Multi-function Tester Quick Guide



- Thank you for purchasing the OTDR tester. Please read the manual before using the OTDR tester and use properly.
- For using the OTDR tester safely, please first read the「Safety Information」carefully in the manual.
- The manual should be kept well in case of reference.
- Keep the S/N label for after-sale service within warranty period. Product without S/N label will be charged for repair service.
- If there is any question or problem while using the Multi-function OTDR tester, or damages occurred on the product, please contact our technical Department.

Safe information

- The tester is intended to use in compliance with the local rules of the electrical usage and avoid to apply at the places which are inapplicable for the use of electrics such as hospital, gas station etc.
- Please use the original accessories, to avoid damage the tester caused by the use of non-certified accessories
- The accessories only for our testers, don't for another usage.
- To prevent the functional decline or failure, the product should not be sprinkled or damped.
- The exposed part of the tester should not be touched by the dust and liquid.
- During transportation and use, it is highly recommended to avoid the violent collision and vibration of the tester, lest damaging components and causing failure.
- Don't leave the tester alone while charging and recharging. If the battery is found severely hot, the tester should be powered off from the electric source at once. The tester should not be charged over 10 hours.
- Don't connect the living cable or device to the ports of tester when the tester on.
- Don't use the tester where the humidity is high. Once the tester is damp, power off immediately and move away other connected cables.
- The tester should not be used in the environment with the flammable gas.
- Do not disassemble the instrument since no component inside can be repaired by the user. If the disassembly is necessary indeed, please contact with the technician of our company.
- The instrument should not be used under the environment with strong electromagnetic interference.
- Don't touch the tester with wet hands or waterish things.
- Don't use the detergent to clean and the dry cloth is suggested to use. If the dirt is not easy to remove, the soft cloth with water or neutral detergent can be used. But the cloth should be tweaked sufficiently.

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1. Installing the Battery

Note: The tester has built-in lithium ion rechargeable battery. The battery cable inside battery cabin should be disconnected for safety during transportation!

Prior to the use of the instrument, the battery cables inside the battery cabin should be well connected.





Pressing the key  continuously can power on or off the tester.

Please use the original adaptor and connected cable of the device!

When the battery icon is full or the charge indicator turns off automatically, indicate the battery charging is complete

2. OTDR

2.1 Summary

OTDR is an instrument to understand the uniformity, defect, fracture, joint coupling and other properties of optical fiber through the analysis of the measuring curve. It is used to measure the attenuation of optical fiber, attenuation of connector and fault locator, and view the loss distribution along the length of optical fiber, it is an essential tool in the construction, maintenance and monitoring of optical fiber.

2.2 Warning

- When using OTDR to measure optical fiber, except 1610nm wavelength product, working light in the measured optical fiber couldn't exist. Otherwise, the measuring result won't be accurate, and the instrument may be damaged perpetually.
- Don't look at the optical interface directly or look over the optical interface through optical instrument.
- When the OTDR is working, do not look at the laser outlet directly;
- After using, cover the dust cap onto the optical outlet of the OTDR
- Don't directly look at the disconnected terminal of the being tested optical fiber. If possible, make the disconnected terminal of fiber optical point to a non-reflective object.

2.3 Operation

Connecting fiber→ Setting parameters→Testing→Tracer viewing



2.31 Fiber connection

Connect the fiber to the top optical interface of OTDR. It adopts FC-PC optical connector.

Notice: When using OTDR to measure optical fiber, working light in the measured optical fiber couldn't exist. Or the instrument will be damaged.

2.32 Auto OTDR test

Auto OTDR by default, click "OTDR test" or select wavelength, Pulse width and measurement duration in the "Quick Setup" to start testing. Another parameters setting as below:



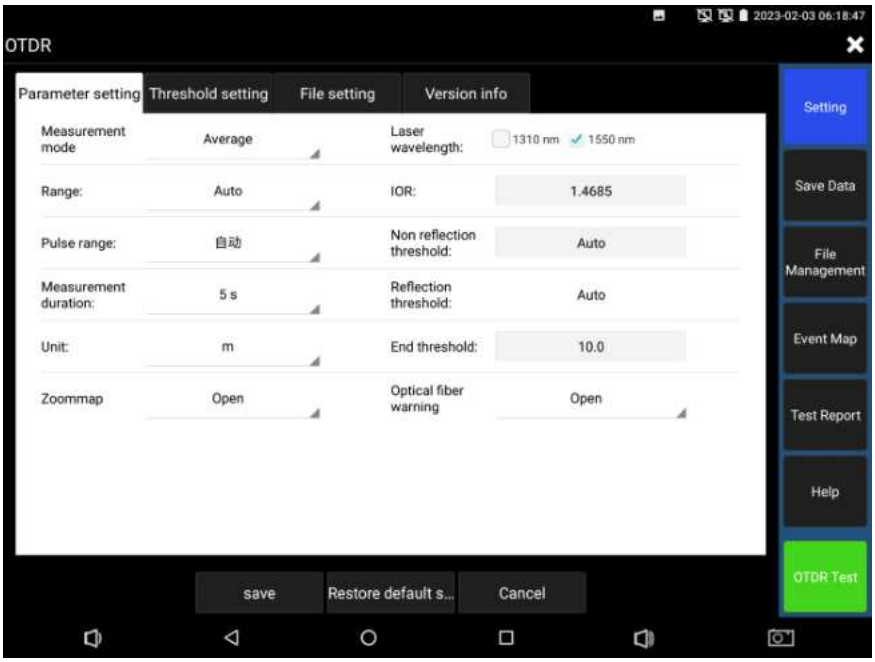
2.33 Expert OTDR test

Manually to select the range, pulse width, etc parameters, the test result will be more accurate.

