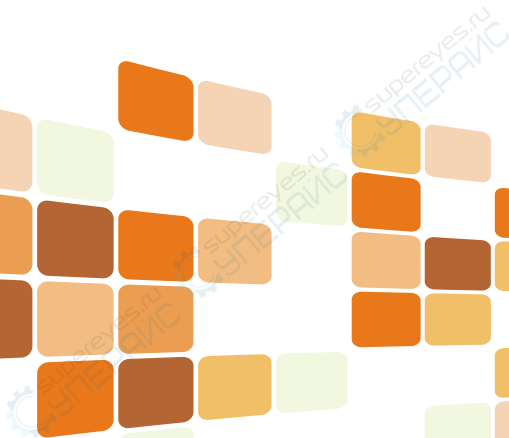




# Optical Time Domain Reflectometer

## USER'S GUIDE





## WARNING

You are cautioned that changes or modifications not expressly approved in this document could void your authority to operate this equipment.

To reduce the risk of fire or electric shock, do not expose this apparatus to rain or moisture.

To avoid electrical shock, do not open the cabinet. Refer servicing to qualified personnel only.



## NOTE

As the laser is harmful to the eyes, do not attempt to disassemble the cabinet.

### Precautions for Use

#### Use batteries

At the same time, can not use different style or different capacitance batteries. And only charge the rechargeable batteries.

#### Avoiding condensation problems

As much as possible, avoid sudden temperature changes. Do not attempt to use the drive immediately after moving it from a cold to a warm location, to raising the room temperature suddenly, as condensation may form within the drive. If the temperature changes suddenly while using the drive,

Stop using it and take out batteries for at least an hour.

#### Storage

When long time no use, must take out the batteries to avoid destroying the device.

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Standard



Host(with TF card)



Lithium battery



Power adapter



Carrying bag



USB cable


## Description




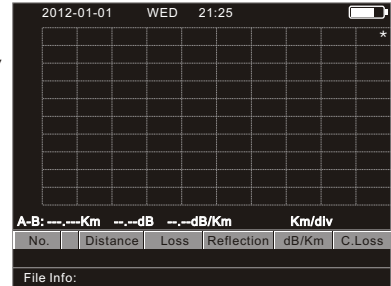
1	USB interface
2	TF(micro SD) cardslot
3	Power adapter socket
4	Charge indicator
5	Menu button
6	Cursor select button
7	File operation button
8	OPM fast enter button
9	VFL control button
10	Zoom control button
11	Full screen button
12	Power button
13	Cancel button
14	Real-time measurement button
15	Average measurement button
16	Up button
17	Right button
18	Down button
19	Left button
20	Confirming button
21	OTDR optic fiber connector
22	VFL optic fiber connector
23	Anti-dust cover
24	LCD

## On/off



“  ” Button is used to turn on/off the device. Keep pressing it for 2 seconds to turn on device. Short press it again to turn off the device.

Press “  ” button to start measuring. But user should modify measurement setting by real requirement before test start.

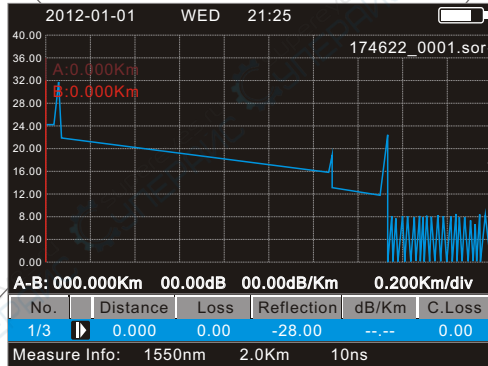


## Measurement Interface

2012-01-01 WED 21:25  
Date and time

  
Power

There are 10x10 grids in waveform region.  
Horizontal grids mean distance, vertical grids mean dB value. As shown in figure, each horizontal grid represents 0.2km, each vertical grid represents 4dB.



174622\_0001.sor  
File name

Waveform region

Events list

A-B: 000.000Km 00.00dB 00.00dB/Km 0.200Km/div  
The distance and Attenuation between A and B cursor  
Every horizontal grid is 0.2Km

Measure info: 1550nm 2.0Km 10ns  
Measurement setting info

## Real-time and average measurement



Real-time measurement can quickly judge basic faults of optical fiber. Press “ **REAL** ” button to start real-time measuring. During measuring, you can change range, zoom in or zoom out. Press “ **REAL** ” button again or “ **ESC** ” button to stop. The device will not analyse event after real-time measurement in default. Unless you turn on RT analyse in System settings, the device will analyse events according to the last refreshed waveform.







