UNI-T®

UT622 Series Handheld LCR Meters User Manual

P/N:XXXXXXXXXXXX

Preface

Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the device, for future reference.

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Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this device.

Notices
Thank you for purchasing this brand new product. In order to use this product safely and correctly, please read this manual thoroughly, especially the safety notes.

After reading this manual, it is recommended to keep the manual at an easily accessible place, preferably close to the product, for future reference.

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Document Version
UT622 series-20200229-V1.00

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c) Any repair on damage or malfunction caused by the use of a power source which does not conform to the requirements of this manual.

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Safety Overview
This product is designed and manufactured according to the IEC/EN61010-1:2010 safety requirements for electronic measuring instruments, and EN61326-2-1:2013, EN61326-2-2:2013 electromagnetic compatibility standards. Please understand the following safety preventative measures, to avoid personal injury, and to prevent damage to the product or any connected devices. To avoid possible dangers, be sure to use this product in accordance with the regulations.

Avoid fire and personal injury:
- Use the correct power cord: Only use the dedicated power cord approved by the country for this product.
- Check all terminal ratings: To avoid fire and the large current charge, please check all the ratings and marks on the product. Please consult this manual for details on the ratings before connecting the product.

- Do not start the product when the outer cover or front panel is open.
- Avoid circuit exposure: Do not touch exposed connectors or components after power on.
- Do not operate if the product is suspected of malfunction, and please contact UNI-T authorized service personnel for inspection. Any maintenance, adjustment, or replacement of parts must be performed by UNI-T authorized maintenance personnel.
- The maintenance and service must be implemented by qualified professionals.
- Do not operate the product in wet, flammable, or explosive environments.
- Please keep the product clean and dry.

Safety Terms and Symbols

The following terms may appear in this manual:
Warning: Indicates conditions and actions that may endanger life.
Caution: Indicates conditions and actions that may cause damage to the product and other property.

The following terms may appear on the product:
Danger: Performing this operation may cause immediate damage to the operator.
Warning: Performing this operation may cause potential damage to the operator.
Caution: Performing this operation may cause damage to the product or other connected devices.

The following symbols may appear on the product:


Safety warning, reminding users to operate according to relevant operating procedures in the manual


USB communication (virtual serial port) and charging interface

Preface

This manual introduces information about the operation of UT622 series handheld

LCR meters. It includes the following chapters:

Introduction of UT622 Series Handheld LCR Meters

UT622 series handheld LCR meters are used to measure inductance, capacitance, and resistance. They are powered by a 3.7V 1800mAh lithium polymer battery or external power adapter, which provides great convenience for mobile measurement and handheld measurement occasions. The operation of these meters is simple and intuitive, featuring immediate selection of test frequency, parameter, and speed, tolerance mode for component sorting, recording mode to assist in obtaining readings, easy-to-operate clear function (open/short circuit) to improve measurement accuracy, and utility menu to set touch tone, auto power off, etc.

UT622 series includes: UT622A, UT622C, and UT622E

Key features:

- Compact size
- 2.8-inch TFT LCD display
- Up to 100 kHz test frequency
- 0.1V/0.3V/1V test level
- 5-digit readings
- Up to 0.1% measurement accuracy
- With DCR function (UT622E only)
- Maximum test speed: 20 times/s
- Constant 100Ω signal source impedance
- Audible/Visual alarm and counting function for tolerance
- Recording and statistics function
- Manual/Auto trigger mode
- Automatically determines component type and selects appropriate measurement parameters

Table of Contents

Chapter 1Getting Started Guide

This chapter introduces the precautions for first use.

1.1 General Inspection

It is recommended to check your LCR meter according to the following steps before first use.

(1) Check the Shipping Container for Damage

If the packaging carton or foam plastic cushions are severely damaged, please contact your seller immediately.

(2) Check the Accessories

For the details of the accessories provided, please refer to “Appendix A”. If any of the accessories is missing or damaged, please contact your seller immediately.

(3) Check the Meter

If the meter appears to be damaged, works abnormally, or fails the performance test, please contact your seller. If the meter is damaged due to shipping, please keep the packaging material and notify both the transportation department and your seller. UNI-T will arrange maintenance or replacement.

1.2 Panel Introduction

The schematic diagram of UT622 series panel is shown in Figure 1-1.

Figure 1-1 Panel

Caution: The meter can use a standard USB power adapter that meets the specifications. The output voltage is DC 5V ± 0.25V, and the output current is above 1A.
Caution: A standard Mini-USB cable with excellent performance is required for charging and communication of the meter. If it is connected to a USB port of a PC, the load current of the port should be no less than 500mA.

Note: After the external power source supplies normally, the internal battery supply circuit will be cut off automatically; the external power source will charge the battery at the same time. UT622 series has an independent charging management function. Even in the shutdown state, the charging control continues normally.

Warning: Before connecting the external power source, please make sure the battery is installed correctly. If the battery polarity is reversed and the external power source is connected, the meter may be seriously damaged!

1.3 Button Functions

The panel buttons (excluding the power button) are divided into two categories according to the color of the silk screen:
White - First operation function, response after short press
Yellow - Second operation function, response after long press (for 1s)

Note: In the button operation instructions, if there is no ambiguity, the *button name* is used to indicate the button operation, and long or short press is no longer prompted, such as pressing the *UTIL* button; some situations may also be described by long press.

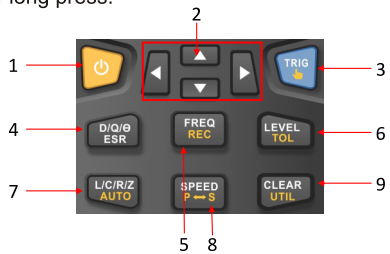

Figure 1-2 Buttons

No.	Button	Description
1	⏻	Power button: Turn the meter on by long press and off by short press.
2	▲▼◀▶	Arrow buttons: Backlight (up and down) and range (left and right) shortcut operation; menu operation
3	TRIG	Trigger/Trigger mode
4	D/Q/Θ/ESR	Secondary parameter selection
5	FREQ/REC	Frequency switching and recording mode
6	LEVEL/TOL	Test level switching and tolerance mode
7	L/C/R/Z /AUTO	Primary parameter selection and automatic identification of primary parameter
8	SPEED/P◀▶S	Test speed and equivalent mode switching
9	CLEAR/UTIL	Clear and utility menu

1.4 LCD Display

UT622 series adopts a 2.8-inch TFT LCD display, of which the main layout is shown in Figure 1-3:

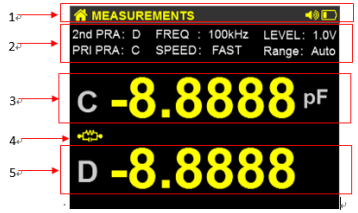

Figure 1-3 TFT color display

1. Label and status bar: Contains label prompt page and setting status icons
2. Parameters setting area: Displays the set parameters
3. Primary display area: Displays the primary parameter L/C/R/Z test data
4. Equivalent mode: Displays the current equivalent mode (series/parallel)
5. Secondary display area: Displays the secondary parameter D/Q/Θ/ESR test data

Description of status bar icons:

- Manual trigger, single mode
- Prompt tone for button operation
- Tolerance alarm
- Auto power off
- Remote communication
- Auto identification
- Key lock identification

1.5 Test Ports

UT622 series supports three-terminal simple test, five-terminal end-face test, and Kelvin test lead expansion, as shown in Figure 1-4.

