MOT-200

Optical Time Domain Reflectometer

User manual

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1. General provisions

Before using this product, carefully read the instructions for use and follow the instructions and recommendations therein. The information in this publication has been carefully checked and is believed to be completely accurate at the time of publication. However, OPTOKON, a.s. accepts no responsibility for any errors or omissions or for any consequences arising from the use of the information contained herein. OPTOKON, a.s. reserves the right to make changes to its products or product specifications with the intention of improving the function or design at any time, with or without notice, and is not obliged to update this documentation to reflect on such changes.

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Notice: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment. Shielded interface cables and power cord from original accessories must be used to meet RF emission limits.

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2. Introduction

This document, "MOT-200 – Optical Time Domain Reflectometer User Manual" is a guide to operating the OPTOKON® MOT-200 OTDR. It guides the user through using the device and warns them of potential hazards. Reading this document thoroughly is required before use.

2.1. Legend

Title	Description
Boldface	Warnings, notes, table headings
Italics	Information that requires special attention
<KEY>	Key names

2.2. Warnings and notes

Warnings alert you to situations that can harm your device or users and can cause data loss

Notes contain important information, tips, and advice on using and configuring the device

3. Safety precautions

To ensure a high level of safety during installation, operation and maintenance of the equipment for operating personnel, please read the following paragraphs carefully.

Operation and service are only allowed to be carried out by an authorized person.
Only a person trained in the safety of fiber optic systems can handle and operate this equipment.
The test equipment is intended for / to be used only in a safe low voltage environment.
Use only standard or optional accessories supplied by your distributor.
Use only the equivalent connector types to those built into the equipment to avoid damage to its components.
During storage and operation, the equipment must be kept clean.
When the device is in storage, the battery should be kept at half-charge. Storage charge state that is too low or too high can have adverse effect on battery life.

3.1. Optical interface connection

Take note of the safety rules for class 1M lasers for OTDR module and 3R for VFL module.
Use only the equivalent optical connectors to those built into the equipment.
Optical connectors must be kept clean.
Before connecting, a visual check of the optical connector at 400× magnification must be performed.
In case the connector is not perfectly clean, please clean it according to the procedure described in the technical specification for the relevant connector type.

3.2. Laser classification

A laser is a light source that can be dangerous to the people exposed to it. Even low power lasers can be hazardous to eyesight. A person exposed to laser radiation (especially invisible radiation) may be unaware that damage is occurring. Some lasers are so powerful that even the diffuse reflection from a surface can be hazardous to the eye. Laser radiation predominantly causes eye injury via thermal effects on the retina. A transient increase of only 10 °C can destroy retinal photoreceptors.

Lasers have been classified by wavelength and maximum output power into four classes and a few subclasses since the early 1970s. The classifications categorize lasers according to their ability to produce damage in exposed people, from class 1 (no hazard during normal use) to class 4 (severe hazard for eyes and skin). There are two classification systems, the "old system" used before 2002, and the "revised system" being phased in since 2002. The latter reflects the greater knowledge of lasers that has accumulated since the original classification system was devised and permits certain types of lasers to be recognized as having a lower hazard than was implied by their placement in the original classification system. The revised system is part of the revised IEC 60825 standard. From 2007, the revised system is also incorporated into the US-oriented ANSI Laser Safety Standard (ANSI Z136.1). Since 2007, labeling according to the revised system is accepted by the FDA on laser products imported into the US. The old and revised systems can be distinguished by the 1M, 2M and 3R classes used only in the revised system and the 2A and 3A classes used only in the old system. Class numbers were designated using Roman numerals (I–IV) in the US under the old system and Arabic numerals (1–4) in the EU. The revised system uses Arabic numerals (1–4) in all jurisdictions.

The classification of a laser is based on the concept of accessible emission limits (AEL) that are defined for each laser class. This is usually a maximum power (in W) or energy (in J) that can be emitted in a specified wavelength range and exposure time. For infrared wavelengths above 4 μm, it is specified as a maximum power density (in W/m2). It is the

responsibility of the manufacturer to provide the correct classification of a laser, and to equip the laser with appropriate warning labels and safety measures as prescribed by the regulations. Safety measures used with the more powerful lasers include key-controlled operation, warning lights to indicate laser light emission, a beam stop or attenuator, and an electrical contact that the user can connect to an emergency stop or interlock.

Below, the main characteristics and requirements for the classification system from 2002 are listed, along with the typical required warning labels. Additionally, classes 2 and higher must have the triangular warning label shown here and other labels are required in specific cases indicating laser emission, laser apertures, skin hazards, and invisible wavelengths.

3.2.1. Class 1

A class 1 laser is safe under all conditions of normal use. This means the maximum permissible exposure (MPE) cannot be exceeded. This class includes high-power lasers within an enclosure that prevents exposure to the radiation and that cannot be opened without shutting down the laser. For example, a continuous laser at 600 nm can emit up to 0.39 mW, but for shorter wavelengths, the maximum emission is lower because of the potential of those wavelengths to generate photochemical damage. The maximum emission is also related to the pulse duration in the case of pulsed lasers and the degree of spatial coherence.

3.2.2. Class 1M

A Class 1M laser is safe for all conditions of use except when passed through magnifying optics such as microscopes and telescopes. Class 1M lasers produce large-diameter beams, or beams that are divergent. The MPE for a Class 1M laser cannot normally be exceeded unless focusing or imaging optics are used to narrow the beam. If the beam is refocused, the hazard of Class 1M lasers may be increased and the product class may be changed. A laser can be classified as Class 1M if the total output power is below class 3B but the power that can pass through the pupil of the eye is within Class 1.

3.2.3. Class 2

A Class 2 laser is safe because the blink reflex will limit the exposure to no more than 0.25 seconds. It only applies to visible-light lasers (400–700 nm). Class-2 lasers are limited to 1 mW continuous wave, or more if the emission time is less than 0.25 seconds or if the light is not spatially coherent. Intentional suppression of the blink reflex could lead to eye injury. Many laser pointers are class 2.

3.2.4. Class 2M

A Class 2M laser is safe because of the blink reflex if not viewed through optical instruments. As with class 1M, this applies to laser beams with a large diameter or large divergence, for which the amount of light passing through the pupil cannot exceed the limits for class 2.

3.2.5. Class 3R

A Class 3R laser is considered safe if handled carefully, with restricted beam viewing. With a class 3R laser, the MPE can be exceeded, but with a low risk of injury. Visible continuous lasers in Class 3R are limited to 5 mW. For other wavelengths and for pulsed lasers, other limits apply.

3.2.6. Class 3B

A Class 3B laser is hazardous if the eye is exposed directly, but diffuse reflections such as from paper or other matte surfaces are not harmful. Continuous lasers in the wavelength range from 315 nm to far infrared is limited to 0.5 W. For pulsed lasers between 400 and 700 nm, the limit is 30 mJ. Other limits apply to other wavelengths and to ultrashort pulsed lasers. Protective eyewear is typically required where direct viewing of a class 3B laser beam may occur. Class-3B lasers must be equipped with a key switch and a safety interlock.

3.2.7. Class 4

Class 4 lasers include all lasers with beam power greater than class 3B. In addition to posing significant eye hazards, with potentially devastating and permanent eye damage because of direct beam viewing, diffuse reflections are also harmful to the eyes within the distance called the Nominal Hazard Zone. Class 4 lasers are also able to cut or burn skin. In addition, these lasers may ignite combustible materials, and thus represent fire risk, in some cases. Class 4 lasers must be equipped with a key switch and a safety interlock.

4. Device introduction

The MOT-200 series Optical Time Domain Reflectometer (OTDR) is a next-generation intelligent meter designed for detecting fiber communication systems. As optical networks expand in urban and rural areas, measurements become shorter and more dispersed; the MOT-200 is specifically tailored for these applications. It is cost-effective and delivers exceptional performance.

Manufactured with meticulous care, the MOT-200 adheres to national standards, integrating extensive experience with modern technology. It undergoes rigorous mechanical, electronic, and optical testing and quality assurance. The new design makes the MOT-200 smarter, more compact, and versatile.