Average measurement can judge the line condition more accurate. It can get a better SNR and fits high requirement circuit. Press “ **SCAN** ” button to start. User can set measurement time from 5 second to 180 second. The device analyses events and generates event list automatically. Press “ **ESC** ” button during measuring, device will stop measuring, analyses events and generates event list automatically.



## Event list


No.		Dis.	Loss	Ref.	dB/Km	C.Loss
1/3		0.000	0.00	-28.00	--	0.00







Event list on maininterface



Event List						
No.		Dis.	Loss	Ref.	dB/Km	C.Loss
1/6		0.000	0.00	-51.74	--	0.00
2/6		0.940	0.08	-51.74	0.24	0.26
3/6		4.301	0.12	-54.67	0.28	1.18
4/6		5.589	--	--	--	--
5/6		18.712	-0.05	-41.03	0.22	4.07
6/6		39.809	--	-46.02	0.21	9.41

Press key ENTER to locate the corresponding event.

Event List

After measurement or open a waveform in memory, there is event list on the bottom of waveform interface. Press “” button to show the whole event list. Six types of events as followed:

-  Optic fiber start
-  Reflection event
-  Attenuation event
-  Mix event
-  Gain event
-  optic fiber ending

Press Up or Down button to select an event which needs to be located by cursor on the waveform. Then press “” button to return to waveform interface. The cursor will stay on the position of the selected event. Press “” button to return to waveform interface.

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## Real-time measurement tips






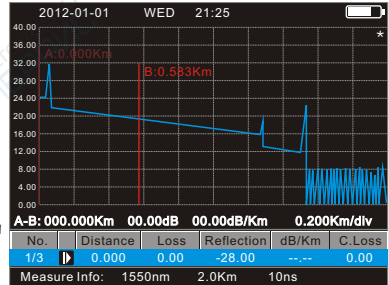
The device supports user to change measurement range during real-time measurement. Start Real-time measuring function and press Up or Down button to increase or decrease the range. And it also supports to change the cursor position and zoom in/out waveform in realtime, which means you can zoom in partial waveform while measuring to judge the network fault.

## Cursor selection and waveform zoom in/out

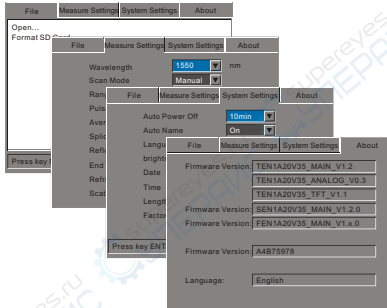


This device has two cursors, A and B. Default distance is 0m, activated cursor turned to bright red. Press “Marker” button switch to another cursor. Press Left or Right button to move cursor. Press Up or Down button to previous or next event. You can calculate the distance and attenuation between two cursors.

Keep pressing “”, then press and Up/Down button to zoom in or out waveform vertically. Keep pressing “”, then press Left/Right button to zoom in or out horizontally. Press “” button to return to full screen display. Notice: the focus of zooming is the location of the activated cursor.



## Menu



There are four pages of menu which used to configure parameters.

Under waveform interface, press

“ **MENU** ” button to switch the four menus cyclically.

The four menus are:

1. File menu
2. Measure settings menu
3. System settings menu
4. About

## Menu-File menu

The image shows two screenshots from a device's software interface. The left screenshot shows the 'File' menu with 'Open...' and 'Format SD Card...' options. A green arrow points from 'Open...' to the right screenshot, and another green arrow points from 'Format SD Card...' to a 'Warning' dialog box. The right screenshot shows a file list with '20140619' selected. The 'Warning' dialog box asks 'Are you sure to format the SD card?' with 'OK' and 'Cancel' buttons.

File menu options:

- Open...
- Format SD Card...

