

Optical Time Domain Reflectometer

1. Unpacking Inspection

Before you receive this instrument, please carefully check the product appearance and quality according to the packing list to find the possible damage caused in the transport process. If the package is found damage, please keep the original packing materials, give an immediate notice to the freight company and contact the supplier to solve this problem.

The product package should be provided with the power cord, adapter, analysis software installation CD, user manual, etc together with the instrument, for detail, see the packing list. If the materials in the packing box are discovered incomplete, please contact your supplier agent to solve them in a timely manner.

Table 1-1 Basic components of 5302 series Optical Time Domain Reflectometer

ITEM	NAME	QUANTITY
Host machine	5302 Optical Time Domain Reflectometer	1
Standard accessories	Power cord	1
	Power adapter	1
	User manual	1
	CD (containing 5302 simulation analysis software)	1
	Engineering plastics packing box	1

2. Overview of Instrument

5302 series handheld optical time domain reflectometer (OTDR) is a new generation of intelligent optical measuring instrument designed for the optical fiber communication system testing by zhe Electronics Technology Co., Ltd.. This product is mainly used to measure the parameters of optical fibers and cables, such as length, loss, and connection quality, etc.; it can realize the accurate positioning of event points and fault points, and can be widely used in the construction, maintenance testing and emergency repair of the optical fiber communication systems as well as the research, production and production measurement of optical fibers and cables and so on. This product can provide you with the highest performance of solutions for installation and construction of fiber optic network construction and the subsequent fast and efficient maintenance and troubleshooting testing.

5302 has novel appearance, durable; it has the simplest interface and intuitive operation in the OTDR industry; among the same type of handheld products, its unique dual operation mode of key plus touch screen can greatly simplify the user's application; with one-key analysis, it can quickly obtain the test results. The events are displayed in the main interface in a way of list, and such information includes event number, type, event location (distance), loss, reflection, event point attenuation, total loss, etc.; the whole machine adopts the intelligent power management mode; the high capacity of lithium battery can make the whole machine working for more than 10 hours, so it is very suitable for outdoor environments for a long time.

3. Notices

➤ External power supply

Power adapter input meets the following requirements: 100V ~ 240V, 50/60Hz; @ 1.8A.

Power adapter output meets the following requirements: 19V ± 1V, 3.42A Polarity: center positive.



Please use the external power supply in strict accordance with the specification; otherwise it may cause damage to the device.

➤ Internal battery

Inside the instrument is the 5302 Series OTDR dedicated lithium battery. To give full play to the performance of the battery, please charge the instrument with the internal battery and use up the electric quantity before using this instrument, and then charge the battery. The first time of charging should be no less than 10 hours. The charging temperature range of the battery inside the machine is 0°C ~ 50°C. When the ambient temperature is too high, charging will be automatically terminated for your safe use. When the instrument is not in service for more than 2 months, timely charge it to maintain the electric quantity of the battery; do not take out the battery without permission; do not keep the battery close to the fire source and intense heat; do not open or damage the battery; the battery must be taken out when the instrument is stored for a long time. The temperature range for long term storage of battery is -20°C ~ 45°C.

➤ Laser safety

When using this instrument, avoid eyes to look at the laser output port directly, nor look at the end of the optical fiber when testing; when the instrument is not in operation, please cover the dust cover of the optical output port.

When the visible red light of the instrument is on, please do not look at the output port of the red light directly, nor look at the end of the optical fiber at the output end of red light directly.

➤ Instrument maintenance

1. The warranty period of the whole machine is 18 months and that of the battery is 6 months. The items accompanied with the product are not within the warranty scope.
2. The light output connector of the instrument is quick-wear part, which is not within the warranty scope.

3. If the instrument is damaged or in performance reduction caused by irresistible external factors, they will not be within the warranty scope.
4. If the instrument is damaged or in performance reduction caused by improper operation, they will not be within the warranty scope.
5. **Users are forbidden to dismantle this instrument without the permission of the company or designated authorized entity; otherwise, it will lose the qualification of warranty permanently!**

➤ Return of Instrument

If the product needs to be returned due to product calibration or other reasons, please contact your supplier in advance and briefly explain the reasons for product return, so as to provide effective and timely services for you.

When returning your product, please notice that:

- Pack the instrument with polyethylene and other soft thin cushion to protect the completeness of the instrument shell;
- Please use the original hard packing box. If other package is used, ensure that there is at least 3 mm thick of soft object around the instrument;
- Fill out the warranty card correctly, including the company name, address, contact person, contact phone, problem description, etc.;
- Deliver the products to the supplier's agent in a reliable way.

Chapter 2 Basic Operation of 5302 OTDR

1. Introduction

OTDR is a precise optical measuring instrument made according to the backscatter principle of Rayleigh scattering and Fresnel reflection when the transmission of laser in the optical fiber. It can be widely used in the installation and construction, maintenance and repair and monitoring application of optical fiber and fiber cables. It can be used to measure the length, attenuation, connection quality and fault location of optical fibers and cables, etc..

When transmission of light in the optical fiber, the optical pulses in the optical fiber transmission will generate Rayleigh scattering due to the defects of optical fiber and non-uniformity of the mixed components. Of which, a part of light signal will be scattered back along the direction opposite to the incident pulse, therefore, it is called backward Rayleigh scattering. Through observing the intensity changes of backward Rayleigh scattering light signal, the loss distribution, connection quality and other features of optical fibers and cables can be accurately measured. Besides, according to the theory of optical transmission, when the light encounters the boundary of the two transmission media of different refractive indices in the transmission process (for example, connectors, mechanical connection, fracture or optical fiber termination points), Fresnel reflection phenomenon may occur. Through receiving the Fresnel reflection signal on regular basis, the position of the discontinuity points along the length of the optical fiber can be accurately determined. The size of reflection depends on the refractive index difference and boundary surface flatness.

2. Description of the OTDR test event type

OTDR test event refers to the abnormal points that may cause loss or a sudden change in the reflected power, including various types of connection and bending, cracks or fracture in the fiber link, which may cause the transmission signal loss.

The OTDR test events are mainly divided into two types: reflection events and non-reflective events.

2.1 Reflective event

When the laser pulse emitted from OTDR is transmitted along the measured optical fiber, which encounters a mechanical connection point or the end of the optical fiber, reflection phenomenon will occur due to the change of the refractive index, and some of the light energy will return along the optical fiber to the instrument. Through receiving this reflected signal, the instrument will detect this reflection event, which will be presented as upward spike signal of a certain width in the curve. The width of the spike is mainly determined by the width of the tested pulse, as shown in Fig. 2-1.

