

# **UT8806E Benchtop Digital Multimeter**

## **Datasheet**

REV 1.1

2024.8

**UNI-T®**

# 1. Characteristics

- 4.3" TFT-LCD, display resolution 480×272
- 6½ digital reading
- Measuring speed up to 10,000 rdgs/s
- TRMS AC voltage and current measurement
- Total capacity of 32Gb Nand Flash for saving a large number of setting and data files of the instrument.
- Built-in thermocouple cold-end compensator
- Supports SCPI remote control command, upper computer software and compatible with the latest mainstream multimeter command set.
- Supports dual display, simplified Chinese and English display, and built-in help system for accessing information easily.
- Configuration interface has USB Host, USB Device, LAN, RS-232C and GPIB(optional)
- Measured data and settings can be imported or exported by VXI-11, USBTMC and USB, so that users can easily modify, view and backup.
- Backup is support SCPI remote control command.

## 2. Product Introduction

The UT8806E 6½-digit dual-display digital multimeter with its outstanding reading rate and accuracy, which is designed to meet customers requirements of high-precision and automatic measurement.

### Basic Measurement Function

DC voltage measurement: 200mV, 2V, 20V, 200V, 1000V

DC current measurement: 2μA, 20μA, 200μA, 2mA, 20mA, 200mA, 2A, 10A

AC voltage measurement (RMS): 200mV, 2V, 20V, 200V, 750V

AC current measurement (RMS): 200μA, 2mA, 20mA, 200mA, 2A, 10A

Resistance measurement (2-wire, 4-wire): 20Ω, 200Ω, 2kΩ, 20kΩ, 200kΩ, 2MΩ, 10MΩ, 100MΩ, 1GΩ

Capacitance measurement: 2nF, 20nF, 200nF, 2μF, 20μF, 200μF, 2mF, 20mF, 100mF

Connectivity test: Max. 2KΩ, continuously adjustable

Diode test: 0V to 4V

Frequency test: 3Hz to 1MHz

Period measurement: 1μs to 0.333s

Temperature measurement: supports thermocouple and thermal resistance sensor

### Mathematical Operation

Maximum, minimum, average, standard deviation, relative measurement, bar chart, histogram, tendency chart, dB/dBm, Pass/Fail

### Humanized Design

Graphical user interface, simple and convenient operation; more help system for accessing information easily; supports simplified Chinese and English menus; dual-window display function; supports USB and local storage for file management.

