

# Smart OTDR

Optical Time Domain Reflectometer

User Manual

## Foreword

Thank you for purchasing our OTDR (Optical Time Domain Reflectometer). This user's manual contains useful information about the instrument's functions and operating procedures of the OTDR. To ensure correct use, please read this manual thoroughly before beginning operation. After reading the manual, keep it in convenient location for quick reference whenever a question arises during operation.

## Note

The contents of this manual are subject to change without prior notice as a result of continuing improvements to the instrument's performance and functions. The figures given in this manual may differ from those that actually appear on your screen.

Every effort has been made in the preparation of this manual to ensure the accuracy of its contents. However, should you have any questions or find any errors, please contact your nearest dealer.

Copying or reproducing all or any part of the contents of this manual without our company's permission is strictly prohibited.

## Safety Tips

### Charger:

Input: AC 100V ~ 240V, 50/60Hz; @0.3A~0.5A。

Output: DC 8.4V, 0.5A~1A, Polarity: positive inside ,negative outside

Please use the charger in strict accordance with the specifications, or it may cause damage to the equipment

### Battery:

Special lithium battery is used in the instrument. In order to fully utilize the performance of the battery, when using the instrument for the first time, please exhaust the battery and then charge the battery. The first charging time should be no less than 8 hours. The charging temperature of the internal battery is from 0 °C to 50 °C. When the ambient temperature is too high, please terminate the charging for your safety. When the instrument is unused for more than 2 months, it should be charged in time to maintain the battery power; do not remove the battery; please do not let the battery close to the fire source, strong heat; do not open or damage the battery; Temperature for long-term storage of the battery is -20 °C ~ 45 °C.

### Laser Safety:

When using this instrument, please pay attention to avoid direct view of the laser output port, and do not look directly at the end of the fiber during testing; After used the

instrument, please cover dust cap. When the visible fault locator function is turned on, please do not look directly at the output port of the VFL; and do not look directly at the end of pigtail connected to VFL port to avoid the damage to eyes

### **Features:**

1. Two wavelength: 1310/1550nm
2. Measurement distance: 60km
3. Touching screen ( Optional)
4. Test record can be saved as so format
5. Optical power meter/ optical light source/ visual fault locator/ OTDR- -Multi-function tester
6. Editable file name and lineNo.
7. Support upgrade
8. 4 inch ISP Display, 800\*480 pixels, Clear and readable in outdoor sunlight
9. Quick boot, it takes only 2 seconds to test

# Catalog

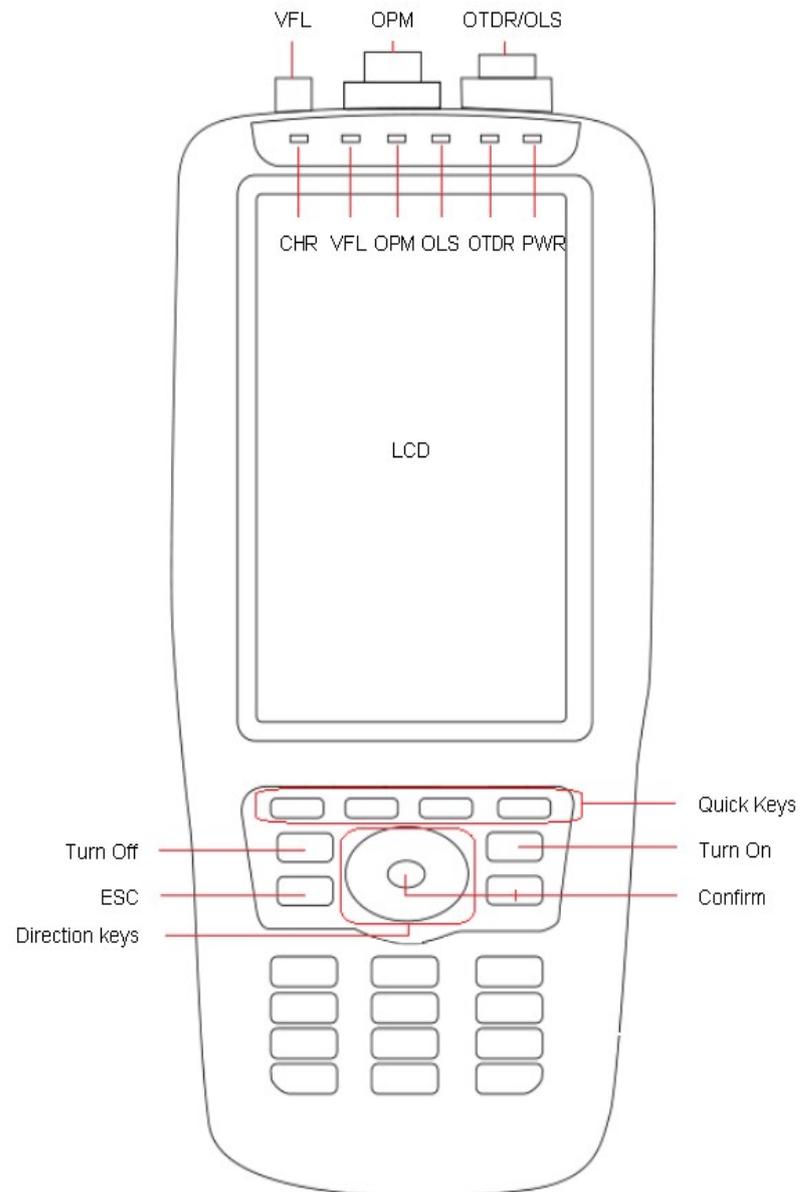
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# 1.Specifications