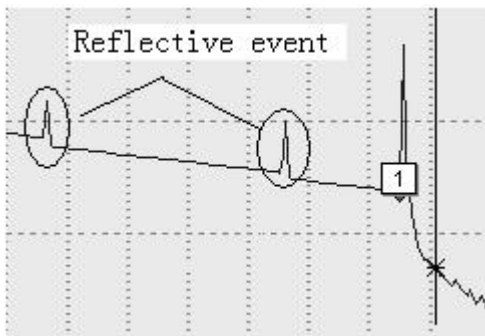


Fig. 2-1 Reflective event chart

2.2 Non-reflective events

When the laser pulse emitted from OTDR is transmitted along the measured optical fiber, which encounters a welding point, bending that may causes loss of some energy, there is no great change to the refractive index, therefore, the reflection phenomena do not occur or can be negligible. OTDR detection can detect the non-reflective event parameters of this point through the energy change difference of backscattering to the OTDR receiving end. The non-reflective events can produce a light energy drop signal in the curve and its drop amplitude represents the power attenuation condition, as shown in Fig. 2-2.

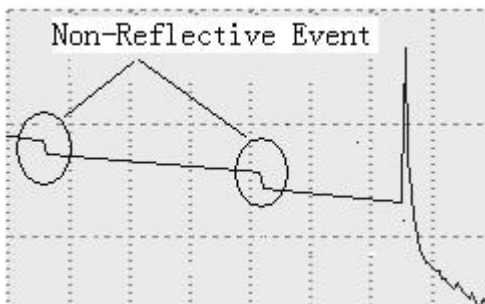


Fig. 2-2 Chart of non-reflective event

3. Description of 5302 series OTDR interface

3.1 Optical connection ports of 5302 OTDR

The optical connection ports of 5302 OTDR can be divided into OTDR output interface and visible red light output port which both adopt FC/PC optical connector (can be changed to SC/PC and ST/P).

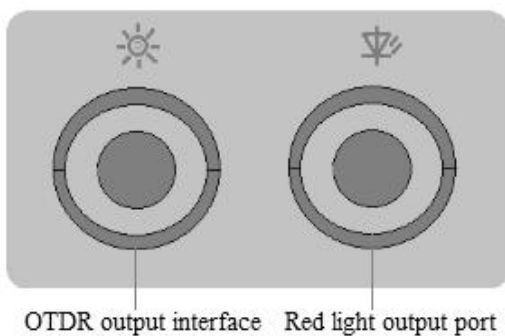


Fig. 2-3 Schematic diagram of 5302 optical interface



When using OTDR or visible red light, do not directly look at the corresponding light output interface.

3.2 5302 OTDR Power Supply Interface

5302 Series OTDR power port is on the right side of the instrument.

Input requirement: $19V \pm 1V$, $\geq 2A$, Polarity: positive in the center.

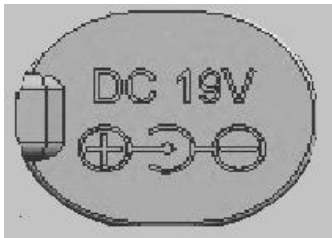


Fig. 2-4 Schematic diagram of 5302 power port



Please use the adapter provided by the manufacturer to charging this instrument, otherwise, it may cause damage to the instrument.

3.3 Data Interface

This instrument is equipped with USB interface, which is located on the left side of instrument. Through this interface, the test trace stored in the instrument can be uploaded to the computer through this interface, and carry out follow-up analysis and processing with the PC machine data analysis software, print and produce report forms, etc..

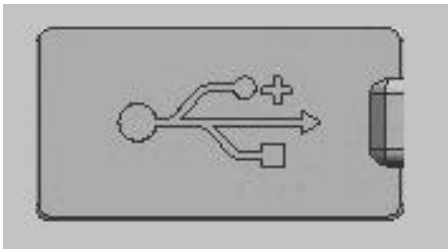


Fig. 2-5 Schematic diagram of 5302 data interface

4. Operation interface and button of 5302 Series OTDR

The operation interface of 5302 Series OTDR is very simple, which is mainly divided into operation window area and menu display area. When the instrument is started to enter the application interface, the interface appearing on the display screen is the main operating window, as shown in Fig. 2-6. The main operating window includes all six main operating menu bars of OTDR and each menu bar contains different sub-windows. Through these operation buttons, start the different sub-windows to realize the corresponding functions. (Details see the operation method).

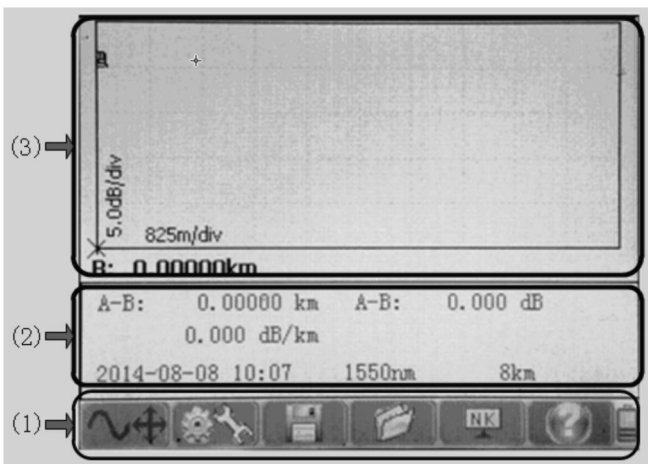


Figure 2-6 the OTDR main operating window diagram

The description of notes is as follows:

- (1) the OTDR function menu area, where the yellow background indicates the current menu selection location.
- (2) sub-operations area of the test parameters and test results. This area can be changed according to different selections of menu.
- (3) the main instrument display interface area.

4.1 Menu structure and functional description

5302 Series OTDR has the simplest and quick operation way in the industry. The whole main user interface contains only 6 menu options. Through the optimized operating mode, it can conform to the user's daily habits; besides, the unique key plus touch screen function operating mode of the similar products in the industry can facilitate the operation and eliminate the tedious process of frequent movement of cursor.