Whether you need to detect the link layer during the construction and installation of optical networks or perform efficient maintenance and troubleshooting, the MOT-200 is your ideal assistant.

Features:

- Ultra-thin design, smart and rugged
- 4.95-inch capacitive multi-touch screen
- Build-in operation system
- One-button automatic test
- Event map function
- Built-in OLS/OPM/VFL modules
- RJ-45 cable tester and Tracker module
- Over 1000 groups of testing results storage
- PC software for generating test report
- USB-C port for data transmission
- Built-in rechargeable Lithium battery

Application:

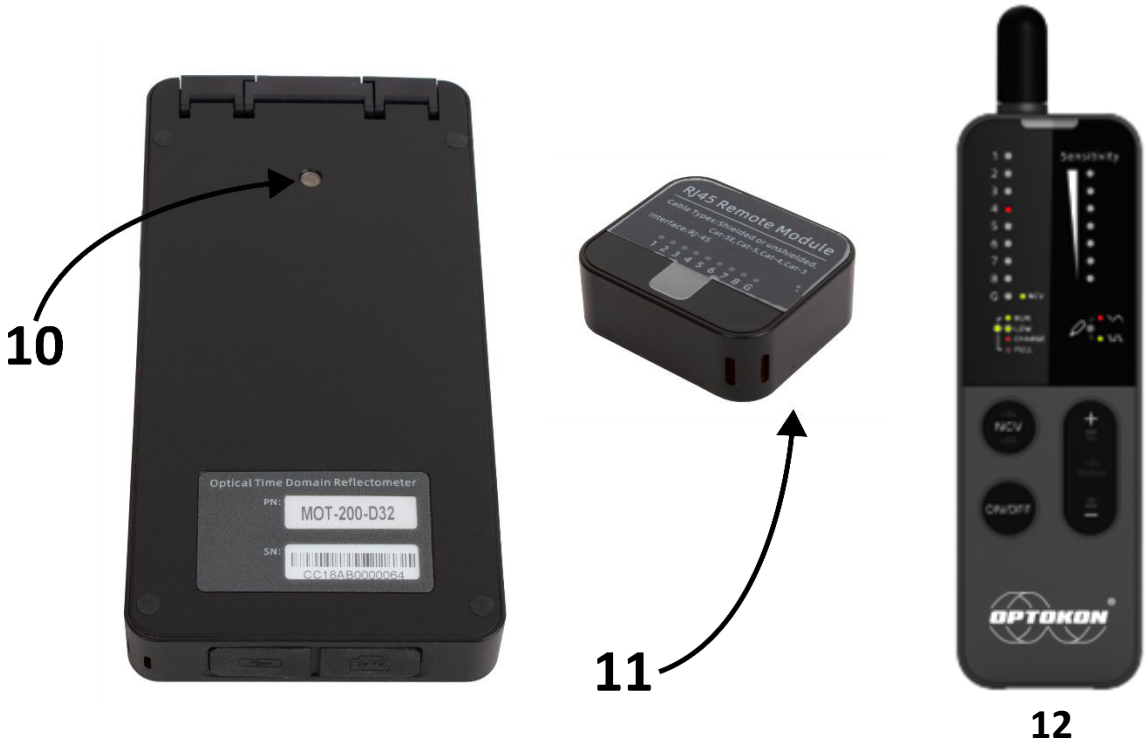
- FTTX test with PON networks
- CATV network testing
- Access network testing
- LAN network testing
- Metro network testing
- Lab and Factory testing
- Live fiber troubleshooting

4.1. Technical parameters

MODULE	PARAMETER	SPECIFICATION
VFL MODULE	Wavelength	650±20nm
	Output Wave Type	CW & 2Hz
	Output Power	10mW or customized (Max. 30mW)
LASER SOURCE MODULE	Wavelength	Same as OTDR
	Modulation Frequency	270Hz/330Hz/1KHz/2KHz & Blink
	Output Power	≥ -5dBm
POWER METER MODULE	Calibration Wavelength	850/980/1270/1300/1310/1490/1550/ 1577/1625/1650nm
	Connector	2.5mm universal
	Modulation Freq. Detection	270Hz/330Hz/1KHz/2KHz
	Measuring Range	S: -70 to +10dBm; H: -50 to +30dBm
RJ45 REMOTE MODULE	Line sequence test	8 core & shielded line
	Dimensions (L*W*H)	35mm * 41mm * 14.5mm
RJ45 CABLE TRACKER	Line sequence test	8 core & shielded line
	Cable Detect	Normal & Anti-jamming mode, Adjustable sensitivity, Max. 600M
	NCV Detect	AC90V~1000V
	Power Supply	Lithium Battery
	Dimensions (L*W*H)	132mm * 35mm * 14.5mm

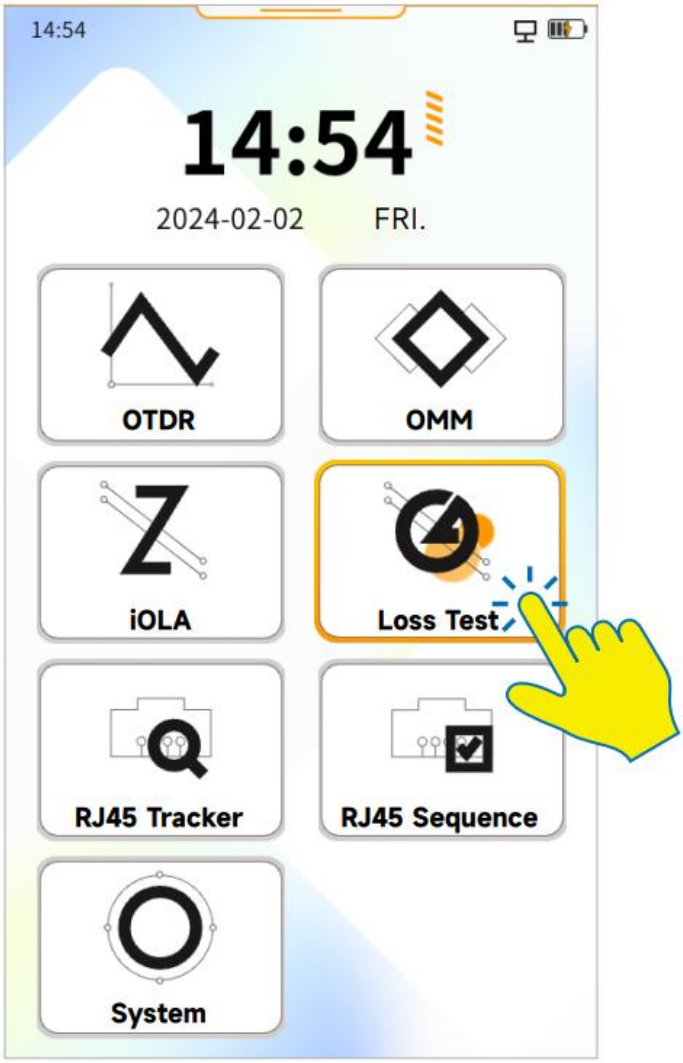
5. Physical description of the device

1 – OTDR
2 - OPM
3 – VFL
4 – Reserved port
5 – LCD screen
6 – Power switch
7 – Function keys
8 – RJ45
9 – USB Type-C port



10 – LED light **11** – RJ45 sequence module **12** – RJ45 tracker detector (optional)

6. Main menu

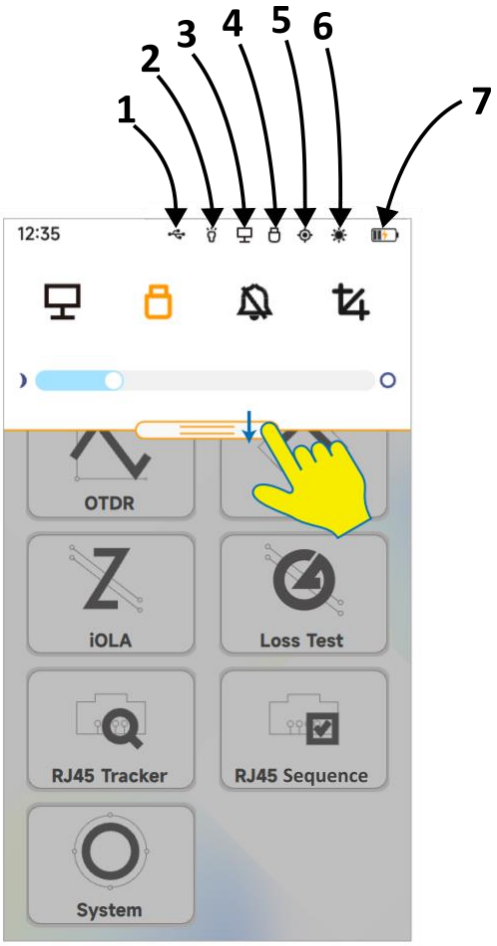


After booting, the device will enter the main menu by default. The main menu shows the icons of the various functional modules that the machine has.