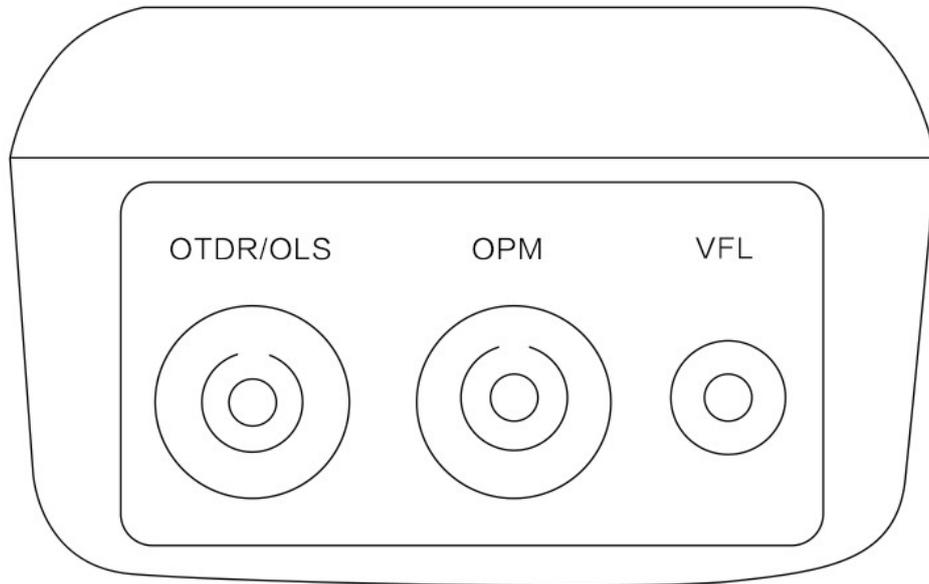
OTDR		
Wavelength(nm)	1310/1550nm	
Dynamic Range	22/20dB	
Measurement Distance	0-60 km	
Type of Fiber	9/125um SM	
Type of Connectors	FC/PC; SC/PC (FC/APC SC/APC--Optional )	
Peak Value of laser	>=30mW	
Unit	Meter/ inch/ mile	
Dead Zone of Reflection	2m	
Dead Zone of attenuation Event	12m	
Accuracy Distance(Reflection Event)	About $\pm(1m+2 *10^{-4}) * distance$	
Storage of records	200 groups	
Visual Fault locator (VFL)		
Wavelength (nm)	650nm	
Output power	>=10mW	
Mode	CW, 1Hz, 2Hz	
Fiber type	SM, MM	
Optical Power Meter		
Measurement range dBm	-70~+10 dBm	-50~+26 dBm
Wavelength range (nm)	800~1650	
Calibrated wavelength	850、1300、1310、1490、1550、1625	
Detector	InGaAs	
Accuracy	< $\pm 3\%$ (-10dBm、22°C)	
Resolution	Linearity: 0.1%, Non-linearity: 0.01dBm	
connector	Changeable FC/PC SC/PC, (ST as Optional)	
Optical Light Source		
Emitter	FP-LD	
wavelength (nm)	1310/1550nm	
Connector	FC/PC (SC/ST as optional)	
Output power	$\geq -5$ dBm	
Output stability(dBm)	$\pm 0.04 @ 20^{\circ}\text{C} @ 15\text{min}$	
Modulation	CW/270Hz/1KHz/2KHz	
Fiber type	SM	
Others		
LCD	3.97inch,800*480pixels, IPS screen	
Battery	7.4V/4400mAH Lithium-ion battery, >5000 tests	
Temperature	Work temperature: -5 ~ 50 ° C, storage temperature: -10 ~ 60 ° C	
Humidity	0~85%(Non-condensing)	
Dimensions (mm)	190×84×52	
Weight(g)	375	

## 2.Functions

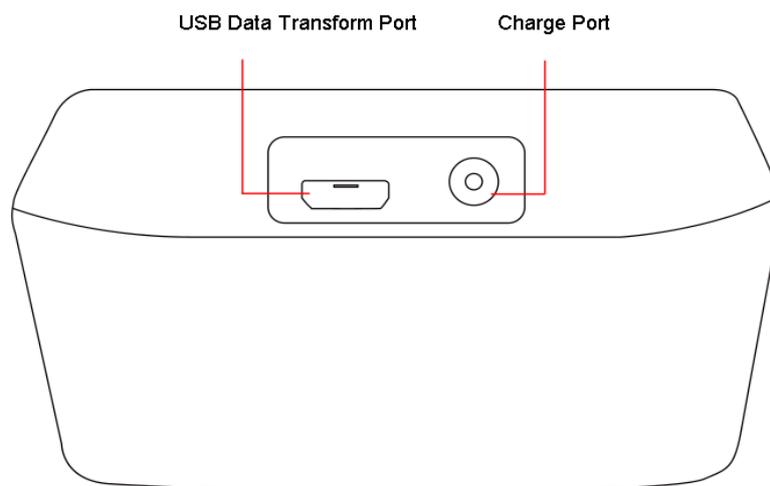
### 2.1Front Panel



## 2.2 Top Interface

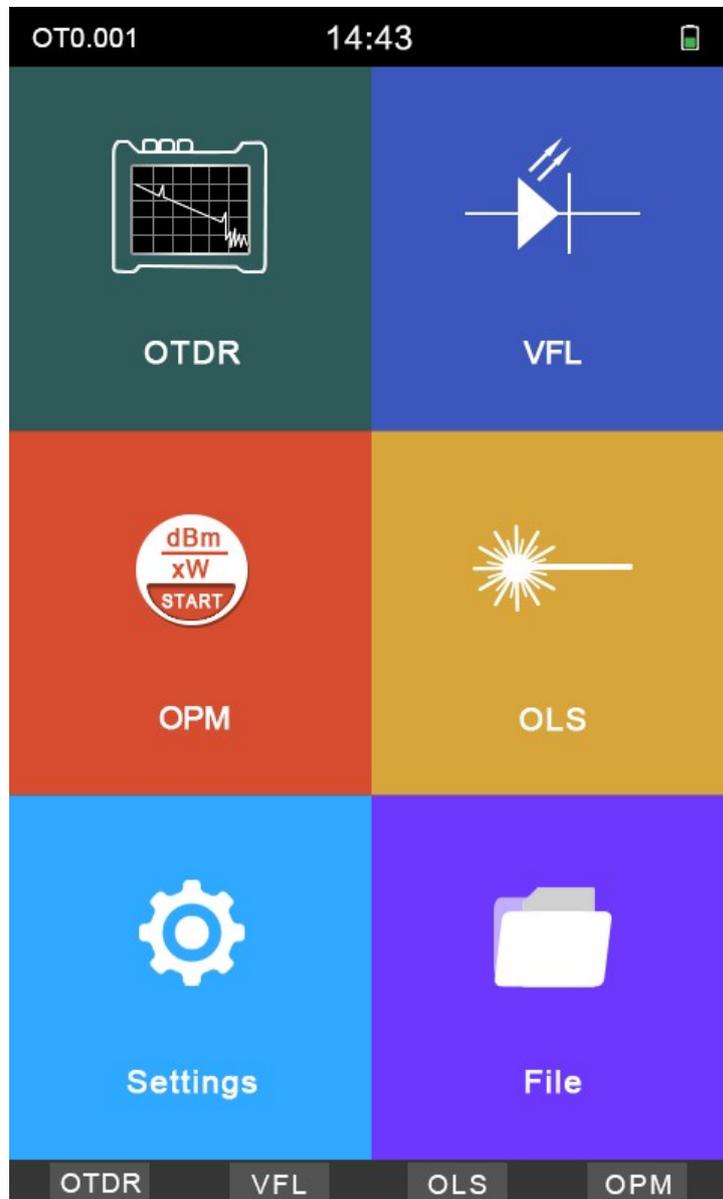


## 2.3 Bottom Interface



### 3.LCD Display

#### Main Menu



### 4.Operations

#### 4.1 ON/OFF & Charge

**Turn On:** Press  to turn on the tester, the PWR LED lights up and the display shows the main menu

**Turn Off:** Press “OFF”, the display shows: Confirm to turn it off?Yes: OK; NO: ESC

**Turn off by force:** when the tester works abnormally, press  for 6 seconds to turn off the tester by force.

During normal use, the battery level will be displayed in the upper right corner of the tester. When the battery level is too low, the battery level symbol will turn red as warning. Please charge it with the charger provided by factory. The remaining charge will be displayed at the top of the screen. The red color of LED on the charger indicates that charging is in progress, and the green color means it is already fully charged.

