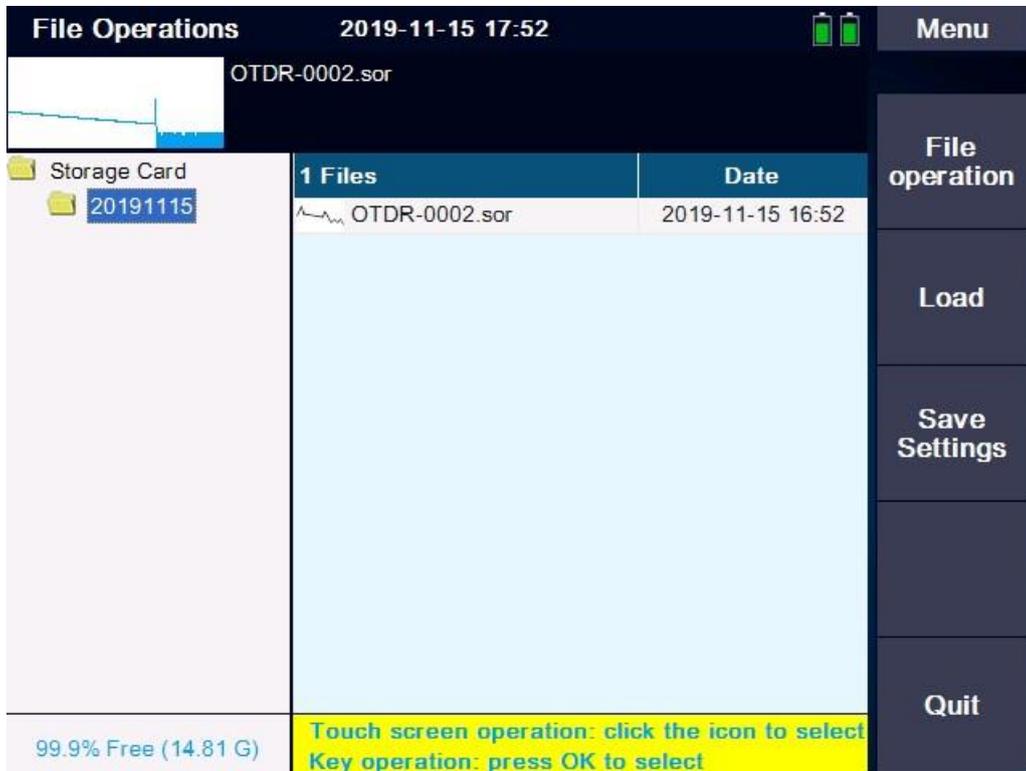
Average mode

When the measurement is finished, the measurement result will be automatically saved

Under no circumstances shall the optical interface and the end of the tail fiber connected to the optical interface be directed to the eye of the operator or other person. Otherwise, the vision of the irradiated person may be damaged, or even blind!

## 2.3 File storage

Press [FILE] to view and edit stored files



File operation

The menu provides a complete file storage, call out function. The results of each measurement are automatically saved to internal storage (configurable) and marked with time, date, serial number and other information for easy reference. Users can name, number, comment on each measurement curve, and generate complete reports through random attached software.

## 2.4 Event map

Event maps can be used to assist in viewing fiber links. The event map translates the connection of the whole fiber link directly into the physical schematic diagram, such as fusion connection, flange connection, splitter, fiber start, fiber end, bending, etc.

Some analysis parameters need to be set before using event map measurements (the meter has default classical value, if the user is not familiar with the link analysis parameters, it is recommended to use the default value directly).



### 2.4.1 Qualified threshold

The qualified threshold parameter is used to judge whether the welding junction and flange connection point are within the qualified range and exceed the threshold parameter. The schematic diagram shows red, less than the threshold parameter, and the schematic diagram shows green.



The threshold parameter

## 2.4.2 Splitter loss Settings

In PON network, there are usually 1 x N splitter, but the loss of each splitter may be different. Therefore, it is necessary to limit the loss value of the splitter. If the value range is set incorrectly, the accuracy of the event map will be affected.



Splitter loss Settings

## 2.5 Computer software

If the user needs to carry out multi-curve comparison or other further analysis functions or remote operation, the measurement data stored in the device after measurement can also be printed by the software.

(For detailed operation of upper computer software, please refer to the operation manual of upper computer software)

Note: the software installation package and software operation instructions are stored in the SD card of the device. Relevant files can be imported into the computer through the MINI USB cable.