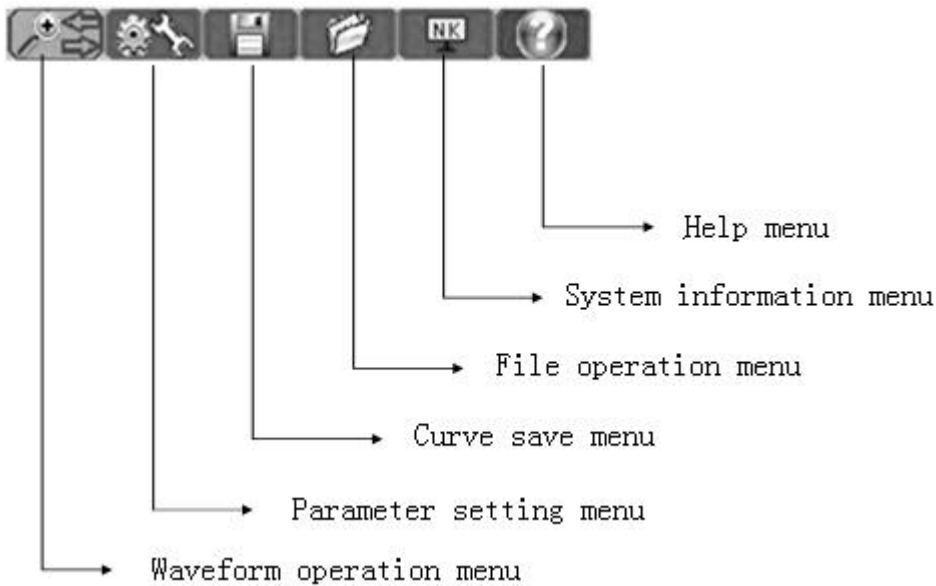
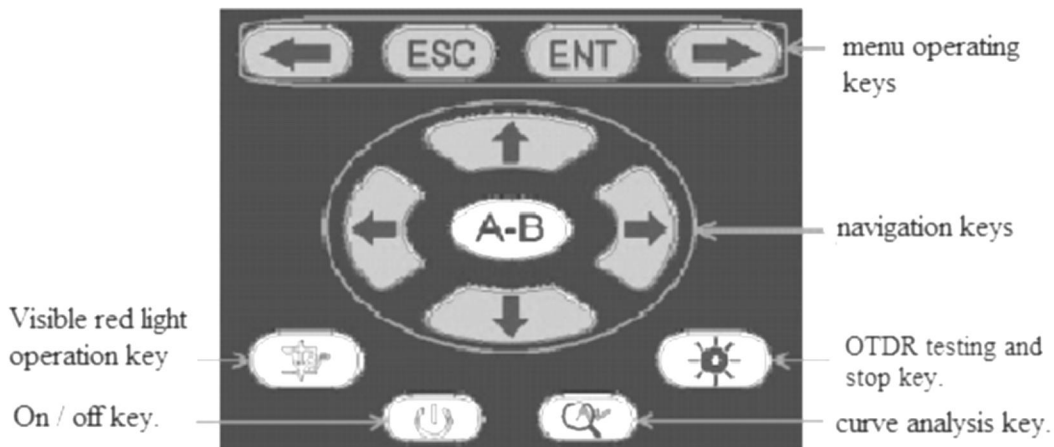


Fig. 2-7 Schematic diagram of main window menu bar


Fig. 2-7 shows the schematic diagram of the six main menu of 5302 Series OTDR, which respectively “waveform operation”, “parameter setting”, “curve save”, “file operation”, “system information”, “help” from left to the right.


4.2 Description of the OTDR button functions



The functions of various buttons on the keys are as follows:

The four keys in the “menu operating key” marked in the above figure 2-8 are mainly for the menu operation, to realize the menu selection, entry and exit, etc. of which:

: Left movement in the OTDR operation menu.

: Right movement in the OTDR operation menu.

ENT: The menu of the currently selected cursor. If this menu contains subordinate menu interface, then when pressing this key, the corresponding sub-interface will pop up.

ESC: The menu of exit the current cursor, or the corresponding sub-interface.

The five keys “navigation keys” marked in Fig. 2-8 are mainly to realize the movement, switching of cursor and the parameter selection and modification in sub-interface, of which:

Key:

- Move the current cursor to the left under the main operating window;
- Move the parameter options upwards under the parameter setting sub-interface;
- Move the keyboard characters to the left under the curve save sub-interface;
- Modify the operation type under the file operation sub-interface;
- Move to the left to select the system time and language under the system information sub-interface.



Key:

- Move the current cursor to the right under the main operating window;
- Move the parameter options downwards under the parameter setting sub-interface;
- Move the keyboard characters to the right under the curve save sub-interface;
- Modify the file operation path under the file operation sub-interface;
- Move to the right to select the system time and language under the system information sub-interface.



Key:


- Move the waveform upwards under the waveform movement menu;
- Expand the waveform horizontally under the waveform horizontal expansion / compression menu;
- Expand the waveform vertically under the waveform vertical expansion / compression menu;
- Modify the value of the parameters under the parameter setting sub-interface;
- Modify the path under the curve save sub-interface;
- Select the file to be operated under the file operation sub-interface;
- Modify the value of the item where the cursor is under the system information sub-interface;
- Use to page up under the help information interface.

Key:

- Move the waveform downwards under the waveform movement menu;
- Compress the waveform horizontally under the waveform horizontal expansion / compression menu;
- Compress the waveform vertically under the waveform vertical expansion / compression menu;
- Modify the value of the parameters under the parameter setting sub-interface;
- Modify the path under the curve save sub-interface;
- Select the file to be operated under the file operation sub-interface;
- Modify the value of the item where the cursor is under the system information sub-interface;
- Use to page down under the help information interface.



Key:

- Switch the cursors A and B under the waveform operating menu;
- Confirm and exit the parameter setting sub-interface and this function is equivalent to the  key.



Key: OTDR testing and stop key.

When the OTDR operating interface displays as the main operating window, press down this button to start the OTDR module to test the optical fiber and display the test curve in the main operating window. The test is divided into automatic test, real-time test and average test. The test way can be set in the OTDR parameter setting window.



Key: curve analysis key.

Press down this key under the OTDR operation interface to analyze the displayed curve. Give the analysis results under the curve. If no curve or the curve has no the event to meet the condition, it is a null operation.



Key: Visible red light operation key





When the OTDR is in the non-test status, press and hold this key for about 2 seconds, and this light is on, indicating that the visual fault positioning function is started under the DC mode; at this time, press the key once again, the key light flickers, and the visual fault positioning function working way changes to the flickering way; and press the key once again, the visual fault positioning function is closed and the light of the key is off.

 Key: On / off key.

When the instrument is under the off state, press this key about 1s, the instrument is started to enter the OTDR operating interface and display the main operation window. When the instrument is switched on, press and hold this button for about 1 second to switch off the instrument.