After turn on the device, please enter into the system settings from the main menu, set the parameters like date, time, backlight, brightness, auto power off time, button tone and other information.

## 4.2 Connect the fiber

**Note:** In any case,do not exposure eyes to the emitted light directly;

The light is harmful to your eyes;

Before connecting the fiber,please check whether the connector type matches or not, and also check whether the connector is clean or not; both the unmatched connectors and the contaminated connectors can cause inaccurate measurements and can even damage the the instrument.

### **Clean the end face of connector and pigtail:**

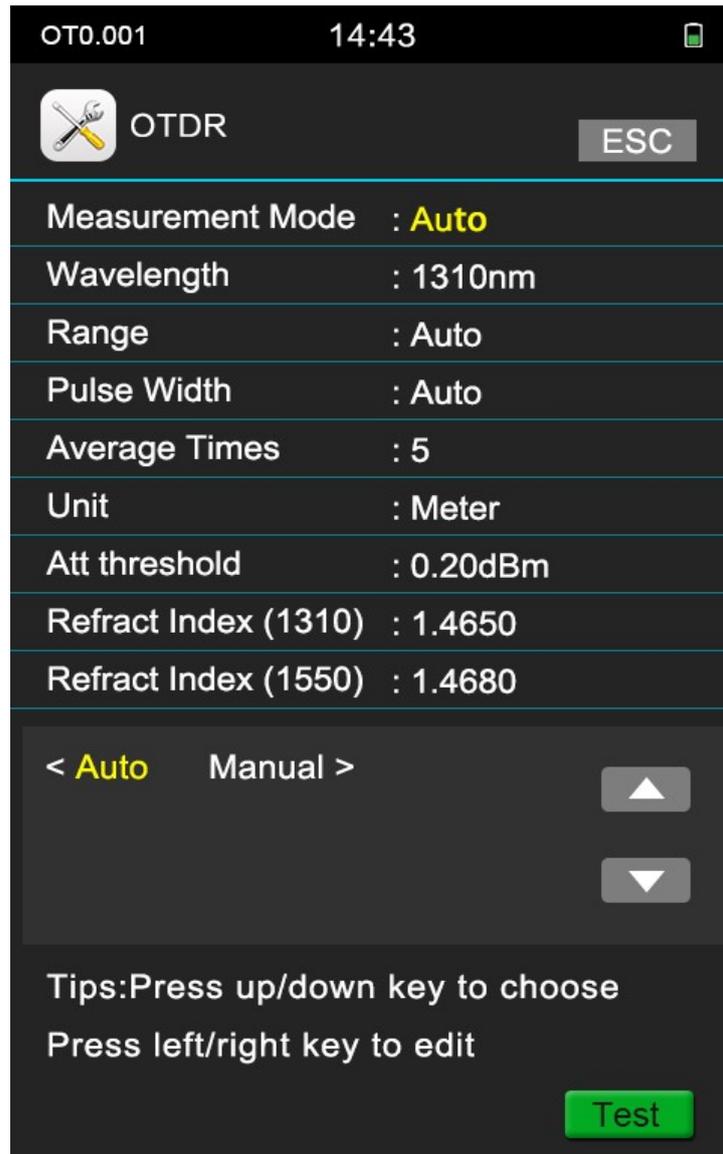
Before connecting the pigtail, please clean the end face of the pigtail by water-free alcohol; After the alcohol has evaporated, connect it to the device.

Please cover the dust cap when not in use

## 4.3 Setting measurement conditions

### 4.3.1 Auto Test

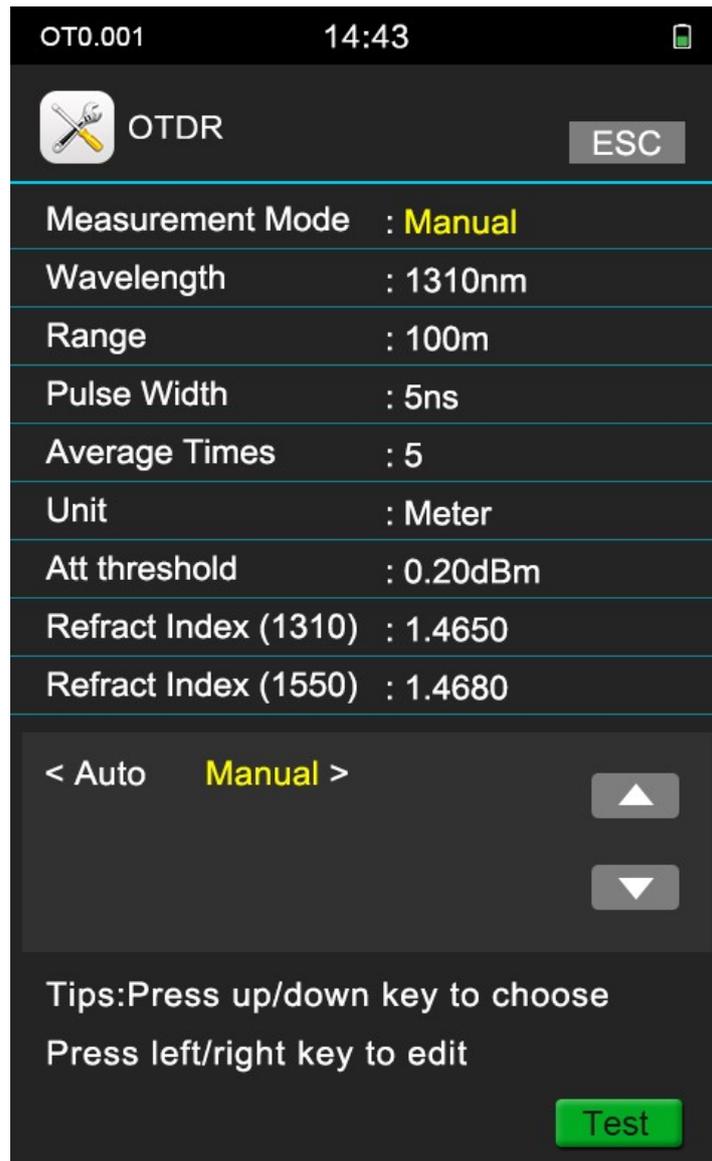
- 1.Press OTDR/parameters
- 2.Choose wavelength
- 3.Choose Test Mode
- 4.Choose Automatic