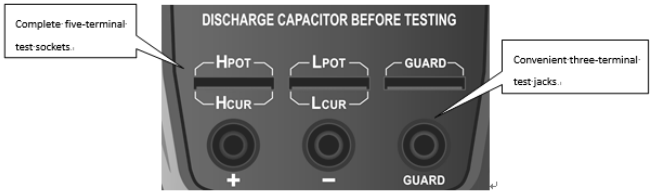

Figure 1-4 Test ports

The three-terminal test jacks of the meter are standard rubber jacks, which are compatible with alligator clip test leads, and convenient for low-frequency and low-precision measurement applications.

UT622 series is also equipped with five-terminal test sockets. With a special test fixture, complete five-terminal measurement of the extension lead can be realized to guarantee measurement accuracy.

1.6 Power Supply

The meter is powered in two ways: lithium polymer battery and external power adapter. The meter can automatically switch between the two ways for uninterrupted power supply, based on the principle of external power priority.

(1) Install the Battery

Use the following procedures to install the battery:

1. Open the battery cover. Loosen the screw (inside the blue circle) with a suitable screwdriver, and lift the tilt stand to remove the battery cover along with the stand, as shown in Figure 1-5.
2. Insert the battery. Make sure the battery contact chip matches the battery chip holder.
3. Close the battery cover. Place the battery cover and tilt stand back in the original position and tighten the screw.

Figure 1-5 Rear cover

Note: No need to separate the tilt stand and battery cover.
Caution: Only replace with lithium batteries of the same specifications; do not use unprotected battery packs; do not use other types of batteries such as alkaline or NiMH batteries.

Spare battery connector:
The battery compartment contains a spare battery socket, which can be used for a 3.7V lithium polymer battery pack with a wire plug. The size and polarity must be confirmed, and it is not recommended.

(2) Connect the External Power Source

A standard Mini-USB cable can be used to connect the meter with a USB power adapter for power supply and charging, or with a USB port of a PC for charging and communication.

Caution: Please use a certified USB power adapter with an output voltage of 5V ± 0.25V and an output current of >1A. Before use, make sure the power supply conditions are consistent with the adapter parameters.

Caution: Make sure the Mini-USB cable supports 1A current and the load current of the USB port is no less than 500mA.

Connection method:

1. Make sure the battery is installed correctly (no battery does not affect the use of external power source).
2. Make sure the Mini-USB cable (charging/communication line) meets the specifications.
3. Make sure the power adapter or USB port meets the specifications.
4. Connect the adapter to the power socket (if used). Connect the meter to the USB port.

Figure 1–6 Connect the external power source

Note: When the external power source is connected and supplies normally, the meter automatically switches to the external power supply mode. At the same time, the charging manager is activated, regardless of whether the meter has been turned on.
Note: For communication with the PC, please refer to “Remote Control”.

(3) Battery Level and Charging Indication

When the external power source is connected, the battery is automatically charged until full capacity.

External power source connected

Battery level indicator

Light blue display: Battery powered

Green display: In charging

Red display: Low battery. Please charge the meter as soon as possible.

Full display: Full capacity

Note: Whether or not the external power source is connected, the battery level indicator reflects the battery level in real time. However, the battery is in the state of weak load after being connected to the external power source, so it is normal for the level display to show some virtual power.

Note: If the meter automatically powers off due to low battery, it may take a few minutes to charge for normal startup.

Caution: Removing the charging cable in charging may cause shutdown protection. But it will not affect restart use.

(4) Backlight Function

The TFT LCD needs to work under backlight to make the displayed information visible.

Backlight brightness can be set in the utility menu (maximum brightness level:10). Under the measurement page, the real-time brightness can be dynamically adjusted in the maximum brightness range by pressing the ▲ or ▼ button. Real-time brightness adjustment will not be saved.

(5) Keylock Function

To lock the keyboad, you could press the button ▼ 2 seconds at measurement page, SCPI order set work normal with keylock.

The keylock icon will be displayed in the status bar when the keylock function is turned on.

In the keylock state, short press the power key to unlock, and the keylock mark disappears

Chapter 2 Operation Guide

This chapter describes the operation of UT622 series LCR meters in detail.

2.1 Measurement Settings

(1) Trigger Mode

UT622 series supports single trigger measurement and continuous trigger measurement, which can be switched by long pressing the **TRIG** button. The meter defaults to continuous trigger. Will be displayed for single trigger.

Single trigger: Press the **TRIG** button to measure once, or use the trigger command to trigger measurement once through the PC.

Continuous trigger: Use the set test speed (Fast, Med or Slow) for measurement. The **TRIG** button and trigger command are ignored.

(2) Primary Parameter (L/C/R/Z) Selection

Press the **L/C/R/Z** button to switch between the following primary parameters in sequence:

L (inductance), C (capacitance), R (resistance), Z (impedance), and DCR (direct current resistance, UT622E only)

Note: When the primary parameter is changed, the secondary parameter and the equivalent mode will be automatically switched to the default.

(3) Secondary Parameter (D/Q/Θ/ESR) Selection

Press the **D/Q/Θ/ESR** button to switch between the following secondary parameters in sequence:

D (dissipation factor), Q (quality factor), Θ (phase angle - degree), Θ (phase angle - radian), and ESR (equivalent series resistance)

(4) Test Frequency

Different test frequencies may result in different measurement results when using LCR meters. Therefore, the appropriate frequency should be selected before measurement.

Press the FREQ button to switch between the following test frequencies:

UT622A: 100Hz, 120Hz, 1kHz, and 10kHz

UT622C/E: 100Hz, 120Hz, 1kHz, 10kHz, and 100kHz

Note: Frequency selection is invalid under DCR function.