Title bar icon will light up when the corresponding function is turned on. Tap the function module to enter the corresponding function interface.

When ——————— appears at the bottom of the screen, swipe up from the bottom of the screen to return to the previous interface.

7. Status and navigation bar

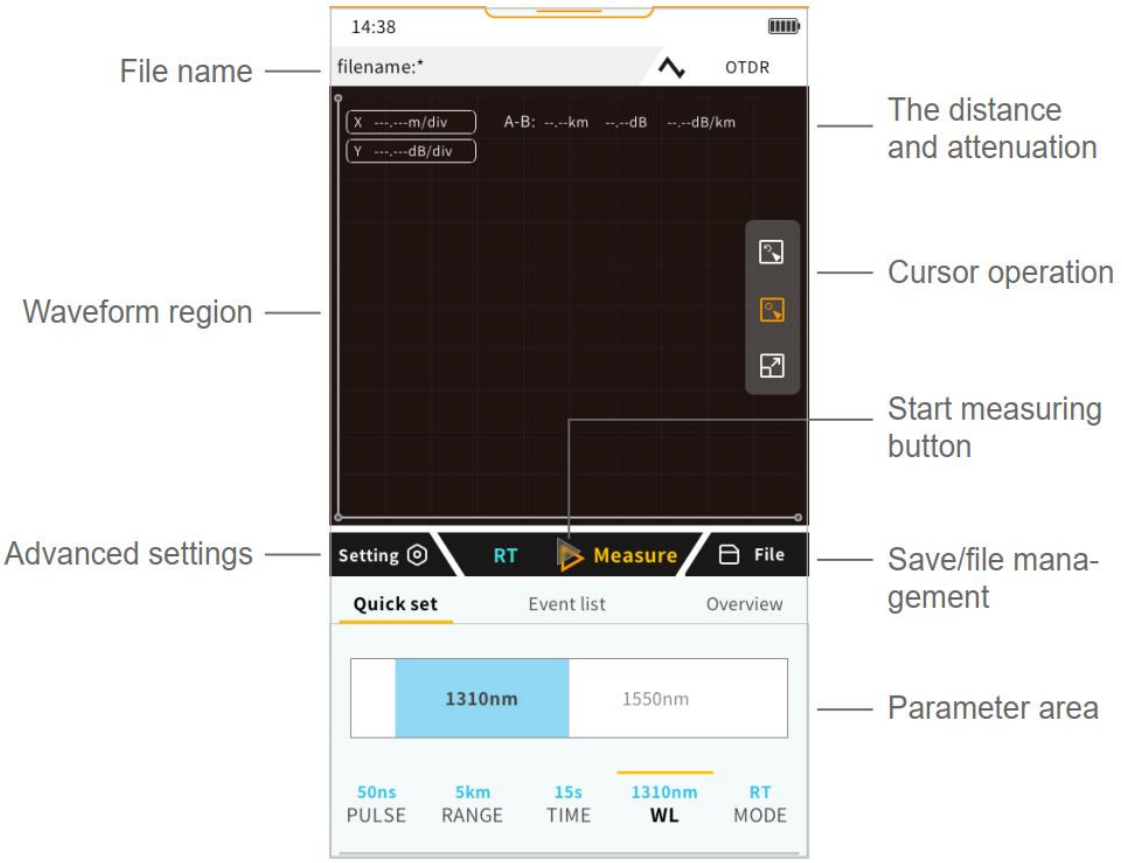


1 - USB
2 – LED light
3 – PC connection
4 – USB disk
5 - OLS
6 – VFL
7 – Battery charge indicator

Swipe down from the top of the screen in any function module interface to access quick navigation icons:

	Connect a removable drive to the device and tap this icon to read the files on the drive
	Connect the device to a computer and tap this icon to transfer data between the computer and the device
	Tap this icon to turn audible alert indication on and off
	Tap this icon to take and save a screenshot of the current function module interface
	Slide this bar left or right to adjust screen brightness

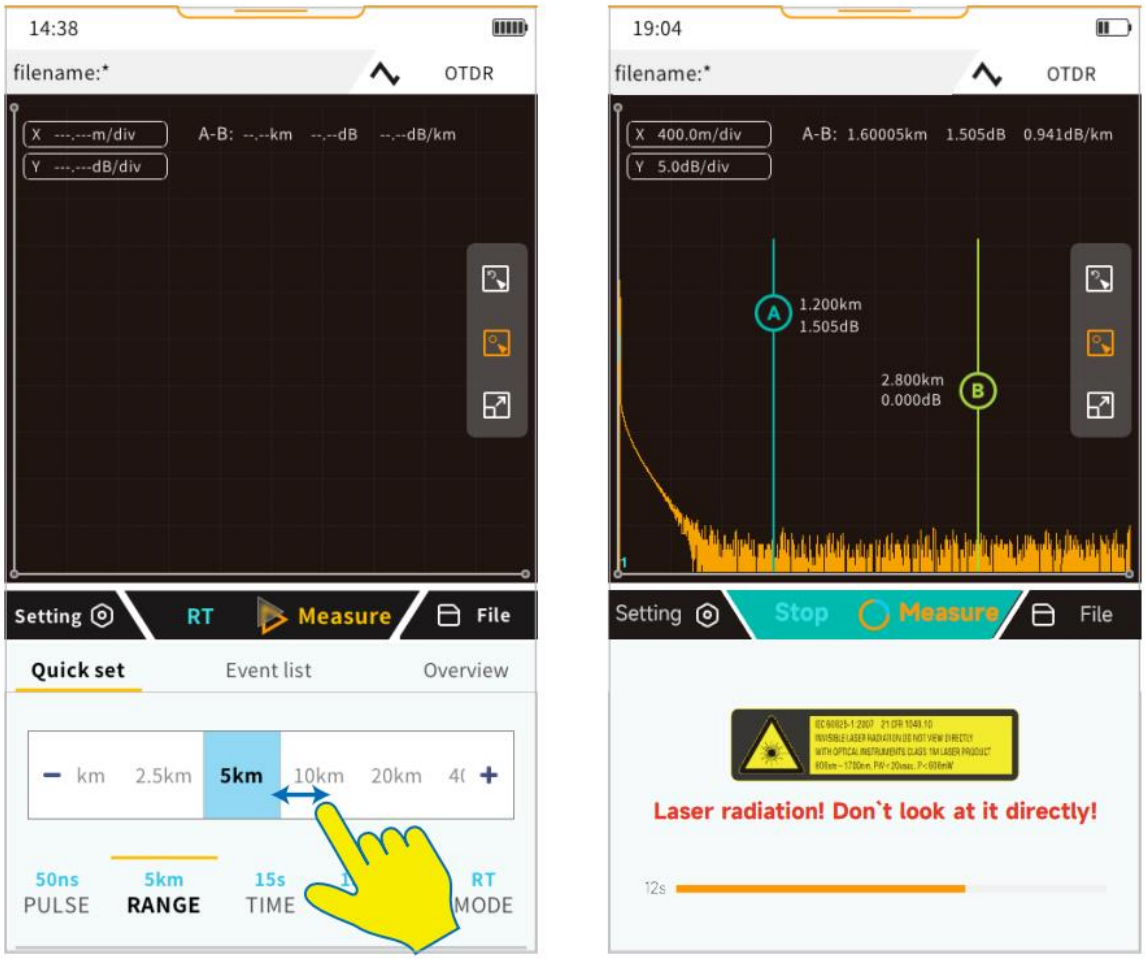
8. OTDR



When you open the OTDR function module, the quick settings interface is displayed by default. Using this interface you can adjust measurement parameters.