Can zoom the curve tracer, and view event map details.

Quick test can set laser wavelength, distance range, pulse width and measurement duration parameters.

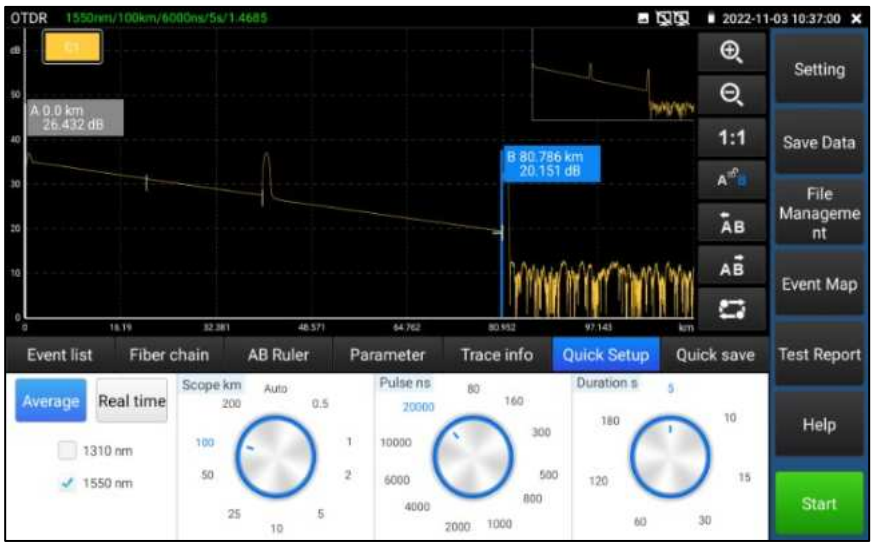
Setting can set laser wavelength, distance range, pulse width, measurement duration, measurement mode, IOR, Non reflection threshold and end threshold parameters, the reflection threshold is the specified item.



2.34 Setting

1) Quick Setup

Can quickly set wavelength, distance range, pulse width and measurement duration parameter, if find the parameters are properly on testing, can quickly to change them.



2) Parameter setting

Laser wavelength: Selected by user, it provides several options, wavelength of single mode fiber: 1310nm, 1550nm and 1610nm; users can simultaneously select 2 wavelengths at most to measure, and set analysis and file saving with different wavelength. In addition, multi wavelength measurement is valid only under the average measurement mode. Multi wavelength

measurement is forbidden under the real-time measurement mode. (If the fiber over 100KM, Please select 1550nm wavelength for testing)

Distance scope: Selected by user, options include “auto, 500m, 1Km, 2Km,5Km,10Km,25Km, 50Km, 100Km and 200Km”. If the length is uncertain, it is recommended to use automatic range, for known length, it is recommended to use a range containing 1.5 times the minimum length.

Measurement duration: 5s, 10s, 15s, 30s, 60s, 120s, 180s is optional, If the current measurement model is real-time measurement, the selected duration of measurement won’t play role in the measurement. When need the meticulous and smooth curve, can select the longer measurement time.

Pulse width: Selected by user, options include “auto, 5ns, 10ns, 20ns, 30ns, 50ns, 80ns, 160ns, 300ns, 500ns, 800ns, 1000ns, 2000ns, 4000ns, 6000ns,10000ns, 20000ns”.

Measurement mode: Selected by user, options include “average measurement and real-time measurement”. When selected real-time measurement mode, the selected duration of measurement won’t play role in the measurement.

Refractivity: Set by user, the default value is 1.4685. The refractivity is key parameter for calculating the length, please don’t modify it at will.

Unit: Set by user, options include “m and ft”

Reflection threshold: No option or user setting is provided in OTDR instrument.

Non-reflection threshold: Set by user, input scope: 0.01~2.99, the default value is: auto. When the manual setting value is 0.00, it will transfer to auto value.

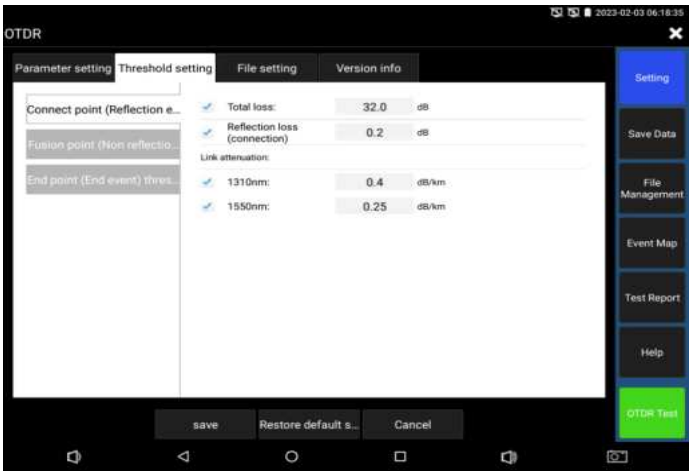
End threshold: It is used as the threshold value for looking over event point when the instrument treating data, i.e.: event points that lower than the set value of end threshold will be removed, while the event points that higher than the set value of bundling threshold will be displayed. For options set by user, input scope is: 1~19.99dB, the default value is: 5.00dB.

