

UT685A /UT685A KIT
TDR Cable Tester User Manual

EN

Preface

Thank you for purchasing a brand-new Uni-Trend instrument, in order to use this instrument correctly, please read the full text of this Quick Guide carefully before use, especially the "Safety Information" section.

If you have read the full text of this Quick Guide, it is recommended that you keep it in a safe place, preferably with the instrument or in a place where you can access it at any time, so that you can refer to it in future use.

Limited warranties and liability statement

The Company warrants that this product will be free from any defects in materials and workmanship for a period of one year from the date of purchase. This warranty does not apply to damage caused by accident, negligence, misuse, modification, contamination and abnormal operation or handling. The Distributor is not entitled to any other warranties in the name of the Company. If warranty service is required during the warranty period, please contact the nearest authorized service center to obtain the product return authorization information, and then send the product to the service center with a description of the product problem.

This guarantee is your sole remedy. Otherwise, the Company disclaims all warranties, express or implied, such as those applicable to a particular purpose. The Company shall not be liable for any special, indirect, incidental or consequential damages or losses arising from any cause or presumption, and the above limitations and provisions of liability may not apply to you because some states or countries do not allow limitations on implied warranties and incidental or consequential damages.

Contents

1.Overview ---------- 24
2.Unpack to Check ---------- 24
3.Safety Information ---------- 24
4.Features ---------- 25
5.UT685A Display ---------- 26
6.Functions in Test Mode ---------- 27
7.Functions in PoE Mode ---------- 34
8.Functions in Cable Tracing Mode ---------- 35
9.Calibrating Length Measurements (supported only in TEST mode) ---- 37
10.Turn on/off the backlight ---------- 38
11.Change the units of length ---------- 38
12.Auto-off ---------- 38
13.Other functions ---------- 39
14.Maintenance and Repair ---------- 40

1. Overview

UT685A is a handheld TDR cable tester, suitable for copper (CAT 5E, CAT 6, CAT 6A or CAT 8) cables. It can inspect and diagnose the wiring condition of twisted-pair cables, as well as detect network services and problems such as open circuits, short circuits, split pairs, miswires and poor crimping of RJ45 connector in network cabling. It can also detect whether there is PoE power supply (Power over Ethernet module) in the network cabling and the standards of POE(IEEE 802.3af/at/bt). And it can simultaneously display information such as the wiremap, cable length, and open circuit position on the screen. It features precise measurement, convenient operation and intuitive ease of use. It is an ideal tool for application in network communication maintenance, comprehensive wiring network engineering and other metal wire engineering and maintenance work.

2. Unpack to Check

The Tester is equipped with the accessories listed below. If you find any missing or damaged parts, please contact the supplier immediately.

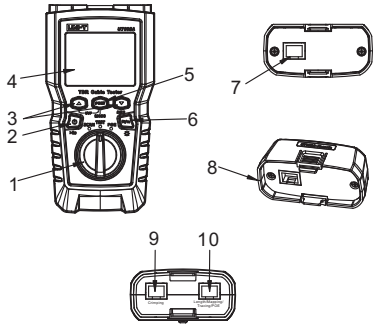
- UT685A TDR Cable Tester: 1 pc
- 1.5V AA Alkaline Batteries: 3 pcs
- RJ45 Adapter Cable: 1 pc
- RJ11 Adapter Cable: 1 pc
- RJ11 to Crocodile Clip Adapter Cable: 1 pc
- User Manual (in 8 languages including Chinese): 1 pc
- Carry Bag: 1 pc
- UT683R Receiver (included only in UT685A KIT): 1 pc
- Type-C Charging Cable (included only in UT685A KIT): 1 pc
- Safety Guide: 1pc

3. Safety Information

To avoid possible fire, electric shock or personal injury:

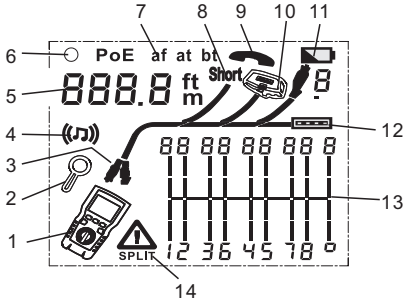
- Do not open the casing. There are no user-serviceable parts inside.
- Please use the tester as instructed in the user manual, otherwise, the tester may be damaged.
- Check the tester before use, do not use a damaged tester and do not modify the tester yourself.
- If the tester malfunctions, do not use it.
- To ensure the accuracy of the test results, replace the battery as soon as the low battery indicator appears.