The cursor operation floating window exposes the following controls: cursor reset, show/hide cursor, waveform analysis display.

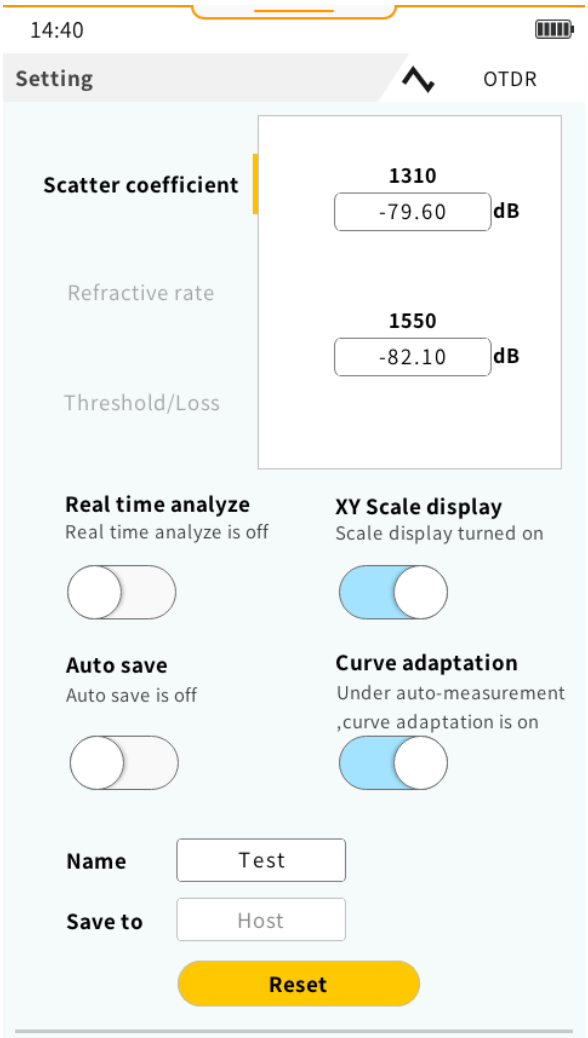
8.1. Measurement settings



To select measurement parameters in the quick settings interface, select the relevant parameter to adjust from the selection at the bottom of the screen, then slide the selection area left or right until the desired value is displayed, tap to select.

To start measurement with the currently selected parameters, tap the RT Measure button. To stop the measurement, tap the Stop Measure button. If real-time analysis is enabled during real-time measurement, an average measurement will be taken before the measuring process is stopped.

8.2. Advanced settings



To change advanced parameters of OTDR measurement, tap the Setting button in the main OTDR interface.

From the advanced settings interface you can adjust thresholds, coefficients, turn on or off real-time analysis, automatic saving, etc.

8.3. Waveform analysis

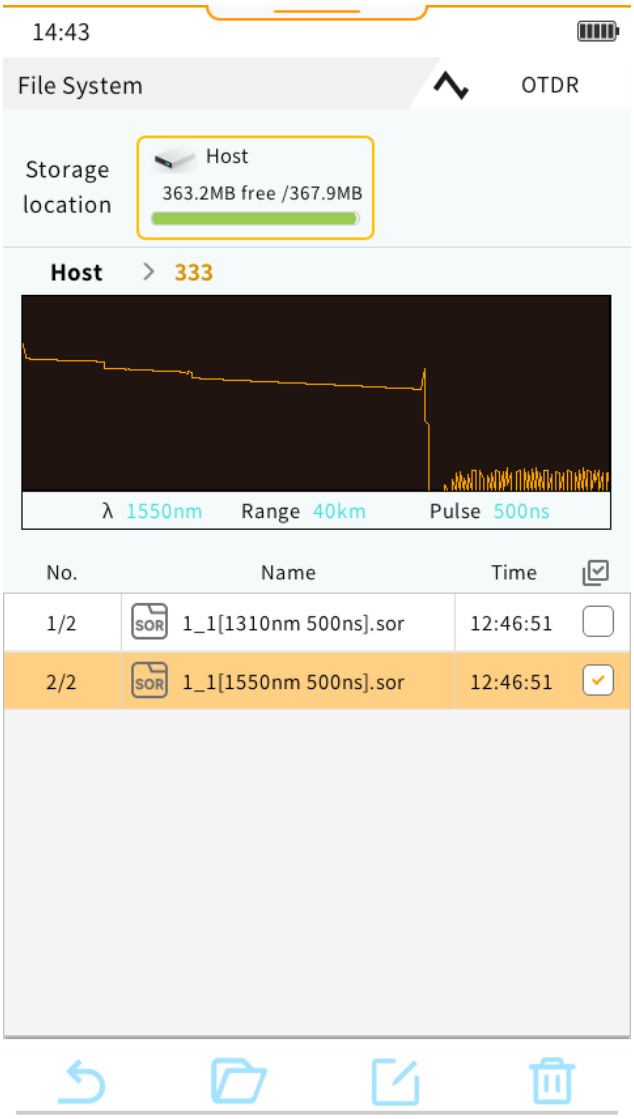
Tap the button in the cursor operation floating window to open the waveform analysis interface. The screen will flip to horizontal orientation. In this interface you can observe the curve more clearly and analyze events along the line.

You can use the pinch-to-zoom gesture to zoom in on the curve and back out, double-tapping restores the zoom level to fit the whole curve.

The right-hand side of the screen shows a diagram of event points, you can tap any of these points to quickly locate it along the curve.

Tap the button to return to the normal OTDR interface.

8.4. File manager



In the main OTDR interface tap the File button to enter the file management interface. This interface allows you to browse, rename, or delete saved SOR files and screenshots.