4.3 Description of 5302 Series OTDR test parameters and setting method

Correct setting the measurement parameters of the instrument is necessary for the accurate measurement of the optical fibers. Therefore, prior to the use of the instrument, it is necessary to set parameters as required. The test parameters of OTDR are mainly testing wavelength, measurement range, pulse width, channels, refractive index, fiber optic correction coefficient and event threshold value, etc..

In the main operating interface, move the cursor to the parameter setting menu  through the menu operating key  or , then press the key , the parameter setting interface will pop up.

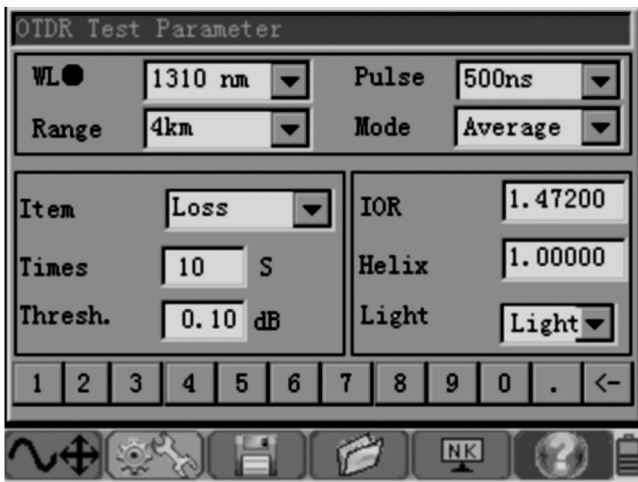







Figure 2-9 5302 parameter setting interface






4.3.1 Description of parameters and setting method

- **WL(nm):** to set the OTDR test wavelength.

Setting method: Under the parameter setting interface, move the cursor to the wavelength option via the navigation key  or , and press the key  or  to select the wavelength value, or directly click on the touch screen wavelength window to select it, and press the  key to save the setting and exit the window.






- **Range (km):** set the scope of the scan path. The range should be set according to the actual length of the optical fiber. The predefined range should be greater than the length of the measured optical fibers; usually it is more than twice of the length of the optical fibers to be measured. Under the automatic test mode, it is not required to set by the users.

Setting method: Under the parameter setting interface, move the cursor to the option Range via the

navigation key  or , and press the key  or  to select the value of the range, or directly click on the touch screen range window to select it, and press the  key to save the setting and exit the window.

- **Pulse (ns):** Set the laser pulse width emitted from instrument. The selection of pulse width will affect the dynamic range and resolution of the test curve. The large pulse width may obtain a high dynamic range and test a long optical fiber, but the resolution is poor; the small pulse width may have high resolution, but it can test a short distance. Users need to make appropriate choice between the dynamic scope and blind spot. Under the automatic test mode, users need not set them.

Setting method: Under the parameter setting interface, move the cursor to the option Pulse

Width via the navigation key  or , and press the key  or  to select the value of the range, or directly click on the touch screen range window to select it, and press the  key to save the setting and exit the window.





- **Mode:** Used to select the way of OTDR scan event. Select the “real-time test”, “average test” and “automatic test”.


Of which, the “**real-time test**” is to perform real time scan on the test link and display the test results, to perform dynamic monitoring on the links before and after connection conveniently.

“**Average test**” is to accumulate the scan results for many times and perform average processing, which can further enhance the testing curve quality and the testing precision.

“**Automatic test**” is an intelligent test way. Under this mode, the instrument can automatically carryout the matching of the test conditions according to the test links; users are not required to set the test conditions manually.

Setting method: Under the parameter setting interface, move the cursor to the option Test Method

via the navigation key  or , and press the key  or  to select the test method, or

directly click on the touch screen test method window to select it, and press the  key to save the setting and exit the window.





- **Item:** Used to select the type of the OTDR test events; select the “average loss”, “connection loss” and “reflection loss”.


Of which, the “average loss” is used to test the parameters such as total loss, spacing and average loss between two points in the test link; through moving the location of the cursor point, it can realize the measurement of any two points in the whole link.






“Connection loss” is used to test the connection point, welding points or the macrobend loss characteristics of the test link.






“Reflection loss” is used to conduct test on the losses of the reflection events in the link.






Setting method: Under the parameter setting interface, move the cursor to the option Test Item via






the navigation key  or , and press the key  or  to select

the test item, or directly click on the touch screen test item window to select it, and press the  key to save the setting and exit the window.

- **Times:** under the modes of “average test” and “automatic test”, it is used to set the time of them.
Setting method: Under the parameter setting interface, move the cursor to the option Average Number of Times via the navigation key  or , press the key  or  to select the value, and press the  key to save the setting and exit the window.





- **Thresh:**
The event threshold for curve analysis. When the event point is discovered through curve analysis, the events that the loss between events is greater than the threshold value will be listed in the list of events, and those that the loss between events is less than the threshold value will be ignored.
Setting method: Under the parameter setting interface, move the cursor to the option Event Threshold via the navigation key  or , or directly click on the touch screen Event Threshold window and press the key  or  to select the threshold value; and press the  key to save the setting and exit the window.

- **IOR:** Refractive index.
The refractive index of the optical fiber may affect the optical fiber transmission speed, so the setting of refractive index will directly affect the accuracy of the measuring distance. The refractive index of optical fibers is provided by the manufacturer.
Setting method: Under the parameter setting interface, move the cursor to the option Refractive Index via the navigation key  or , or directly click on the touch screen Refractive Index window and press the key  or  to select the set refractive index; and press the  key to save the setting and exit the window.





- **Helix:**
The setting of the cable correction factor is to consider the change of the optical fiber length and optical cable length after the optical fiber is changed to optical cable. This parameter can be obtained from the optical cable manufacturer.
Setting method: Under the parameter setting interface, move the cursor to the option Optical Cable Correction via the navigation key  or , or directly click on the touch screen Optical Cable Correction window and press the key  or  to select the correction value; and press the  key to save the setting and exit the window.

■ **Thresh:**

The event threshold for curve analysis. When the event point is discovered through curve analysis, the events that the loss between events is greater than the threshold value will be listed in the list of events, and those that the loss between events is less than the threshold value will be ignored.

Setting method: Under the parameter setting interface, move the cursor to the option Event Threshold via the navigation key  or , or directly click on the touch screen Event Threshold window and press the key  or  to select the threshold value; and press the **ENT** key to save the setting and exit the window.

■ **Light:** To set the light of LCD

Setting method: Under the parameter setting interface, move the cursor to the option Event Light via the navigation key  or , or directly click on the touch screen Event Light window and press the key  or  to set the light of LCD.



4.4 Description of testing ways of 5302 series OTDR

There are 3 kinds of test modes of 5302 OTDR: automatic test, real time test, average test.



