INSTRUCTION MANUAL

MT784

1500V DC THERMAL CLAMP METER WITH DATA LOGGER & MOBILE APP

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1. INTRODUCTION

The MT784 is a CAT IV 600V True RMS 1000A AC/DC digital clamp meter incorporating an 80 x 80 pixel Thermal Imager with a range from -20°C to 260°C. This clamp meter has a large 6000 count colour TFT LCD display that provides fast sampling times and high accuracy measurements. The meter has been designed to measure 1500V DC purposely for the Solar industry, 1000V AC, K-Type temperature, frequency, capacitance, AC+DC Voltage and resistance measurements, plus the Low Z range function has a low pass filter to eliminate errors caused by "Ghost" voltages. The 100ms Inrush current detects starting up currents of electric motors, input surge current, or switch-on surge currents, this is the maximum instantaneous input current drawn by an electrical device when first turned on.

The meter has a built-in record and store function and displays trend capture, using the Bluetooth function the meter wirelessly transmits data to the Android or iOS mobile App allowing the user to view, save, organise and share recordings. Added features is Non-Contact voltage detection, Peak Hold, Min/Max and Average, Data hold function and a built-in flashlight for dimly lit areas. The double injection moulded housing is IP65 waterproof.

2. SAFETY

2.1. Safety Information

This symbol adjacent to another symbol, terminal or operating device indicates that the operator must refer to an explanation in the Operating Instructions to avoid personal injury or damage to the meter.

WARNING This WARNING symbol indicates a potentially hazardous situation, which if not avoided, could result in death or serious injury.

CAUTION This CAUTION symbol indicates a potentially hazardous situation, which if not avoided, may result damage to the product.

This symbol advises the user that the terminal(s) so marked must not connected to a circuit point at which the voltage with respect to earth ground exceeds (in this case) 1000 VAC or VDC.

This symbol adjacent to one or more terminals identifies them as being associated with ranges that may, in normal use, be subjected to particularly hazardous voltages. For maximum

safety, the meter and its test leads should not be handled when these terminals are energized.


This symbol indicates that a device is protected throughout by double insulation or reinforced insulation.

2.2. Per IEC1010 Overvoltage Installation Category
Overvoltage Category I
Equipment of OVERVOLTAGE CATEGORY I is equipment for connection to ciruits in wchich measures are taken to limit the transient overvoltages to an appropriate low level.
Note: Examples include protected electronic circuits.

Overvoltage Category II
Equipment of OVERVOLTAGE CATEGORY II is energy-consuming equipment to be supplied from the fixed installation.
Note: Examples include household, office, and laboratory appliances.

Overvoltage Category III
Equipment of OVERVOLTAGE CATEGORY III is equipment in fixed installations.
Note: Examples include switches in the fixed installation and some equipment for industrial use with permanent connection to the fixed installation.

Overvoltage Category IV
Equipment of **Overvoltage Category IV** is for use at the origin of the installation.
Note: Examples include electricity meters and primary over-current protection equipment.

2.3. Safety Instructions
This meter has been designed for safe use, but must be operated with caution. The rules listed below must be carefully followed for safe operation. Never apply voltage or current to the meter that exceeds the specified maximum:

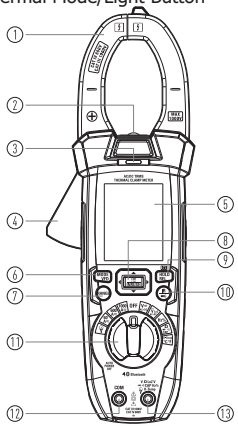
Function	Maximum Input
V DC/AC	1500VDC/1000VAC RMS
A AC/DC	1000ADC/AC RMS
Frequency, Resistance, Capacitance, Duty Cycle, Diode Test, Continuity	1000VDC/AC RMS
Temperature	1000VDC/AC RMS
Surge Protection	8kV peak per IEC 61010