Optical warning of optical fiber: Options include “ON and OFF”, When in ON, if the optical fiber has optical signal, the instrument will pop up alarm.

Default setting recovery: Distance scope is “auto”, pulse width is “auto”, duration of measurement is “5 s”, laser wavelength is “1550nm”, measurement mode is “average mode”, length unit is “meter”, refractivity is “1.4685”, back scattering coefficient is “auto”, reflection threshold is “auto”, non-reflection threshold is “auto”, end threshold is “5.0dB”, When finished setting, please click “Save” to save the parameters.

3） Threshold setting

In Event map, can set loss and link attenuation parameters of fusion and connect point event, If less than reference value, then judge as PASS, otherwise, will judge as Failed.



If not select the parameter, then will not judge.

Total loss: The total loss value of fiber link. Input scope: 0-60, If less reference value, then judge as PASS, otherwise, will judge as Failed.

Reflection loss (connect point): The loss value of connector. Input scope: 0-60, If less reference value, then judge as PASS, otherwise, will judge as Failed.

Non reflection loss (fusion point): The loss value of Fusion point or bend point fiber. Input scope: 0-60, If less reference value, then judge as PASS, otherwise, will judge as Failed.

Link attenuation coefficient: Different wavelength of fiber, the attenuation coefficient is different. Input scope: 0-60, If less reference value, then judge as PASS, otherwise, will judge as Failed.

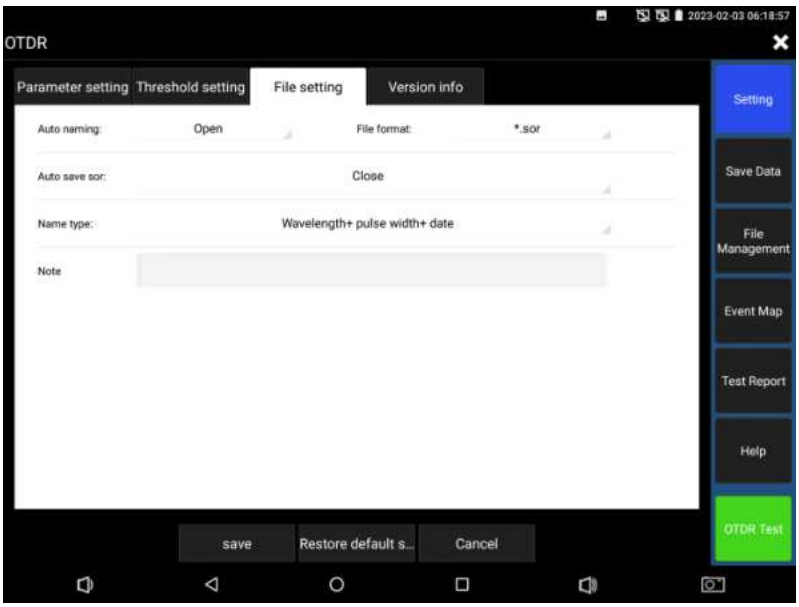
4） File setting

Auto naming: Options include “Open and Close”. When the auto naming status is “ON”, the auto naming category is optional. When the auto naming status is “OFF”, the auto naming function is off.

File format: Set by user, options include “otdr and sor”format.

Name type: Optional automatic naming of wavelength, pulse width, date, range, comment, etc. It will take effect when automatic naming is turned on.

Note: It is used for edit the content of name type.



2.35 Curve tracer

When setting and saved the parameters, click “Start” to start the testing, the wavelength/ distance range/pulse width/duration of measurement/refractivity will display at the top of interface, when finished the testing, will create the trace. Click the “Stop” to end the testing.

Definition of trace: After the first measurement, reflection power diagram is displayed as distance function, the diagram is called trace.

Trace displays the measurement result by graphic mode on the screen. The vertical axis represents the power, while the lateral axis represents the distance. The event point is marked with red symbol.



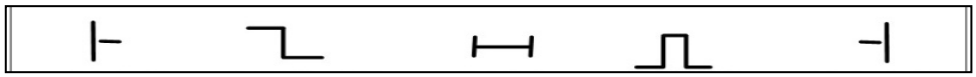
① Trace area ② Trace operation button area ③ Information area ④ Menu button area

2.36 Instruction of Events Categories

Events on optical fiber indicate these abnormal points that brought loss or sudden change of reflection power beyond normal scattering of optical fiber material, including various kinds of connection and bending, loss of flaw or fracture on the optical fiber link.

Event points displayed on the screen is the abnormal points in the optical fiber that led to deviation of trace, which are classified with special symbols on the trace.

Events include “reflection event” and “non-reflection event”.



Initial Event Non-reflection Event Fiber section Reflection Event End Event

Initial Event

“Initial event” on the OTDR trace is the event that marks the starting point of optical fiber. Under default conditions, “initial event” is located at the first event (usually be the first connector of OTDR) of the tested optical fiber. The event belongs to reflection event.

