Thermal Imaging Multimeter

Thermal Imaging · True-RMS Multimeter

THERMAL IMAGING MULTIMETER · USER MANUAL

Model **ITM-1**



■ Thermal Imaging + Multimeter · Auto Hi/Lo Temperature Capture

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This manual describes the safe operation, functions and specifications of the ITM-1 thermal imaging multimeter — a 2-in-1 instrument combining an infrared thermal imager and a high-precision true-RMS multimeter. It features a 2.4-inch TFT display with one-key switching between thermal imaging and multimeter modes. The thermal imager auto-captures target temperatures with multiple display palettes; the multimeter offers a high-precision 25000-count display with waveform curve recording.

1 Safety

To avoid possible electric shock, fire or personal injury, read the safety precautions before use. Use the product only for its intended purpose, otherwise the protection provided by the product may be impaired.

- Before use, check the case for cracks or missing plastic and carefully inspect the insulation near the input terminals.

- Use the correct input terminals and correct settings, and measure within the specified ranges as described in this manual.
- Do not use the product around explosive gas or vapor, or in damp environments.
- Keep your fingers behind the finger guards of the test probes.
- Do not touch unused input terminals while the product is connected to a circuit under test.
- Disconnect the test leads from the circuit before changing the measurement mode.
- DC voltages above 36V or AC voltages above 25V may cause severe injury — avoid electric shock.
- Select the correct mode and range to avoid instrument damage or personal injury.
- Do not use the product with the front cover or rear cover removed.
- Low battery voltage may affect measurement accuracy; charge the battery promptly.
- Keep the device stable during use and avoid violent shaking.

2 Parts and keys

2.1 Panel description



Fig. 1 Instrument panel

The top of the body is the flashlight and the IR/visible-light camera; the front contains the 2.4-inch display and the keypad; the side is the USB port; the bottom is the multimeter measurement input.

2.2 Keypad

Key	Function
Power	Hold 2s to power on/off; short press toggles current measurement modes in multimeter mode
HOLD/REL	Short press enters/exits data hold; long press enters/exits relative-value mode
IR/DMM	Long press switches between multimeter and thermal imaging; short press adjusts IR/visible fusion in thermal mode; short press increases / moves up in settings

Palette	Adjusts the image palette in thermal mode; decreases / moves down in settings; toggles AC/DC voltage modes in multimeter mode
Back	Exits settings; toggles resistance, capacitance, diode and continuity modes in multimeter mode
MENU/OK	Short press opens settings and confirms values; long press toggles the flashlight during measurement
SAVE	Long press saves a screenshot of the measurement data; short press toggles the waveform curve in multimeter mode

3 Display description

3.1 Thermal imaging display

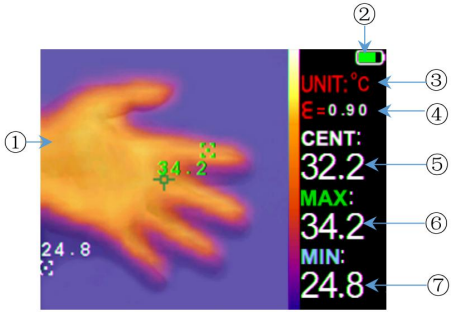


Fig. 2 Thermal imaging display

①	Image area	Shows the target as a thermal image and auto-captures the highest and lowest temperatures
②	Battery symbol	Shows the battery level and charging status
③	Temperature unit	Shows Celsius (℃) or Fahrenheit (℉)
④	Emissivity	Set according to the surface material of the target for accurate measurement (see the emissivity reference table in the appendix)
⑤	Real-time temperature	Shows the current real-time temperature
⑥	Maximum temperature	Shows the highest measured temperature
⑦	Minimum temperature	Shows the lowest measured temperature

3.2 Multimeter display

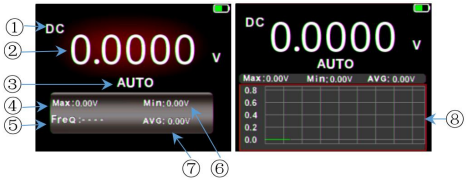


Fig. 3 Multimeter display

①	Measurement symbol	Shows the current measurement symbol: AC, DC, resistance, capacitance, diode or buzzer
②	Main reading	Shows the measured value, max 25000 counts
③	AUTO	Indicates auto ranging
④	Max	Shows the maximum value
⑤	FreQ	Shows the measured frequency value
⑥	Min	Shows the minimum value
⑦	AVG	Shows the average value
⑧	Waveform area	Automatically plots a waveform curve of the measured value to record signal changes

4 Thermal imaging

4.1 Temperature measurement

1. Determine the surface material of the target and set the corresponding emissivity (see the emissivity reference table in the appendix).
2. Switch to the thermal imaging screen and point the lens at the target.
3. Keep a distance of 0.25m to 2m between the lens and the target.
4. Observe the thermal image and read the temperature on the display.