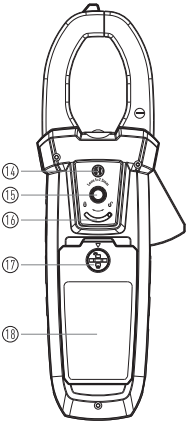
- Use extreme caution when working with high voltages.
- Do not measure voltage if the voltage on the "COM" input jack exceeds 1000V above earth ground.
- Never connect the meter leads across a voltage source while the function switch is in the current, resistance or diode mode, doing so can damage the meter.
- Always discharge filter capacitors in power supplies and disconnect the power when making resistance or diode tests.
- Always turn off the power and disconnect the test leads before opening the covers to replace the fuse or batteries.
- Never operate the meter unless the back cover and the battery and fuse covers are in place and fastened securely.
- If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

3. DESCRIPTION

3.1. Meter Description

1 - Current Clamp
2 - Work Light
3 - Non-Contact Voltage Indicator
4 - Clamp Trigger
5 - LCD Display
6 - MODE/VFD Button
7 - RANGE Button
8 - INRUSH/Menu Button
9 - Hold/Relative Button
10 - Thermal Mode/Light Button
11 - Rotary Function Switch
12 - COM(-) Probe Input Jack
13 - Positive(+) Probe Input Jack for all Inputs Except A and mA
14 - Laser
15 - Thermal Imager Len
16 - Len Cover
17 - Battery Cover Lock
18 - Battery Cover





3.2. Understanding the Push Buttons

The 9 push buttons on the front of the Meter activate features that augment the function selected using the rotary switch, navigate menus or control power to Meter circuits.

3.2.1. Cursor Buttons: MAX ◄ REL ▲ PEAK ►

Select an item in a menu, adjust display contrast, scroll through information, and perform data entry.

"REL ▲" Use Navigation UP buttons select PEAK function.
"MAX ◄" Use Navigation Left buttons to select REL function.
"PEAK ►" Use Navigation Right buttons select MAX function.

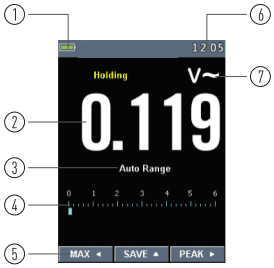
3.2.2. Physical Buttons:

"HOLD/REL" Freezes the present reading in the display and allows the display to be saved.
"MODE/VFD" Press the MODE key to switch the functions.
"RANGE" Press the RANGE key to manual range.
"IR/■≋" Press the IR key to switch DMM Mode and IR+DMM Mode.
"INRUSH/Menu" Enter function of the MENU or INRUSH selects.

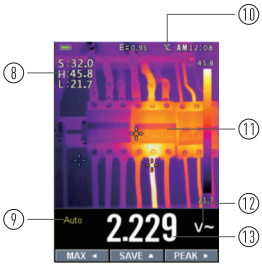
3.3. Understanding the Display

3.3.1. Measurement on LCD Display

1 - Indication of Battery Charge Level
2 - Indication of Measuring Result
3 - Indication of Automatic/Manual Mode
4 - Analogue Bargraph
5 - Indications Associated with Function Keys
6 - Indication of the system's Time
7 - Indication of Measuring Unit
8 - Temperature Measuring Result
9 - Indication of Automatic/Manual Mode
10 - Temperature Unit
11 - IR Camera
12 - Indication of Measuring Unit
13 - Indication of Measuring Result



Clamp Meter Mode



IR+Clamp Meter Mode

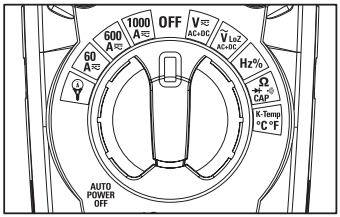
3.3.2. Icons on LCD Display

⚡	Voltage is over 30V (AC or DC)	~	AC Voltage or Current
⚠	Warming	⎓	DC Voltage or Current
	Flexible Coils	≂	AC+DC Voltage or Current
	Traditional Clamps	)))	Continuity Function
△	Relative	→|	Diode Function
⎍	High Edge Time	Ω	Ohms
VFD	Variable Frequency Driver	LoZ	VFD Loz Low Impedance Mode
	Inrush Current		

3.4. Understanding the Rotary Switch

- Select a primary measurement function by positioning the rotary switch to one of the icons around its perimeter.
- For each function, the Meter presents a standard display for that function (range, measurement units, and modifiers).
- Button choices made in one function do not carry over into another function.