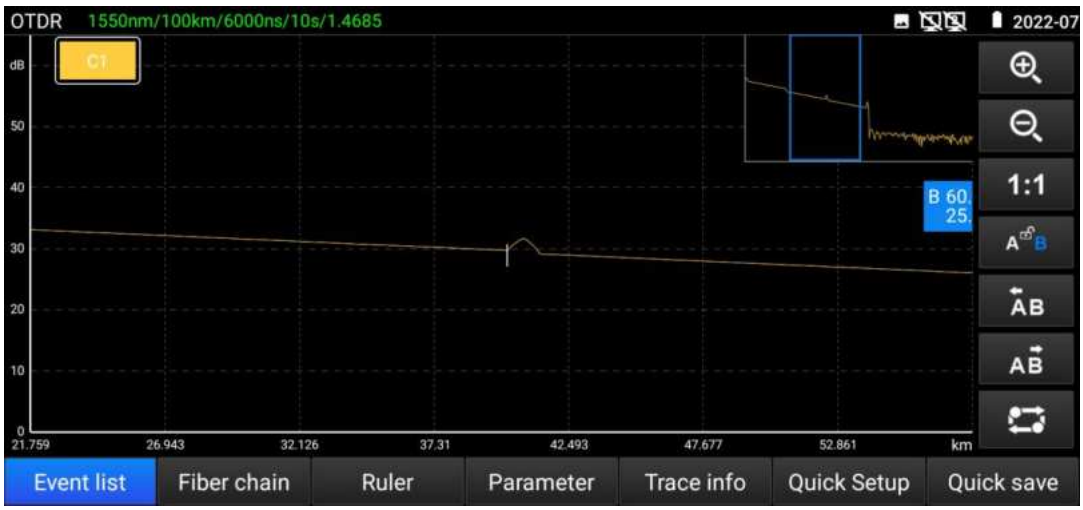
End Event

"End event" on the OTDR trace is the event that marks the terminal of optical fiber. Under default conditions, "end event" is located at the last event of the tested optical fiber. The event is called optical fiber terminal event (usually be the end or fracture point of the tested optical fiber), which usually belongs to reflection event.

Reflection Event

When optical pulse energy is reflected (such as on the connector), reflection event occurs. On the trace, reflection event is shown as peak signal, as shown in the picture.

Non-reflection Event



Non-reflection event brings loss on the whole transmission link of optical fiber, but no light reflection. On the curve, non-reflection event is shown as drop of optical power, as shown in follow picture.

Event Inspection

OTDR sends optical pulse into the optical fiber that waited for inspection, then, begins to accept the returned optical signal immediately, and calculate the distance of "event" in the optical fiber. The further the event is, the longer the time for returning back to OTDR will be. The distance can be calculated according to the time when receiving the event.

Through inspecting the curve of the reflected signal, the optical transmission characteristics of optical fiber, connector and joint can be confirmed.

2.37 Instruction of Info Window Area of the Main Interface

Contents of info window include measurement parameter, event list, scale plate A/B, and analyzed parameter, etc.

Data displayed in the event list include: serial number, category, position, plug-in loss, attenuation coefficient, echo loss, and accumulate loss. "Serial number" indicates the information of the nth event that currently displayed on the trace graph; "Category" indicates the event category of the event point; "Position" indicates the distance from the initial point of the optical fiber to the event point; "Plug-in loss" indicates the quantity of plug-in loss of the event; "Attenuation coefficient" indicates the attenuation characteristics of the optical fiber

from the last event point to the current event point; “Echo loss” reflect the reflection value of the event point; “Accumulate loss” indicates the loss value of optical fiber from the initial point to the current event point. Contents of information of event list are shown in follow picture. The event point data and event section data are separately displayed in the event list. Serial number of event only numbers the event points. Event category displays the following information by picture: initial event, optical fiber section, reflection event, non-reflection event, and end event. Corresponding pictures of event category are shown in follow picture. When looking over information of event list, click the icon “event” through the touch screen, then the information of event list can be found in the info window.



Optical fiber link information includes file name, measurement date, measurement time, link length, link loss, link attenuation coefficient, and quantity of event. Definition and setting of file name, duration of measurement, and measurement date are shown in “set” menu. When looking over information of optical fiber link, click the “fiber link” through the touch screen, then the information of optical fiber link can be found in the info window. Contents of information of optical fiber link are shown in follow picture.



Information of scale plate includes position of point A (or B), plug-in loss of point A (or B), back scattering coefficient of point A (or B), accumulate loss of point A (or B), distance of A B section, loss between two points of AB section, attenuation coefficient between two points of AB section, and LSA attenuation coefficient of AB section. Sign post is used to mark and analyze a single event, curve section and distance. The information of sign post shows distance, loss and attenuation coefficient between sign posts. When changing any sign post, the record value will also be changed along with it. When looking over information of scale plate, click the icon “scale plate” through the touch screen, then the information of scale plate can be found in the info window. Contents of information of scale plate are shown in follow picture.



Measurement parameter includes laser wavelength, distance scope, pulse width, refractivity, back scattering coefficient, reflection threshold, bundling threshold, non-reflection threshold,

and duration of measurement. The definition and setting are shown in “setting” menu. Can click “Fiber link” to view the fiber link information, Fiber link information is shown in follow picture.