File list:


20140615	2014-06-15
20140617	2014-06-17
20140618	2014-06-18
20140619	2014-06-19
20140622	2014-06-22

Warning dialog box:

Warning

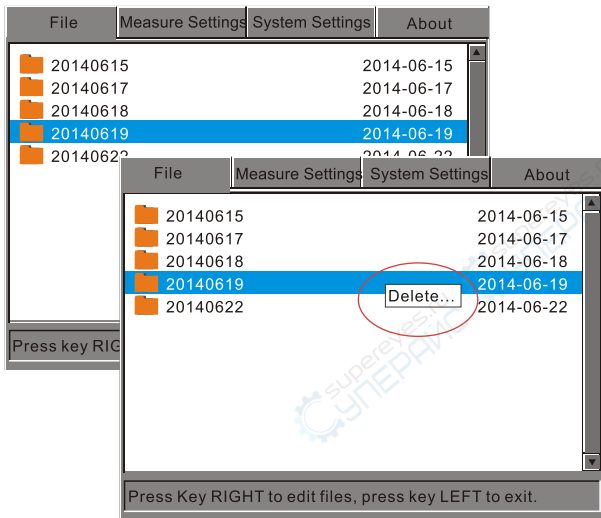
Are you sure to format the SD card?

OK Cancel





Enter File menu, there are two options, "open" and "formatting SD card". Select one option and press “  ” button to enter the corresponding operation.

Attention: formatting SD card operation will delete all files and cannot recover, please be cautious.

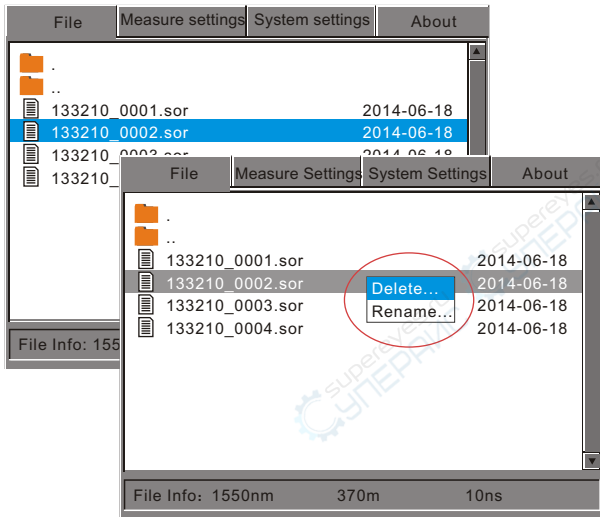
## Menu-File menu




Select "open" option, there are folders. The folder name is the date of the file saved, which is generated automatically by system. Files measured in the same day will be stored in the same folder. Folder can only be deleted, but not renamed. And must delete all files before deleting the folder.

Press Up or Down button to select a folder and press “” button to open delete tip. Then press “” button to finish deleting, or press “” or “” button to cancel.

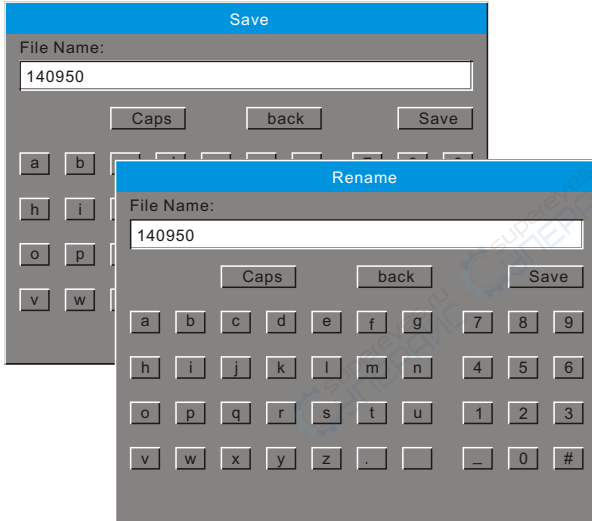
## Menu-File menu




Select one folder to display all files inside. Press Up or Down button to select one file and press “ENTER” button to display it in main interface. The file information at the bottom is the file's main measurement setting.

Press “” button can delete or rename the file. Filename can make up of 23 digits, alphabets and special symbols at most. The last four numbers\_ xxxx is generated by "Automatic naming" function. Shut down this function will not generate.

