P/N:110401111426X

UNI-T
UNI-TREND TECHNOLOGY（CHINA）CO., LTD.
No. 6, Gong Ye Bei 1st Road,
Songshan Lake National High-Tech Industrial
Development Zone, Dongguan City,
Guangdong Province, China

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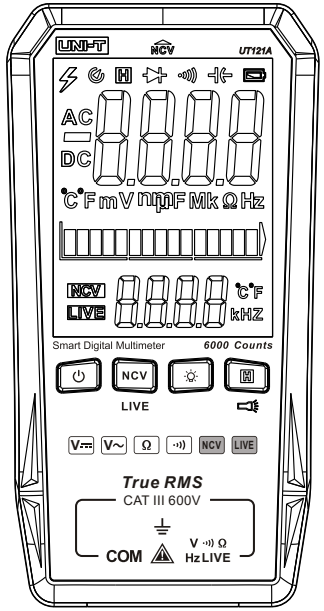


UT121A/UT121B
Smart Digital Multimeter

Contents

I. Overview

UT121A/UT121B is a pocket-sized smart multimeter, it can identify functions and ranges automatically according to the input signal, reducing operating difficulty effectively and improve work efficiency. The EBTN display screen (UT121B) allows user to obtain clear readings at maximum angle. This multimeter conforms to safety standards and is set with all-featured overload protection, ensuring users to perform safe operation in CAT III 600V locations. Designed with special appearance and function configurations, UT121A/UT121B is a suitable measurement tool for entry-level and residential users.

II. Features

1. Stylish appearance, ultrathin design, large display screen.
2. Entering automatic signal recognition interface when powered on, i.e., resistance, AC/DC voltage, continuity and other functions.
3. Displaying ambient temperature in auxiliary display screen when turned on.
4. NCV detection of electromagnetic field strength and circuit continuity.
5. Recognizing live wire fast with indication sound and frequency display under LIVE mode.
6. Protection against false detection, withstanding 600V (3.6kVA) impact at most, set with overvoltage indication.
7. Large capacitance (60mF) measurement function (UT121B).
8. 10MHZ frequency and temperature measurement functions (UT121B).
9. Designed with large EBTN LCD and smart ADC at 3 times per second (UT121B).

III. Accessories

If any item in the package is missing or damaged, please contact your supplier immediately.

User manual ---------- 1 pc
Test lead ---------- 1 pair
Carrying bag ---------- 1 pc
Type-K temperature probe ---------- 1 pc (UT121B)

IV. Safety Information

Note the “Warning labels and sentences”. A Warning identifies conditions and procedures that are dangerous to the user and that can cause damage to the Product or the equipment under test.

The product is designed in accordance with EN61010-1/61010-2-030/61010-2-033, Electromagnetic Radiation EN61326-1 Standard, and conforms to Double Insulation, Overvoltage CAT III 600V and Pollution Class 2. Failure to follow operating instructions can impair the protection provided by the product.

1. Check the product and test leads before use. Pay attention to any damage or abnormal situation. Please stop use if test lead and casing insulation are damaged, or the LCD displays nothing, or the product cannot work normally.
2. It is forbidden to use without rear cover or battery cover set in place. Otherwise it may cause electric shock.
3. Keep fingers behind the finger guard and never make contact with exposed wire, connector, input terminal not in use, or circuit being measured during measurement.
4. Set the functional switch to correct position before measurement. It is forbidden to switch over during measurement to avoid product damage.
5. Do not exert AC/DC voltage over 600V between terminal and grounding to prevent electric shock and product damage.
6. Use caution when working with voltages over 60V DC or 30Vrms AC.
7. Do not measure voltage or current over allowed value. Before measuring on-line resistance, diode or continuity, please disconnect all powers in the measured circuit, and discharge all capacitors completely, otherwise it can cause inaccurate measurement result.
8. When the symbol “ ” appears on the LCD, please replace the battery in time to ensure measurement accuracy. Remove the battery if the product is not used for a long time.
9. Do not alter the internal wiring to avoid product damage and safety hazard.
10. Do not keep or use the product in environments with high temperature, high humidity, strong electromagnetic field, or inflammable and explosive environments.
11. Please wipe the casing with wet cloth and cleaning agent, do not use abrasives or solvents, so as to prevent casing corrosion and avoid product damage and safety hazard.