### Application Fields

Scientific research and education

Research and development

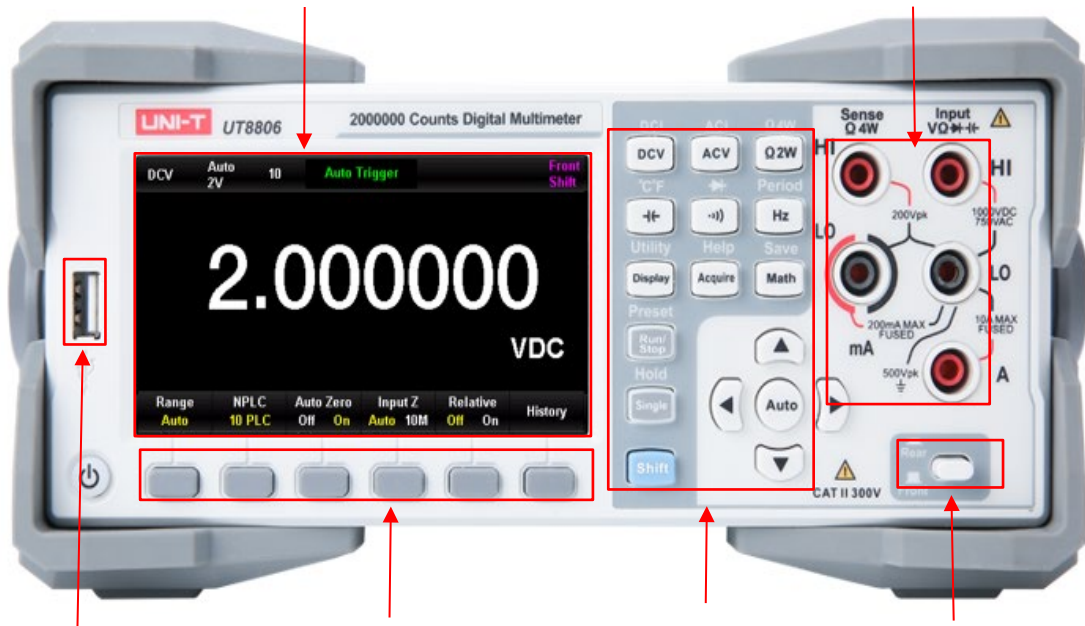
Inspection and maintenance

### 3. Design Highlights

Clear and simple key front, 4.3 inch TFT-LCD, graphical user interface, simple and convenient operation; more help system for accessing information easily; supports simplified Chinese and English menus; dual-window display function; supports USB and local storage for file management.

4.3 inch TFT screen

Signal input terminal



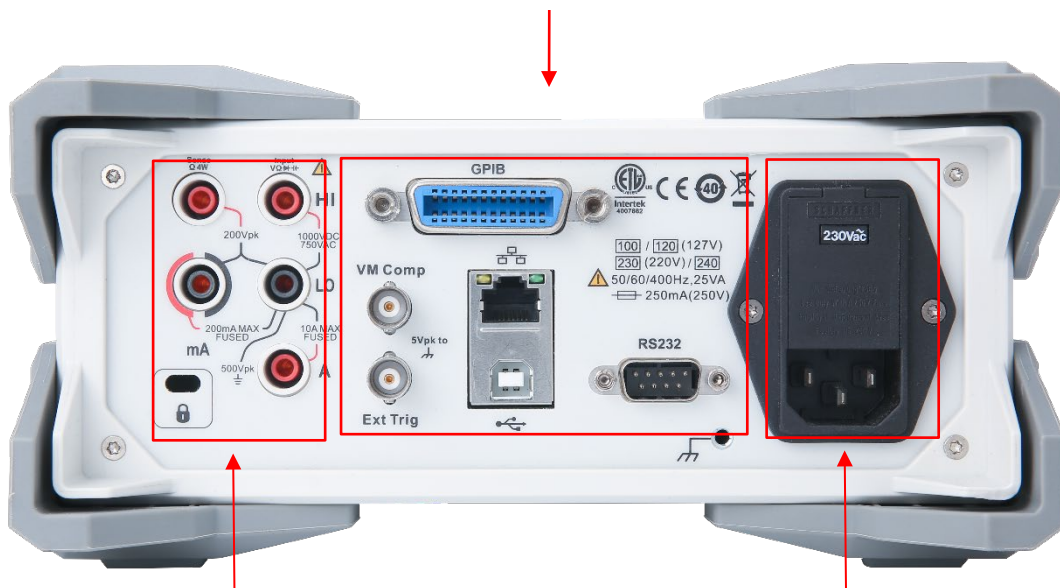
Support U disk firmware upgrade and external storage data

Menu action keys

measurement keys, auxiliary keys, and trigger keys

Front and rear signal input switching switch

GPIOB(optional)、External trigger input、VMC input、USB Host、USB Device、LAN 、RS-232



Signal input terminal and keyhole

Power input jack, input voltage selector, and power fuse



## 4. Technical Index

UT8806E Accuracy Index  $\pm$  (% Reading+% Range)<sup>1</sup>

Range <sup>2</sup> / frequency		24 Hours <sup>3</sup>	90 Days	1 Year	Temperature Coefficient /°C <sup>4</sup>
		TCAL $\pm$ 1°C	TCAL $\pm$ 5°C	TCAL $\pm$ 5°C	
DC Voltage	Input Resistance				
200mV	10M $\Omega$ or > 10G $\Omega$	0.0020+0.0015	0.0030+0.0020	0.0040+0.0023	0.0005+0.0003
2V	10M $\Omega$ or > 10G $\Omega$	0.0015+0.0004	0.0020+0.0004	0.0035+0.0006	0.0005+0.0001
20V	10M $\Omega$ or > 10G $\Omega$	0.0020+0.0003	0.0030+0.0004	0.0040+0.0004	0.0005+0.0001
200V	10M $\Omega$	0.0020+0.0005	0.0040+0.0004	0.0050+0.0005	0.0005+0.0001
1000V	10M $\Omega$	0.0020+0.0005	0.0040+0.0008	0.0055+0.0008	0.0005+0.0001