4.2 Image mode switching

Press IR to switch the image mode as required: visible-light mode, visible + IR fusion mode, or IR mode.

4.3 Palette adjustment

Press the palette key to change the display colour as required: black & white, iron red, heat, or rainbow.

4.4 System settings

Press MENU to open the system settings, use the up/down arrows to select an item, then press MENU to confirm.

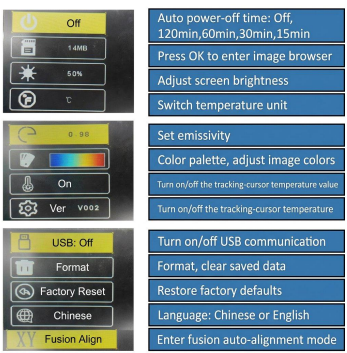


Fig. 4 Settings menu

Settings include: auto power-off (off, 15/30/60/120 min), image browsing, brightness, temperature unit, emissivity, palette, cursor temperature value, cursor temperature, USB communication, format, factory reset, language (Chinese/English), and fusion auto-alignment.

4.5 Fusion alignment calibration

When changing between close and long distance measurement, perform fusion alignment calibration to improve accuracy:

1. Press MENU to open the settings and page down to the last page.
2. Press OK to enter, then use the arrow keys to adjust the XY-axis fusion alignment.

4.6 Saving pictures

The instrument supports screenshot saving of thermal imaging and multimeter measurement data. Long-press SAVE to save; a progress prompt appears and the current screen is saved as an image with a sequential number in the Flash memory.

4.7 Browsing and transferring pictures

On the instrument: open the settings, select the memory menu and press OK, then select a picture to preview.

On a computer: enable USB communication in the settings and connect the instrument with the supplied cable; a DISK drive appears on the computer. Open the PICTURE folder to view the saved pictures, or copy them to the computer for analysis.

4.8 Firmware upgrade

1. With the instrument off, hold IR and press the power key; connect USB — a DISK of 15.7MB appears on the computer.
2. Open the disk, locate the firmware folder and copy the firmware file into it.
3. An upgrade progress bar appears — wait for it to complete; do not operate the instrument during the upgrade.

5 Multimeter functions

5.1 Input terminals

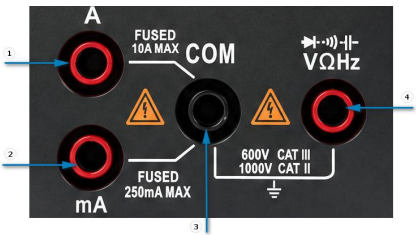


Fig. 5 Multimeter input terminals

①	A terminal	Input for current measurement (≤9.999A)
②	mA terminal	Input for current measurement (≤250mA)
③	COM terminal	Common (return) terminal for all measurements
④	VΩHz terminal	Input for AC/DC voltage, resistance, capacitance, frequency, continuity and diode measurements

5.2 Measuring AC/DC voltage

1. Insert the black lead into COM and the red lead into VΩHz.
2. Select the appropriate mode with the palette key: DC voltage, AC voltage, DC millivolt or AC millivolt.
3. Touch the correct test points of the circuit with the probe tips.
4. Read the voltage on the display.

a. Never exceed the rated maximum input, or the instrument may be damaged and personal injury may occur. b. When measuring high-voltage circuits, avoid contact with the high-voltage circuit.

5.3 Measuring AC/DC current

1. Insert the black lead into COM and the red lead into the 10A or mA terminal (choose the terminal according to its maximum rating and the estimated current).
2. Select the appropriate mode with the power key: DC current, AC current, DC milliamp or AC milliamp.
3. Break the circuit path, connect the leads in series and power up; read the current on the display.