### 4.3.2 Manual Test

The manual test is a professional test mode, and operators can set the test conditions according to the actual condition of the fiber

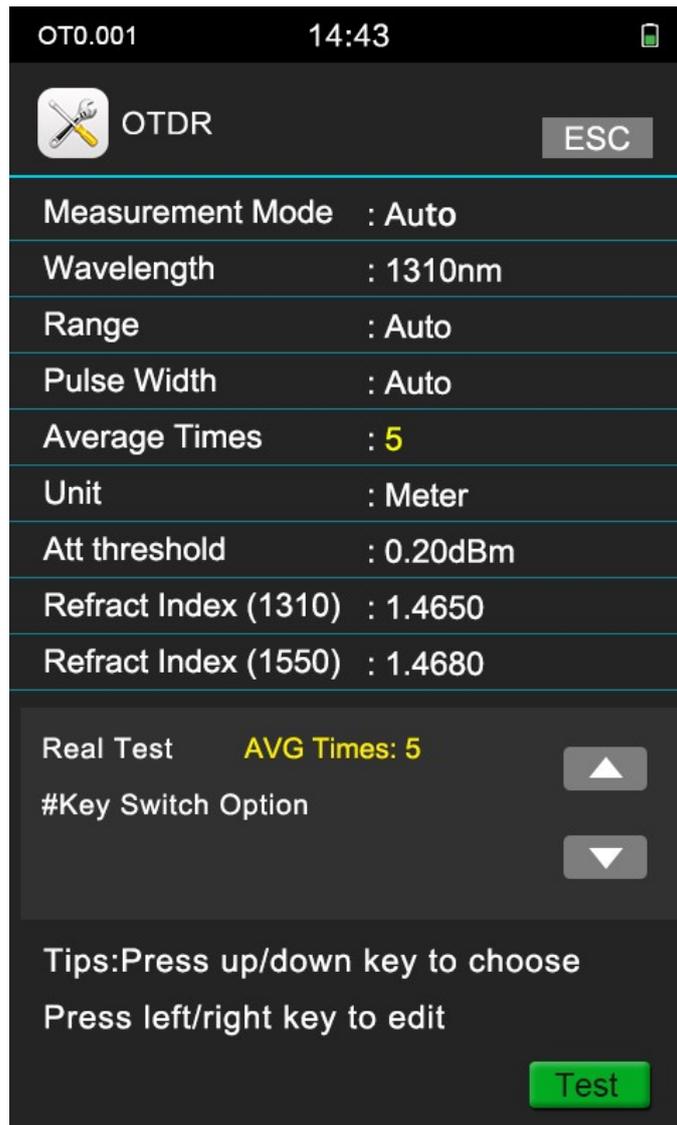
1. Press OTDR/parameters
2. Choose Test Mode: Manual
3. Choose Average time: we suggest 10 as Minimum:
4. Choose suitable parameters



Experienced engineers can select the most suitable measurement parameters; according to the accumulated experience of the measurement and the situation of the field curve, which can improve the measurement efficiency and quickly find the fault point.

#### 4.3.3 Real-time Test

1. Press OTDR/parameters
2. Choose wavelength
3. Choose Test Mode
4. Choose Test range
5. Choose pulse width
6. Choose Average times: Real

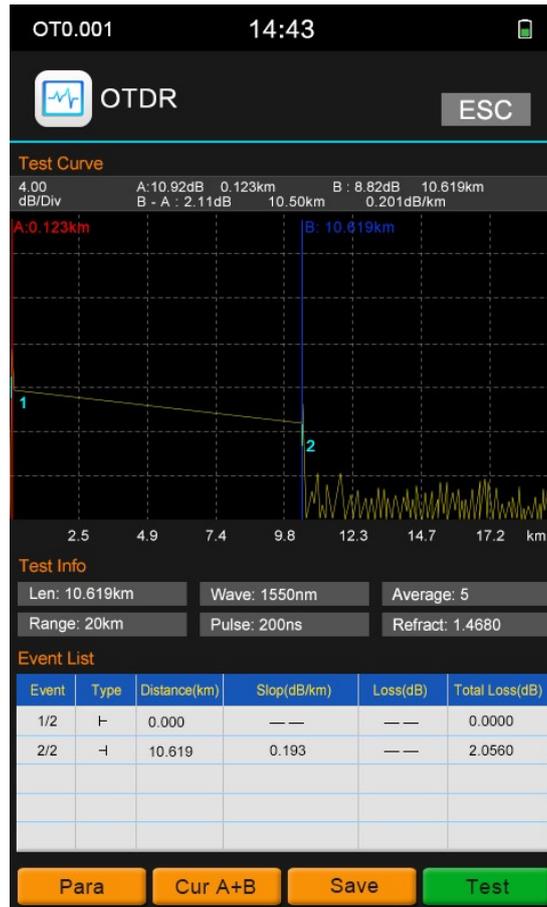


#### 4.4 Test

- 1.PRESS F4 to Test
- 2.Press F4 in the" OTDR" menu

#### 4.5 Curve analysis

After testing, the curve, test results and event list will show in the display



## 4.6 Measure Distance and Average Loss

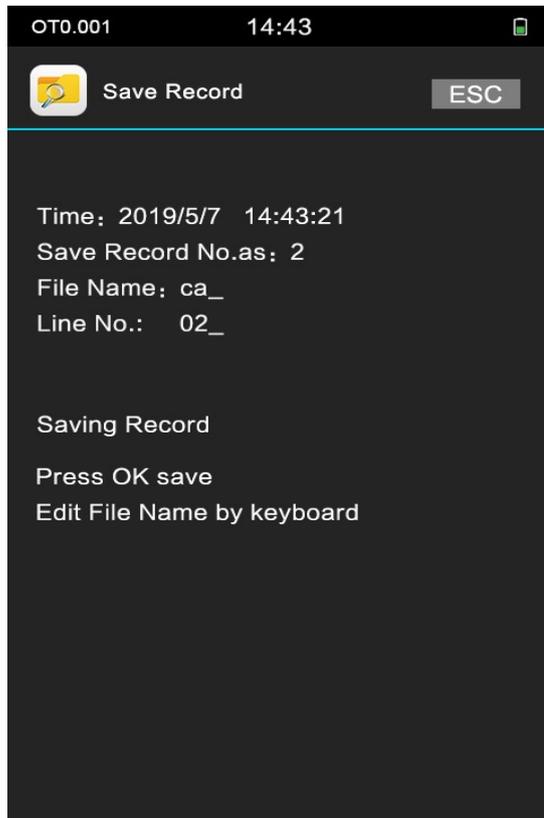
Press F2, choose cursor A , cursor B, or cursor A+B, move the cursors to left or right through press the direction keys, the distance and average loss between B-A will display in the gray area above the curve