TRMS AC Voltage <sup>2,5,6</sup>					
200mV, 2V, 20V, 200V and 750V range					
3Hz - 5Hz		1.00+0.02	1.00+0.03	1.00+0.03	0.10+0.003
5Hz - 10Hz		0.35+0.02	0.35+0.03	0.35+0.03	0.035+0.005
10Hz - 20kHz		0.04+0.02	0.05+0.03	0.06+0.03	0.005+0.003
20kHz - 50kHz		0.10+0.04	0.11+0.05	0.12+0.05	0.011+0.005
50kHz - 100kHz		0.55+0.08	0.60+0.08	0.60+0.08	0.060+0.008
100kHz - 300kHz		4.00+0.50	4.00+0.50	4.00+0.50	0.20+0.02

Resistance <sup>7</sup>	Testing Current				
20 $\Omega$	About 10 mA	0.008+0.006	0.010+0.006	0.015+0.005	0.0006+0.0008
200 $\Omega$	About 10mA	0.0030+0.0031	0.008+0.005	0.010+0.004	0.0006+0.0006
2k $\Omega$	About 1 mA	0.0020+0.0005	0.008+0.001	0.010+0.001	0.0006+0.0002
20k $\Omega$	About 100 $\mu$ A	0.0020+0.0005	0.008+0.001	0.010+0.001	0.0006+0.0001
200k $\Omega$	About 10 $\mu$ A	0.0020+0.0005	0.008+0.001	0.010+0.001	0.0006+0.0001
2M $\Omega$	About 1 $\mu$ A	0.002+0.001	0.010+0.001	0.012+0.001	0.0010+0.0002
10M $\Omega$	About 1 $\mu$ A	0.015+0.001	0.030+0.001	0.040+0.001	0.0030+0.0005
100M $\Omega$	1 $\mu$ A  10M $\Omega$	0.1+0.001	0.2+0.001	0.3+0.001	0.1+0.0001
1000M $\Omega$	1 $\mu$ A  10M $\Omega$	2+0.001	2+0.001	3+0.001	1+0.0001

DC Current	Burden Voltage				
2 $\mu$ A	< 5mV	0.009+0.010	0.040+0.007	0.050+0.007	0.0025+0.0030
20 $\mu$ A	< 5mV	0.009+0.002	0.040+0.005	0.050+0.005	0.0025+0.0005
200 $\mu$ A	< 30mV	0.009+0.010	0.040+0.005	0.050+0.005	0.0020+0.0026
2mA	< 0.3V	0.007+0.001	0.030+0.001	0.050+0.002	0.0020+0.0001
20mA	< 30mV	0.006+0.008	0.030+0.005	0.050+0.005	0.0020+0.0015
200mA	< 0.3V	0.009+0.001	0.030+0.001	0.050+0.002	0.0020+0.0001
2A	< 0.1V	0.045+0.015	0.080+0.005	0.100+0.012	0.0050+0.0008

10A <sup>8</sup>	< 0.3V	0.090+0.002	0.120+0.005	0.150+0.005	0.0050+0.0018
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Capacitance <sup>15</sup>					
2.000 nF		1.8+2.4	1.8+2.4	2+2.4	0.05+0.06
20.00 nF		0.9+0.1	0.9+0.1	1+0.1	0.05+0.01
200.0 nF		0.9+0.1	0.9+0.1	1+0.1	0.01+0.01
2..000 µF		0.9+0.1	0.9+0.1	1+0.1	0.01+0.01
20..00 µF		0.9+0.1	0.9+0.1	1+0.1	0.01+0.01
200.0 µF		0.9+0.1	0.9+0.1	1+0.1	0.01+0.01
2.000 mF		0.9+0.1	0.9+0.1	1+0.1	0.01+0.01
20.00 mF		0.9+0.2	0.9+0.2	1+0.2	0.01+0.01
100.0 mF		2.8+0.1	2.8+0.1	3+0.1	0.05+0.02