(5) Test Level

The test level is the effective value of the output amplitude of the AC test signal.

Press the **LEVEL** button to switch between the following test levels:
1.0Vrms, 0.3Vrms, and 0.1Vrms
Note: Level selection is invalid under DCR function.

UT622E has a DCR measurement function, which is tested using a fixed 1V DC signal source.

(6) Test Speed

Press the SPEED button to switch between the following test speeds:
Fast (20 times/s), Med (5 times/s), and Slow (2 times/s)

(7) Equivalent Mode (Parallel/Series)

UT622 series can display parallel ( ) or series ( ) mode data for all ranges. In general, for low-impedance components (<100Ω), series mode should be selected; for high-impedance components (>10kΩ), parallel mode should be selected; for in-between components, the equivalent mode (parallel or series) has little influence on the measurement results.

Press the P↔S button to switch between the parallel and series mode.

When the primary parameter is L/R, series mode is the default setting; when the primary parameter is C/Z, parallel mode is the default setting.

(8) Auto Identification

Press the **AUTO** button to automatically identify the appropriate measurement required for the device-under-test (DUT). The icon will be displayed while the LCR meter identifies the DUT, and – selects an appropriate primary parameter and corresponding secondary parameter, and – selects the appropriate equivalent mode (series or parallel).

In Auto mode, the secondary parameters correspond to the primary parameters as follows:

Table 2-1 Correspondence between primary parameters and secondary parameters

Primary parameter	Secondary parameter
C	D
L	Q
R	X
Z	Θ (RAD)

In Auto mode, the equivalent mode is selected according to the impedance (parallel mode for high impedance, and series mode for low impedance).

Change the primary parameter, secondary parameter, or equivalent mode to exit the auto mode, and the icon will disappear.

Note: The range can be locked in auto mode, and the frequency/level/speed can be switched normally.

2.2 Tolerance Mode

Tolerance mode can be used for component sorting. In tolerance mode, the meter can display the percentage deviation between the measured value of the primary parameter and the set nominal value, make a comparison according to the deviation tolerance, display the GO/NG discrimination result, and give an audible /visual alarm.

In tolerance mode, the secondary parameter will be ignored and not displayed.

In CONFIGS (System Settings) – TOL (Tolerance) Setting, the nominal value, tolerance value, alarm, alarm sound, alarm LED, and counter can be set. For details, please refer to "CONFIGS (System Settings)".

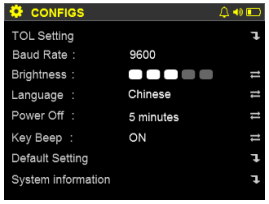

Figure 2-2 System settings

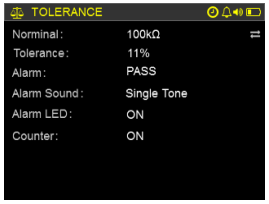

Figure 2-3 Tolerance setting

To use the tolerance mode:

1. Press the **L/C/R/Z** button to select an appropriate primary parameter.
2. Select an appropriate test frequency, test level and equivalent mode.
3. Perform the clear operation as needed.
4. Test the DUT and confirm if the measured value is correct. Users can lock the range after the correct measurement is obtained, or keep auto range in use.
5. View or set the nominal value, tolerance value, etc.
6. Under the measurement page, press the **TOL** button to enter the tolerance mode.

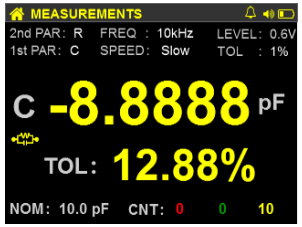

Figure 2-4 Tolerance mode

TOL (percentage) = 100 * (Mx - Nom)/Nom %

Where Mx: measured value

Nom: nominal value

In tolerance display mode, NOM displays the current nominal value, and CNT is the count values, displaying the pass count, fail count, and total count.

Caution: In tolerance mode, FREQ , LEVEL , and CLEAR are not available.

Note: In tolerance mode, the speed and equivalent mode can be selected. Press the TOL, L/C/R/Z, or DQΘ button to exit the tolerance mode.

2.3 Recording Mode

Recording mode can be used for data statistics. In recording mode, the average value (AVG), maximum value (Max) and minimum value (Min) of the primary parameter and the number of recordings (Num) can be obtained dynamically within a certain range.

No options need to be set for the recording function.

In recording mode, the secondary parameter will be ignored and not displayed.

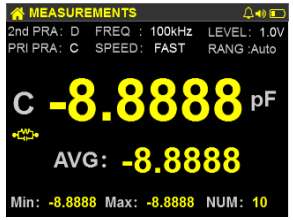

Figure 2-5 Recording mode

There are differences between the single and continuous measurement modes for obtaining valid data records:

- During single measurement, any trigger measurement is recorded and this method is recommended.
- During continuous measurement, the value recognized as being close to the open or short circuit state is an invalid value. A stable measurement result is only recorded as valid data once.

Caution: During continuous measurement, the discriminability of the meter for a valid measurement may be disturbed.

Note: Before entering the recording mode, it is better to do open circuit and short circuit clearing to improve the recognition ability.

When the meter is not in tolerance or recording mode, press the **REC** button to enter the data recording mode.

In recording mode, when the data is effectively recorded once, the number is increased by 1, and the buzzer beeps once.

In recording mode, press the **CLEAR** button to clear the record.

Caution: In recording mode, **FREQ , LEVEL** , and **P↔S** are not available.
Note: In recording mode, the speed and trigger mode can be selected.

Press the **REC, L/C/R/Z**, or **DQΘ** button to exit the recording mode.

2.4 Quick Clear

Zero clearing includes two functions: open circuit clearing and short circuit clearing. Open circuit clearing can reduce the influence of distributed capacitance and distributed resistance between test leads on measuring high-impedance components; short circuit clearing can reduce the influence of contact resistance and test leads resistance on measuring low-impedance components.

Press the **CLEAR** button to enable zero clearing. The primary display area displays **CORR** (clearing correction), and the meter automatically judges to perform open circuit clearing or short circuit clearing by measurement.

Note: If zero clearing is not required, press any function button to exit.

(1) Open Circuit Clearing

Select the desired test frequency, keep the test clip or test socket open, and press the **CLEAR** button. After automatic measurement and judgment of the meter, the primary display area displays CORR**,** and the secondary display area displays OPEN. At this time, press the **CLEAR** button again to perform open circuit clearing.

Note: If the secondary display area displays "----", it indicates that the test terminal is not in the open state, and the open circuit clearing cannot be performed.