2.38 Trace zoom

1）Touch screen zoom operation instructions

Use the center point of the two fingers as the center to zoom. When the horizontal angle between the two fingers and the center is less than 45 degrees, zoom horizontally.

When the horizontal angle between the two fingers and the center is more than 45 degrees, zoom vertically. Touch the top right thumbnail twice to restore the original state of the trace.

Trace Movement

Press the trace and move in any horizontal or vertical direction.

2) Instruction of Trace Operation Button Area

Horizontal amplification: click the button on the touch screen to enlarge the curve horizontally.

Horizontal reduction: click the button on the touch screen to reduce the curve horizontally.

1: 1 restore: restore the scaled curve in the original 1:1 ratio.

After clicking the button on the touch screen, in this state, the left and right arrow keys move the a pole.

After clicking the button on the touch screen, in this state, the left and right arrow keys move the b pole.

After clicking the button on the touch screen, in this state, the left and right arrow keys move the and b pole at the same time.

Move the marker to the left and touch the screen to click the button, the pole A/B in the selected state will move to the left.

Move the stick to the right and touch the screen to click the button, the pole A/B in the selected state will move to the right.

Track switching. This button takes effect only when multiple curve tracks are opened. After clicking the button on the touch screen, you can switch between different curves.

2.39 Date Saving

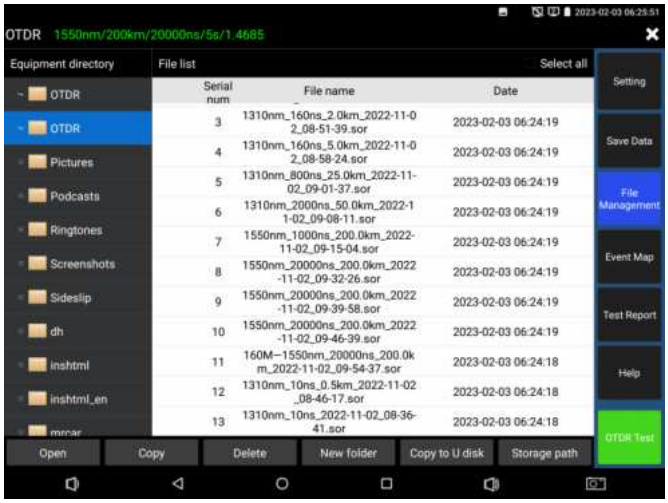
Chick “Quick Save” will auto naming and save the file, according to “Setting-file setting” name type to name the file.

Click the icon “Save date” to select the path to save the file and modify the file name. Can choose the save file format in “Setting-file setting”, the file support PDF and .SOR file format.

Default save files in the internal SD card of the OTDR directory.

2.40 Data import

Select the file to be opened in File management, click the “open” in the bottom to import the curve file.



2.41 File management

Open: Open the selected the curve file, 4 traces can be simultaneously selected at most on main page.

Rename: Rename the checked file or folder.

Copy: Copy the selected file or folder to External or internal SD card.

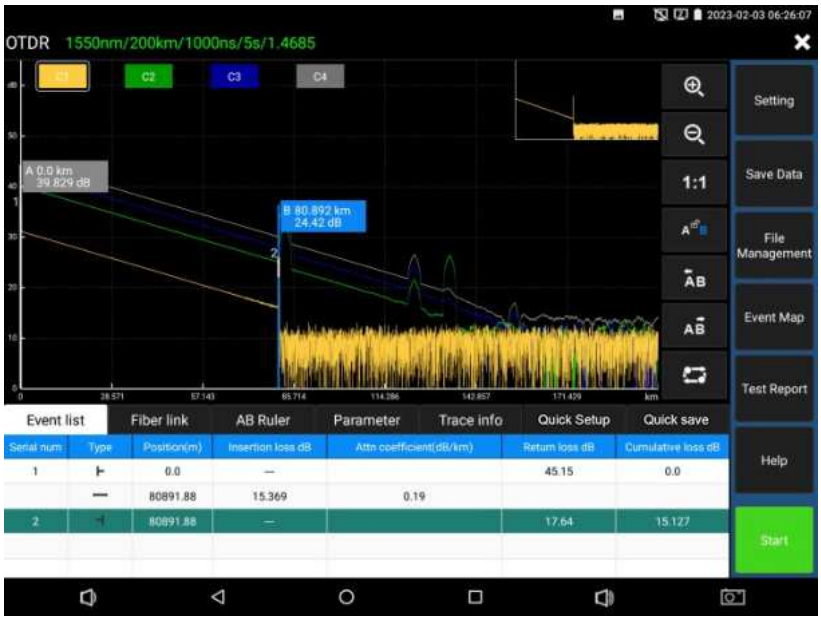
Delete: Delete the selected file or folder.

New folder: Create a new folder in the selected directory of "Equipment directory". The new folder will be used as the default storage path.

Storage path: Set or view the current storage curve path.

2.42 Analysis of “Multi-traces setting”

Click the trace 1/2/3/4 of “Multi-traces setting”, 4 traces can be displayed at most. The opened traces are distinguished through different colors.