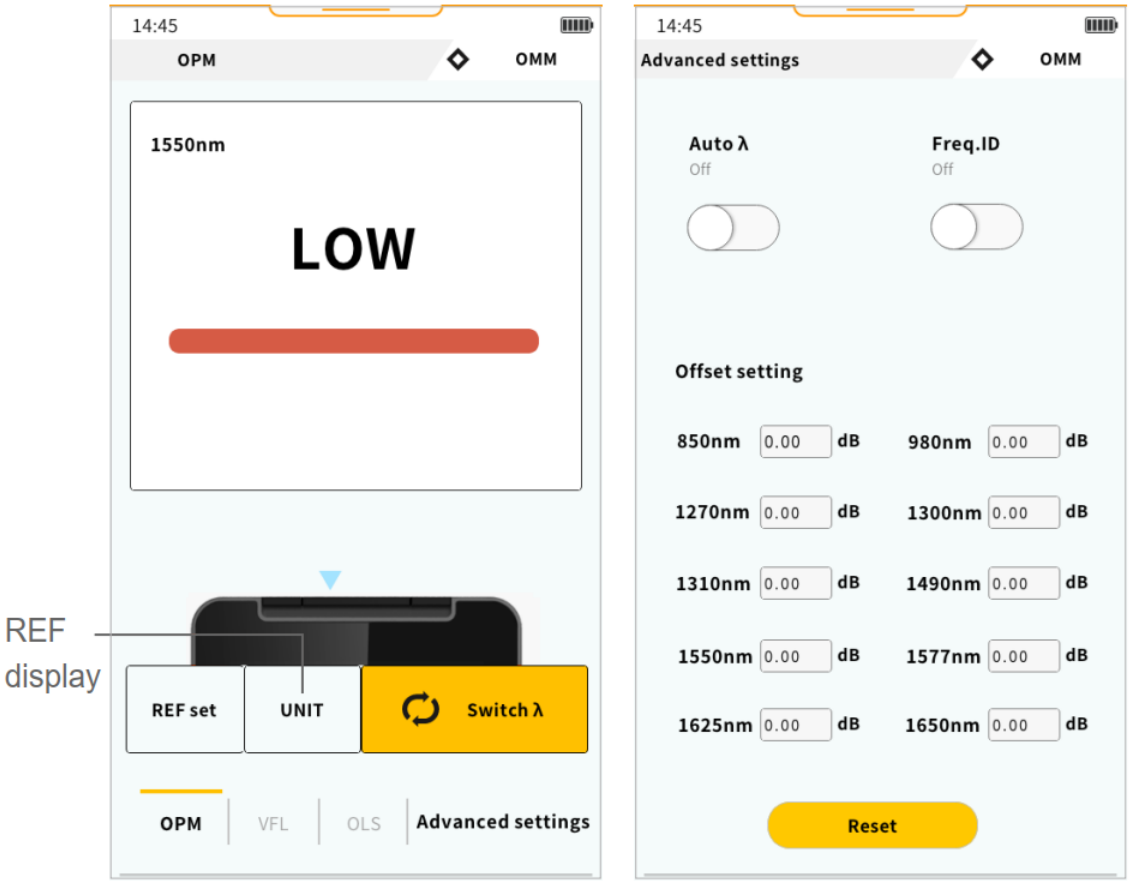
You can select different storage locations using the navigation buttons along the top.

When the auto-save function is enabled, the file is automatically generated and saved after the test with the file name based on the parameters entered in the advanced settings interface.

To preview a SOR file, select it from this interface.

9. OMM

9.1. OPM

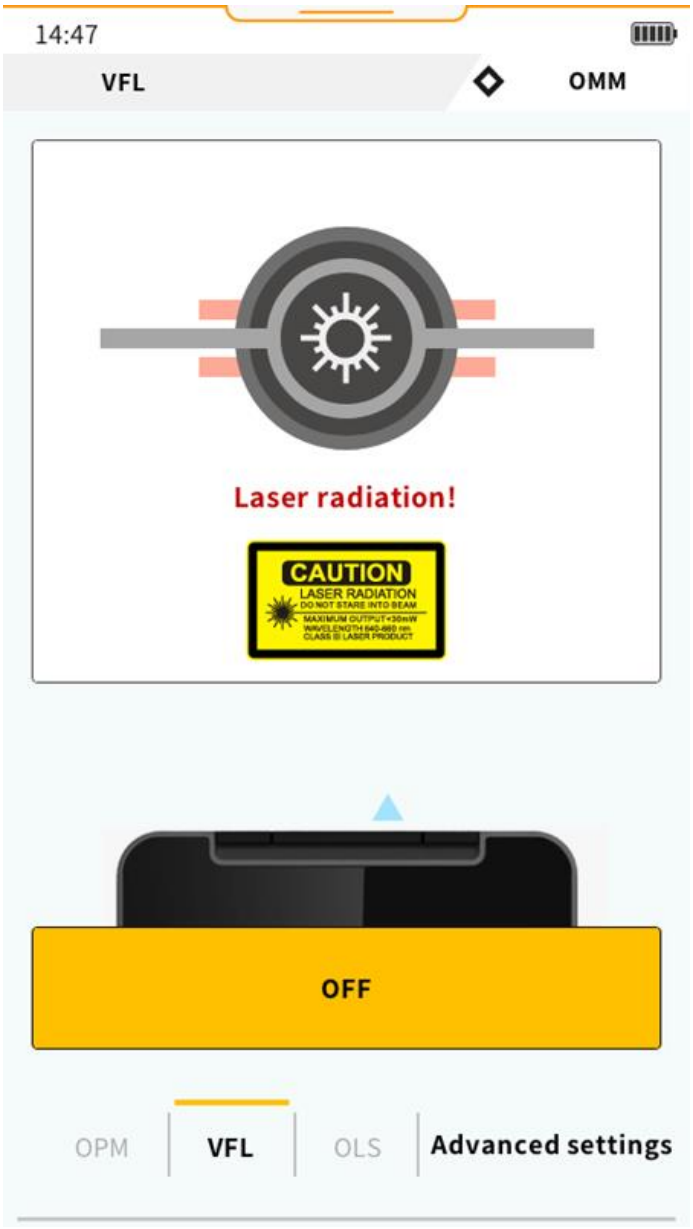


Connect the fiber to the designated ports as shown in the diagram, then follow the interface prompts for operation. The available functions to choose from include an optical power meter, a visual fault locator, and an optical laser source. By default, the system will open the optical power meter function.

Advanced Settings for the Optical Power Meter:

- **Wavelength Recognition**: Toggle this option to enable or disable automatic wavelength recognition.
- **Frequency Identification**: Toggle this option to enable or disable automatic frequency identification.
- **Offset Settings**: When enabled, a wavelength selection bar and offset adjustment field will appear. Users can calibrate the power value for each wavelength based on actual conditions.

9.2. VFL

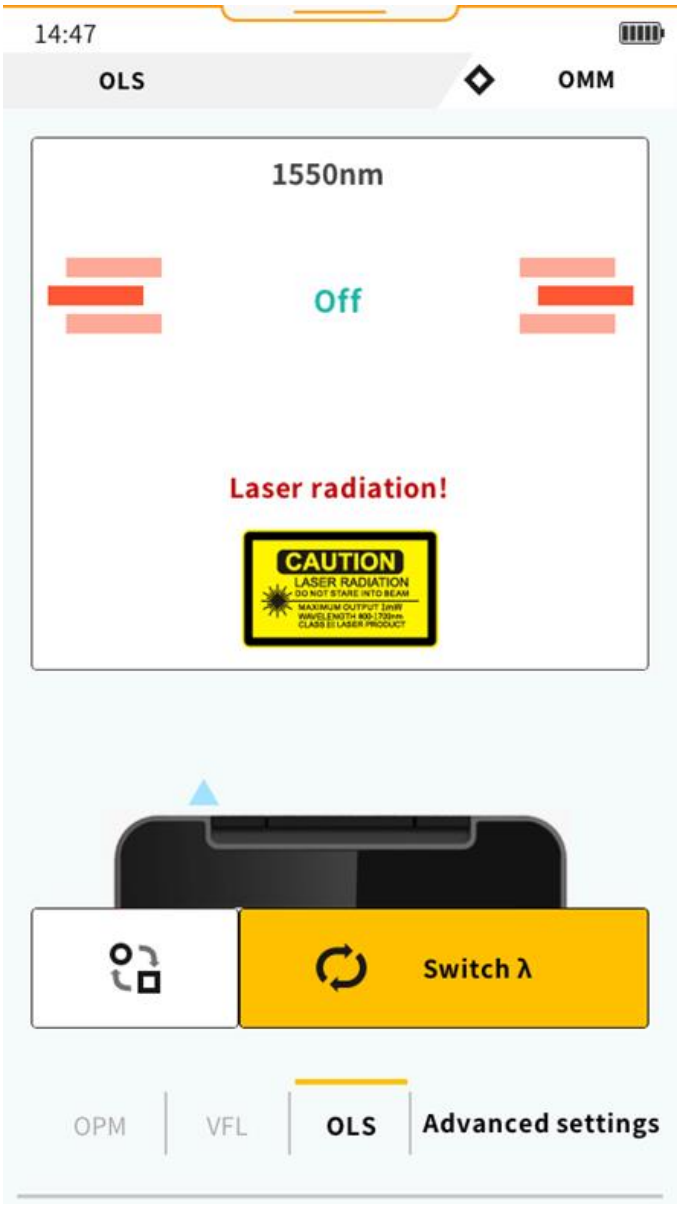


To enter the Visual Fault Locator (VFL) function, tap "VFL" on the selection ribbon at the bottom of the screen. The VFL will cycle through the following modes: On → Blink → Off.