> a. Never exceed the rated maximum input, or the instrument may be damaged and personal injury may occur. b. If the current is unknown, test via the A terminal first, then select the terminal and range according to the reading. c. Never apply voltage in the current modes.

5.4 Measuring resistance

1. Insert the black lead into COM and the red lead into VΩHz.
2. Press Back to select the resistance mode.
3. Touch the desired test points of the circuit with the probe tips.
4. Read the resistance on the display.

> a. Never apply voltage in this mode. b. Before measuring resistance, make sure all power in the circuit is off and all capacitors are fully discharged.

5.5 Continuity test

1. Insert the black lead into COM and the red lead into VΩHz.
2. Press Back to select the continuity mode.
3. Touch the two points of the circuit under test; the built-in buzzer sounds when a short circuit is detected.

a. Never apply voltage in the continuity and diode modes. b. Disconnect the circuit power and discharge all high-voltage capacitors before testing.

5.6 Diode test

1. Press Back to select the diode mode.
2. Connect the red probe to the anode and the black probe to the cathode of the diode, then read the forward voltage on the display. If the leads are reversed or the diode is defective, the display shows "OL".

Never apply voltage in the continuity and diode modes.

5.7 Capacitance measurement

1. Insert the black lead into COM and the red lead into VΩHz.
2. Press Back to select the capacitance mode.
3. Connect the red probe to the positive terminal and the black probe to the negative terminal of the capacitor.
4. Wait for the reading to stabilize, then read the capacitance on the display.

Disconnect the circuit power and discharge all high-voltage capacitors before testing.

6 Maintenance

Except for battery and fuse replacement, do not attempt to repair or modify the instrument unless you are qualified and have the corresponding calibration, performance-test and service instructions.

6.1 Cleaning

Clean the case with a damp cloth and mild detergent; do not use abrasives or solvents. Dust or moisture in the test terminals may affect reading accuracy.

> Remove all input signals before cleaning.

6.2 Charging the battery

When the low-battery symbol appears at the top-right of the display, charge the battery promptly:

1. Connect the TYPE-C cable to a DC 5V adapter.
2. Or connect the TYPE-C cable to a computer USB port.
3. A charging symbol is shown while charging.
4. A full-battery symbol is shown when fully charged.
5. During charging, the red indicator inside the power key lights up; it flashes or turns off when the battery is full.

6.3 Replacing the fuse

When the fuse blows or fails, replace it as follows:

1. Remove the test leads and power off before replacing the fuse.
2. Unscrew the four screws on the rear cover and remove it.
3. Remove the old fuse and install a new fuse of the same type.
4. Reinstall the rear cover and tighten the screws.

7 Specifications

7.1 General specifications

Item	Specification
Display (TFT)	2.4 inch, 320×240
Reading	25000 counts

Range	Auto/manual
Material	ABS+TPE
Sampling rate	3 readings/second
True RMS	Yes
Data hold	Yes
Backlight	Yes
Low battery indication	Yes
Auto power-off	Yes

7.2 Mechanical specifications

Item	Specification
Dimensions	149×76×33.5mm
Weight	193g (built-in battery)
Battery	2000mAh lithium battery ×1
Warranty period	One year

7.3 Environmental specifications

Item	Specification
Operating temperature	0~40℃
Operating humidity	<75%
Storage temperature	-20~60℃
Storage humidity	<80%

7.4 Multimeter specifications

Function	Range	Resolution	Accuracy
DC voltage (V)	2.5000V	0.0001V	±(0.05%+3)
	25.000V	0.001V	
	250.00V	0.01V	
	1000.0V	0.1V	
DC voltage (mV)	25.000mV	0.001mV	±(0.5%+3)
	250.00mV	0.01mV	
AC voltage (V)	2.5000V	0.0001V	±(0.5%+3)
	25.000V	0.001V	
	250.00V	0.01V	
	750.0V	0.1V	
AC voltage (mV)	25.000mV	0.001mV	±(0.8%+3)
	250.00mV	0.01mV	

AC voltage frequency response: 40Hz~1kHz

Function	Range	Resolution	Accuracy
DC current (A)	2.5000A	0.0001A	±(0.5%+3)
	10.000A	0.001A	
DC current (mA)	25.000mA	0.001mA	±(0.5%+3)
	250.00mA	0.01mA	
AC current (A)	2.5000A	0.0001A	±(0.8%+3)
	10.000A	0.001A	
AC current (μA/mA)	25.000mA	0.001mA	±(0.8%+3)
	250.00mA	0.01mA	