V. Electrical Symbols

Symbol	Description	Symbol	Description
⚡	High voltage	∿	Alternating voltage or current
⏚	Grounding	⎓	Direct voltage or current
⧈	Double insulation	⚠	Warning

VI. General Specifications

Display count: 6199

Polarity indication: Auto

Overload indication: “OL” or “-OL”

Low battery indication: The symbol “ ” appears to indicate low voltage and battery replacement.

Power supply: AAA 1.5V battery (2 pcs)

Auto power off: The product powers off automatically after 15 minutes of inactivity. Disable this function if needed.

Dimension: 143mm*74mm*17mm

Weight: About 142g (including battery)

Altitude: 2000m

Operating temperature and humidity:

0°C~30°C (≤80%RH)

30°C~40°C (≤75%RH)

40°C~50°C (≤45%RH)

Storage temperature and humidity: -20°C~+60°C (≤80%RH)

EMC: Under radio frequency field of 1V/m, overall accuracy = Specified accuracy + 5% of range. Under radio frequency field over 1V/m, there is no specified specification.

VII. External Structure (Figure 1)

1. LCD display screen (Display measurement data and function symbols)
2. Power on/off
3. Switch between NCV and LIVE functions
4. Data hold and flashlight
5. Backlight (UT121A)
6. Switch functions (UT121B)
7. “VΩ” terminal
8. “COM” terminal

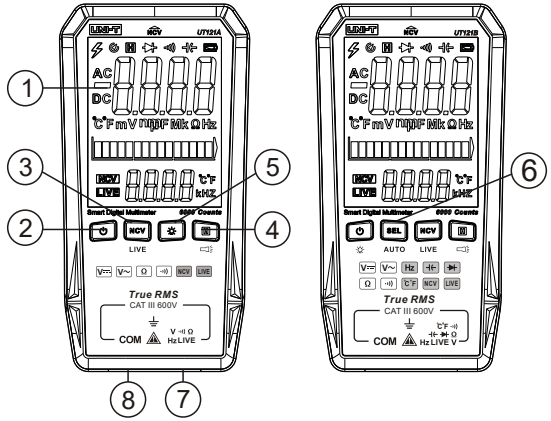


Figure 1

VIII. Button Descriptions

1. “ ” button (UT121A)

a) Long press this button for about ⩾2 seconds to turn on the product, long press again to turn it off.
b) When powered on, “Auto” appears on the LCD, and the product enters automatic measurement state in which it can identify voltage, resistance and continuity signals automatically.

2. “ ” button (UT121B)

a) Long press this button for about ⩾2 seconds to turn on the product, long press again to turn it off.
b) When powered on, “Auto” appears on the LCD, and the product enters automatic measurement state in which it can identify voltage, resistance and continuity signals automatically.
c) Short press this button in ON state to switch backlight brightness. The brightness level is weak by default when powered on, short press this button to switch to level-2 brightness).

3. NCV/LIVE button “ ”

a) Press this button under any function state to enter NCV measurement mode.
b) Press this button in electric field detection mode to switch between NCV and LIVE.
c) Long press this button for ⩾2 seconds to return automatic measurement state.

4. SEL/AUTO button “ ” (UT121B)

a) When powered on, “Auto” appears on the LCD, and the product enters automatic measurement state in which it can identify voltage, resistance and continuity signals automatically.
b) Short press this button to enter manual selection mode, click continuously to return to automatic measurement state.
c) Long press this button in temperature testing state for ⩾2 seconds to switch between °F and °C.
d) Long press this button ⩾2 seconds to return to automatic measurement state.

5. Backlight button “ ” (UT121A)

a) Short press this button to turn on/off the backlight, the backlight turns off automatically after it is ON for 30 seconds.
b) Long press this button for about ⩾2 seconds to enter constant ON mode.

6. HOLD/LIGHT button “ ”

a) Short press HOLD to hold the recent testing data, the LCD shows the symbol “H” when pressed.
b) Long press HOLD for ⩾2 seconds to turn on/off the flashlight. The flashlight turns off automatically after it is ON for 3 minutes.

IX. Operating Instructions

1. AC/DC Voltage Measurement

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.
2) Set the functional switch to AC/DC voltage range or smart range, and connect the test leads with power supply or load to be measured in parallel.
3) Read the testing result from main display. The auxiliary display shows ambient temperature in DC voltage range and frequency in AC voltage range.