2.43 Instruction of Button “Trace 1/2/3/4”

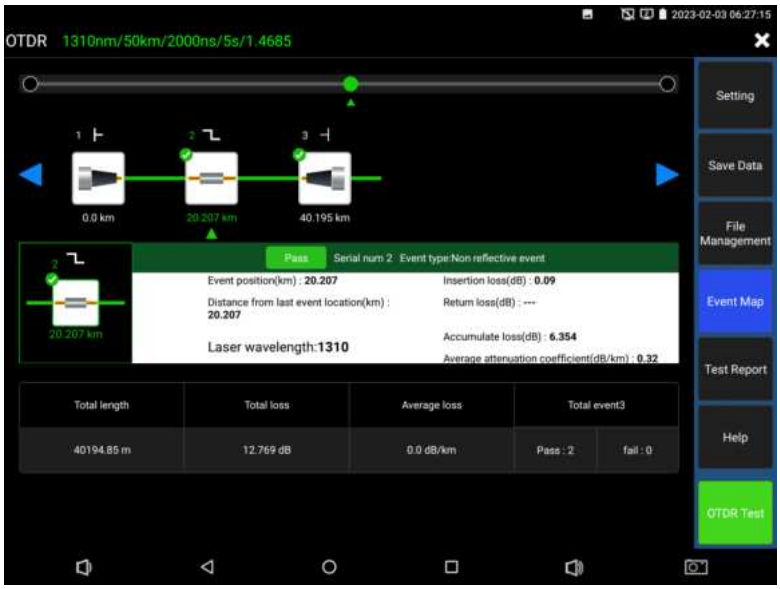
Button icons in the trace operation area are valid to all opened traces simultaneously. Current trace can be switched through the trace switching button or through clicking “C 1” (or “C 2”, “C 3”, “C 4”) directly. The data in the info window is that of the current trace. Or click C1/C2/C3/C4 at left upper corner to switch the trace.

After the scaling, switching the traces of different ranges will automatically restored to 1:1. Switching the traces of the same range will not restore the scaling.

Click “delete” to remove the trace.

2.44 Event Map

Display the quantity of event, link loss, link length, link attenuation coefficient. Click again to switch to trace.



Initial Event: The starting point of link.



Reflection Event: Connector, reflection event is shown as peak signal.



Non-reflection Event: Fusion point or optical fiber bending, non-reflection event is shown as drop of optical power.



End Event: The terminal of fiber, the end event with reflection peak is the normal end.



End Event: Optical fiber bending, the end event with non-reflection peak is the fracture.

2.45 Test report

Can save trace trajectory, event, parameter, optical fiber link, rules list ,etc information, can save the 4 traces simultaneously, can create EXCEL or FDF file test report.

3. Loss test

Use short standard jumpers to connect the OTDR and LS ports of the instrument respectively to set the reference value.



After setting the reference value, let's talk about the optical device being connected to the OTDR and LS interface of the instrument

It is used to test the insertion loss of optical passive devices.

Click loss test of optical fiber test to enter interface.

Calibration： Connect standard jumper to meter's OTDR and LS port, click "Start", after power is stable, click "Reference"



After setting the reference, connect the tested optical device to meter's OTDR and LS port, click "Start", the relative power on the interface is insertion loss value of the tested device

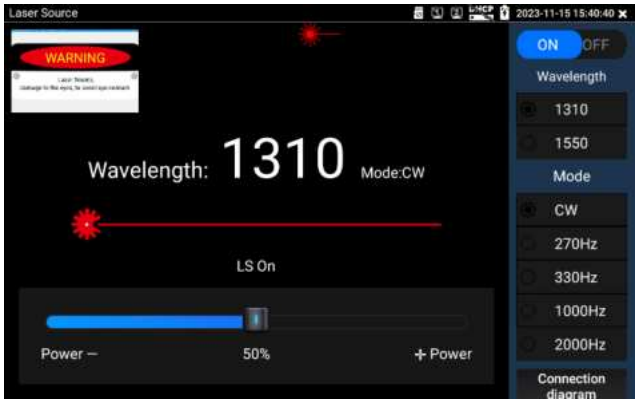


Please calibrate before each test, the test results will be more accurate

4. Laser source

Laser source output stable power laser with same wavelength as OTDR function

Which can be used to engineering and maintenance of optical fiber communication and CATV, fiber parameter setting, the production and research of optical components.



Open/Off: Turn on/off the laser source

Wavelength: 1310/1550/1610 are optional, the wavelength same as OTDR module

Mode: Switch the frequency of laser source, CW/270Hz/330Hz/1000Hz/20000Hz

Power: Through the slider to adjust the power, the power range is 1-100

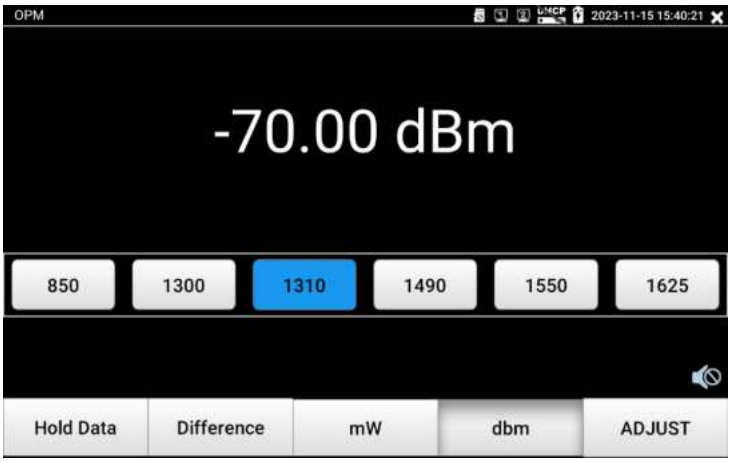
WARNING: Please don't look the laser directly, will damage the eyes.