V≂AC+DC	DC and AC+DC Voltage Measurement
V~LoZ	Low Impedance Mode AC voltage Measurement
Hz%	Frequency and Duty Measurement
Ω→•))CAP	Resistance, Diode Test, Capacitance and Continuity Measurement
K-Temp °C°F	Temperature Measurement
60A	AC and DC 60 Amps Clamp Current Measurement
600A	AC and DC 600 Amps Clamp Current Measurement
1000A	AC and DC 1000 Amps Clamp Current Measurement
	Flexible Coils Current



4. CLAMP METER MEASUREMENT AND SETUP

4.1. DC Voltage Measurement

CAUTION: Do not measure DC voltages if a motor on the circuit is being switched ON or OFF, Large voltage surges may occur that can damage the meter.

1. Set the function switch to the **V** ⎓ Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Press the **MODE** key to switch the **VDC** Voltage functions.
5. Read the voltage in the display.

4.2. AC+DC Voltage Measurement

CAUTION: Do not measure DC voltages if a motor on the circuit is being switched ON or OFF, Large voltage surges may occur that can damage the meter

1. Set the function switch to the **V** ⎓ Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Press the **MODE** key to switch the **V AC+DC** Voltage functions.
5. Read the AC+DC voltage on the display.

4.3. AC Voltage Measurement

WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

CAUTION: Do not measure AC voltages if a motor on the circuit is being switched ON or OFF, large voltage surges may occur that can damage the meter.

1. Set the function switch to the **V~** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Read the voltage on the display.

4.4. Frequency Measurement

1. Set the function switch to the **Hz%** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Read the Frequency in the display.
5. Press the **MODE** key to switch the **Duty(%)** functions.
6. Read the Duty on the display.

4.5. LoZ AC Voltage Measurement

WARNING: Risk of Electrocution. The probe tips may not be long enough to contact the live parts inside some 240V outlets for appliances because the contacts are recessed deep in the outlets. As a result, the reading may show 0 volts when the outlet actually has voltage on it. Make sure the probe tips are touching the metal contacts inside the outlet before assuming that no voltage is present.

CAUTION: Do not measure AC voltages if a motor on the circuit is being switched ON or OFF, large voltage surges may occur that can damage the meter.

1. Set the function switch to the **V~LoZ** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Read the voltage on the main display.

4.6. Resistance Measurement

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements, remove the batteries and unplug the line cords.

1. Set the function switch to the **Ω CAP** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Read the resistance on the display.

4.7. Continuity Check

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements, remove the batteries and unplug the line cords.

1. Set the function switch to the **Ω**))) ⇥| **CAP** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Press the **MODE** key to switch the continuity functions.
5. If the resistance is less than approximately 50Ω, the audible signal will sound.
6. If the circuit is open, the display will indicate "**OL**".

4.8. Diode Test

1. Set the function switch to the **Ω**))) **⇥ CAP** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Press the **MODE** key to switch the Diode functions.
   - Forward voltage will typically indicate 0.400 to 3.000V.
   - Reverse voltage will indicate "**OL**".
   - Shorted devices will indicate near 0V and an open device will indicate "**OL**" in both polarities.