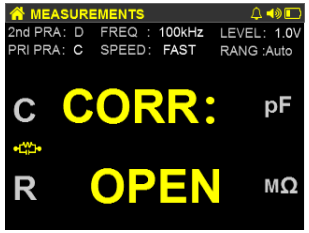

Figure 2-6 Open circuit clearing

(2) Short Circuit Clearing

Select the desired test frequency, insert a short-circuit piece (such as a SMD test clamp or test clip) in the test socket, short-circuit the test terminal with the short-circuit piece, and press the **CLEAR** button. After automatic measurement and judgment of the meter, the primary display area displays CORR, and the secondary display area displays SHORT. At this time, press the **CLEAR** button again to perform short circuit clearing.

Note: If the secondary display area displays "----", it indicates that the test terminal is not in the short circuit state, and the short circuit clearing cannot be performed.

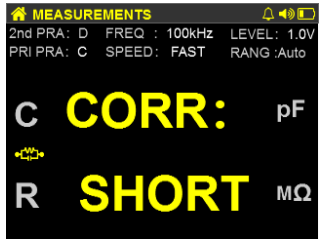

Figure 2-7 Short circuit clearing

(3) Quick Guide for Zero Clearing

To perform open/short circuit clearing:
1. Select the primary and secondary parameters to be measured.
2. Select the test frequency and level.
3. Select the equivalent mode.
4. Keep the test terminal open and perform open circuit clearing.
5. Short-circuit the test terminal and perform short circuit clearing.
6. Connect the DUT to start measurement after zero clearing.

Caution:
1. The meter does not support sweep frequency clearing. The clearing data is automatically saved at regular time and still valid next time. If the measurement data is found to be obviously incorrect, try to clear again.
2. Zero clearing is not related to the type of test parameter and the equivalent mode.
3. After continuous use for some time,
4. After continuous use for some time, zero clearing may be needed again to meet the accuracy requirements, due to the influence of temperature environment or changes in fixtures, test leads, and contact resistance.

2.5 Range Hold/Auto

Under the measurement page, press the ◀ or ▶ button to switch between Hold and Auto (default).

When products of the same specifications are measured in batches, better measurement efficiency can be obtained by holding range, and better measurement effect can be obtained in tolerance mode and recording mode.

Note: Hold the range on the condition that the correct value is measured.

2.6 Utility Configurations

The meter has a built-in utility menu that can be used for system settings and tolerance settings. Press the UTIL button to enter the system settings, press the ▲ and ▼ buttons to select the setting item, and press the ◀ and ▶ buttons to change the item.

The icon on the right side of the setting item shows the operation function:

⇄ Press the ◀ and ▶ buttons to change or confirm the content of the setting item.

↴ Press the ▶ button to enter the submenu.

Exception: When setting the nominal value, press the ▲ button to change the data bit to be set, and press the TRIG button to get the measured data at the current test terminal.

(1) CONFIGS (System Settings)

The CONFIGS include the following:

Setting item	Function	Option
TOL Setting	To enter submenu	See “Tolerance Settings” for details
Baud Rate	To select baud rate	9600/19200/38400
Brightness	To set maximum brightness level	Level 1~10
Language	To set language	Chinese/English
Power Off	Auto power off	OFF/5min/15min/30min/60min
Key Beep	Prompt tone for button operation	ON/OFF
Default Setting	To enter submenu to select	Yes (All measurement parameters, system settings, tolerance settings, and clearing data are all cleared)/No
System Infor.	To enter submenu to view	

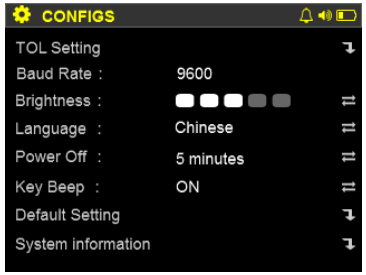

Figure 2-8 CONFIGS

(2) Baud Rate Setting

The meter can be connected to a PC through the Mini-USB cable. When establishing communication, the baud rate of the PC should be set consistent with that of the meter. When the meter receives any command from the PC, ⇢ will be displayed.

Three baud rates can be selected: 9600 (default), 19200, 38400

(3) Backlight Brightness Setting

The maximum brightness level (default: Level 5) can be set. Under the measurement page, the real-time brightness can be dynamically adjusted in the maximum brightness range by pressing the ▲ or ▼ button. Real-time brightness adjustment will not be saved.

(4) Language Setting

The language can be set to English or Chinese (default).

(5) Auto Power Off

Auto power off can be set to OFF/5min/15min/30min/60min (default: 15min). When auto power off is in effect, ◷ will be displayed. Once the set time is reached, the buzzer will continuously alarm to indicate the upcoming shutdown. If any operation occurs before auto power off, the timer will be reset to zero and re-timed.

Note: Auto power off is only effective for battery power supply.

(6) Touch Tone Setting

Touch tone can be turned on or off (default: ON). When it is on, 🔊 will be displayed. If a button is pressed, there will be a touch tone for response.

Note: The setting is only valid for button response and does not affect the buzzer's prompt in other states.

(7) Factory Reset

To restore Factory settings, press the ▶ button to enter the submenu and select Yes.

Table 2–3 Factory settings

Setting item	Default
Primary parameter	C (capacitance)
Secondary parameter	D (dissipation factor)
Equivalent mode	PAL (parallel)
Auto identification	Off
Range	Auto
Test frequency	1 kHz
Test speed	Med (medium)
Test level	0.3V
Trigger mode	Continuous trigger
Tolerance/Recording mode	off
System settings	Restore to default settings
Tolerance settings	Restore to default settings
Clearing data	Clear

(8) System Information

Press the ▶ button to enter the submenu to view the system information, including model, serial number, version, etc.

(9) Exiting System Settings

In each submenu, press the UTIL button to exit and return to the system settings page. Under the system settings page, press the UTIL , L/C/R/Z , or DQΘ button to return to the measurement page.

(10) Tolerance Settings

Table 2–3 Tolerance settings

Setting item	Function	Option
Nominal	To get and edit nominal value	Corresponding to the nominal data of the current primary parameter
Tolerance	Percentage deviation tolerance	1%~20%
Alarm	Comparison result alarm	OFF/PASS/FAIL
Alarm Sound	Alarm sounding method	Single Short/Single Long/Dual Short
Alarm LED	LED light alarm	OFF/ON (green light: pass; red light: fail)
Counter	Pass count, fail count, and total count	OFF/ON

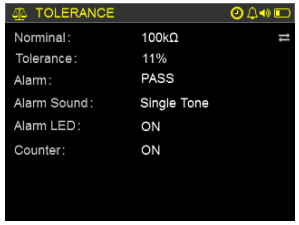

Figure 2-9 Tolerance settings

a. Setting the nominal value
The nominal value should be set first when using the comparator.
In the nominal value setting item, users can use the **TRIG** button to measure and get the current value in real time, use the button to change the data bit to be set, use the and buttons to modify the value of the data bit.