⚠ Warning:

- Do not input voltage over AC 600V. It is possible to measure higher voltage, but it may cause damage to the product.
- Pay special attention to avoid electric shock when measuring high voltage.
- If the measured voltage is ⩾30V, the LCD shows warning symbol “ ”. If the measured voltage is ⩾AC 600V, the product sounds a warning and the symbol “ ” flashes.

2. Resistance Measurement

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.
2) Set the functional switch to “Ω” or smart range, and connect the test leads with the resistor to be measured in parallel.
3) Read the test result from the LCD, the auxiliary display shows ambient temperature.

⚠ Warning:

- If the measured resistor is open or the resistance exceed the maximum range, “OL” appears on the LCD.
- Before measuring on-line resistance, switch off all powers in the measured circuit and discharge all capacitors completely, so as to ensure accurate measurement.
- Do not input voltage over DC/AC 30V to avoid personal injury.

3. Continuity Detection

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.
2) User can set the product to Auto smart identification state. To enter manual mode (UT121B), set SEL/AUTO function switch to “ ” and connect the test leads with both ends of the load of measured circuit. If the resistance between both measured ends is less than 30Ω, the circuit is conductive and the buzzer makes sound continuously; the buzzer keeps silent if the resistance is ≥50Ω.

⚠ Warning:

- Before detecting on-line resistance, switch off all powers in the measured circuit and discharge all capacitors completely, so as to ensure accurate measurement.
- Do not input voltage over DC/AC 30V to avoid personal injury.

4. Diode Measurement (UT121B)

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.The polarity of red test lead is “+”, and black is “-”.
2) Set the functional switch to “⊣◀”, read from the LCD the appropriate forward voltage of PN junction of measured diode. The normal voltage of silicon PN junction is about 500~800mV generally. The auxiliary display shows ambient temperature.
3) Read the test result from the LCD.

⚠Warning:

- If the measured diode is open or the polarity is reversed, “OL” appears on the LCD.
- Before measuring on-line diode, switch off all powers in the measured circuit and discharge all capacitors completely, so as to ensure accurate measurement.
- Do not input voltage over DC/AC 30V to avoid personal injury.

5. Capacitance Measurement (UT121B)

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.
2) Set the function to “⊣⊢”, connect the test leads with both ends of measured capacitor in parallel, read the test result from the LCD, the auxiliary display shows ambient temperature.

⚠Warning:

- If the measured capacitor is shorted or the capacitance exceeds the maximum range, “OL” appears on the LCD.
- It takes some time to stabilize the reading for measurement of capacitance over 400μF.
- To ensure measurement accuracy, please discharge the capacitor completely before measurement, especially for capacitor with high voltage.

6. Frequency Measurement (UT121B)

1) Connect red test lead with “VΩ” terminal, and black with “COM” terminal.
2) Set the function to “HZ”, connect the test leads with both ends of measured object in parallel, read the test result from the LCD.

⚠Warning:

- Do not input voltage over DC 60V or AC 30V to avoid product damage and personal injury.

7. Temperature Measurement

1) Detecting ambient temperature automatically
   The product is designed with automatic detection of ambient temperature (Shown in auxiliary display). The accuracy is for reference only (Please restart the product and refresh the recent temperature when performing measurement in different environments).
2) Detecting HVAC temperature (UT121B)
   “----” appears under open circuit, the auxiliary display shows ambient temperature. Connect type-K temperature sensor to perform temperature (°C/°F) measurement (°F = °C∗1.8+32). Connect positive end of thermocouple with “VΩ” terminal, and negative of that with “COM” terminal.

⚠Warning:

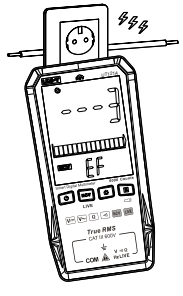
- The equipped type-K (NiCr-NiSi) thermocouple is only applicable to measurement of temperature below 230°C/446°F.

8. Non-Contact AC Voltage Detection (NCV) (Figure 2)

1) Press NCV/LIVE button to switch to “NCV” range, without test leads connected.
2) Electric field detection: When the front end of the product gets close to the measured object, the main display shows “---1”, “----2” or “---3” as the detected strength changes, the buzzer makes sound, and “EF” flashes on the auxiliary display , at the same time, the analog bar graph (3 segments) appears accordingly.
3) If there is no electric field detected, the main display shows “EF” and the auxiliary shows room temperature.