Range <sup>2</sup> / Frequency		24 Hours <sup>3</sup>	90 Days	1 Year	Temperature Coefficient /°C <sup>4</sup>
		TCAL±1°C	TCAL±5°C	TCAL±5°C	
TRMS AC Current <sup>2,6,9</sup>	Burden Voltage				
200µA, 2mA	< 30mV, < 0.3V				
20mA and 200mA range	< 30mV, < 0.3V				
3Hz-10Hz		1.0+0.04	1.0+0.04	1.0+0.04	0.02+0.006
10Hz-10kHz		0.1+0.04	0.1+0.04	0.1+0.04	0.03+0.006

2A, 10A <sup>8</sup> Range	< 0.1V, < 0.3V				
3Hz-10Hz		1.0+0.04	1.0+0.04	1.0+0.04	0.02+0.006
10Hz-10kHz		0.15+0.04	0.15+0.04	0.15+0.04	0.03+0.006

Connectivity					
Testing Current					
2kΩ	About 1mA	0.002+0.010	0.008+0.020	0.010+0.020	0.0010+0.0020

Diode Test <sup>10</sup>					
Testing Current					
4V	About 1mA	0.002+0.010	0.008+0.020	0.010+0.020	0.0010+0.0020

Temperature <sup>11</sup>	
RTD(R0 span 49Ω ~ 2.1kΩ)	Probe accuracy +0.05°C
Thermocouple (E, J, K, N, R, T)	Probe accuracy +0.5°C
Thermocouple (S)	Probe accuracy +0.6°C
Thermocouple (B)	Probe accuracy +0.76°C
5KΩ Thermistor	Probe accuracy +0.1°C

Frequency( $\pm$ % Reading) <sup>12, 13</sup>				
200mV, 2V, 20V, 200V and 720V range <sup>14</sup>				
3 Hz-5 Hz	0.07	0.07	0.07	0.005
5 Hz-10 Hz	0.04	0.04	0.04	0.005
10 Hz-40 Hz	0.02	0.02	0.02	0.001
40 Hz-300 kHz	0.005	0.006	0.007	0.001
300 kHz-1 MHz	0.005	0.006	0.007	0.001
square wave <sup>15</sup>	0.004	0.005	0.006	0.001

Additional low frequency				
error (% Reading) <sup>13</sup>				
Gate Time	1s	0.1s	0.01s	0.001s
(Resolution/range)	(0.1ppm)	(1ppm)	(10ppm)	(100ppm)
3 Hz-5 Hz	0	0.12	0.12	0.12
5 Hz-10 Hz	0	0.17	0.17	0.17
10 Hz-40 Hz	0	0.2	0.2	0.2
40 Hz-100 Hz	0	0.06	0.21	0.21
100 Hz-300 kHz	0	0.03	0.21	0.21
300 kHz-1 MHz	0	0.01	0.07	0.07

1. For DC: The specifications are valid after 60 minutes of warm-up, with the integration time set to 10 or 100 NPLC and auto-zeroing is enabled.

For AC: The specifications are valid after a 60-minute warm-up period, with slow AC filtering and sine wave.

2. All scales have 20% overrange except 1,000V DCV, 750V ACV, 10 A DC, 10 A AC, and diode tests.

3. Relative to calibration standards.

4. . Increase by a factor for every 1 degree (°C) when exceed the TCAL  $\pm 5^{\circ}\text{C}$  range.