Note: Since the unit magnification of the nominal value cannot be modified, it should be measured and obtained first, and then fine-tuned.

To use the comparator, set the nominal value (default: 0) as follows:
1. Select the primary parameter.
2. Select the test frequency and level.
3. Select the test speed.
4. Perform open/short circuit clearing as needed.
5. Connect the standard sample of the tested product to the test terminal, and confirm the measured value is as expected.
6. Hold the range.
7. Press the **UTIL** button to enter the system settings, and press the ▶ button to enter the tolerance settings.
8. Press the **TRIG** button to get the measured value as the current nominal value.
9. Edit and modify the nominal value as required.

b. Setting the tolerance value
The tolerance value is used to set an acceptable range for comparison, expressed as a percentage deviation (range: 1%~20%; default: 5%)

c. Setting the alarm
The buzzer alarm can be used to prompt the comparison result.
OFF: No audible alarm
PASS: Alarms when the comparison result is pass
FAIL: Alarms when the comparison result is fail

Default: OFF

d.Setting the alarm sound
There are three options for the alarm sound.
Single Short: a short beep
Single Long: a long beep
Dual Short: two short beeps

Default: Single Short

e.Setting the alarm LED
The comparison result can also be indicated by LED light.
Green light: pass
Red light: fail
Set the Alarm LED to ON to use the LED light alarm.
Default: OFF

f.Using the comparison counter
In tolerance mode, the comparison result can be counted. The count result is displayed below the tolerance.
Green number: count value of passed components
Red number: count value of failed components
Yellow number: count value of total components
Default: OFF

Chapter 3 Quick Application Guide

Warning
- Do not measure charged capacitors otherwise the meter may be damaged.
- Please measure on-board devices under the condition of power off. Do not measure the active circuit directly.
- Accumulated dust often affects the use of the meter due to its certain conductivity. Clean the meter regularly to protect the test terminal and prevent dust from entering the meter.
- Do not place the meter directly in explosive, direct sunlight, or overheated environments.
- Before opening the rear cover, power off the meter, remove the test piece and test accessories, and unplug the external power adapter.

Note: To achieve appropriate measurement accuracy, refer to the “Quick Clear” section for open/short circuit clearing before measurement.

3.1 Inductance (L) Measurement

1. Long press the ⏻ button to turn on the meter.
2. Press the **FREQ** button to select a suitable test frequency.
3. Press the **L/C/R/Z** button to select inductance measurement; or alternatively long press the **AUTO** button to enable the auto identification function.
4. Insert an inductor into the test socket, or select a suitable test accessory (alligator clip test leads, test clips, or **SMD** test tweezers) to access the measured inductor.
5. Press the **DQθ/ESR** button to select a secondary parameter as required.
6. Read the displays.

3.2 Capacitance (C) Measurement

Warning: Make sure the capacitor is fully discharged before measurement.

1. Long press the ⏻ button to turn on the meter.
2. Press the **FREQ** button to select a suitable test frequency.
3. Press the **L/C/R/Z** button to select capacitance measurement; or alternatively long press the **AUTO** button to enable the auto identification function.
4. Insert a capacitor into the test socket, or select a suitable test accessory (alligator clip test leads, test clips, or **SMD** test tweezers) to access the measured capacitor.
5. Press the **DQΘ/ESR** button to select a secondary parameter as required.
6. Read the displays.

3.3 Resistance (R) Measurement

1. Long press the ⏻ button to turn on the meter.
2. Press the **FREQ** button to select a suitable test frequency.
3. Press the **L/C/R/Z** button to select resistance measurement; or alternatively long press the **AUTO** button to enable the auto identification function.
4. Insert a resistor into the test socket, or select a suitable test accessory (alligator clip test leads, test clips, or **SMD** test tweezers) to access the measured resistor.
5. Press the **DQΘ/ESR** button to select a secondary parameter as required.
6. Read the displays.

Note: The meter uses AC signals to measure resistance, so the test results reflect the AC resistance characteristics of the device, not the DC resistance.

3.4 Impedance (Z) Measurement

1. Long press the ⏻ button to turn on the meter.
2. Press the **FREQ** button to select a suitable test frequency.
3. Press the **L/C/R/Z** button to select impedance measurement; or alternatively long press the **AUTO** button to enable the auto identification function.
4. Insert a component (resistor, capacitor, or inductor) into the test socket, or select a suitable test accessory (alligator clip test leads, test clips, or **SMD** test tweezers) to access the measured component.
5. Press the **DQΘ/ESR** button to select a secondary parameter as required.
6. Read the displays.

Note: The three rubber jacks can be used for unshielded measurement at two terminals, which is suitable for low frequency and low impedance measurement.
Caution: If the reeds in the test sockets are not in good contact, the measurement at two terminals may not be conducted.

Figure 3-1 Component measurement

Chapter 4 Remote Communication

The meter can be connected to a PC through the Mini-USB cable. After the driver is installed on the PC, the PC can control the meter through the virtual serial port or collect test results.

Warning: Before connecting to the PC, please make sure the load current of the USB port on the PC is not less than 500mA.

4.1 Connecting the Meter to PC

Use the following procedures to connect the meter to a PC:

1. Download and install the CH340 virtual serial port driver online.
2. Connect the meter to the PC through the Mini-USB cable, and long press the ⏻ button to turn on the meter; if the USB power supply is insufficient or the communication cable load is weak, it is recommended to remove the battery.
3. Check the ports in PC Device Manager. If the driver is installed properly, the USB SERIAL CH340 port and the assigned serial number (COMx) can be seen in the list.
4. If the port can not be found, try to reinstall; or reconnect the meter and turn it on.
5. Open the control software and use the specified serial number to establish communication with the meter.

4.2 Virtual Serial Port Configuration

Serial communication parameters of the meter:

- Baud rate: 9600/19200/38400
- Data bit: 8
- Parity: None
- Stop bit: 1
- Flow control: None

After the USB driver is installed, if the related parameters of the serial port are inconsistent with the above, please modify:
Open the Device Manager → Ports → Corresponding serial port → Attributes → Port settings

After the communication is established, the meter displays  after receiving any command from the PC.

4.3 Command System Description

The meter uses the SCPI instruction set. Commands and data are transmitted in ASCII string + end mark NL format, following the general basic rules of SCPI instructions.