⚠Warning:

- Please make sure that the NCV sensing end gets close to the measured electric field, otherwise the measurement sensitivity can be affected.
- If the voltage of measured electric field is ⩾100V AC, please observe if the conductor of measured electric field is insulated



9. LIVE Detection (Figure 3)

The red test lead connects with “V” terminal, and then makes contact with MAINS outlet or bare wire to identify live or neutral wire.

1) The main display shows “----” if there is no live wire detected.
2) The main display shows “----” if neutral wire is detected.
3) If MAINS “live wire” is detected, the main display shows “LIVE”, and the sound changes depending upon the detected strength to indicate the strength of the voltage of live wire.
4) Room temperature (Celsius) changes to “50Hz or 60Hz” in auxiliary display.

⚠ Warning:

- To avoid “COM” terminal from interfering electric field, please remove the black test lead from “COM” terminal.
- For concentrated high voltage electricity, the accuracy of identifying “live wire” may be unstable, thus, please judge based on the display and the sound frequency.

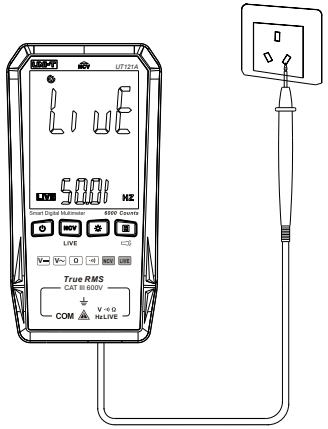


Figure 3

10. Other Functions

- Auto power off: The product powers off automatically after 15 minutes of inactivity. In auto-off state, long press “ ⏻ ” to restart the product.
- To disable auto power off function, please hold down “ ⏻ ” and “NCV” (UT121A)/“ ⏻ ” and “SEL” (UT121B) at the same time in OFF state and then power on the product. To enable the function, please turn off the product and then restart it.
- Buzzer: If any enabled button is pressed, the buzzer makes beep sound once (about 0.25s). When measuring voltage, continuity, diode, NCB, and LIVE, the buzzer also makes beep sound to indicate high voltage, overrange, conductive, identification, electric field, etc.
- Low voltage detection: Battery voltage is detected when the product works, the low battery symbol “ ▭ ” appears on the LCD if the voltage is less than about 2.5V.

X. Technical Specifications

Accuracy: ± (a% of reading + b digits), one-year calibration period
Ambient temperature and humidity: 23°C±5°C; ⩽80%RH
Temperature coefficient: The range to ensure accuracy is 18°C~28°C, the fluctuation range of ambient temperature keeps within ±1°C. If the temperature is <18°C or >28°C, the additional error of temperature coefficient is “0.1 × (Specified accuracy)/°C”.

(1) DC Voltage

Range	Resolution	Accuracy	Overload Protection
6.000V	0.001V	±(0.7%+3)	600Vrms
60.00V	0.01V		
600.0V	0.1V		
1000V (UT121B)	1V	±(1.2%+3)	

- Input impedance: ⩾10MΩ
- Minimum identifiable voltage: 0.6V
- Range to ensure accuracy: 5%~100% of range (in manual mode)

(2) AC Voltage

Range	Resolution	Accuracy	Overload Protection
6.000V	0.001V	±(1.0%+3)	600Vrms
60.00V	0.01V		
600.0V	0.1V		
750V (UT121B)	1V	±(1.5%+3)	

- Input impedance: ≥10MΩ
- Minimum identifiable voltage: 0.6V
- Frequency response: 45~400Hz (Display true RMS value)
- Range to ensure accuracy: 5%~100% of range (in manual mode)
- Add error for AC crest factor of non-sinusoidal wave:
  a) Add 3% if crest factor is 1~2
  b) Add 5% if crest factor is 2~2.5
  c) Add 7% if crest factor is 2.5~3

(3) Continuity

Range		Resolution	Accuracy	Overload Protection
UT121A	UT121B			
6000Ω	600.0Ω	1Ω/0.1Ω	≤30Ω: Buzzer sounds ≥50Ω: Buzzer keeps silent Open circuit voltage: About 2.0V	600Vrms

(4) Resistance

Range		Resolution	Accuracy	Overload Protection
UT121A	UT121B			
6000Ω	600.0Ω	1Ω/0.1Ω	±(1.0%+5)	600Vrms
	6.000kΩ	0.001kΩ	±(1.0%+5)/±(0.8%+5)	
60.00kΩ	60.00kΩ	0.01kΩ		
600.0kΩ	600.0kΩ	0.1kΩ		
6.000MΩ	6.000MΩ	0.001MΩ	±(2.0%+3)/±(2.0%+5)	
10.00MΩ	60.00MΩ	0.01MΩ		