## 4.7 Save& Browse&export record

### 4.7.1 Save record

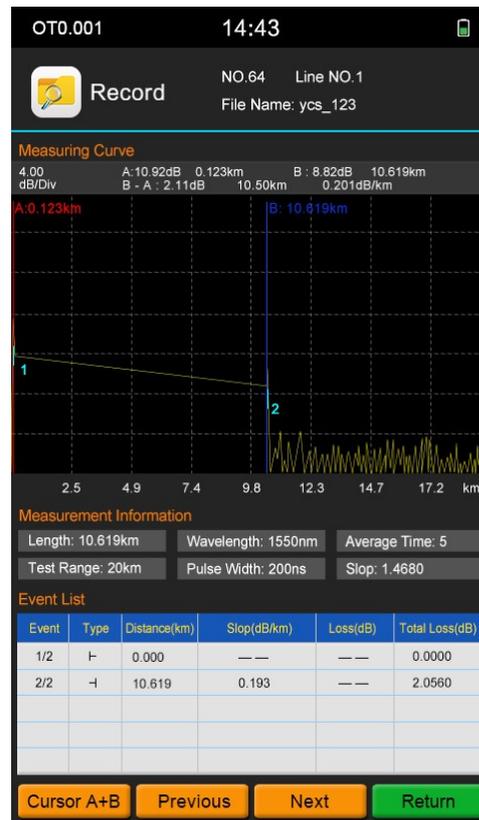
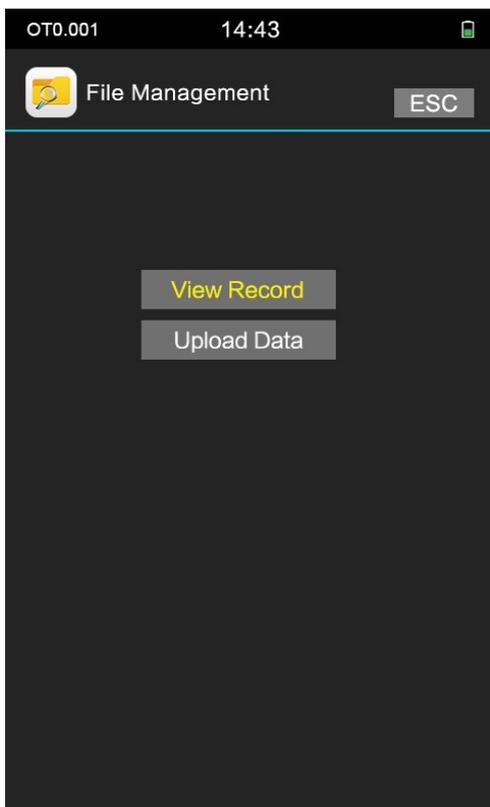
After testing, press F3 to save the record, there will be prompt message shows in the display, operators can edit the file name and prefix via keyboard, Enter the starting number of the file name, press “ OK”to save the record; and the number of the line will Automatically add 1 next time

This tester can save 200 groups of records



#### 4.7.2 View Record

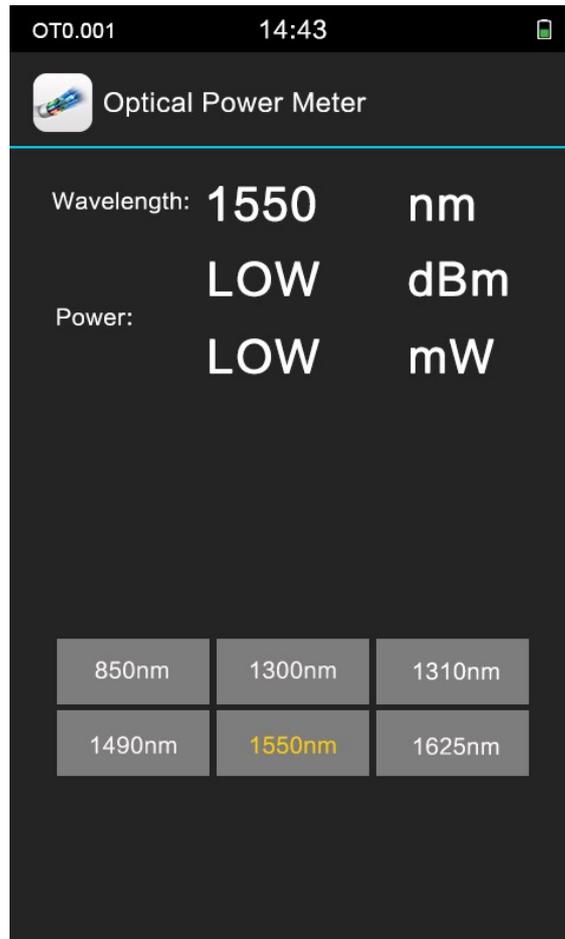
From the main menu of the home page/ File/REC View; To view the records by moving or pressing F2 to view the previous record and press F3 to view the next record



### 4.7.3 Data Upload

Connect the instrument to the PC with the USB data cable. The USB interface is at the bottom of the instrument, Turn on the instrument, enter the main menu/Files/Data Upload, and save the records to the software. The software can do Analysis, archiving and printing operations to test records

## 5. Optical Power Meter



### Calibration Instructions:

when the power meter shows deviation values, please clean the detector firstly. If there is still a small deviation after cleaning, you can perform manual calibration. The operation is as follows: Press the up/down direction key to display Adjust State (above 1300nm) and press “#” key enters manual calibration mode, press the up and down keys to fine tune, press 2 and 8 keys to coarse adjustment, press OK to save.