**OTDR Test Report**

2020-03-31 17:45:36

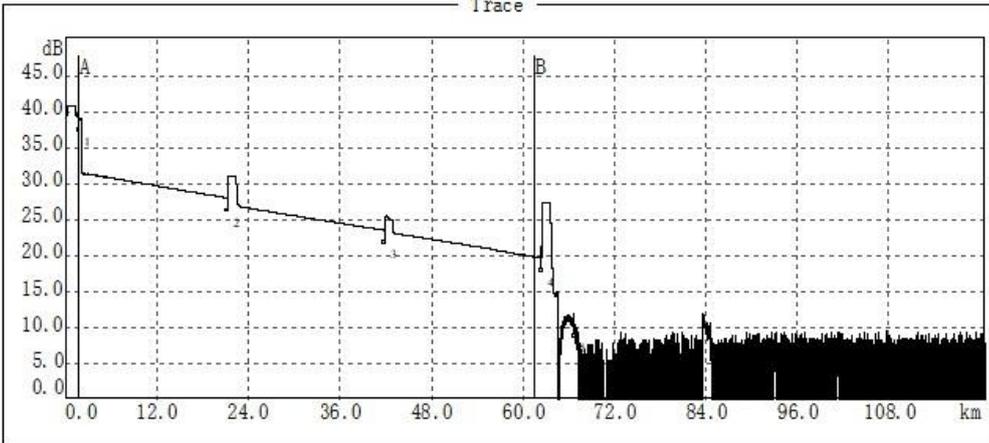
Task

Filename: iLOM-1550-10us-0009.sor Measurement date: 2020-02-21 12:17:18  
 Operator:

Configuration

Wave length : 1550nm Test range : 120 km Pulse width : 10us  
 Average time : 10s Backscattering (dB): 81.0 Attenu threshold(dB): Auto  
 Reflex threshold(dB): Auto Terminal threshold: Auto Refractive index : 1.469  
 Cable Id : Fiber Id :

Trace



Fiber link information

Length(A-B): 59.472 Km Total Loss(A-B): 19.156 dB Average Loss(A-B): 0.322 dB/km

Event

No.	Distance (Km)	Segment (Km)	Loss (dB)	T. Loss (dB)	Slope (dB/Km)	Reflect (dB)
1Non Reflect (S)	1.592	0.000	0.000	—	0.000	--
2Reflect (F)	21.015	19.423	0.887	3.847	0.182	-14.088
3Reflect (F)	41.565	20.550	0.230	8.300	0.172	-14.088
4Reflect (F)	62.057	20.492	8.791	12.128	0.178	-14.088
5Non Reflect (E)	66.316	4.259	--	21.255	0.208	--

**Batch printing:**

You can set the A/B cursor of each picture arbitrarily, A/B cursor information will be printed on the report. A/B cursor is located at the start and end events by default.

Batch

File Path:

Filename	Size(KB)	Date
<input type="checkbox"/> OTDR-0003.sor	9.98	202
<input type="checkbox"/> OTDR-0004.sor	9.96	202
<input checked="" type="checkbox"/> OTDR-0005.sor	9.96	202
<input checked="" type="checkbox"/> OTDR-0007.sor	9.96	202

File Selected:

Filename	Directory
<input type="checkbox"/> iLOM-1550-10us-0009.sor	E:\VS2005
<input type="checkbox"/> iLOM-1550-1us-0006.sor	E:\VS2005
<input type="checkbox"/> iLOM-1550-2us-0007.sor	E:\VS2005
<input type="checkbox"/> iLOM-1550-5us-0008.sor	E:\VS2005
<input type="checkbox"/> iLOM-1550-5us-0012.sor	E:\VS2005
<input type="checkbox"/> OTDR-0020.sor	E:\VS2005
<input type="checkbox"/> OTDR-0005.sor	E:\VS2005
<input type="checkbox"/> OTDR-0007.sor	E:\VS2005

Trace:

A-B:  
59.472 Km  
19.156 dB  
0.322 dB/km

Print Type: Eight per page

Print Preview  
Print

OTDR Test Report

Task	Measurement date	Operator
2020-02-21 11:09:41	2020-02-21 12:17:18	

Configuration:

Wave length : 1550nm	Test range : 100 km
Pulse width : 20ns	Average time : 10s
Refractive index : 1.469	Attenu threshold(dB) : Auto
Reflex threshold(dB) : Auto	Terminal threshold : Auto

Trace:

Fiber link information (m=8)

No.	Distance (km)	Loss (dB)	T. Loss (dB)	Slope (dB/km)
1	0.000	0.000	0.000	0.000
2	21.015	0.887	0.847	0.182
3	41.868	0.230	0.800	0.172

Length: 59.472 Km Total Loss: 19.156 dB Average Loss: 0.322 dB/km

## 3.Other functional modules

### 3.1 VFL Module

VFL module (650nm)



VFL module

VFL module has two emission modes:

**CW MODE:**In this mode a continuous stream of visible light is emitted. **2Hz**

**MODE:**In this mode, visible light flashes at a frequency of 2Hz.

Press [Shutdown], [MENU] or [ESC] to turn off the VFL

When using the VFL module, do not aim the emitter at the eyes, otherwise it may cause irreversible damage to the eyes!