Alternatively, you can quickly activate the VFL by pressing the VFL button located in the lower left corner of the device.

You can check the current status of the VFL through the VFL interface or in the status bar, indicated by the "☀" symbol.

9.3. OLS

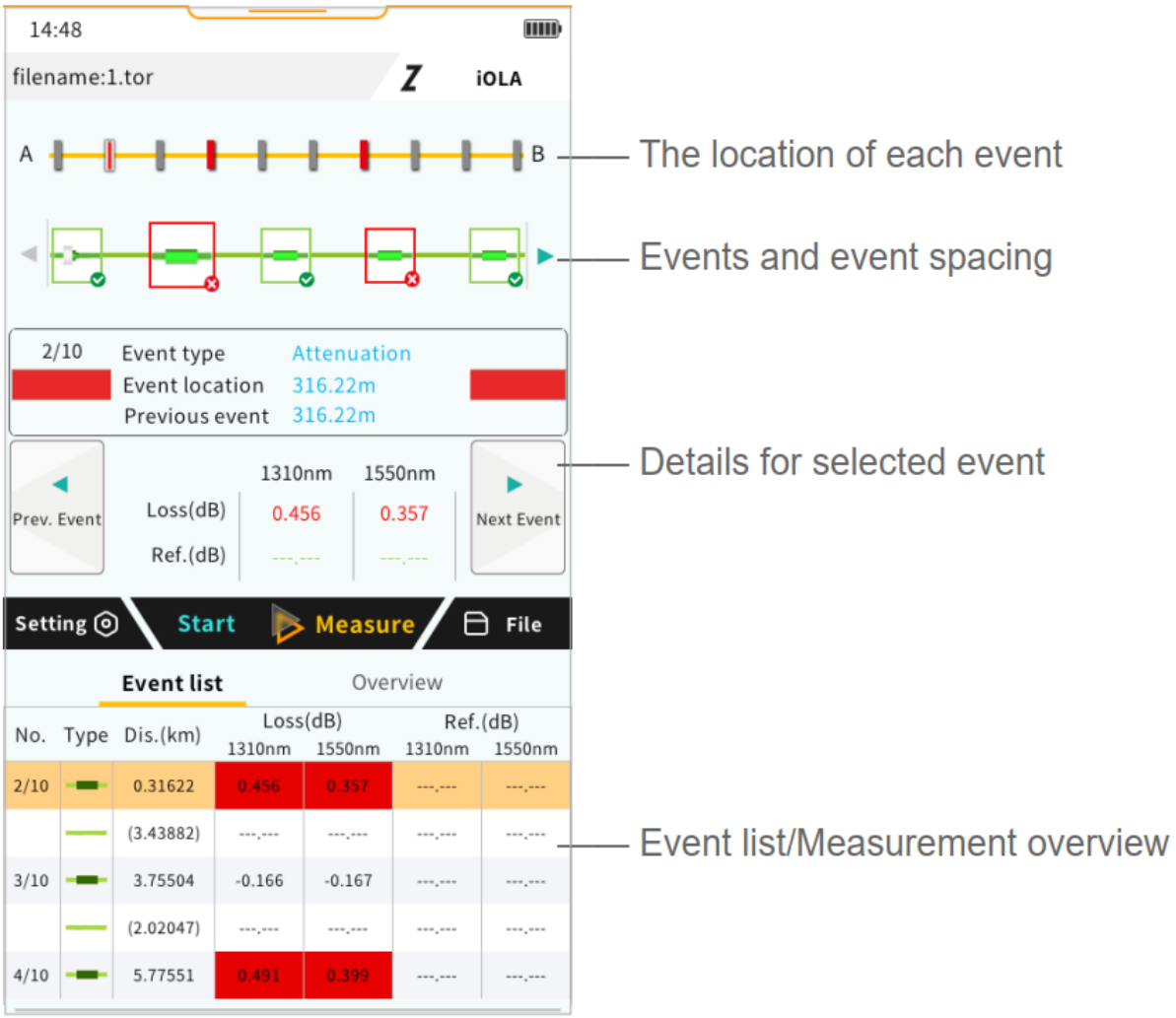


Connect the optical fiber to the ports as shown in the diagram, and operate the device according to the on-screen interface.

For multi-modulated signals, tap to switch between the following modes: continuous signal, 270Hz, 1kHz, 2kHz, 1kHz + blink, and 2kHz + blink.

To switch wavelengths, tap the button. This option is available only on multi-wavelength devices.

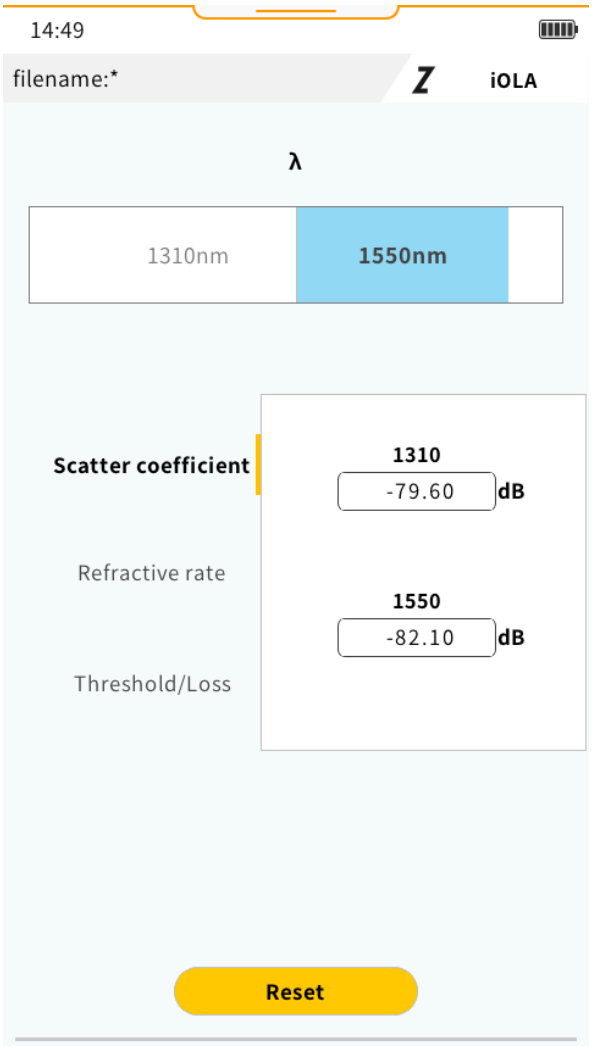
10. iOLA



In the iOLA interface, the details of link event points are visually displayed, allowing you to quickly observe and analyze events.

You can swipe through the event list and tap on individual events or the spaces between them to select a specific event for further analysis.