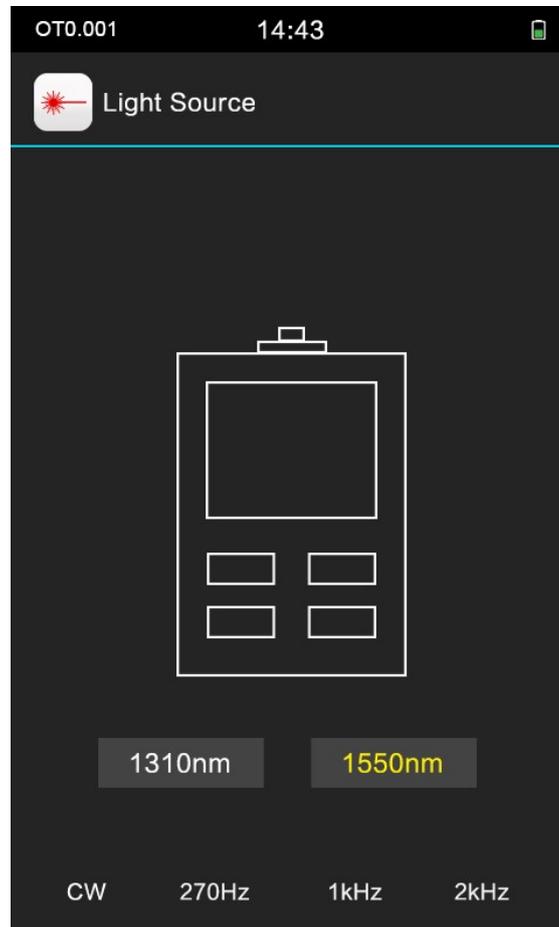
## 6. Visual Fault Locator (VFL)



CW: continuous light ; OFF: turn off the light; 2Hz: Fast Blink; 1Hz: Slow Blink

**Reminder:** When using the VFL function, Do not see directly to the optical interface of the instrument and the end of the pigtail connected to the optical interface , otherwise it may hurt the eyes or even blindness!

## 7. Optical Light Source



Two wavelengths:1310nm,1550nm

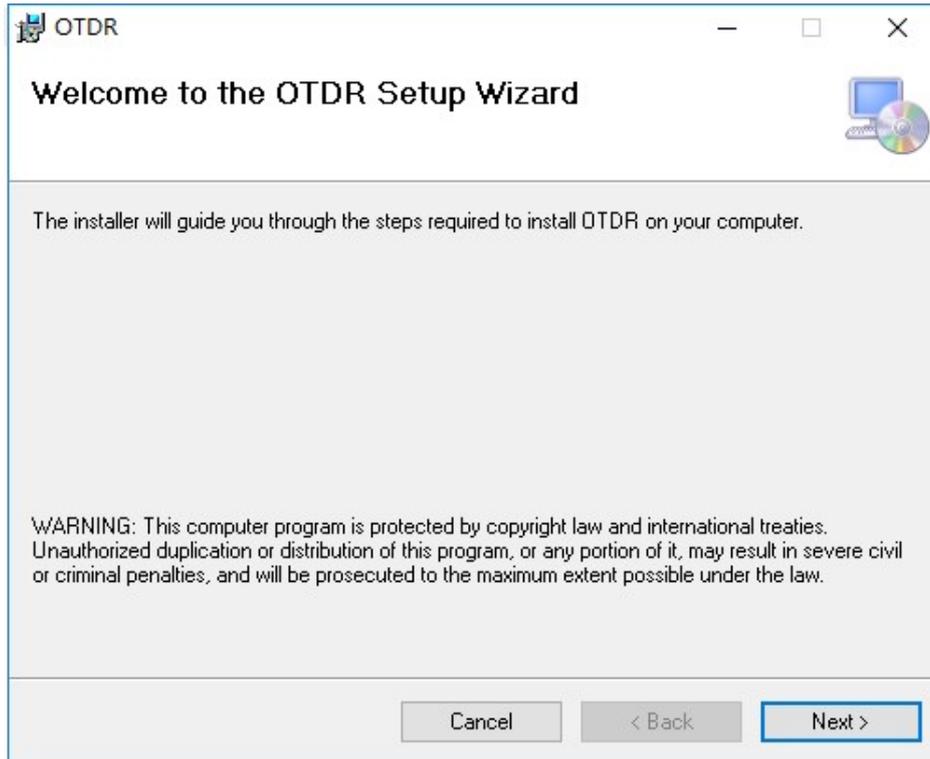
CW:Continuous light output, 0Hz。

270Hz, 1kHz, 2kHz : Non-continuous light output, Simulate actual data signal transmission

## 8.Upgrade software

### 8.1 Install Driver

Copy the CH340 driver (USB serial driver)\_XP\_WIN7 shared file in the CD or U disk to the computer, unzip it, and then click SETUP.EXE to install it. When the installation is successful. After connecting the PC and the instrument, you can see the USB-SERIAL CH340 under Device Manager/Port. At this point, you can upgrade the software software FlyMcu and the instrument data transmission.

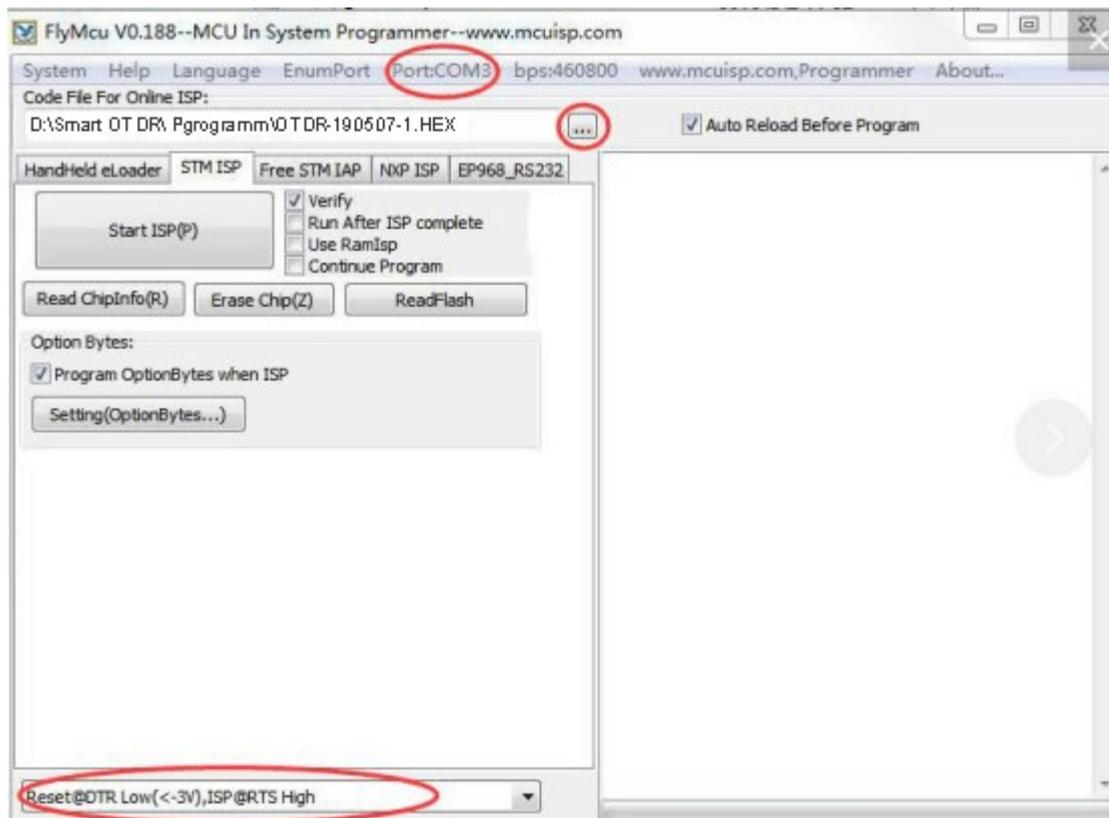


## 8.2 FlyMcu Firmware download tool

Copy the FlyMcu application from the CD or USB flash drive to your computer and double-click it to open it.