Fig.2-10 Setting of test modes of 5302 OTDR

4.4.1 Automatic Test


When the OTDR test mode is set to automatic test, users only need to set the test wavelength and time; after pressing the key , OTDR will automatically adjust the test parameters to test the fiber link and users are not required to set the related parameters. When the testing is over, display the test curve in the main operating window; during the test process, press the key  once again to immediately stop the test and obtain the test results.

4.4.2 Real –time test


When the OTDR test mode is set as real time test, users need to set the measurement range, pulse width , and other parameters according to the length of the optical fibers to be tested; press the key



, OTDR can perform real time scanning test of the tested optical fiber link. The test curves in the

main operating window will be refreshed continuously until pressing the key  again, and then OTDR will stop testing.

4.4.3 Average test

When the OTDR test mode is set to the average test, users need to set the range, pulse width, and other parameter according to the length of the tested optical fibers; press down the  key, OTDR

can perform average test on the the tested optical fibre link according to the set test parameters and the test curves in the main operating window will be subject to average processing until the average number of times displayed ih the interface is equal to the set one, OTDR stops the testing. In the

average test process, press down the key  again, OTDR will immediately stop testing.

4.5 Description of test items of 5302 series OTDR

The test items of 5302 OTDR include average loss, connection loss and reflection loss.

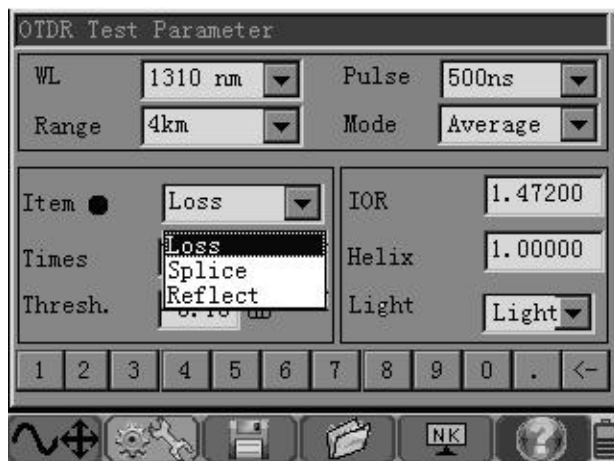


Fig. 2-11 Setting of test methods of 5302 OTDR

4.5.1 Average loss test

At this time, OTDR can perform test on the distance between cursor A and cursor B, the loss between them and the average loss of the optical fiber segment where cursors A and B are located. Through the navigation key, the cursors A and B can be switched and the positions of them can be modified, so that customers can observe the detailed characteristics of each fiber link distance.

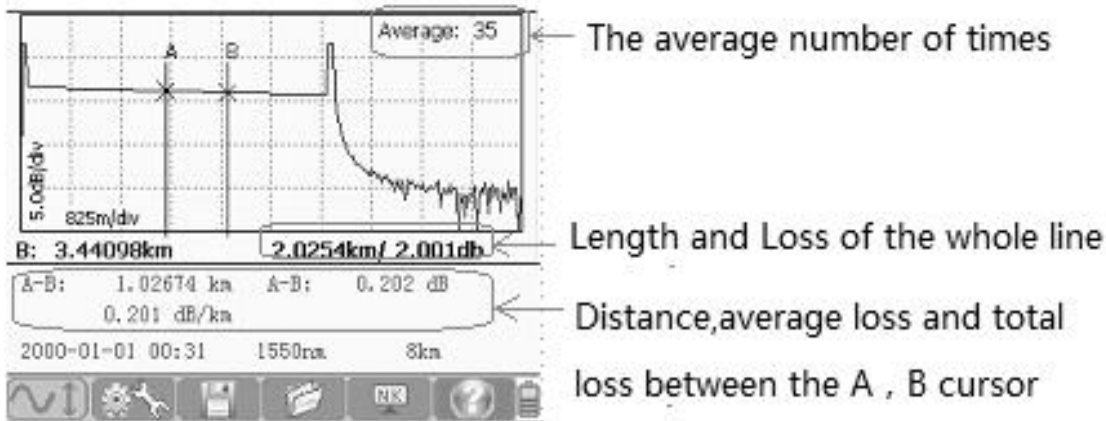


Fig. 2-12 Average loss test of 5302 OTDR

4.5.3 Connection loss test

At this time, four cursors are displayed on the main interface of OTDR. Besides, the test results show the connection loss of the connection points where the cursor A is located and the average loss of the optical fiber segments before and after the connection points.

As shown in Figure 2-13, move the cursors A and B before and after the connection events to be tested and close to the two sides of the event respectively. Move the small cursor at the front of cursor A to the far end of the previous segment of linear area of the event to be tested (linear area A) and move the small cursor at the back of the cursor B to the far end of the following segment of linear area of the event to be tested (linear area B), at this time, read the connection loss value of the connection event through SP location.

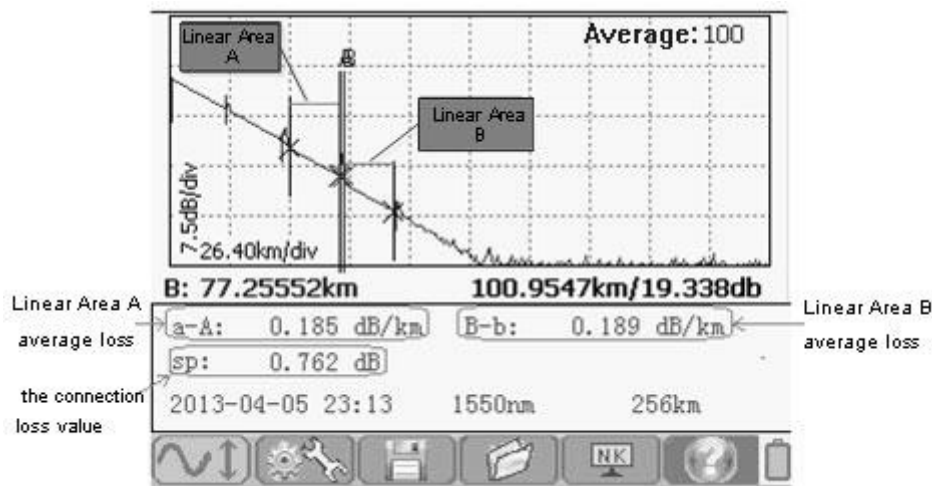


Fig. 2-13 Connection loss test of 5302 OTDR

4.5.3 Reflection Loss Test

At this time, two cursors A and B occur in the main interface of OTDR. When testing the reflection event loss, move the cursor A to the front of the reflection event and close to the jumping edge, and then move the cursor B to the top of the reflection event. Read the reflection loss value of the reflection event through the Ref position.