## 3.2 OPM

Unit: dB, dBm, uW or mW



Opm module

### START/STOP

Turn on and off power meter function.

### Wavelength switching:

Press the "wavelength switch" TAB to switch the current wavelength.

### Set as the reference value:

Press the "REF" TAB to set the current value to the power meter reference.

### Clear zero:

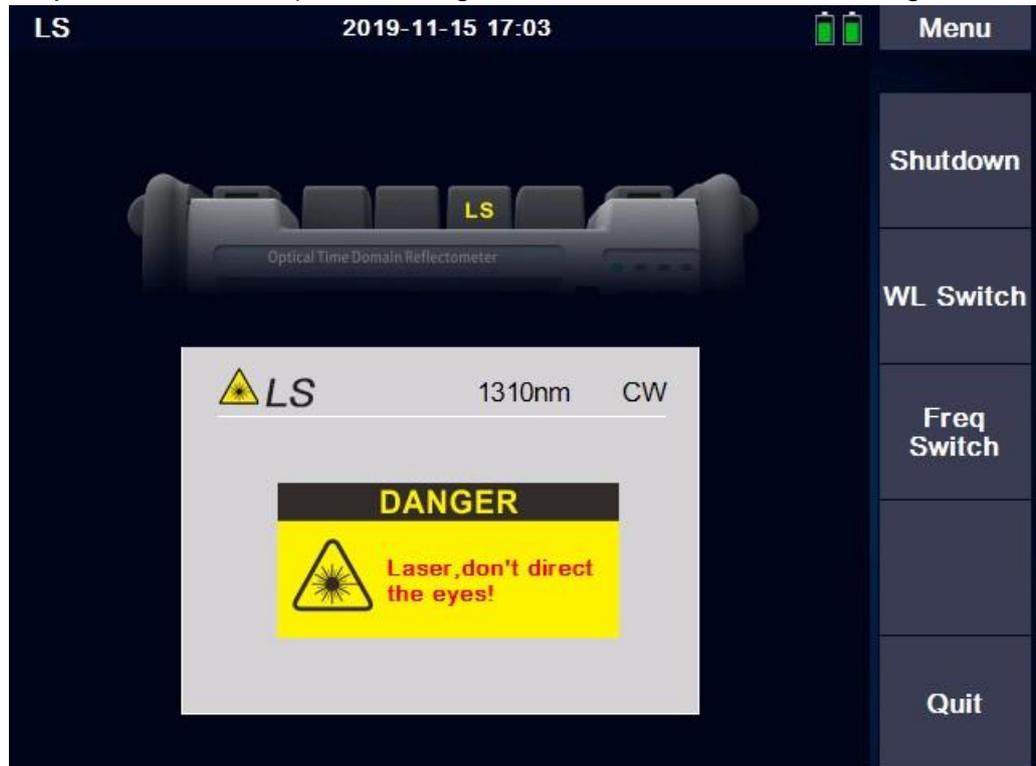
Press the "Zero" TAB to restore the reference value set

### Frequency:

The power meter has a frequency identification function and can identify 270Hz/1kHz/2kHz.

### 3.3 Light source

The light source module and OTDR use the same optical port. OTDR has several wavelengths (except for multi-mode), and the light source has several wavelengths.



Light source module

#### Start/Shutdown

Open and shutdown the light source module!

#### WL Switch

Press "WL Switch" to change wavelength.