Stability: CW, ±0.2dB/15min (tested after 15min turn on laser source)

5. Optical power meter

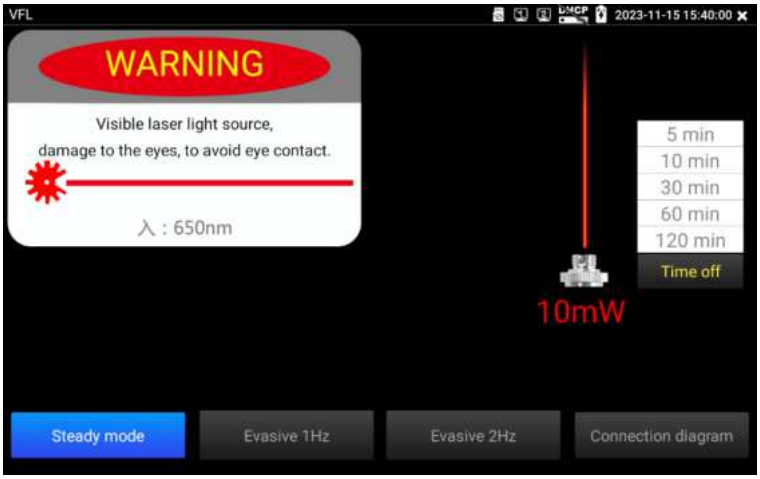
Click icon to enter, with five wavelength 1625nm,1550nm, 1490nm, 1310nm,1300nm, 850nm, linear or nonlinear optical power display, both for optical power testing and Fiber link loss relative measurement. It is necessary tool for installation and maintenance optical fiber communication, cable television and CCTV security system.

Note: Please keep the fiber connector and the dust cap be clean, and clean the detector with the special alcohol.



6. Visual Fault Locator

Click icon to enter



VFL four status can select——"Steady mode", "Evasive 1Hz","Evasive 2Hz"and "Time off". Click button "Steady mode" to enter steady status, click button "Evasive 1Hz" and "Evasive 2Hz", to enter pulse mode, click button "Time off ", VFL is turned off. Timed turn off can select (5 mins, 10 mins, 30 mins, 60 mins and 120 mins).

Click "Steady mode", red laser source emits steady, click again to quit.

6. Digital cable tracer

Connect tested cable or BNC cable to the UTP port or the CABLE SCAN (VIDEO OUT) port on the bottom.

When searching the BNC cable, connect one port of the alligator clips to the copper core or copper net of the BNC cable, the other one to connect the earth wire (barred windows).

Note: Press “Mode” seconds to turn on the wire tracer, then can start the cable searching.



Quickly to verify the tracking result (Only for RJ45 port)
After hunt the cable, connect the network cable to wire receiver “UTP” port for pair line detection, For example, when the “Straight/Cross/Other” light up, indicates the verification of the matching cable, the indicator also shows the type of the cable.

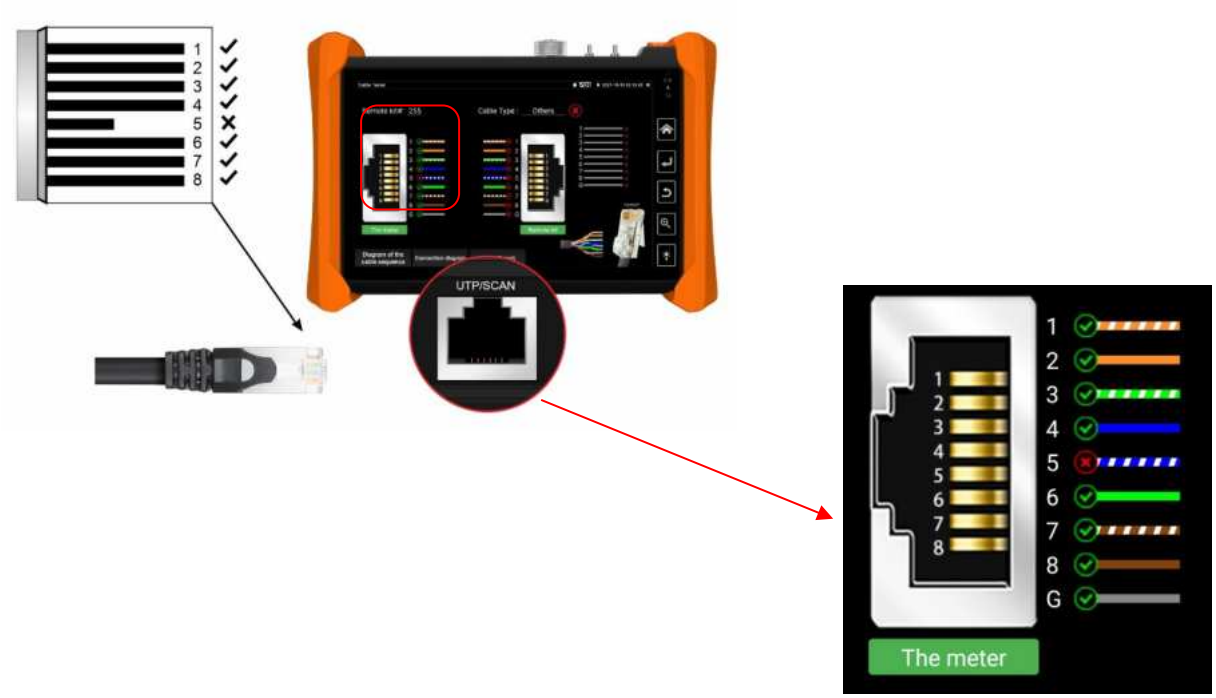


7. UTP cable test

Connect LAN cable or telephone cable to UTP port of tester, the other end connect to UTP port of wire receiver, enter cable test app to test cable’s continuity and sequence.