5. Technical indicators under sinusoidal signals with amplitude > 5% range; When the input is within 1%~5% range and the frequency is less than 50 kHz, an additional error of 0.1% range is added. If the frequency is in the range of 50kHz to 100kHz, the additional error of 0.13% range will be increased. 750V ACV range is limited to 8 x 10<sup>7</sup> V-Hz; When the input exceeds 300V rms, 0.7mV error is added for every 1V excess.

6. Low Frequency Performance: Three filter settings are available: 3 Hz, 20 Hz, and 200 Hz. The frequency in excess of the filter setting is specified so that no additional error occurs.

7. The specifications is apply to resistance measurements with 4-wire or 2-wire measurements (operation bias to zeroed). When 2-wire resistance measurements without "relative" operation, it adds  $\pm 0.2 \Omega$  of additional error.

8. For continuous currents > DV 7A or ACrms 7A, it requires 30 seconds of on-time and 30 seconds of off-time.

9. The specifications is valid when sine wave inputs > 1% of range and >10 $\mu$ A AC.

10. The specifications is apply to voltage measured at the input port. The measurement current of 1 mA is typical value. The voltage drop across the diode junction will change with the change of current source.

11. The selected probe limits the actual measurement range and detection error. The probe accuracy includes all measurement and ITS-90 temperature conversion errors. PT100 Ro can be set to 100 $\Omega \pm 5\Omega$  to eliminate raw probe error.

12. Unless otherwise noted, specifications are valid after a 60-minute warm-up period and with a sine wave input. The specification is apply to a select time of 1s (7 bits).

13. For sine and square wave inputs  $\geq 100$  mV. For 10 mV to 100 mV inputs, multiply % reading error by 10.

14. Amplitude range is 10% to 120% below 750 ACV.



15. Square wave inputs are specified from 3 Hz - 1 MHz.

Measurement and Other Features	
DC voltage	
Input Resistance	200 mV , 2V and 20 V scale, 10M $\Omega$ or > 10G $\Omega$
	200 V and 1000 V scale, 10M $\Omega$ $\pm$ 2%
Input Bias Current	Testing < 30 pA, 25°C
Input Protection	DC 1000V or AC 750V, full scale
Common-mode Rejection Ratio	120dB (For the 1 k $\Omega$ unbalanced resistance of the LO lead, the maximum is $\pm$ 500 VDC.)
Resistance	
Measurement Mode	4-wire resistance or 2-wire resistance
Open-circuit Voltage	The maximum about 10V
The maximum Lead Resistance (4-wire)	200 $\Omega$ , 2k $\Omega$ scale of each lead is 10% scale, and all other ranges are 1k $\Omega$ per lead.
Input Protection	DC 1000V or AC 750V, full scale
DC current	
Current Divider	2 $\mu$ A, 20 $\mu$ A is adopted transresistance test
	200 $\mu$ A, 2 mA scale sampling the resistance 100 $\Omega$
	20 mA , 200 mA scale sampling the resistance 1 $\Omega$
	2 A, 10 A scale sampling the resistance 8 m $\Omega$
Input Protection	Internal 250mA, 250V fast-acting fuse and 10A, 250V fast-acting fuse
Continuity/Diode Test	
Measurement Mode	Use the constant current of 1 mA $\pm$ 5% to measure the resistance or voltage
Response Time	300 sampling/second
Beeper	$\sqrt{\quad}$
Continuity Threshold	Adjustable
Input Protection	DC 1000V or AC 750V
TRMS AC Voltage	
Measurement Mode	AC coupling TRMS measurement, the maximum DC bias is 400 V in arbitrary ranges
Crest Factor	Full scale, crest factor $\leq$ 5
Input Resistance	1M $\Omega$ $\pm$ 2% in parallel < 150 pF in full scale
Input Protection	Full scale 700Vrms
AC Filter Bandwidth	3Hz~300 kHz; 20Hz~300 kHz; 200Hz~300 kHz
Common-mode Rejection Ratio	70 dB (For the 1 k $\Omega$ unbalanced resistance and < 60 Hz of the LO lead, the maximum is $\pm$ 500 VDC.)
TRMS AC Current	
Measurement Mode	DC coupling to the resistance divider, AC coupling to TRMS measurement (AC component of measurement input)
Crest Factor	Full scale, crest factor $\leq$ 3
Maximum Input	Including RMS current of DC component < 10 A
Resistance Divider	0.008 $\Omega$ in 2 A and 10 A scale, 1 $\Omega$ in 20 mA and 200 mA scale, 100 $\Omega$ in 200 $\mu$ A and 2 mA scale