#### Frequency switching

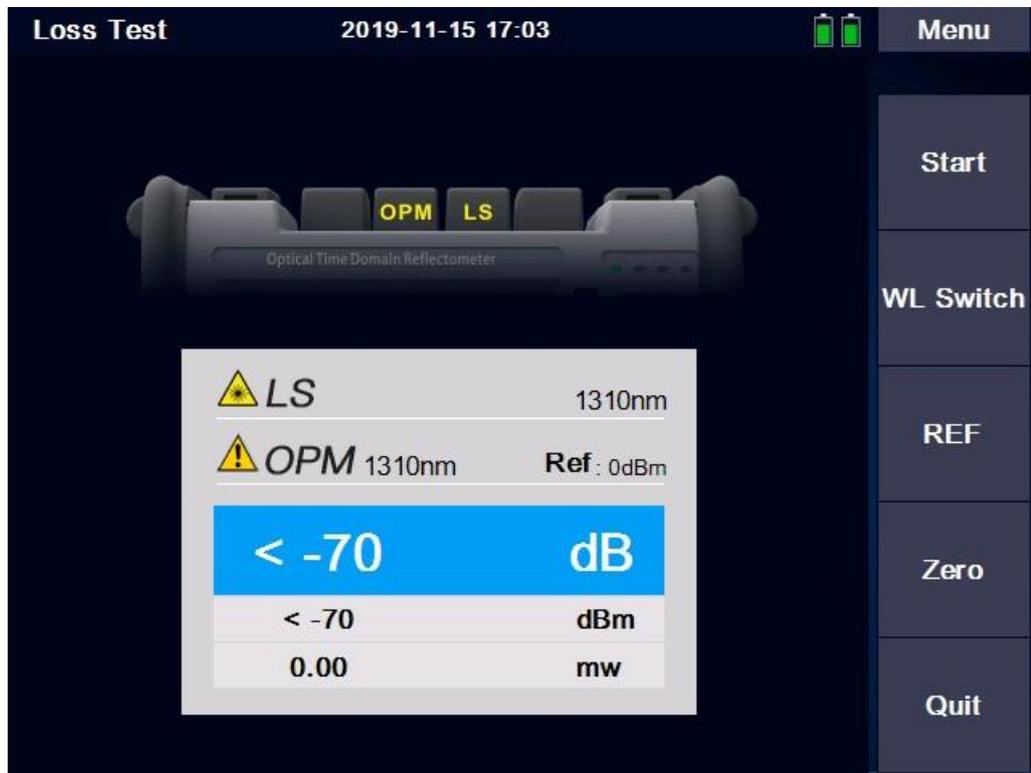
Press the "frequency switch" TAB to switch the output frequency of the laser:  
CW/270Hz/1kHz/2kHz

Description of function and index of light source:

- 1) The output power of the laser:  $-5\text{dBm} \pm 2\text{dB}$
- 2) Function on stable time rate: 3minutes
- 3) Short time stability: 0.05dB
- 4) Long time stability: 0.5dB

### 3.4 Loss test module (optional)

When the meter is installed with both the stable light source module and the power meter module, the loss test module will be automatically activated.



Light source module interface **Start/stop:**Turn

on and off the loss test module.

**WL Switch:**Press the "WL Switch" TAB to switch the current wavelength.

**REF:**Set the reference value.

**Zero:**Restore the set reference value

### 4. Software upgrade

Firmware updates are made by plugging a USB drive into the USB port (the upgrade software must be in the root directory).

**Steps:** 1) Place the software upgrade package in the root directory of your usb flash drive.

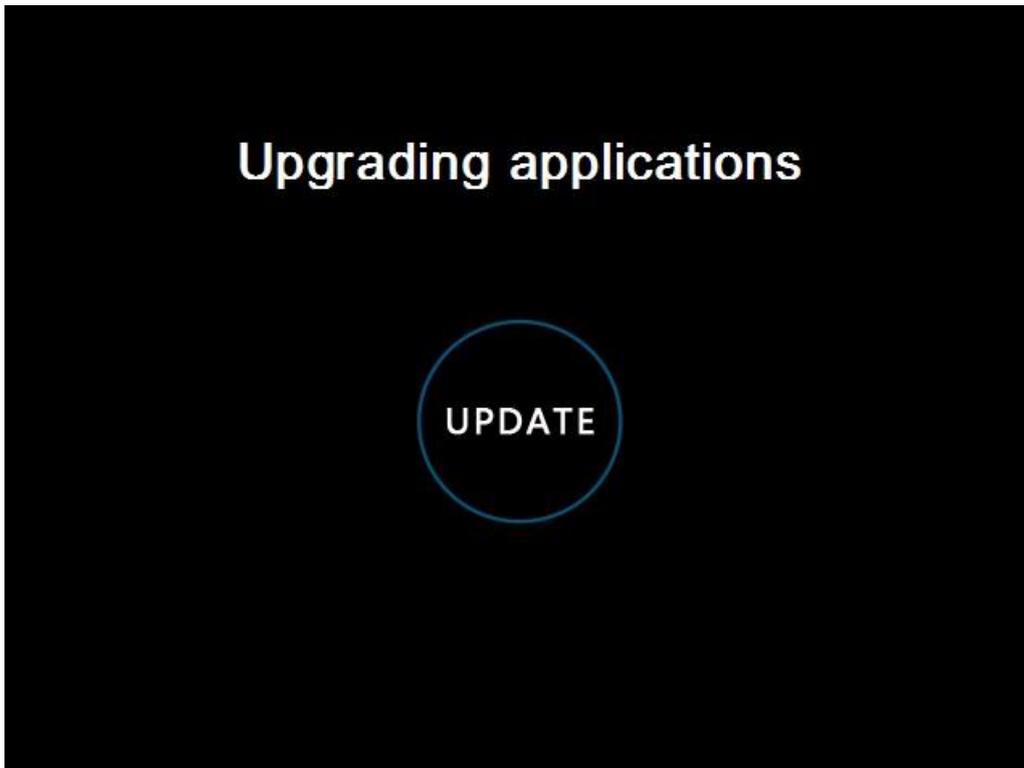
2) turn on the instrument and insert the U disk into the USB port of the instrument.