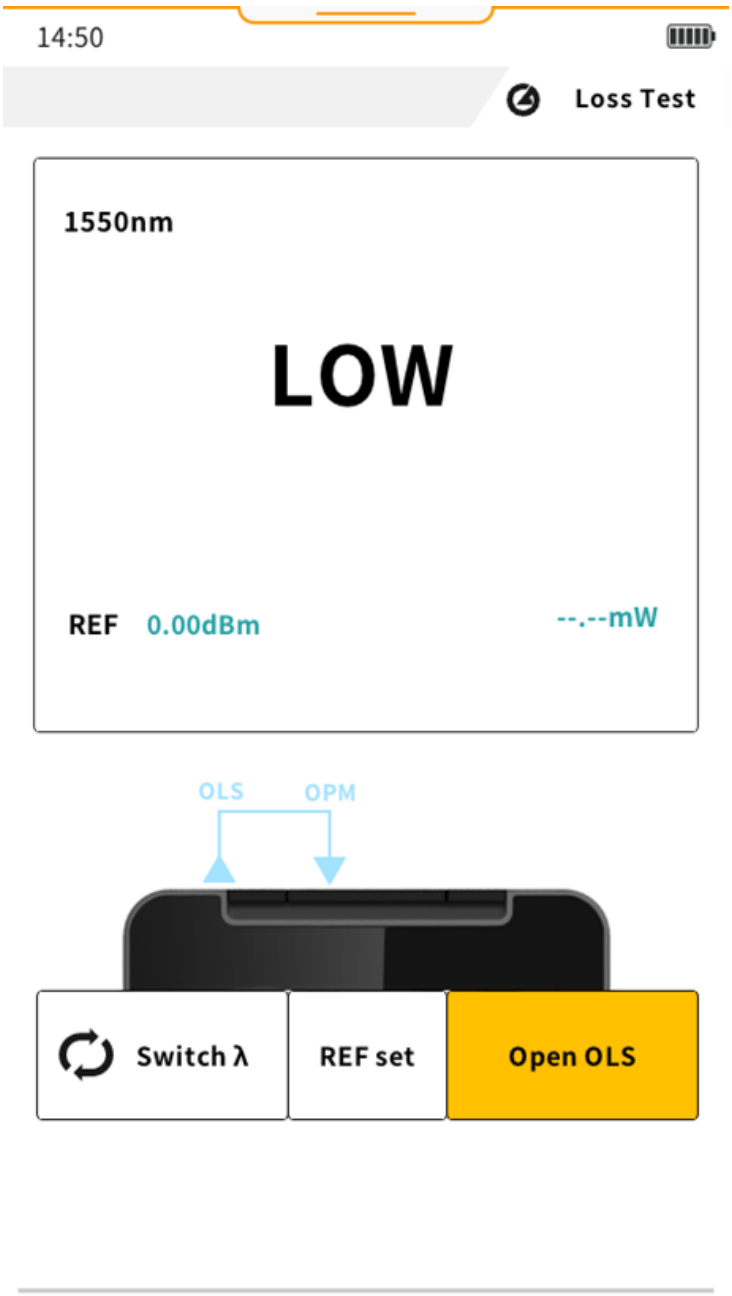
10.1. Link settings



In the iOLA interface, tap Setting to enter the optical link settings.

In this menu, you can configure a range of advanced functions for the iOLA.

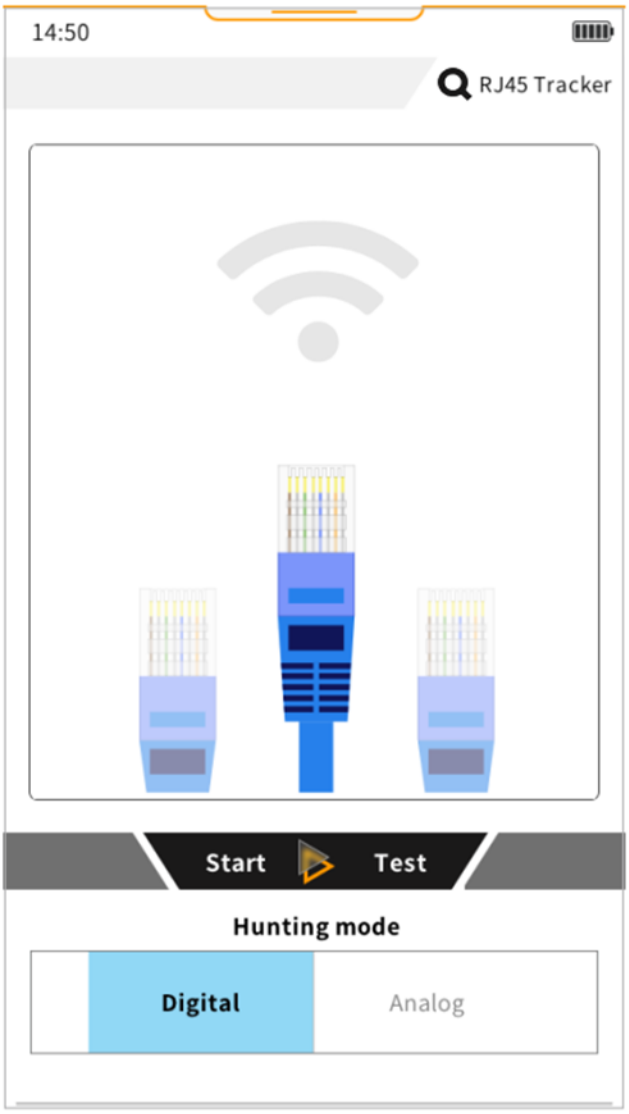
11. Loss test



In this interface, you can perform a loss test to quickly measure the loss value of the optical fiber.

Connect the fiber to the port as shown in the diagram. Tap ↻ to change the wavelength. Then, tap **Open OLS** to activate the optical laser source and begin the test.

12. RJ45 Tracker (optional)

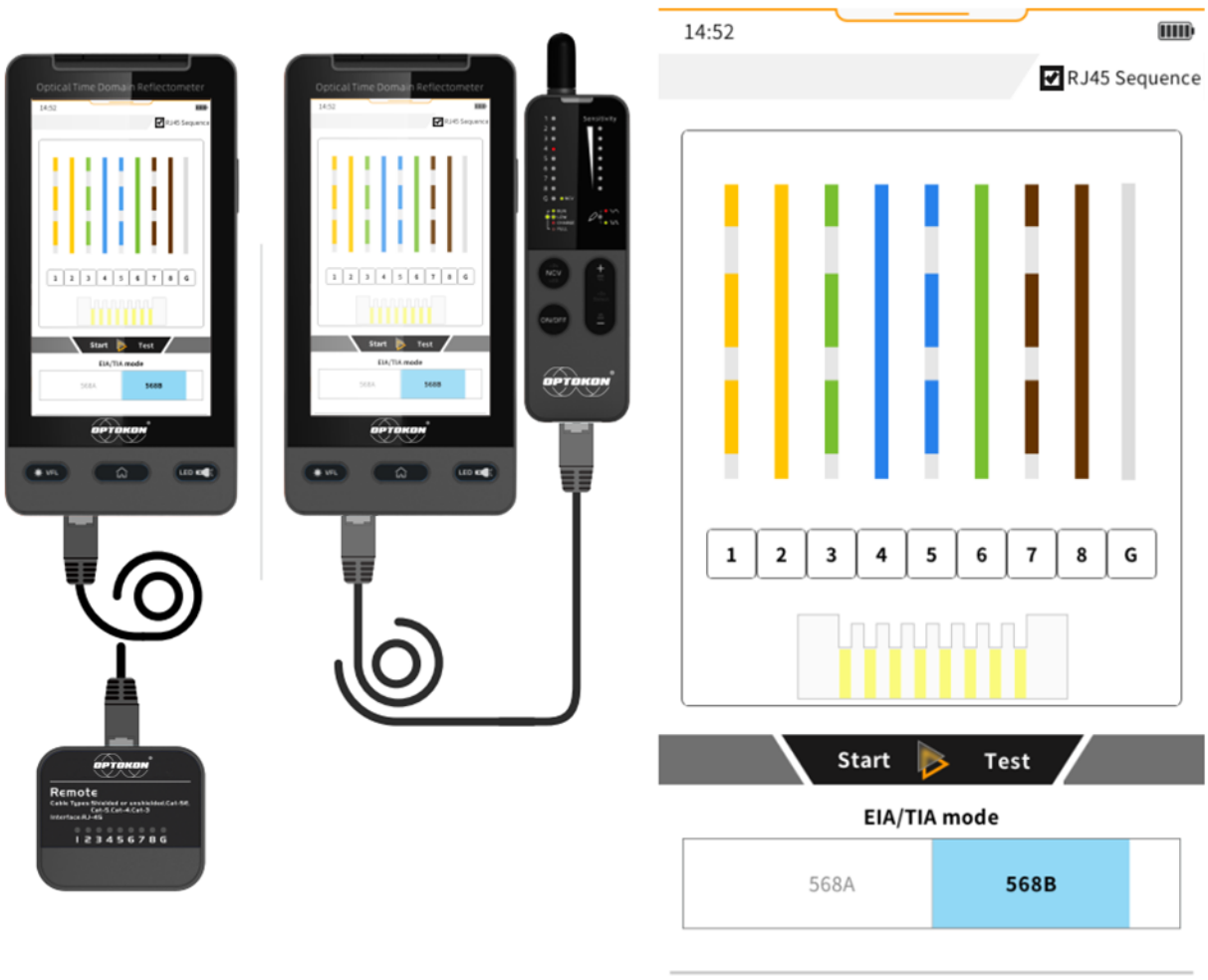


Use this interface with the RJ45 tracker to conduct network cable finding tests. You can choose between two cable-finding modes: Digital and Analog.