4. Features



1. Mode selection knob: Three modes are available: cable tracing mode, test mode, and POE mode.
2. Power on/off button: Press and hold for 2 seconds to turn on the device, and press and hold for 1 second to turn it off.
3. Check the details of the test results and use with other keys.
4. LCD display with backlight.
5. Select the crimping or length/wiremap/cable tracing /POE as the current t est port.
6. Short press to switch units; Press and hold for about 1 second to turn on/off the backlight.
   Press ▲, ▼ and the power button simultaneously to display the software version.
   Press PORT, ▲ and the power button simultaneously to calibrate length measurements. (supported in TEST mode only).
7. Modular jacks for length/wiremap/cable tracing/ POE testing connections using telephone and twisted pair network cables.The jacks can accept 8-pin modular (RJ45) and 6-pin modular (RJ11) connectors.
8. A wiremap adapter with one 8-pin modular jack.
9. Crimp test port.
10. Length/wiremap/cable tracing /POE test port.

5. UT685A Display



1. Tester Icon
2. Screen Detail Indicator
3. Indicates which port is the active port, for length/wiremap/cable tracing/ POE test port or for crimping test port
4. Tracing Mode Indicator
5. Digital Display with Feet/Meter Indicator
6. Test Mode Indicator
7. POE Mode Indicator
8. Short Circuit Indicator, indicating a short circuit exists on the cable
9. Telephone Voltage Indicator
10. Indicates that the other end of the tester is connected to an adapter
11. Low Battery Indicator
12. Ethernet Port Indicator
13. Wiremap Diagram
14. Fault/High Voltage Indicator: The symbol "⚠" indicates a fault on the cable or that it carries high voltage, displaying SPLIT (split pair) when the fault is a split pair.

6. Functions in Test Mode

6.1 Twisted-pair cable test

● 6.1.1 Twisted-pair cable wiring test

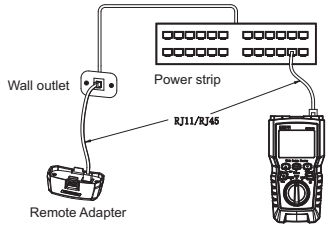


Figure 6.1 Connecting to twisted-pair network cabling

1. Start the tester, set the mode selection knob to the TEST mode "Test", and press the "PORT" key to select the length/wiremap/cable tracing/ POE test port.
2. Connect the Tester and the wiremap adapter to the wiring, and continue the test until the mode is changed or the Tester is turned off.

(It is recommended not to connect the far-end adapter for measuring length, but to perform a complete wiremap test, an adapter is required.)

● 6.1.2 Typical test results of twisted pair cables

6.1.2.1 Open on twisted pair cable

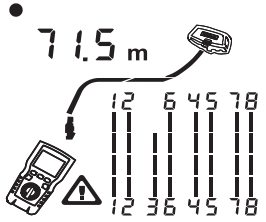


Figure 6.2 Open on twisted pair cable

Figure 6.2 shows that there is an open circuit on the third wire. The three segments shown, representing the lengths of the wire pairs, indicate that the open circuit is approximately located at three quarters of the distance to the end of the cabling, with a cable length of 71.5 meters.

To check the distance between the wiring end and the open circuit, press ▲ and ▼ to view the individual results of the wire pair.

Note: If only one wire in the pair is open and the wiremap adapter is not connected, both wires in the pair will be displayed as open. If both wires in a pair are open-circuited, the fault/high voltage warning symbol will not be displayed, as an open-circuited pair is a normal phenomenon for some wiring applications.

6.1.2.2 Short on twisted pair cable

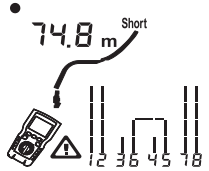


Figure 6.3 Short on twisted pair cable

Figure 6.3 shows that there is a short circuit between the fifth wire and the sixth wire. The short-circuited connection will flash to indicate a fault. The cable length is 74.8 meters.

Note: When there is a short, the far-end adapter and the wiremap of the unshorted wire are not displayed.

6.1.2.3 Crossed wires

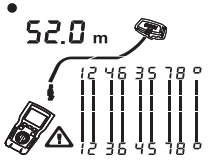


Figure 6.4 Crossed wires

Figure 6.4 shows that wires 3 and 4 are crossed. The pin numbers will flash to indicate a fault. The cable length is 52 meters. The cable is shielded. (Detection of crossed wires requires a far-end adapter.)