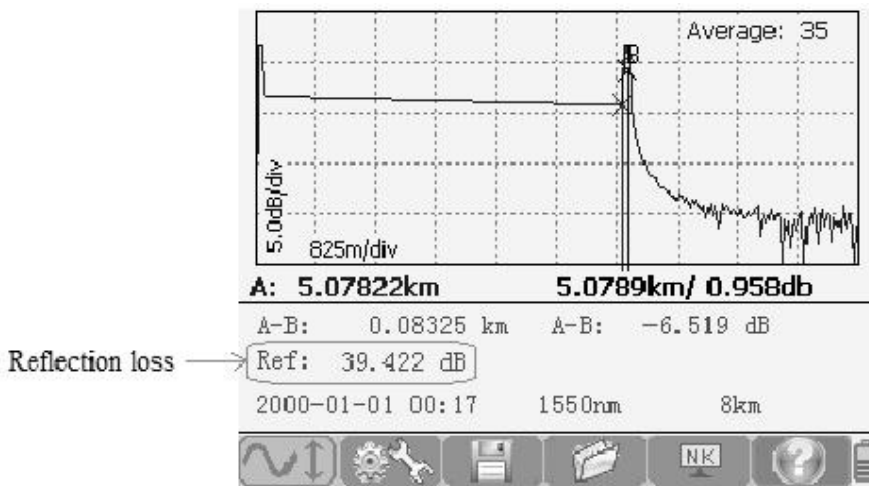





Fig. 2-14 Reflection loss test of 5302 OTDR

5. Description of application method of 5302 series OTDR

5.1 Automatic analysis of the waveform and check the list of events

After the OTDR stops the testing and the test curve is obtained, press down the key  , conduct analysis on the obtained curve, and perform screening and positioning of the event points according to the set event threshold value to obtain the length, loss, average loss and other information of the optical fiber links. Besides, display the event point information at the event list column in the main operating window.

Press the key  or the key  can check the information of all event points in the list of events.

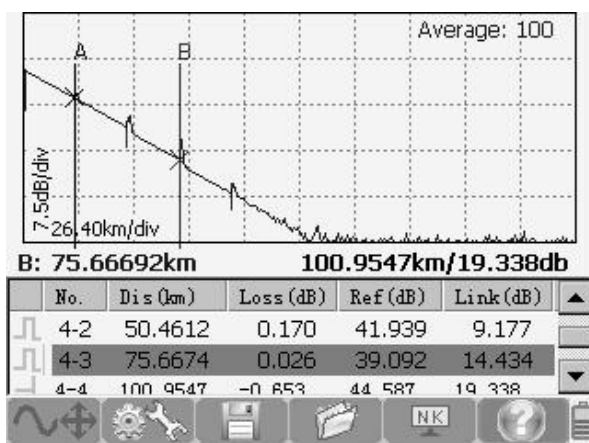












Fig. 2-15 Analysis results of 5302 OTDR






In the sub-operating window of event list:





-  : indicate that this event is a non-reflective event point, generally the event caused by splices, splitters, fiber bending or extrusion, etc..
-  : indicate that this event is a reflective event point, generally the event caused by movable connector of the optic fiber link.
-  : indicate that this event point is the end of optical fiber.

5.2 Move, switch the cursor and set the mark point

Set the position of the mark points through moving the position of the cursor. Move the current activated cursor to the left and right via the navigation key  or . When continuously hold the key  or  and moving 10 data points, the active cursor will move rapidly and move 10 data points each time. Release the key  or , then the active cursor will stop moving; or directly click on the touch screen and move the currently activated cursor to the appropriate touch point. Press the key  of the navigation keys to switch the cursor points.

5.3 Zooming and shift of waveform curve

To facilitate users to carry out manual analysis on the tested curve, when the test of 5302 Series OTDR is over, the menu key is placed on horizontal zoom-in and zoom-out  of the curve operating menu in default, and at this time, just directly press the navigation keys  and  to realize the horizontal zoom-in and zoom-out of the test curve in the center of currently activated cursor. At this time, the key  or  in the navigation keys can be shifted left or right to move the cursor.



When continuously pressing the key  in the menu operating keys, or clicking on the curve operating menu in the touch screen, at this time, this menu can realize the alternative switching among ,  and .

6. Visual red light fault positioning

With the built-in high-power visual red light fault positioning function, 5302 OTDR can discover the breakpoint of the short-distance optical fiber link or the position of a large loss point very conveniently and intuitively. Combing with OTDR function, it can realize the seamless monitoring of the link test so that the maintenance personnel can discover the problems of the links timely and take measures to save the test time.

There are two output modes for the visible red light of 5302sOTDR:

- DC mode;
- AC mode.

In the OTDR test main interface, when the OTDR is under the non-test status, press and hold the key  for about 2s, the light is on, indicating that the visual fault positioning function is started and the working mode is DC mode; press this key once again, the light of the key flickers and the working mode of the visual fault positioning function is changed to AC mode; press this key again, the visual fault positioning function is closed and the light of the key is off. If pressing the key  to start the OTDR

function before starting the visual red light fault positioning function, then the visual red light fault positioning function will be automatically closed and switched to the OTDR test function.

7. File management operation

The 5302 Series OTDR file management operations are described as follows, mainly including file save, reading, copy, deletion, etc..

7.1 Save the waveform files

When the automatic measurement or manual measurement is over, save the measurement curve. The contents of the saved curve are the curve and related information of curve.











In the main interface of test, select the menu  via the menu operation key  or , press the  and the curve save window will pop up.




Fig. 2-16 5302 OTDR file save

Navigation keys:  or : move the key to select the button on the small keyboard.

: enter the character in the small button selected to the square cursor location of the file name input window. If the button selected is , then delete the character before the square cursor.

 or : used to modify the path save path.



Of which, the storage path can be set to internal memory and U disk.



Press the key  to confirm the operation and exit the window;

Press the key  to delete this operation and exit the window;

Note: the above operation can be completed by directly clicking on the touch screen.

7.2 Read, copy, delete waveform files

In the main interface of test, select the menu  and press the key  via the menu operation key

 or , and the file operation window will pop up.