The continuity detection of the RJ45 cable plug Connect one end of cable to tester's UTP port, can test the continuity of this RJ45 cable plug. If the 1-8 of tester are "√", indicating that the RJ45 cable plug is normal, if display "x", indicating that this core of the port is disconnected. (Note: The cable within 1 meter from the port)



8. RJ45 cable TDR test

Connect cable to the LAN port of tester, the other end connect or disconnect other device. Enter "RJ45 cable TDR test" app to test cable's length, status, attenuation, impedance and skew, etc. Test cable's length, please don't connect any device. The max measurement length is 180 meter.



9. Specification

OTDR Technical Specifications								
Wavelength (nm) **Optional ***	1310/1550				1610			
Dynamic range(dB)[2] **Optional***	28/26	30/28	32/30	34/34	28	30	32	34
Pulse width (ns)	5,10,20,30,50,80,160,300,500,800,1000,2000,4000,6000,10000,20000							
Testing range	≤150 Km							
Event blind zone (m)[3]	≤1.6m							
Attenuation blind zone (m)[3]	≤8m							
Linearity (dB/dB)	±0.05 dB/ dB							
Loss threshold (dB)	0.05							
Loss resolution ratio (dB)	0.01							
Minimum distance resolution	0.05							
Sampling point(K)	32-128							
Distance uncertainty (m)	±(1 m + $5\times10^{-5}\times$ distance + sampling interval)							
Distance scope (km)	0.5,1,2,5,10,25,50,100,200							
Typical real-time refreshing duration	1s							
File format	SOR standard format/PDF/EXCEL							
Measurement duration	5sec, 10sec, 15sec, 30sec, 1min, 2min, and 3min are selectable							
Storage	FLASH (EMMC)8G + TF card							
Interface type	SC/FC-PC							

Remarks:

1. The technical specification describes the ensured performance of the instrument when using typical PC model connector to measure, without considering the uncertainty caused by optical fiber refractivity.
2. Dynamic range is the data measured under the condition of the maximum pulse width and 3 minutes of average time. Dynamic range is the data measured under the condition of 200km/20000ns/3min.
3. Measuring conditions of blind zone: reflection event is within 5Km, reflection strength is 45dB. Measured by the minimum pulse width.

Note:"*"sign means functions are customizable! The data above is only for reference and any change of them will not be informed in advance. For more detailed technical inquiries, please feel free to contact us.

Specification		
Size & Display	7 inch IPS touch screen display, 1280*800 resolution	
Network Port	10/100/1000M auto adapt	
WIFI	Built in 2.4G WIFI, speeds150M	
RJ45 cable TDR test	Test cable's length, status, attenuation, impedance and skew, etc. Max testing up to 180 meter	
Power output	5V 2A power output	
UTP cable test	Test UTP cable connection status and display on the screen. Read the number on the screen. detect the near-end, mid-end and far-end fault point of RJ45 cable connector, also can test shield cable	
Network test	Trace route, Link monitor, DHCP server, port flashing, Ping test	
Digital Cable tracer	Search BNC cable, network cable and telephone cable from the mess cables.	
Electroscope	Voltage range	AC12-1000V
	Frequency	50/60Hz
	Alarm type	Sounds and light double alarms
	Level	CAT.III 1000V / CAT.IV 600V;CE
Visual fault locator	10mW visual fault locator with 650nm wavelength, emit red laser sources to test multi-mode and single mode fiber's bending and breakage, test range 8KM	
Optical power meter	Wavelength:1625,1550nm,1490nm,1310nm,1300nm,850nm, measurement range ,-70 ~ +10dBm, for optical power testing and Fiber link loss relative measurement	
Power		
External power supply	DC 12V（2A）	
Battery	Built-in 7.4V 7800mA Li-ion Battery	
Rechargeable	After charging 2.5 hours, normal working time 11 hours	
Parameter		
Operation setting	OSD menu, select your desired language: English, Chinese	
Auto off	5-30 (mins)	
Working environment		
Working Temperature	-10℃---+50℃	
Working Humidity	30%-90%	
Dimension/Weight	264mm x 182mm x 43mm / 1Kg	

10. Packing list

1) Tester
2) Cable tracer
3) Adaptor DC12V 2A
4) Li-ion Battery (7.4V 7800mAh)
5) Tool bag / DC12V Power cable/BNC cable/ RS485 cable/RS485 port/ Audio cable/ Safety cord
6) SC connector, FC connector, Fiber test head
7) BNC alligator clamp
8) RJ45 to BNC connector
9) OTDR test report
10) User manual