6.1.2.4 Crossed pairs

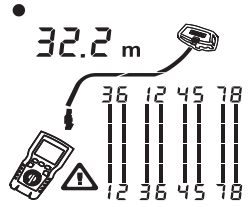


Figure 6.5 Crossed pairs

Figure 6.5 shows that pairs 1, 2 and 3, 6 are crossed. The pin numbers will flash to indicate a fault. A far-end adapter is required for the detection of crossed pairs.

6.1.2.5 Split pair

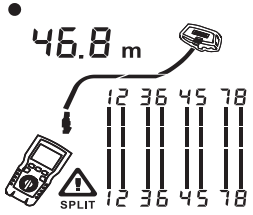


Figure 6.6 Split pair

Figure 6.6 shows a split pair on 3, 6 and 4, 5. The split pair symbol "⚠" is displayed and the split pairs flash to indicate the fault. The cable length is 46.8 meters.
In a split pair, the end-to-end connectivity is correct, but the connected wires come from different pairs. Split pairs can lead to excessive crosstalk, thus interfering with network operation.
(Note: For cables with untwisted pairs, such as telephone lines, typically shows split pairs due excessive crosstalk.)

6.1.2.6 Ethernet port detected

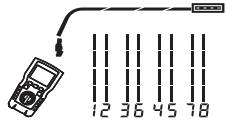


Figure 6.7 Ethernet port detected

Figure 6.7 shows that an Ethernet port is detected by the Tester.
When the switch port fails to generate reflection, the Tester will be unable to measure the length. If the impedance of the switch port fluctuates or is different from that of the cable, the length may constantly change or be significantly too high. Disconnecting the cable from the switch port enables accurate length measurement.

6.1.2.7 POE switch detected

PoE

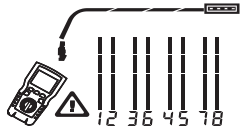


Figure 6.8 POE switch detected

Figure 6.8 shows that the Tester detected a POE switch.
In the test mode, the Tester can identify whether the device connected to the cable under test is a POE switch, and display "POE" on the screen, along with an indicator "⚠".

In the test mode, the three different POE power supply standards of IEEE 802.3af, IEEE 802.3at, and IEEE 802.3bt of the POE switch cannot be recognized. If you need to know the specific power supply standard of the POE switch, you can test the switch in the POE mode.
(For details, please refer to the Section 7 "Functions in PoE Mode" in this User Manual)

6.1.2.8 Voltages detected

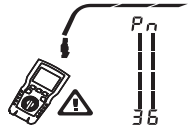


Figure 6.9 The voltage of the cable pair is detected

As shown in Figure 6.9, voltage is detected by the Tester.
When the cable under test is energized and the voltage is greater than or equal to 15V, a fault/high-voltage warning symbol " ⚠ " will be displayed, and at the same time, the Pn symbol (P positive pole, n negative pole) will be shown above pair of energized cable.

6.1.2.9 Viewing individual results of cable tests

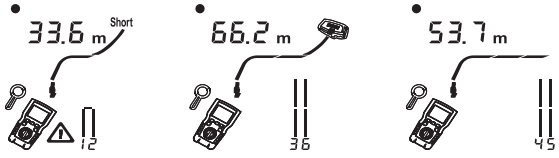


Figure 6.10 Individual result of wire pair

Figure 6.10 shows that the Tester views the individual results of each wire pair. Use ▲ or ▲ to move through screens to view the individual results of each wire pair. In this mode, the Tester continuously tests only the wire pair you are viewing.

a: Short on pair 1, 2 at 33.6 meters. (On the individual result screen, only shorts between wires in a pair are displayed; when there is a short, the far-end adapter and the wiremap of the unshorted wires are not displayed.
b: Pair 3, 6 is 66.2 meters long and are connected to the end of the wiremap adapter.
c: Open on pair 4, 5 at 53.7 meters. The open could be on one or both wires.

6.1.2.10 Connecting to telephone networks wired in star topologies

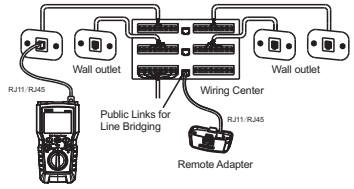


Figure 6.11 Connecting to a telephone network wired in a star topology

Figure 6.11 shows that telephone cables connected in a star topology are joined together at the bridge tap in the distribution center. The bridge tap connects each cable to all other cables with the same number. The Tester will detect the bridge tap and measure the distance to the bridge tap. To measure the length of each cable connected to the bridge tap, the wiremap adapter must be connected to bridge tap, and the Tester must be connected to the wall outlet. The Tester cannot measure lengths past the bridge tap because reflections from the bridge tap connections can interfere with measurements. If the Tester is connected to the bridge tap, it can only measure the length before the bridge tap, that is, the length of the patch cord. (Do not use multiple far-end adapters in star or bus topologies, otherwise it will cause incorrect wiremap results.)