Name	Length	Type	Date
133^5	32k	NK	2013.03.14
133^6	32k	NK	2013.03.14
567	32k	NK	2000.01.01
002	32k	NK	2013.01.30
003	32k	NK	2013.01.30
006	32k	NK	2013.01.30
008	32k	NK	2013.01.30
0010	32k	NK	2013.01.30
0012	32k	NK	2013.01.30
133^4	32k	NK	2013.03.14


Type: Path:



Fig. 2-17 Reading, copy and deletion of 5302 files


Select the operation type via the navigation key . There are 3 types: read, copy and delete;


Of which, when selecting the copy way and the read path is internal memory, copy the memory files to the U disk;

When the read path is U disk, copy the U disk files to the internal memory.

 key: select the operation path, which can be divided into two types: internal memory and U disk.

 or  key : used to select the operation files.





 key : used to select all of the operation files.

Press the key  to confirm the operation and exit the window;

Press the key  to delete this operation and exit the window;

Note: the above operation can be completed by directly clicking on the touch screen.

8. Set the system time and language, screen brightness and view the system information

In the main test interface, select the menu  via the menu operating key  or , press the key  and the system information setting window will pop up.

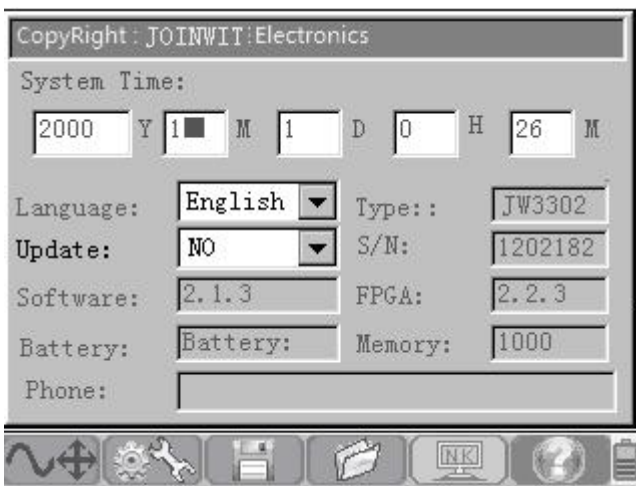







Fig. 2-18 5302 system information setting interface





The navigation key  or : move the cursor ■ to select the operation item;

 or  key: used to modify the parameters of the operation item.

Press the key  to confirm the operation and exit the window;

Press the key  to delete the operation and exit the window;

9. View help information

In the main test interface, select the menu  via the menu operating key  or , press the key  and the help information window will pop up.

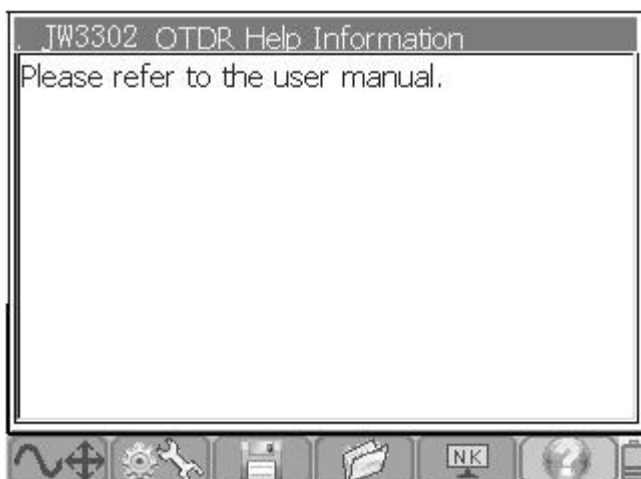


Figure 2-19 5302 Help Information

Navigation key  or : used to page down, page up.

Press the key  and exit the window.

Chapter 3 Maintenance and Troubleshooting

3.1 Routine operation and maintenance

3.1.1 Cleaning of connector

The optical output interface of 5302 Series OTDR is a universal optical interface that can be replaced. During the service process, it is necessary to keep the face clean. When the normal curve cannot be tested by the instrument or the test results are inaccurate, clean the connector firstly.

Make sure that cleaning is carried out when the OTDR and the visual red fault positioning function are stopped. Unscrew the output interface and wipe the connection face with a special paper towel or cotton swab dipped by alcohol.

Besides, when the instrument is not in use, cover the dust cap and keep it clean.

3.1.2 Routine maintenance of internal battery

The battery inside the 5302 Series OTDR is a dedicated lithium battery. When first use of this instrument, supply electricity through the battery; when the battery is completely discharged, charge the battery. The first time of charging time should be more than 8 hours. For your safety use, multiple protection measures on the battery voltage, charge current, charge temperature, etc have been set in the internal charging circuit. The battery charging temperature range is 0°C ~ 50°C. When the ambient temperature is too high, the charge will be automatically stopped. When the instrument is not in use for a long time, charge the battery on regular basis. It is recommended to charge the battery once every 2-3 months to ensure the best performance of the battery.

3.1.3 Cleaning of instrument screen and calibration

The display of 5302 series OTDR is a 3.5-inch color LCD with touch screen. Do not click on the LCD with a sharp object when in use, otherwise, it may cause damage to the LCD screen.

Clean the LCD screen with a soft fabric. Do not clean the LCD screen with organic solvents, otherwise, it may cause damage to the LCD screen.

3.1.4 Calibration

During normal use of the instrument, it is recommended that the 5302 Series OTDR should be calibrated once every two years. For the details about the calibration, please contact the instrument supplier.

3.2 Faults and solutions

Table 3-1 Faults and solutions

Faults	Causes	Solutions
Instrument does not start properly	No electricity of the battery	Charge the battery and observe the light of the on/off key; if the light is red, continue to charge; otherwise, contact the supplier.
Instrument is not charging properly	<ol style="list-style-type: none"> The application environment does not meet the charging conditions. The battery connection is bad. Problems of battery or internal circuit. 	<ol style="list-style-type: none"> Charge the instrument at an environment of 0°C~50°C. Open the battery compartment cover to check the battery contacts and reinstall the battery. Otherwise, contact the supplier to replace the battery.
The normal curves cannot be tested	<ol style="list-style-type: none"> The instrument parameters are not set correctly. The optical fiber output end face is contaminated. The instrument light output connector is damaged. The light output connectors do not match. 	<ol style="list-style-type: none"> Set the correct test parameters again. Clean the light output face. Replace the output connector. Replace the connector with a matching one.
The test curve has great burrs and the waveform is not smooth	<ol style="list-style-type: none"> The output connector is incorrect. The pulse width is set small. The channels are not set correctly. 	<ol style="list-style-type: none"> Connect appropriate light output interface again. Increase the value of the test pulse width. Modify the parameters of the test channel.
Saturation (flat top) phenomenon occur in the front of the test curve	<ol style="list-style-type: none"> The pulse width is set too large. The channel is not set correctly. 	<ol style="list-style-type: none"> Reduce the test pulse width. Modify the parameters of the test channel.