AC current frequency response: 40Hz~1kHz

Function	Range	Resolution	Accuracy

Resistance	250.00Ω	0.01Ω	±(0.5%+3)
	2.5000kΩ	0.0001kΩ	±(0.2%+3)
	25.000kΩ	0.001kΩ	
	250.00kΩ	0.01kΩ	
	2.5000MΩ	0.0001MΩ	±(1%+3)
	25.00MΩ	0.01MΩ	
	250.0MΩ	0.1MΩ	±(5.0%+5)
Capacitance	9.999nF	0.001nF	±(5.0%+20)
	99.99nF	0.01nF	±(2.0%+5)
	999.9nF	0.1nF	
	9.999μF	0.001μF	
	99.99μF	0.01μF	
	999.9μF	0.1μF	
	9.999mF	0.001mF	±(5.0%+5)
	99.99mF	0.01mF	
Frequency	9.999Hz	0.001Hz	±(2.0%+2)
	99.99Hz	0.01Hz	±(0.1%+2)
	999.9Hz	0.1Hz	
	9.999kHz	0.001kHz	
	99.99kHz	0.01kHz	
	999.9kHz	0.1kHz	
Diode	√		
Continuity	√		

7.5 Thermal imaging specifications

Feature	Specification

IR resolution	32×32
Spectral band	8~14μm
Emissivity	0.10~1.00 adjustable
Frame rate	7 frames/second
Field of view (FOV)	33°(H)×33°(V)
Focus	Auto focus
Minimum focus distance	0.25m
Effective measuring distance	≤2m
Temperature range	-20~550℃
Accuracy	±2℃ or 2%
High/low temperature	Auto capture
Measurement point	Centre point
Measurement regions	3 (max, real-time, min)
Display	2.4 inch TFT
Display resolution	320×240
Imaging mode	IR + visible light
Palettes	B&W, iron red, heat, rainbow
Image format	BMP
Capture and browse	Supported
USB interface	Type-C
Firmware upgrade	Supported
Power supply	3.6V~4.2V lithium battery
Charging	USB port, 5V
Charging time	Approx. 3 hours
Battery life	>6 hours

7.6 Appendix Emissivity reference table

Material	Specification	Emissivity	Material	Specification	Emissivity
Aluminium	Oxidized	0.20~0.4	Human skin		0.98
Aluminium	Polished	0.02~0.04	Graphite	Oxidized	0.20~0.60
Copper	Oxidized	0.40~0.80	Plastic	Thickness > 0.5mm	0.95
Copper	Polished	0.02~0.05	Plastic		0.85~0.95
Gold		0.01~0.10	Rubber		0.95
Iron	Oxidized	0.60~0.90	Textiles		0.90~0.95
Steel	Oxidized	0.70~0.90	Concrete		0.95
Asbestos		0.95	Cement		0.96
Plaster		0.80~0.90	Soil		0.90~0.98
Asphalt		0.95	Mortar		0.89~0.91
Ceramics		0.95	Brick		0.93~0.96
Wood		0.90~0.95	Marble		0.94
Charcoal	Powder	0.96	Glass	Tableware	0.85~0.92
Lacquer	Polished	0.80~0.95	Paper	All colours	0.94
Lacquer	Unpolished	0.97	Sand		0.9
Carbon gum		0.9	Gravel		0.95
Water		0.93	Soap bubble		0.75~0.80
Ice		0.96~0.98	Snow		0.83~0.90

8 Warranty

This product is covered by a one-year warranty from the date of purchase. The warranty does not cover the fuse (blown), general accessories, or damage caused by accidents, negligence, misuse, modification, contamination or abnormal operating conditions.

If the instrument freezes or malfunctions during use, restart it.

9 Compliance

9.1 Waste disposal and environmental protection (WEEE)

This product must not be disposed of as unsorted municipal waste. To minimize potential pollution to the environment and risks to human health, separate this product from other waste and recycle it responsibly through an authorized local recycling facility.

9.2 Directives and standards

This product complies with the relevant EU directives and standards for CE certification.

Notes