6.1.2.11 Connecting to telephone networks wired in bus topologies

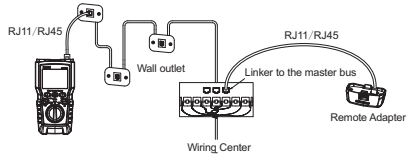


Figure 6.12 Connecting to a telephone network wired in a bus topology

Telephone cables wired in a bus topology are connected in series to wall outlets, and the length from the last outlet to the wiremap adapter is measured in this topology.
If connected to a middle outlet in series, the Tester will report the line bridging information. The length reported by the Tester is the distance from the Tester to the outlet, that is, the length of the patch cord. The Tester cannot measure the length beyond the outlet because the emissions from the cables on both sides of the outlet would interfere with the measurement.

6.2 Tests the crimping of RJ45 connector

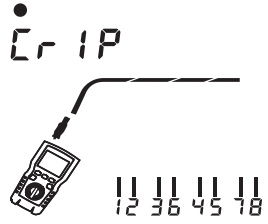


Figure 6.13 Connects to RJ45 connector

(1) Start the tester, set the mode selection knob to the TEST mode, and press the "PORT" key to switch to the crimping test port. The interface is shown in Figure 6.13, with the test indicator " Cr 1P" displayed in the upper left corner and the wiremap diagram flashing below.
(2) Insert the crimped RJ45 connector into the RJ45 socket of the crimping test port. The crimping status of RJ45 connector will be displayed for about 1 second.

- **6.2.1 Well-crimped RJ45 connector detected**

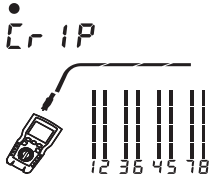


Figure 6.14 Connects to well-crimped RJ45 connector

As shown in Figure 6.14, it is the display interface of the RJ45 connector with good crimping detected. The test indicator in the upper left corner flashes, and the 1-2-3-6, 4-5, and 7-8 pairs respectively indicate good crimping.

- **6.2.2 Poorly-crimped RJ45 connector detected**

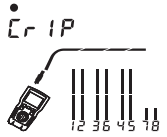


Figure 6.15 Connects to poorly-crimped RJ45 connector

As shown in Figure 6.15, lines 1, 2, 3, 6, 4 and 5 indicate good crimping, while lines 7 and 8 indicate poor crimping.

7. Functions in PoE Mode

PoE bt

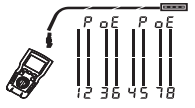


Figure 7.1 POE display

As shown in Figure 7.1, start the Tester, select the POE mode with the mode selection knob, and the POE symbol will appear on the display screen.
Identify and display af/at/bt. As shown in the figure, the Tester is connected to the equipment powered by the IEEE 802.3bt standard. In POE mode, the Tester checks whether there is a POE power supply on pairs 1,2-3,6 and 4,5-7 and 8. The Tester can activate the POE signal source and will not be damaged by the POE power supply.
If a POE power supply is detected, "POE" will appear above the live wire pair and flash as the POE power source is turned on and off.
The detector can detect whether the connected device is powered by POE and can identify three different POE power supply standards: IEEE 802.3af, IEEE 802.3at, and IEEE 802.3bt.
(IEEE 802.3af:CSMA/CD Access Methods and Physical Layer Specification - Data Terminal Equipment (DTE) Powered via Media-related Interface (MDI)
(IEEE 802.3at:CSMA/CD Access Methods and Physical Layer Specification - Enhanced Data Terminal Equipment (DTE) Powered by Media-related Interface (MDI))
(IEEE 802.3bt: Physical Layer and Management Parameters of POE over 4-wire Pairs)

8.Functions in Cable Tracing Mode

8.1 Displays in cable tracing mode



a: Display in cable tracing mode (default)

b: Port flashing function enabled

C: Port flashing function enabled (connected to the switch)

Figure 8.1 Displays in cable tracing mode

(1) Start the Tester, and select the cable tracing mode "SCAN" through the mode selection knob. Under the cable tracing mode, the Fester will display by default as shown in Figure 8.1 (a).