Note: NL (ASCII code: 10) must be added as the end mark after each command string.
Note: Command control and manual panel operation coexist, and the meter can be controlled simultaneously.

(1) Symbolic conventions

Common symbols and descriptions of SCPI command system:
Colon (:)---------- Represents the level of the command, indicating to enter the next level of the command.
Question mark (?) ----------Represents the execution status of the query command.
Semicolon (;)----------Indicates the start of multiple commands.
Asterisk (*)----------The command after an asterisk is a public command.
Comma (,) ----------A comma is used to separate multiple parameters.
Space A ----------space is a separator between a command and a parameter.
Note: The following symbols are only used for expression and not part of the command.

Angle brackets (<>) ----------The characters in angle brackets represent program code parameters.
Square brackets ([ ])----------The items in square brackets are optional.
Vertical separator (|)----------Separates options
Braces ({}) ----------When several items are included in braces, select one.
NR1---------- Integer, for example, 12
NR2 ----------Fixed-point number, for example, 12.3
NR3 ----------Floating-point number, for example, 2.000000e-03
NL---------- Stands for line break (ACSII code: 10), end mark of the string

(2) Command and Parameter Abbreviations

When the words (including multiple words) that make up a command or parameter are long, abbreviations can be used:
> If the number of characters in the command or parameter is less than or equal to 4, do not abbreviate.
For example, TYPE is abbreviated as TYPE.
> If the number of characters in the command or parameter is greater than 4, consider two cases:
1. If the fourth character is a vowel, the abbreviation takes the first three characters.
2. If the fourth character is not a vowel, the abbreviation takes the first 4 characters.
For example, FUNCtion is abbreviated as FUNC;
LEVel is abbreviated as LEV.
> If the command or parameter is composed of multiple words, take the first character of the first word and all of the last word to get a long format, and then follow the abbreviation rules above.
For example, the long format of Mass MEMory is MMEMory, and the abbreviation is MMEN.
> Other customized abbreviations, for example, primary parameter of impedance: IMPA

(3) Unit Magnification

When the command parameter sent to the meter is data, units and unit magnifications can be used. See the following table for the definitions and symbols of magnifications:

Definition	Symbol	If the meter uses
1E18 (EXA)	EX	X
1E15 (PETA)	PE	X
1E12 (TERA)	T	X
1E9 (GIGA)	G	X
1E6(MEGA)	MA*	√
1E3 (KILO)	K	√
1E-3 (MILI)	M	√
1E-6 (MICRO)	U	√
1E-9 (NANO)	N	√
1E-12 (PICO)	P	√
1E-15 (FEMTO)	F	X
1E-18 (ATTO)	A	X
* Note: Because the meter is not case sensitive in commands and parameters, it differs from the standard symbol definitions.		

For example, set the nominal value:
Command COMP: TOL: NOM 100m
The unit of its impedance parameter is determined by the current primary parameter

(4) Common Command

The common command is defined by IEEE488.2-1987 standard and is the most basic command in the command system of the meter. It can be used to form an instruction set with other instructions or to perform specific functions separately.

***TRG**
A trigger is generated, and the result data is returned immediately after the measurement is completed.
This common command is equivalent to the combination of TRIG+FETCH commands.

***IDN?**
Query the meter information
Return: [company information,] model, serial number, version number

***RST**
Reset measurement parameters of the meter, but not the system settings, tolerance settings and clearing data.
The reset page is on the primary measurement page, and the tolerance mode and recording mode are turned off.

***OPC?**
Check if the meter has completed the preceding command.
Return: 1
If it does not return, it needs to wait, or the meter is not properly connected.

***LLO**
Keylock, the meter lock the keyboad when receive the command. The keylock icon display in status area.
The command is igored if it's keylock status. Press power button 1 second to unlock the keyboard.

***GTL**
Unlock meter keyboard to return device operation.

(5) SCPI Command

The meter is a simple and easy-to-use LCR meter with basic LCR functions, which supports only a small portion of the SCPI command set for LCR instruments. It can meet general communication control and data collection requirements.

(5.1) TRIG (Trigger) Command
TRIGger [: IMMediate]
A trigger is generated (invalid in non-measurement page and continuous trigger state).

TRIGger: SOURce {AUTO | INTernal}
Set the trigger source to internal automatic (continuous trigger)

TRIGger: SOURce {MANual | BUS}
Set the trigger source to single

TRIGger: SOURce?
Query the current trigger source
Return: {AUTO | MAN}

(5.2) FETC (Reading) Command

FETCh?
Query the current measurement result.
1) If the measurement has been generated but not read, the data result will be returned immediately
2) If the measurement result has been read, and no new measurement has been taken when a single trigger is entered, or the page refresh is initialized, the data will not be returned until the new measurement is completed.

Return data format:

SN.NNNNNESNN	,	SN.NNNNNESNN	,	SN	NL
<DATA A>		<DATA B>		<Compare>	

Among them:
<DATA A> is the measurement data of primary parameter
<DATA B> is the measurement data of secondary parameter
The primary and secondary parameters use the 12-bit ASII code format (SN.NNNNNESNN, S: +/-, N: 0 to 9, E: Exponent Sign).
<Compare> outputs tolerance comparison result: 0 failed, 1 passed, N not compared

FETCh: AUTO {0 | OFF | 1 | ON}
Set measurement results to automatic return
ON or 1: Turn on automatic return and the result will be returned after each measurement.
OFF or 0: Turn off automatic return and FETCh? instruction is required to get data.

FETCh: AUTO?
Query the status of automatic return
Return: {OFF | ON}

(5.3) FUNC (Function) Command

FUNCtion: IMPA {L | C | R | Z | DCR}
Set the primary parameter to L, C, R, Z or DCR
The command setting is invalid in recording/tolerance mode.
DCR is only supported by some models

FUNCtion: IMPA?
Query the primary parameter
Return: {L | C | R | Z | DCR}

FUNCtion: IMPB {D | Q | X | DEG | RAD | ESR}
Set the secondary parameter to D, Q, X, Θ (Deg), Θ (Rad), ESR

FUNCtion: IMPB?
Query the secondary parameter
Return: {D | Q | X | Deg | Rad | ESR}

FUNCtion: RANGe {0 | 1 | 2 | 3 | 4}
Set the range number, respectively corresponding to 100kΩ/10kΩ/1kΩ/100Ω/10Ω range After setting, the range is held.