## Menu-File menu



When finish measuring an optic fiber, press “  ” button to enter storage interface. Default filename is hour/minute/second of first time storage. Press Up/Down/Left/Right button to select alphabets, digits and symbols on softkeyboard. You can input 23 alphabets at most. If "Automatic naming" is enabled, the filename will automatically generated with four digits. Without shutting down the device, the following stored file's name will automatically plus 1. The file format is .SOR.

On file recalling interface, press Right button can Modify filename, as the same operations above.



## Menu-Measure settings

File	Measure Settings	System Settings	About
Wavelength	1550	nm	
Scan Mode	Manual		
Range	40	Km	
Pulse Width	1000	ns	
Average Time	120	s	
Splice Loss	0.05	dB	
Reflection Threshold	65.0	dB	
End Threshold	2.0	dB	
Refractive Rate	1.46832		
Scatter Coefficient	52.1	dB	

Measure settings menu is used to set relative measurement data, which the judgment of events list is based on. Wrong setting might lead to wrong or missing events.

Wavelength---wavelength of laser.

Scan mode---manual and auto mode. Under auto mode, it will match the distance, range and pulse width.

Range---match with the length of measured optic fiber, usually over one level.

Pulse width---set the pulse width of output laser. Usually, small pulse width can measure close event, large pulse width can measure remote distance, but enlarge event's blind area.

Average time--- can set between 5 second and 180 second as average measurement time.

Splice loss---treat as an event when the loss is higher than setting value.

Reflection threshold---treat as an event when the reflection is higher than setting value.

End threshold---treat as the end of optic fiber when the loss is higher than setting value.

Refractive rate---represent the average refractive index of entire optic fiber.

Scatter coefficient--- the intrinsic value of Rayleigh Scattering.

## Menu-System settings

File	Measure Settings	System Settings	About
Auto Power Off	10min	▼	
Auto Name	On	▼	
Optical Dectector	On	▼	
RT Analyse	Off	▼	
Brightness	60		
Date	2013	- 11	- 02
Time	21	:	57
Length Unit	Metric	▼	
Factory Settings	No	▼	

Press key ENTER to edit settings.

System settings menu is used to set the device's basic functions.

Auto Power Off---set time of automatic off or cancel this function.

Auto Name---name automatically when file is saving, can cancel this function.

Optical Detector ---detect whether there is signal in optic fiber or not before measuring.

RT Analyse --- set whether analyses events after real-time measuring or not.

Brightness--- adjust brightness of LCD.

Date--- set year, month, day.

Time ---set hour, minute.

Length unit ---default is metric units.

Factory settings ---is used in resetting to default, and has no effect on the set time and stored data.

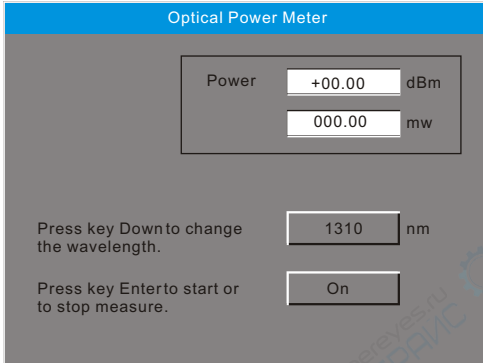
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## Menu- About


File	Measure Settings	System Settings	About
Firmware Version:	<input type="text" value="TEN1A20V35_MAIN_V1.2"/>		
	<input type="text" value="TEN1A20V35_ANALOG_V0.3"/>		
	<input type="text" value="TEN1A20V35_TFT_V1.1"/>		
Firmware Version:	<input type="text" value="SEN1A20V35_MAIN_V1.2.0"/>		
Firmware Version:	<input type="text" value="FEN1A20V35_MAIN_V1.x.0"/>		
Firmware Version:	<input type="text" value="A4B75978"/>		
Language:	<input type="text" value="English"/>		

This menu is version details about device's configuration of hardware and software. CPU number is used to generate upgrading code, which should inform distributor or factory before software upgrading.