(2) Port flashing function enabled: In cable tracing mode, briefly pressing the button ▼ can enable/disable the port flashing function. After enabling the port flashing function, the Tester displays as shown in Figure 8.1 (b).

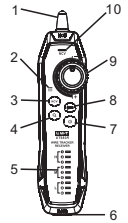
(3) If connected to a working switch, the Tester will flash ⊏ o ⊐ along with the light at the switch port, as shown in Figure 8.1 (c).

The detector can send a 125KHZ digital modulated signal with a signal strength of 10VPP and can be used in conjunction with the UT683R receiver to achieve cable tracing function. (Only the UT685A KIT is used in conjunction with the UT683R receiver instructions. For the receiver's features and functional operations, please refer to the next page.)

8.2 UT683R Receiver (Only the UT685A KIT comes with UT683R)

● 8.2.1 Features of UT683R

UT683R Receiver can be used in conjunction with UT685A Tester to perform cable tracing function on twisted-pair cables. By adjusting the sensitivity, functions such as cable locating and isolating can be achieved.



1	Antenna	6	RJ45 socket
2	Charging status indicator	7	Power button
3	NCV button	8	Flashlight button
4	Cable tracing button	9	Sensitivity knob
5	Wiremap indicator	10	NCV indicator

● 8.2.2 Cable tracing function of UT683R Receiver

8.2.2.1 Twisted-pair cable tracing function

1. Connect the UT685A Tester o the circuit.
2. Set the UT685A tester to SCAN mode. Press the port selection key to choose the length/cable sequence/cable detection/POE test port. In cable tracing mode, short press ▼ to activate the port flashing function. If the cable under test is connected to a working switch, the symbol ⊏ o ⊐ on the UT685A display screen will flash synchronously with the flashing frequency of the switch network port indicator light.
3. Adjust the knob of UT683R Receiver to change the sensitivity. When you hear a "beep ~ beep ~ beep" prompt sound, it indicates that the cable under test has been located.

8.2.2.2 Cable tracing diagram of UT683R Receiver

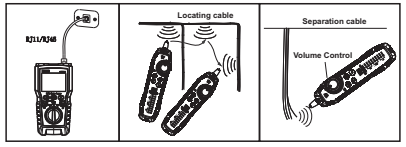


Figure 8.2 Cable tracing diagram of UT683R

When the target cable is mixed with a large number of cables, the sensitivity knob on the receiver can be turned to control the sensitivity of the receiver. A loud sound indicates that the received signal is strong and close to the target cable, thereby precisely locating the target cable.

8.2.2.3 Other functions of UT683R

1. NCV function: Press the "NCV" key on the receiver to activate the NCV function. When the target cable or outlet carries an AC power greater than 40V, the receiver emits a beep ~ beep beep beep, and the "NCV" indicator light flashes synchronously.
2. Flashlight function: Press the flashlight button on the receiver to activate the flashlight function independently.
3. Low battery indication function: When the battery power drops below 3.4V, the power button will flash. When the battery power drops below 3.0V, forced shutdown will be performed and the user needs to charge it before it can be used again.
4. Headphone function: When testing in a noisy environment, set the receiver's sensitivity to the minimum, then plug in the headphones and adjust the sensitivity to a position suitable for the volume. W earing headphones while operating can avoid external interference.

(Note: This product does not come with headphones.)

9. Calibrating Length Measurements (supported only in TEST mode)

9.1 Setting the NVP to a specified value

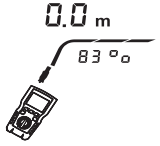


Figure 9.1. NVP value setting interface

Set NVP to the specified value, as shown in Figure 9.1:

(1) Press PORT , ▲ and ⏻ to simultaneously to enter the NVP value setting mode.

(2) Press ▲ and ▼ to set the NVP value.

(3) Save the settings and exit the NVP mode, then turn off the Tester and restart it.

The Tester calculates the length using an NVP value and the signal delay through the cable. The default NVP value of the Tester is usually accurate enough to verify the length, but in the actual measurement process, the accuracy of the length measurement can be improved by adjusting the NVP value to the specified or actual value.

Note: The Chinese definition of NVP (Nominal Velocity of Propagation) means rated propagation rate. 69% mainly refers to the ratio of the speed of electrons in the cable to the speed of light. For instance, if the speed of light is approximately 0.3m/ns and the transmission speed of electrons in the cable is about 0.2m/ns, then NVP is the ratio of these two values: electron speed/speed of light. However, this value was calculated by the manufacturer during cable testing. Different cables have different NVP values, but the NVP of utp (unshielded twisted pair) is basically 69%. Except for those with special settings that need to be set in the DSP, it is a key value for calculating the length.