FUNCtion: RANGe?
Query the current range number
Return: {R0 | R1 | R2 | R3 | R4}
Respectively corresponding to 100kΩ/10kΩ/1kΩ/100Ω/10Ω range

FUNCtion: RANGe: AUTO {ON | 1 | OFF | 0}
Set the range to auto (ON or 1), lock (OFF or 0)

FUNCtion: RANGe: AUTO?
Query the range status
Return: {AUTO | HOLD}

FUNCtion: EQUivalent {SERies | PARallel}
Set the equivalent mode to series (SER) or parallel (PAR)
The setting is invalid in DCR mode.

FUNCtion: EQUivalent?
Query the equivalent mode
Return: {SER | PAR}

(5.4) FREQ (Frequency) Command
FREQuency <Frq>
Set the test frequency, <Frq> is the following value:
100, 100Hz: Set to 100Hz
120, 120Hz: Set to 120Hz
1000, 1kHz: Set to 1kHz
10000, 10kHz: Set to 10kHz
100000, 100kHz: Set to 100kHz
Different models support different frequencies
Frequency setting is invalid in DCR mode

FREQuency?
Query the test frequency
Return: {100Hz | 120Hz | 1kHz | 10kHz | 100kHz}

(5.5) VOLT (Level) Command
VOLTage {0.1V | 0.3V | 1.0V | 0.1 | 0.3 | 1.0}
Set test level, only supporting 0.1V/0.3V/1.0V
Level setting is invalid in DCR mode

VOLTage?
Query the test level
Return: {0.1V | 0.3V | 1.0V}

(5.6) APER (Speed) Command
APERture <Str>
Set the test speed, <Str> is the following value:
FAST or SHORt: fast
MEDium: medium
SLOW or LONG: slow

APERture?
Query the test speed
Return: {SLOW | MED | FAST}

(5.7) COMP (Compare) Command
COMPare [:STATe] {ON | 1 | OFF | 0}
Turn tolerance mode on (ON, 1) or off (OFF, 0)

COMPare [:STATe]?
Query the status of tolerance mode
Return: {ON | OFF}

COMPare: NOMinal <Data>
Set the nominal value of the comparator = Data
<Data> is NR1, NR2, and NR3 type data, which can include the magnification.
If the current primary parameter is unknown, it is better not to follow the unit.
Examples:
>The current primary parameter is inductance, <Data>=1.23m means to set the current nominal value to 1.23mH
>The current primary parameter is capacitance, <Data>=1.23e-6 means to set the current nominal value to 1.23μF

COMPare: NOMinal?
Query the current nominal value
Return: data in exponential format without unit and magnification

COMPare: TOLerance <Data>
Set the tolerance range of the comparator
<Data> is an integer of type NR1, valid in the range of 1~20, representing 1%~20%

COMPare: TOLerance?
Query the current tolerance value
Return: 1.0%~20%, including percent sign

COMPare: ALARm [:STATe] <Str>
Turn on/off the audible alarm for tolerance comparison:
<Str> = OFF or 0: Turn off the alarm
<Str> = PASS or 1: Alarms when the comparison result is pass
<Str> = FAIL or 2: Alarms when the comparison result is fail

COMPare: ALARm [:STATe]?
Query the status of audible alarm
Return: {OFF | PASS | FAIL}

COMPare: ALARm: SOUNd <Str>
Set the alarm sound for tolerance comparison:
<Str> = SHORt or 0: Single Short
<Str> = LONG or 1: Single Long
<Str> = DUAL or 2: Dual Short

COMPare: ALARm: SOUNd?
Query the alarm sound for tolerance comparison
Return: {SHORT | LONG | DUAL}

COMPare: ALARm: LED {ON | 1 | OFF | 0}
Turn on/off the alarm LED for tolerance comparison:
On (ON, 1), off (OFF, 0)

COMPare: ALARm: LED?
Query the status of alarm LED
Return: {ON | OFF}

COMPare: COUNter {ON | 1 | OFF | 0}
Turn on/off the comparison counter
On (ON, 1), off (OFF, 0)

COMPare: COUNter?
Query the status of comparison counter
Return: {ON | OFF}

Chapter 5 Technical Parameters

The following parameters are applicable to UT622A, UT622C, and UT622E.
Disclaimer: Product parameters may change without notice!

5.1 Performance Parameters

Function		
Measurement parameters		Primary parameter: L/C/R/Z/DCR (UT622E)
		Secondary parameter: D/Q/X/Θ-Deg/Θ-Rad/ESR
Equivalent mode		Series/Parallel
Parameters and equivalent mode		Manual/Auto
Range		Auto/Hold
Test terminal configuration		2+1 terminal, 4+1 terminal
Test speed		Fast (20 times/s), Med (5 times/s), or Slow (2 times/s)
Clearing correction		Open/Short circuit clearing
Recording and data statistics		Average value, maximum value, and minimum value (Min)
Tolerance comparator		
Nominal value		Settable, only for the primary parameter
Tolerance		1%~20%
Audible and visual alarm		Settable
Counter		Pass count, fail count, and total count
Test signal		
Test frequency	UT622A	100Hz, 120Hz, 1kHz, 10kHz
	UT622C	100Hz, 120Hz, 1kHz, 10kHz, 100kHz
	UT622E	100Hz, 120Hz, 1kHz, 10kHz, 100kHz
Test level		0. 1Vrms/0. 3Vrms/1. 0Vrms
DCR test level		DC1V (UT622E)
Output impedance of signal source		100Ω
Display		
Display screen		2.8" TFT LCD
Backlight		Adjustable 10-level brightness
Reading		Maximum reading of the primary parameter: 99999 Minimum resolution of the secondary parameter D/Q/Θ: 0.0001
Maximum measurement accuracy		0.1% (see “5.2 Accuracy Parameters” for details)

Parameter display range, resolution (not accuracy range)			
Primary parameter	Impedance type	Display range	Minimum resolution
	L	0.001uH - 9999.9H	1/0.1/0.01/0.001uH
	C	0.001pF - 99.999mF	1/0.1/0.01/0.001pF
	R	0.0001Ω - 99.999MΩ	0.0001Ω
	Z	0.0001Ω - 99.999MΩ	0.0001Ω
	DCR	0.1mΩ - 999.99kΩ	0.1mΩ
Secondary parameter	D	0.0001 - 9.9999	0.0001
	Q	0.0001 - 99999	0.0001
	X	0.0001Ω - 99.999MΩ	0.0001Ω
	θ(Deg)	-179.9° - 179.99°	0.01°
	θ(Rad)	-3.142 - 3.1416	0.001
	ESR	0.01mΩ - 999.99Ω	0.01mΩ
Power supply			
Battery		3.7V 1800mAh lithium polymer battery	
Charging/ Communication interface		Mini-USB interface	
Charging/ Communication cable		Mini-USB cable	
External power adapter		Output: DC 5V±0.25, >1A	
Charging current		Constant charging current: about 330mA; automatic management for charging process	
Working current (charging excluded, level 5 backlight)		External 5V power supply: minimum 130mA, typical 160mA, maximum 190mA Full battery power supply: minimum 140mA, typical 180mA, maximum 200mA	
Standby (shutdown) current		Maximum 35μA (non-charging)	
Battery life		Typical: 8 hours (1800mAH)	
Auto power off (battery powered)		5min/15min/30min/60min/OFF (default: 15min)	