Input Protection	Internal 250m A, 250V fast-acting fuse and10A, 250V fast-acting fuse	
Frequency and Period		
Measurement Mode	Testing the frequency when timing the low frequency, counting the high frequency at the high frequency, AC coupling input, use AC voltage or AC current function	
Notes	All frequency counter introduces the error at low voltage and low frequency signal	
Capacitance Measurement		
Measurement Mode	Use the fixed current to charge the capacitance and measure the average rate of voltage rising	
Connecting Mode	2-wire	
Input Protection	Full scale, DC 1000V or AC 750V	
Arbitrary Sensor Measurement		
Measurement Mode	Thermocouple, DCV, DCI, Ω(2-wire/4-wire), frequency output type sensor , built-in thermocouple cold-end compensation	
Output Polarity	Positive/Negative	
Other	Preset ITS-90 transformer of B, E, J, K, N, R, S, T thermocouple and Pt100, Pt385 resistance temperature sensor convertor	
Frequency Response		
TRMS Measurement	AC voltage measurement, 300kHz	
Sampling and Trigger		
Maximum Testing Rate	10,000 rdgs/s	
Trigger Delay	Can set to 6 ms~10000 ms	
External Trigger	Input Level	TTL compatibility
	Trigger Condition	Rising edge/falling edge
Input	Input Resistance	> 20kΩ // 400pF (DC coupling)
	Minimum Pulse Width	50μs
VMC Output	Level	TTL compatibility (input ≥1kΩ load)
	Output Polarity	Positive/Negative
	Output Resistance	200Ω (typical)
	Pulse Width	About 1μ
Record Function		
Volatile Memory	History data record of 10k reading	
Nonvolatile memory	Total capacity of 32Gb Nand Flash for saving a large number of setting and data files of the instrument	
	Preset setting of 6 groups	
	Supports USB	
Mathematical Function		
Mathematical Function	Pass/Fail, relative, minimum/maximum/average, standard deviation, dBm, dB, Hold, histogram, tendency chart and bar chart	
Interface		
Interface type	USB Host, USB Device, LAN, RS-232C, GPIB (option)	

## 5. General Features

### Power

AC 90V~110V, 45~440Hz

AC 110V~132V, 45~440Hz

AC 200V~240V, 45~66Hz

AC 216V~264V, 45~66Hz

Power consumption: MAX 20W

### Machine Features

Size: 215mm\*88mm\*390.2mm (width x height x depth)

Weight: 3.39kg

Color: grey-white and grey

### Other Features

Full precision working environment: 0°C~28°C <90%; 28°C~40°C <75%; 40°C~55°C <50%  
(non-condensation)

Storage temperature: -20°C~70°C, <95%; Continuously powered on for at least 7 days

before use when save the instrument in high humidity environment

Altitude: ≤2000 meters

Shock and shake: MIL-T-28800E, CAT III, 5 class (only for sine wave)

Electromagnetic compatibility: Low voltage directive 2004/108/EC, EN61326-1:2013

Security: Low voltage directive 2006/95/EC, EN61010—1:2010

Remote interface: 10/100Mbit LAN, USB Device, USB Host, RS-232C, GPIB (option)

Programming language: SCPI and the latest mainstream multimeter command set

Pre-heat time: 30 minutes

## 6. Accessories

Article	Quantity	Remarks
UT8806E	1 piece	
Three-core power cable	1 piece	
Probe	1 pair	
USB connecting line	1 piece	
RS232 connecting line	1 piece	
Upper computer software	1 set	

## 7. Contact Us

UNI-T Technical Support Hotline: 400-876-7822

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