I .Choose serial port : button 1( see the red circle as below) Port, choose the COM of USB-SERIAL CH340

II .see the button 2 ( see the pic as below) at the bottom left , choose "DTR low reset, ,RTS high level into BootLoader"(the fourth option)



### 8.3 Upgrade firmware

Click the FlyMcu button 3. Select the HEX upgrade file of the main program and click Start Programming. The upgrading progress will be shown on the right window. Do not perform other operations. Wait until the upgrade is completed.

### 8.4 Driver and algorithm program upgrade

This upgrade is slightly different from the upgrade of the main application firmware. Please follow the process below to complete the driver and algorithm upgrade.

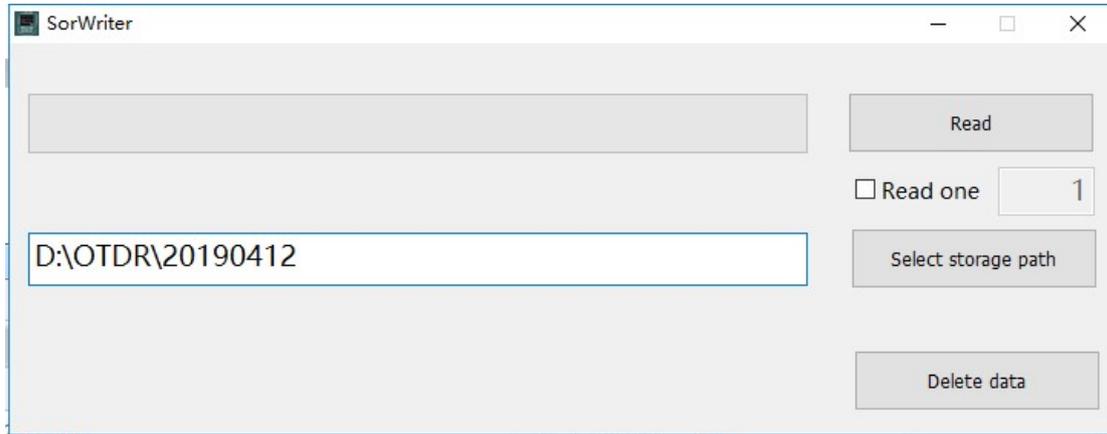
- a: Unplug the USB cable and turn off the FlyMcu software and open the OTDR tester.
- b: Enter the system settings / version information, do not do any operations on the device now.
- c: Plug in the USB data cable and open the FlyMcu software. Then select the correct serial and level mode as described above. Click the FlyMcu button 3, select the HEX upgrade file of the driver algorithm, click Start Programming, the right window will prompt the upgrade progress, do not perform other operations, and wait for the upgrade to complete.

## 9. Simulation analysis software

The device is equipped with simulation analysis software, which can preview the curve from a computer, analyze the curve offline and preview and print the curve. It is convenient for operators to manage and maintain the data of the fibre link.

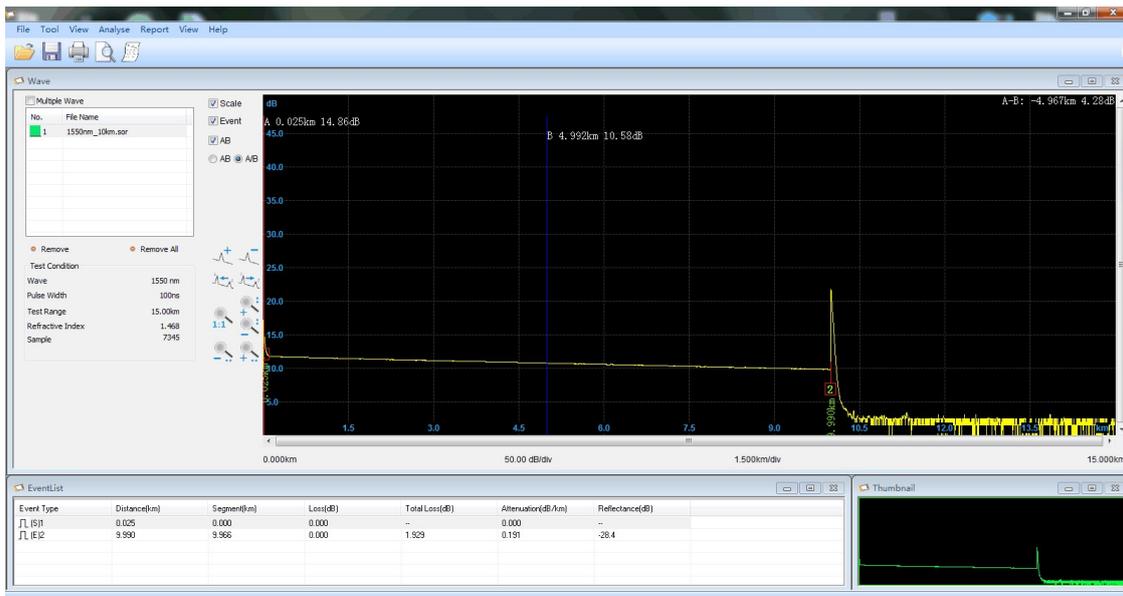
## 9.1 Batch read and storage of test data

Connect the device to the PC through the USB data cable, boot the machine, follow the instructions in Chapter 8 to install the CH340 driver on the PC, use the WriteSor application, obtain the test record saved by the instrument to the PC, select the storage path and save the location. The data can read and converted to the sor format