General		
Operating environment	Temperature	5℃ - 35℃
	Relative humidity	≤80% R.H.
Weight (without battery)		305g
Dimensions (H × W × D)		190mmx90mmx44mm
Packing box size		225mmx220mmx63mm
Safety and EMC		IEC/EN61010-1:2010; EN61326-2-1:2013, EN61326-2-2:2013

5.2 Accuracy Parameters

Precautions:

1. Ambient temperature: 23°C ± 5°C, humidity: ≤75% RH
2. Warm up for about 10 minutes before testing.
3. Test at the test sockets on the meter.
4. Perform open/short circuit clearing before testing.
5. Measure in the recommended equivalent mode and auto range.
6. Actual measurement and display ranges of the meter exceed the ranges specified in the table. The open circuit impedance factor Zo and short circuit impedance factor Zs are used for reference to evaluate the accuracy outside the measurement ranges.

(1) L/C/R/Z/X/DCR Accuracy

Ae = ± (Ab+ Zx/Zo + Zs/Zx) × Kt [%]

Ab: basic measurement accuracy (see the table below, considering the superposition of level and speed)

Zx: impedance of the DUT

Zo: base of open circuit impedance (evaluation of high impedance)

Zs: base of short circuit impedance (evaluation of low impedance)

Kt: temperature coefficient

(2) D Accuracy

The accuracy De of D is given by the following formula (Dx= D value of the DUT):

When Dx ≤ 0.1, $De = \pm \frac{Ae}{100}$

When Dx> 0.1, multiply De by (1+Dx)

(3) Q Accuracy

$$Qe = \pm \frac{Q_x \times D_e}{1 \mp Q_x \times D_e}$$

Here, Qx is the Q value of the DUT, and De is the relative accuracy of D
Condition for using the above formula: Qx × De <1

(4) ΘAccuracy

$$\Theta e = \frac{180}{\pi} \times \frac{A_e}{100} \text{ [deg]}$$

Ae is the relative accuracy of L, C, R, Z, and X

(5) Basic Accuracy (Ab)

Basic accuracy is divided by impedance range:

Impedance (Ω)	≤3. 3	3. 3~33	33~9. 6k	9. 6k~33k	>33k
Basic accuracy (Ab)	0. 18	0. 15	0. 10	0. 15	0. 20

The superposition of test level on basic accuracy:

Level	0.1V	0.3V	1.0V
Superposition accuracy (Av)	0.1	0	0.2

The superposition of test speed on basic accuracy:

Speed	Slow	Medium	Fast
Superposition accuracy (As)	0	0	0. 05

Temperature coefficient:

Temperature (°C)	0~8	8~18	18~28	28~38	>38
Temperature coefficient Kt	4.0	2.0	1.0	2.0	4.0

(6) Open Circuit Impedance Factor (Zo)

The open circuit impedance factor reflects the extension measurement capability for high impedance.

Frequency	Test speed	
	Fast	Medium/Slow
100Hz/120Hz	3.3MΩ	5MΩ
1kHz/10kHz	6MΩ	10MΩ
100kHz	2MΩ	3. 3MΩ
0Hz(DCR)	1MΩ	1MΩ

For example, when measuring 100kΩ impedance at 100 kHz, the accuracy needs to be superimposed by 0.1M/3.3M=0.03%.

(7) Short Circuit Impedance Factor Zs

The short circuit impedance factor reflects the extension measurement capability for low impedance.

Frequency	Test speed	
	Fast	Medium/Slow
100Hz/120Hz	1.0Ω	0.3Ω
1kHz/10kHz	0.2Ω	0.1Ω
100kHz	0.3Ω	0.1Ω
0Hz(DCR)	0.1Ω	0.1Ω

For example, when measuring 1Ω impedance at 100 kHz, the accuracy needs to be superimposed by 0.1/1=0.1%.

Chapter 6 Appendixes

1. Product warranty period: 3 years
2. Warranty period for standard accessories: 3 months (unless otherwise specified)
3. Please note that the product warranty does not include the following items:
1) Damage caused by pollution
2) Normal wear of mechanical components
3) Man-made damage or battery damage

Appendix A: Accessories and Options

Model	UT622A	UT622C	UT622E
Standard accessories	Alligator clip test leads with rubber plugs (UTR-002)	Four-terminal Kelvin test leads (UTR-L100k-H)	Four-terminal Kelvin test leads (UTR-L100k-H)
	UTR-001 Gold-plated short circuit board		
	User manual		
	USB cable		
	CD (application software)		
Optional accessories	Four-terminal Kelvin test leads (UTR-L100k-H)	Alligator clip test leads with rubber plugs (UTR-002)	
	SMD Kelvin test tweezers (UTR-L100kS-H)		

Please order all accessories (standard and optional) from the local UNI-T dealers.

Appendix B: Maintenance and Clean

(1) General Maintenance

Do not store or place the meter where the LCD is exposed to direct sunlight for a long time.
Caution: Do not allow sprays, liquids, or solvents to stain the meter or test fixture to prevent damage.

(2) Clean

Check the meter and test fixture frequently according to the operating conditions. Clean the outer surface of the meter according to the following steps:

- Please use a soft cloth to wipe the dust off the meter. When cleaning the LCD, take care to avoid scratches.
- Please disconnect the power supply and wipe the meter with a damp but not dripping soft cloth. Do not use any abrasive chemical cleaning agent.

> Warning: Before use, please confirm that the meter is completely dry to avoid short circuit or personal injury caused by moisture.

Appendix C: Limited Warranty and Liability

Uni-Trend guarantees that the product is free from any defect in material and workmanship within three years from the purchase date. This warranty does not apply to damage caused by accident, negligence, misuse, modification, contamination or mishandling. The dealer shall not be entitled to give any other warranty on behalf of Uni-Trend. If you need warranty service within the warranty period, please contact your seller directly.

Uni-Trend will not be responsible for any special, indirect, incidental or subsequent damage or loss caused by using this product.

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