Connect the near end of the test network cable to the network port on the host device, then select the appropriate mode for the cable finding process.

The sensitivity of the detector can be adjusted. When the detector is close to the target network cable, it will emit a regular tone.

13. RJ45 Sequence test



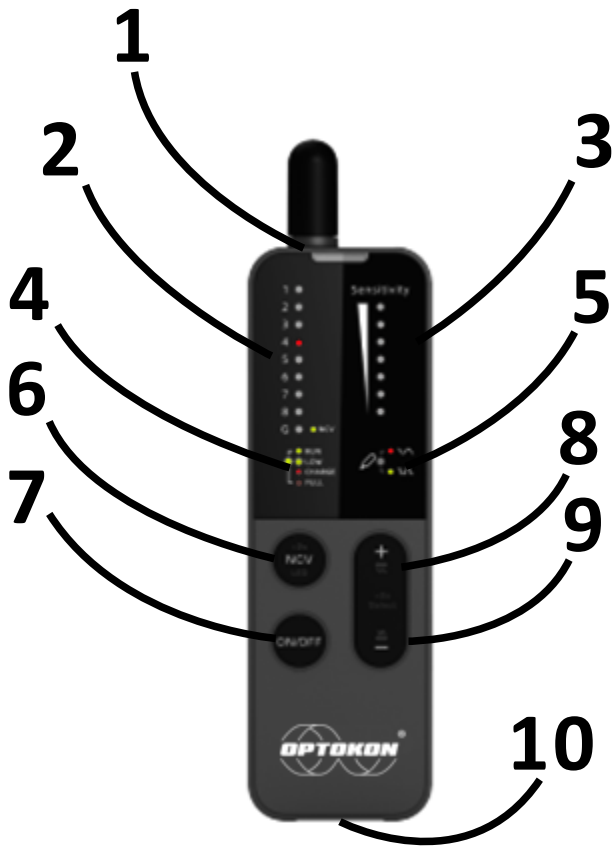
This interface works with the RJ45 Sequence module or the optional RJ45 Tracker detector for network cable testing. The device supports two line sequence test standards.

Connect one end of the network cable to the host and the other end to the module. You can check the quality of the network cable by observing the indicator status on the host UI and the module.

Pass: The indicators on both the host UI and module light up, and the numbers correspond correctly.

Fail: The indicators are in the wrong sequence, or the indicator does not light up.

14. RJ45 Tracker detector (optional)



1 – Detector and LED light
2 – Sequence indicator
3 – Detector sensitivity
4 – Power status
5 – Line finding mode
6 – LED/NCV
7 – Power switch
8 – Digital LFM/sensitivity +
9 – Analog LFM/sensitivity -
10 – RJ45

When two functions are combined – 1st function: long press/2nd function: short click

The optional RJ45 Tracker detector features network cable finding and sequence testing functions. It can be charged via a Type-C interface.

Non-Contact Voltage (NCV) Detection: This function detects the presence of high-voltage cables in the working environment to ensure construction safety. Press NCV to enter NCV mode, at which point the NCV indicator will light up. The receiver will beep when it detects a voltage greater than the threshold.

The line finding function is divided into two modes:

- **Analog Mode:** Enter this mode by long-pressing , which will illuminate the red indicator.
- **Digital Mode:** Enter this mode by long-pressing , which will illuminate the green indicator.

After initiating the line-finding function, pressing the  and  keys allows you to adjust the receiver sensitivity. There are a total of seven sensitivity levels, indicated by the corresponding LED lights. When the receiver detects a signal, the buzzer emits a prompt sound, and the LED light flashes (the color corresponds to the current line search mode).

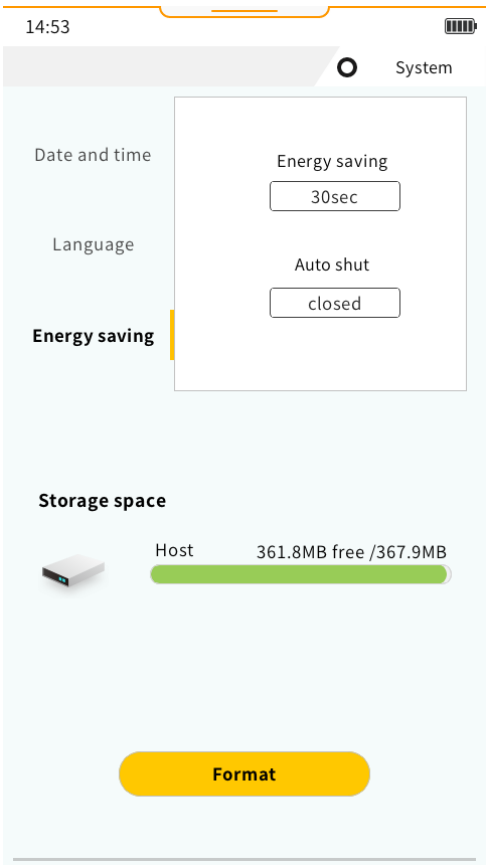
Note: The line search modes of the transmitter and receiver must be consistent; otherwise, no signal will be received.

Power Status Indicators:

- **Green (Power Indicator):**
    - LED off: Device is shut down
    - Steady on after booting up: Normal power level
    - Flashing after booting up: Low power level
- **Red (Charging Indicator):**
    - Steady LED: Charging
    - LED off: Fully charged

If the device boots up while charging, both the red and green lights will be on simultaneously, and the LED may display yellow in certain conditions.

15. System



On the main interface, select the **System Settings** function to enter the settings menu. You can click and swipe to navigate through the options.

- **Intelligent Energy Saving:** When there is no activity for a specified period, the backlight brightness will automatically decrease.
- **Auto Power Off:** This option allows you to set or disable the auto power-off timer.
- **Format:** Select the device to format, then confirm the action according to the prompt. This will delete all files on the device.
- **Version Information:** Swipe the screen left to view the version information.

16. Disposal requirements

At the end of the product's service life, the user is obliged to ensure its environmentally friendly disposal in accordance with Act No. 185/2001 Coll.

Instructions for ecological disposal must be included in the accompanying product documentation, provided that the materials used and the product itself are not classified as environmentally hazardous waste according to Decree No. 93/2016 Coll. and Decree No. 94/2016 Coll.

The LMCP facility falls into the waste catalogue according to Decree No. 93/2016 Coll. 20 01 35 - Discarded electrical and electronic equipment containing hazardous substances (Lithium button battery type CR2032).

The crossed-out wheeled bin symbol reminds us that batteries or products with an integrated battery must not be disposed of with household waste within the European Economic Community (EWR), but must be collected separately.

OPTOKON, a.s. will allow free recycling of all electronic equipment if the customer returns the equipment to the collection point designated by OPTOKON, a.s. In the event that a replacement product is not supplied, recycling will be possible at the customer's request for an additional fee. OPTOKON, a.s. will issue a certificate of disposal.

The costs of logistics and special services (dismantling or controlled destruction of data) will be calculated separately based on the current market price.

Another option is to entrust the disposal to the operators of compliance schemes with consent to ensure the financing of the management of electrical and electronic equipment.

https://www.mzp.cz/cz/kolektivni_systemy_oeez

17. Contact

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