- Range to ensure accuracy: 5%~100% of range
- 6000Ω (UT121A): Measured value = Displayed value – Value of shorted test lead
- 600.0Ω (UT121B): Measured value = Displayed value – Value of shorted test lead
- Open circuit voltage: About 0.5V
- If ambient temperature deviates from 23±5°C and the humidity is greater than 60%, it may cause large error for high resistance measurement (60MΩ).

(5) Diode (UT121B)

Range	Resolution	Accuracy	Overload Protection
3.000V	0.001V	Open circuit voltage is about 2.9V, forward voltage drop of PN junction can be measured. The normal voltage of silicone PN junction is about 0.5V~0.8V or 1.2V around.	600Vrms

(6) Frequency (UT121B)

Range	Resolution	Accuracy	Overload Protection
10Hz~10MHz	0.01Hz~0.01MHz	±(0.1%+3)	600Vrms

- Sensitivity measurement:
  ≤100kHz: 400mVrms ≤ Input amplitude ≤ 20Vrms
  >100kHz~1MHz: 600mVrms ≤ Input amplitude ≤ 20Vrms
  >1MHz~10MHz: 1Vrms ≤ Input amplitude ≤ 20Vrms

(7) Capacitance (UT121B)

Range	Resolution	Accuracy	Overload Protection
60.00nF	0.01nF	±(4.0%+5)	600Vrms
600.0nF	0.1nF		
6.000uF	0.001uF		
60.00uF	0.01uF		
600.0uF	0.1uF		
6.000mF	0.001mF		
60.00mF	0.01mF	±(10%+5)	

- Range to ensure accuracy: 5%~100% of range
  Note: Under open circuit state, the least significant digit may be ≤10, which shall be subtracted from the reading.

(8) Temperature (UT121B)

Range	Resolution	Accuracy	Overload Protection
-40°C~40°C	1°C	±3	600Vrms
41°C~500°C		±(1.0%+3)	
501°C~1000°C		±(2.0%+3)	
-40°F~104°F	1°F	±6	
105°F~932°F		±(2.0%+4)	
933°F~1832°F		±(2.5%+4)	

(9) NCV

Range	Accuracy
NCV	1) If there is no electric field detected, the main display shows “EF” and the auxiliary display shows ambient temperature. 2) When detecting conductor with voltage over 48V, the main display shows “---1”, “----2” or “---3” as the detected strength changes, the buzzer makes sound, and “EF” flashes on the auxiliary display, at the same time, the analog bar graph (3 segments) appears accordingly. Note: The testing result may be affected by different types of outlet design or different insulation thickness of MAINS electric wire.

(10) LIVE Function

Range	Live wire detection	Accuracy
LIVE	Trigger voltage of outlet or bare wire: ≥70Vac (50Hz/60Hz)	1) The main display shows “----” if there is no live wire detected. 2) The main display shows “----” if neutral wire is detected. 3) If MAINS “live wire” is detected, the main display shows “LIVE” and the buzzer makes sound. 4) Room temperature (Celsius) changes to “50Hz or 60Hz” in auxiliary display.

XI. Maintenance (Figure 4)

Warning: Please remove the test leads before opening the bottom cover.

1. When the product is not in use, please power it off to save energy.
2. General maintenance

a. The product must be maintained or serviced by qualified professional repair personnel or designated repair department.

b. Clean the casing with dry cloth periodically, do not use cleaning agent containing abrasive or solvent.

3. Battery replacement (Figure 4)

The product is powered by 2 pieces of AAA 1.5V batteries, please install or replace the battery according to the steps below:

a. Power off the product and remove the test leads from the input terminal.

b. Loosen the screw, take off the battery cover, remove the battery, and then install new battery according to correct polarity.

c. Rejoin the battery cover and tighten the screw.

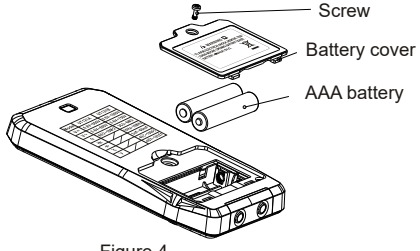


Figure 4