The starting end of the test curve decreases slowly and tailing phenomenon happens	<ol style="list-style-type: none"> 1. The optical fiber output end face is contaminated. 2. Instrument light output connector is damaged. 3. The light output connector does not match. 	<ol style="list-style-type: none"> 1. Clean the light output face. 2. Replace the output connector. 3. Replace the connector with a matching one.
The reflection peak at the end of the optical fiber cannot be identified	<ol style="list-style-type: none"> 1. The range is set too small. 2. The pulse width is set too small. 	<ol style="list-style-type: none"> 1. Increase the test range value. 2. Increase the pulse width.
Mistaken reporting of the curve analysis	<ol style="list-style-type: none"> 1. The test curve has poor quality. 2. The event threshold is set too small. 	<ol style="list-style-type: none"> 1. Increase the pulse width. 2. Increase the event threshold value.
The measured length of the optical fiber is not accurate	<ol style="list-style-type: none"> 1. The instrument parameters are not set correctly. 2. The refractive index of the optical fiber is not set accurately. 3. The cable correction factor is not set accurately 	<ol style="list-style-type: none"> 1. Re-set appropriate parameters again. 2. Re-set the refractive index of the optical fiber. 3. Re-set the cable correction coefficient.
The average loss value of the measured optical fibers is not accurate	<ol style="list-style-type: none"> 1. The tailing at the front end of the test curve is too long. 2. The cursor position is set incorrectly. 	<ol style="list-style-type: none"> 1. Clean light output face. 2. Reset the cursor position. (Note: ensure that the spacing between cursor points is not less than 300m).

Note:

- The above descriptions are only for reference. Refer to the instructions for the detailed application method. During the application process, if you have any questions, contact the instrument supplier to solve them.
- The instrument is forbidden to remove without permission in the application process; otherwise, it may lose the qualification for warranty permanently.

Chapter 4 Technical parameters and purchase information

4.1 Technical parameters

4.1.1 Main features of 5302 Series OTDR

- ✧ Novel and beautiful appearance and structure design;
- ✧ Special protection design of shell, durable and able to work under bad environment;
- ✧ Simplest operating interface, shortcut key operation, easy to use;
- ✧ Dual operation of touch screen and keys;
- ✧ Short event blind zone, test 5 m fiber jumper easily; Have a multiple kinds of test modes such as automatic test, manual test and blind zone test, etc..
- ✧ Light detection and alarm are provided in the line, to avoid signal light from damage the instrument in the tested optical fiber;
- ✧ Built-in high-power visual red light fault positioning function;
- ✧ The USB interface functions can quickly realize the file transfer and report form preparation;
- ✧ The universal light output connector is easy to replace, which is able to realize a variety of interface tests;
- ✧ Smart battery electric quantity indication and low –voltage alarm function;
- ✧ 10-hour long time of duration, particularly suitable for the field construction application for a long time;
- ✧ The multi-wavelength and dynamic range selection can satisfy customer's high higher cost performance demands to the greatest extent;
- ✧ The highly intelligent analysis software can accurately identify the fault splices, connectors and even macro-bending;
- ✧ Language: multiple choices of languages, such as Chinese, English, etc, which can be customized according to customer's requirements.

4.1.2 Main functions of 5302 Series OTDR

- ✧ Test the distance from any point of the optical fiber link to OTDR output end (origin of test);
- ✧ Test the distance between any two points of the optical fiber link;
- ✧ Test and display the loss of any two points in the optical fiber link and fiber attenuation constant;

- ✧ Test and display the connection loss of the connection points in the optical fiber link;
- ✧ Test the value of the reflection loss in the fiber link;
- ✧ The automatic search function of connection point;
- ✧ Test the waveform storage function;
- ✧ File copy function: copy the data files stored in this machine directly to the U disk;
- ✧ Electric quantity indication of smart battery;

4.1.3 Technical Specification of 5302 Series OTDR

Table 4-1 Technical Specification of 5302 Series OTDR

Item \ Model	5302 series			
	S1	S2	S3	M1
Type of optical fiber	Single –mode			Multi-mode
Center wavelength	1310nm/1550nm ±20nm			850nm/1300nm ±20nm
Maximum dynamic range (dB) ϕ	30/29	36/35	40/39	22/36
Event blind zone \emptyset	1.5m	1.5m	1.5m	3m
Attenuation blind zone	10m	10m	10m	10m
Display type	3.5inch, color LCD, touch screen operation			
Optical interface	FC/UPC (Interchangeable SC, ST)			
Test range (dB)	500m,1km,2km,4km,8km 16km,32km,64km,128km		2km,4km,8km,16km,32km @850nm; 2km,4km,8km,16km,32km,64k m 128,256km; @1300nm	
Pulse width	10,30,50,100,275 500,1000,5000,10000ns		10,30,100,275, 500,1000 @850nm; 10,30,100,270,500,1000,5000 @1300nm	
Range accuracy	$\pm (1m + \text{sampling interval} + 0.005\% \times \text{distance})$			
Attenuation measurement accuracy	$\pm 0.05 \text{ dB/dB}$			

Reflection measurement accuracy	±4dB
Data storage	≥ 1000 test curves
Communication interface	USB
Visible red light source	
Output power	≥2mW
Test distance	≥5 km
Environmental adaptability	
Power supply mode	AC / DC adapter: AC: 100V ~ 240V (1.5A), 50/60Hz DC: 18V to 20V (2A) Internal lithium-ion battery pack: 7.4V, 4400mAh
Battery operation time ③	≥ 10hours
Operating temperature	-5℃ ~ 50℃
Storage temperature	-20℃ ~ 70℃
Relative humidity	0 ~ 95%, no condensation
Weight	≤ 1kg
Volume	208mm × 110mm × 56mm

Note:

- ①. Ambient temperature 23℃±2℃, maximum test pulse width and the average number of times more than 500;
- ②. Test condition of blind zone (range 500m, pulse width 10ns and channel III), reflection loss of fiber end face ≥45dB, typical value;
- ③. Low brightness , not tested.

4.2 5302 Series OTDR Purchase Information

- **Standard**

Table 4-2 Standard list of 5302 Series OTDR

No	Name	Qty
1	Host of 5302 series handheld OTDR	1
2	Power cord	1
3	AC / DC power adapter	1
4	Certificate	1
5	User manual	1
6	CD-ROM (including simulation software)	1
7	Instrument plastic box (with strap)	1

Note: OTDR Standard Interface Type can be chosen from FC / UPC and FC / APC.