3) The main interface-->System Settings-->Software upgrade

4) After entering the upgrade interface, the upgrade will be completed automatically

**Note:** during the upgrade, please do not cut off the power or unplug the usb drive. These illegal operations may cause system software damage and the meter cannot start normally.

Once this happens, you must contact the manufacturer or the authorized after-sales service point of the manufacturer for system repair.



## **5. Instrument maintenance and trouble shooting**

### **5.1 Cleaning of connectors**

The optical output interface of this series of fiber optic comprehensive tester is a universal replaceable interface. In case the instrument fails to test the normal curve, or the test result is not accurate, consider cleaning the connector first.

When cleaning, be sure to do it when the OTDR function and visual red light fault location function are turned off. Unscrew the output port and wipe the end face with a special clean paper towel or cotton swab moistened with alcohol.

At the same time, please cover the dust cap after the use of the instrument, and keep it clean.

### **5.2 Instrument screen cleaning**

The display of this series of fiber optic comprehensive tester is a 5.6-inch TFT color LCD with touch screen. Do not click the LCD screen with sharp objects when using, otherwise the derivative LCD screen may be damaged: when cleaning, wipe the LCD screen with soft paper. Do not use organic solvent to wipe the LCD screen, otherwise it may cause damage to the LCD screen.

### **5.3 Calibration**

It is recommended to calibrate the fiber optic comprehensive tester every two years. For specific calibration, please contact the instrument supplier.

## 6.Common faults and treatment methods

Fault description	Cause	Solution
The instrument cannot start properly	Battery dead	Charge the battery and observe the charging indicator light. If the light is red, continue charging. Otherwise, contact the supplier
The instrument cannot be charged properly	The use environment does not meet the charging conditions	Charge the instrument at -10°C ~ 50°C
	Battery problems, or internal circuit problems	Contact the supplier to replace the battery
You can't measure the normal curve	Instrument parameters are not set correctly	Reset the correct test parameters
	The output connector of the optical fiber is contaminated	Clean the light connector
	Instrument light output connector damaged	Connect to the output connector
	The optical output connector does not match	Replace the matching connector
Test curve burr is big, Unsmoothness of waveform	The output interface is not properly connected	Reconnect the appropriate output interface
	Use a smaller pulse width	Switch to a larger pulse width
Saturation (flat top) appears at the front of the test curve	Set the pulse width too large	Use a smaller pulse width
At the beginning of the test curve, the reflection peak drops slowly and the tail drags	The output end of the optical fiber is contaminated	Clean the connector's interface
	Instrument light output connector	Replace the output connector
	The optical output connector does not match	Replace the matching connector
The reflection peak at the end of the fiber cannot be measured	The range setting is too small	Increase the test range value
	Set the pulse width to small	Increase the pulse width parameter
False positives in curve analysis	The threshold of poor quality event of test curve is set to be too small	Increase the test pulse width parameter and increase the event threshold value
The measured fiber length is not accurate	Instrument parameters are not set correctly	Reset the appropriate parameters
	Optical fiber refractive index setting is not	Reset the refractive index of the fiber
The measured fiber average loss value is not accurate	The front end of the test curve is too long	Clean the connector's interface
	The cursor position is not set properly	Reset the cursor position

The above description is for reference only. Please refer to the new instructions for detailed usage. During the use of the instrument, if there is any question, please contact with the instrument supplier. In the use of the instrument, without permission, users are strictly prohibited to dismantle the machine, otherwise will lose the warranty qualification!