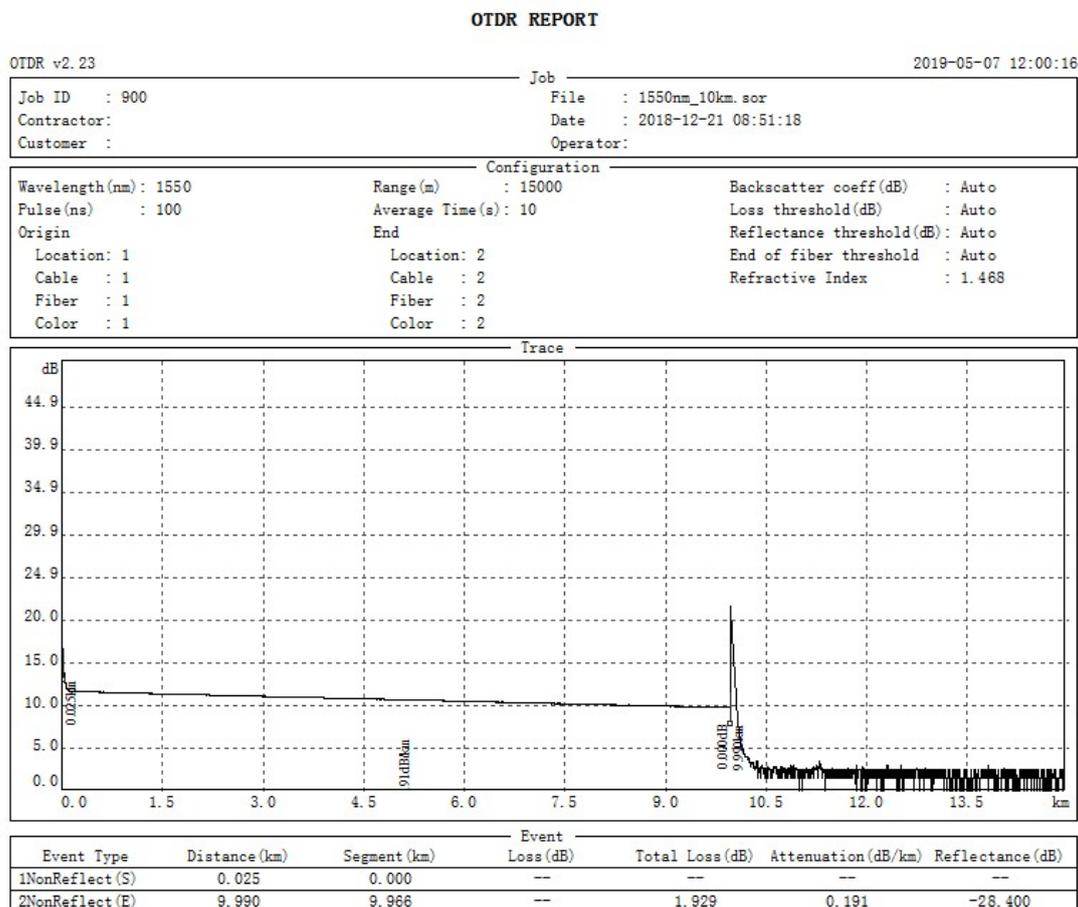


## 9.2 Print Test Report

Use the OTDRViewer simulation analysis software to view the OTDR test report through print preview. The test report contains the information such as test conditions, test curves, link loss, average loss, event list, etc., and the test reports can be batch printed after confirmation.



The software can open, print preview, and print curves through files. Through the report wizard, you can set to print multiple test curves per page. The test report is shown as below:



## 10. Maintenance and troubleshooting

### 10.1 Clean connectors

The connectors ( end face of the pigtail) must be kept clean during use. When the device fails to test the normal curve, or the test result is inaccurate, please consider cleaning the connector firstly.

When cleaning, be sure to turn off the OTDR and VFL functions. Unscrew the connector and wipe the connecting end face with a special dust-free paper towel or cotton swab moistened with alcohol. At the same time, after using the instrument, please cover the dust cap to keep the connector clean.

### 10.2 Clean Display

The display of this OTDR adopts 3.97-inch IPS color LCD with touch screen (Optional). When using it, you can't use a sharp object to click on the LCD screen. When cleaning, operators can wipe the LCD screen with a soft paper. Do not wipe the LCD with an

organic solvent, as this may cause damage to the LCD .

### 10.3 Calibration

It is recommended to calibrate the device every two years. Please contact the supplier for specific calibration items.

### 10.4 Trouble shootings

<b>Fault</b>	<b>Reasons</b>	<b>Solutions</b>
Can't turn on	Low power	Charge the battery and observe the charger indicator. If CHR LED is red continue charging. Otherwise, contact the supplier.
Can't be charged properly	The use environment does not meet the charging conditions	Charge the device in an environment of 0 ° C ~ 50 ° C
	Battery problem, or internal circuit problem	Contact the supplier to replace the battery
Unable to measure normal curve	Parameter settings are incorrect	Reset the correct test parameters
	The end of the fiber is contaminated	Clean the end face of fiber
	Connector of device is damaged	Change the connector
	Connectors do not match	Change the matched connector
The test curve has a large burr.Waveform is not smooth	Output connector is not connected correctly	Reconnect the appropriate output connector
	Pulse width is too low	Increase value of pulse width
Saturated (flat top) phenomenon at the front end of the test curve	Pulse width setting is too large	Reduce value of pulse width
At the beginning of the test curve, the reflection peak drops slowly and tailing occurs.	The end of the fiber is	Clean the end face of fiber
	Connector of device is damaged	Change the connector
	Connectors do not match	Change the matched connector
Unable to test reflection peak of fiber end	Range of setting too low	Increase value of range
	Pulse width is too low	Increase value of pulse width

False report of test curves	Quality of test curve is bad; Event threshold setting is too small	Increase value of test pulse width and increase the value of event threshold
The measured fiber length is not accurate	Parameter settings are incorrect	Reset the appropriate parameters
	Refractive index setting is not	Reset fiber refractive index
The measured average fiber loss value is not accurate	The front end of the test curve is	Clean end face of fiber interface
	The cursor position is not set	Reset cursor position

- The above description is for reference only. Please refer to the new instructions for detailed usage. If you have any questions during the use of the device, please contact the supplier to resolve it.

- During the use of the device, It is forbidden to disassemble the device without authorization, otherwise the warranty will be lost!

## 11.Packing List

NO	Name	Qty
<b>Standard accessories</b>		
1	OTDR with FC/UPC connector	1
2	AC/DC Charger	1
3	CD (software and user manual)	1
4	User manual	1
5	Test Report	1
6	Softcase	1
<b>Optional Accessories</b>		
1	SC /ST connector for OTDR Port	1
2	SC/ST Connector for OPM port	1

Note: The default connector of this OTDR is FC/UPC, and the FC/APC type is optional. The above contents are subject to change without notice due to the need for design improvement.