## OPM function




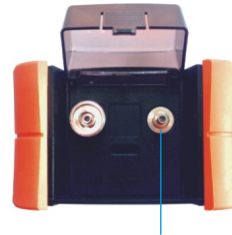
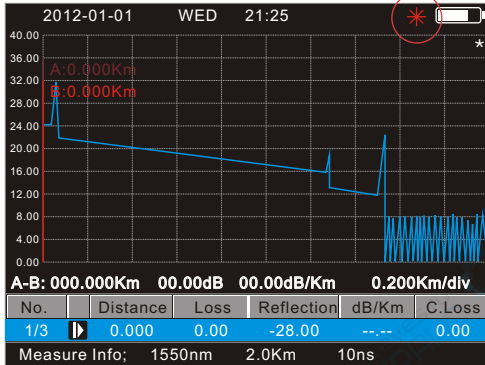
Press “  ” button on device with OPM function to enter OPM measurement interface. Press “  ” button to start measuring. Press “  ” button to change the wavelength. The meter's six calibration wavelengths are: 850nm, 1300nm, 1310nm, 1490nm, 1550nm, 1625nm.

Press “  ” button to quit OPM function.

## VFL

This device has VFL function, the output power is about 1 nW.

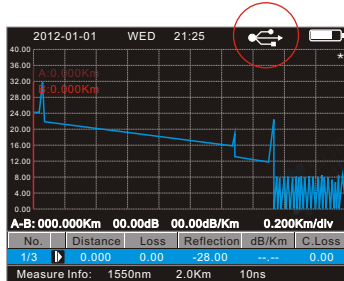
Press “  ” button to control laser on-flashing-off. When Laser is on, the prompt icon will occur at upper right corner.



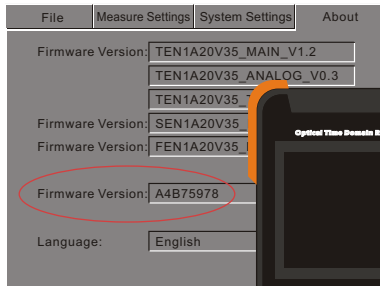
VFL laser output connector

## TF card and USB communication

All measured waveforms are stored in TF card. Using mini USB cable can store data to PC. PC will show a new disk icon, data inside. According to filename, user can store or recall files.






## User upgrading



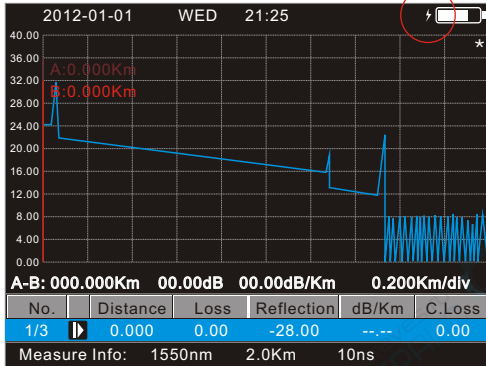
When device needs upgrading, user does not need to send it back to factory. Prepare materials before upgrading as follows:

1. CPU ID
2. TF (micro SD) card, capacity is less than 16GB

Inform the CPU ID to distributor or factory, you can get upgrading firmware only for your device. Store the firmware to TF card through computer. Insert TF card to device when it is power off. Press

“  ” and “  ” button and hold them, then press “  ” button to turn on the device, upgrading is starting. You can delete upgrading file in TF card when finish upgrading.

## Charging



This device has lithium batteries inside, and can only use the power adapter from factory to charge it. Insert the adapter to device, and finish charging in 8-10 hours. Red charge indicator means charging, while green means finish.





## Detail parameters

Dynamic range	Type S: 22/24dB, Type A: 26/28dB, Type B: 30dB/32dB, Type C: 34dB/36dB
Optic fiber type	SM optical fiber
Wavelength	1310nm $\pm$ 20nm, 1550nm $\pm$ 20nm
Optic fiber connector	FC/PC (SC/PC Optional)
LCD	3.5 inch colour LCD
Test range	Type S: 80Km Type A: 100Km Type B: 120Km Type C: 140Km
Pulse width	10ns~10us
Measurement time	5s~180s
Attenuation blind area	8m
Event blind area	1.5m
Distance accuracy	1.25m
Data storage	Micro SD card, less than 16GB
Communication connector	USB
VFL power	1mW
power	Special lithium battery packet
Battery lifetime	Standby > 15 hour, measurement > 8 hour
Working temperature	0 $^{\circ}$ C~-50 $^{\circ}$ C
Storage temperature	-20 $^{\circ}$ C~-70 $^{\circ}$ C
Relative humidity	< 90%
Weight	0.75Kg
Appearance size	197mmx107mmx67mm