9.2 Determining the actual NVP of a cable



Figure 9.2 Determining the actual NVP value of the cable

(1) Press PORT , ▲ and ⏻ to simultaneously to enter the NVP value setting mode.

(2) Connect the cable to be tested of known length to the port of the Tester.

(3) Press ▲ and ▼ to set the NVP value until the measured length is the same as the actual length of the cable.

(4) To save the settings and exit the NVP mode, please turn off the Tester and restart it.

Determination of cable NVP: The actual NVP value of the cable can be determined by adjusting the measured length to the known length of the cable.

10. Turn on/off the backlight

Long press the button ft/m for 1 second in power-on state to turn the backlight on or off.

11. Change the units of length

Short press the button ft/m in power-on state to switch the units between ft and m.

12. Auto-off

If no buttons are pressed or there is no change in the interface of the Tester, the Tester will power off after 10 minutes (60 minutes in the cable tracing state).

13. Other functions

13.1 Low battery indication

When the battery power indicator appears on the display screen of the Tester, please replace the battery of the Tester in time. Before replacing the battery, please turn off the Tester and disconnect all test leads.

13.2 Troubleshooting

(1) The Tester fails to start up normally: Replace the battery of the Tester.
(2) Inaccurate measurement of length value: Check the NVP value and adjust the NVP value correctly with a line of known length.
(3) The display interface remains unchanged and the buttons do not respond: Shut down and restart the Tester.

13.3 Other specifications

(1) Performance specifications

Types	Descriptions
Display screen	2.8-inch LCD digital screen
Cable types tested	Twisted-pair cables: UTP (Unshielded cable), FTP (aluminum foil shielded cable), SSTP (Double-shielded network cable).
Length test	Range: 300 m
	Resolution: 0.5 m
	Typical accuracy: <20m: ±1.6m, 20~100m: ±2.4m, >100m: ±4%. NVP uncertainty is an additional error.
	Calibration: User-settable NVP for twisted-pair cable. Use a cable of known length to determine the actual NVP value.
Wiremap test	Detects single-wire faults, shorts, miswires, split pairs, and up to seven far-end adapter IDs. Draw the line length to the fault point in scale to visually represent the approximate location of the fault.
Port detection	Detects whether it is connected to the Ethernet port
POE detection	Detects whether it is a POE-powered device and be able to identify what standard it is (802.3AF, 802.3AT, 802.3BT).
Cable tracing function	Send a 125KHZ digital modulated signal with a signal strength of 10VPP
Crimping detection	Detects whether the crimping of RJ45 connector is good, and the result will be displayed in about 1 second.
Voltage detection	Detects whether there is a voltage greater than or equal to 15V on the tested cable.

Port flashing	The port flashing function can be enabled in the cable tracing state.
Input protection	70VDC
Power supply	1.5V, AA battery x 3
	About 3.7V: Low battery indication
	About 3.3V: Forced shutdown (The port flashing function shuts down at about 3.6V)

(2) General specifications

Operating temperature	0~45℃
Storage temperature	-20~60℃
Operating humidity	20~75% RH (N.C)
Storage humidity	10~90% RH (N.C)
Operating altitude	≤2000 meters
Safety standards	CE, EN 61326-1:2013 / EN61326-2-2:2013
Dimensions of TDR Cable Tester	181mm*80mm*39mm
Dimensions of Receiver	197mm*48mm*34mm
Weight of TDR Cable Tester (unit only)	About 360g
Weight of Receiver (unit only)	About 127g

14. Maintenance and Repair

1. Solvents or corrosive cleaning agents can damage the display screen or the casing. Therefore, when cleaning the Tester, it is recommended to wipe the display screen with a soft cloth and glass cleaner, and wipe the casing with a soft cloth dampened with a small amount of water or soap solution. Try to avoid the Tester getting damp.
2. Do not open the casing. There are no user-replaceable components inside the Tester. If you open the casing to replace the components, the warranty of the Tester will be invalid and it may also damage the safety functions of the Tester.
3. When users replace the components of the Tester, they should only use the designated replacement parts.

WARNING: Cancer and reproductive harm-See www.P65Warnings.ca.gov for more information
http://www.uni-trend.com
The contents of this manual are subject to change without notice