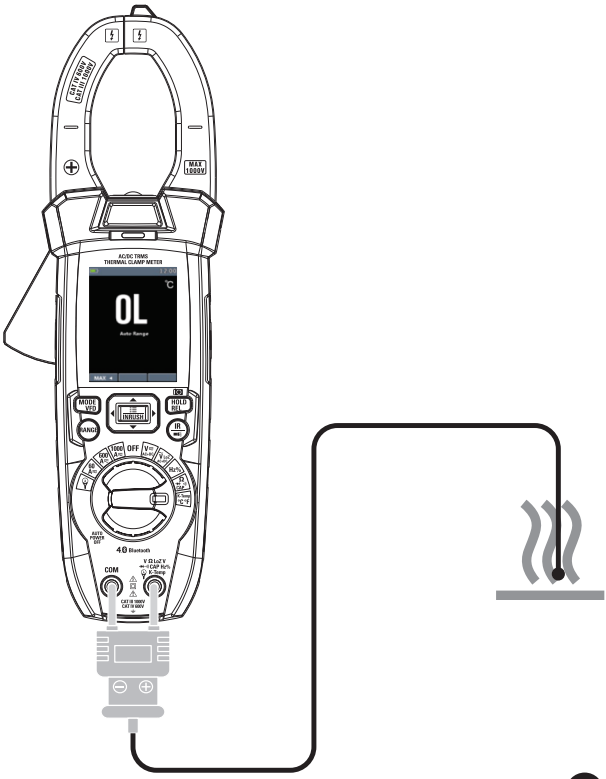
4.9. Capacitance Measurement

WARNING: To avoid electric shock, disconnect power to the unit under test and discharge all capacitors before taking any resistance measurements, remove the batteries and unplug the line cords.

1. Set the function switch to the **Ω**))) ⊣⊢ **CAP** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Press the **MODE** key to switch the Capacitance functions.
5. Read the Capacitance value on the Display.

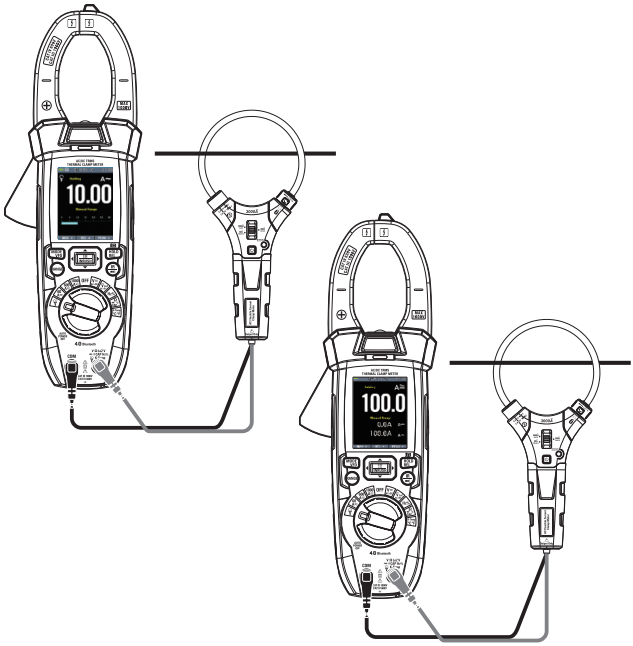
4.10. Temperature Measurement

1. Set the function switch to the **Temp °C°F** Position.
2. Insert the Temperature Probe into the input jacks, making sure to observe the correct polarity.
3. Read the Temperature on the display.
4. Press the **MODE** key to switch the Unit (°C or °F).



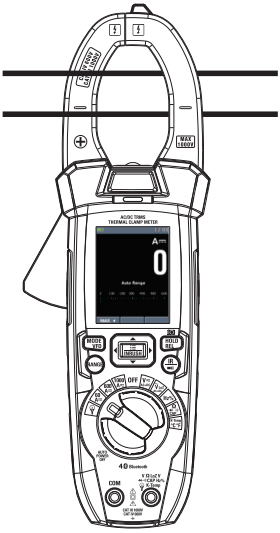
4.11. Flexible Coil Current Measurement (MT740 Optional)

1. Set the function switch to the **Flexible Coil** Position.
2. Insert the black test lead banana plug into the negative **COM** jack.
3. Insert the red test lead banana plug into the **Positive** jack.
4. Read the current in the display.
5. Press the **MODE** key to switch the AC and AC+DC Current.
6. Press the **RANGE** key to switch range: 1000mA, 10A, 30A, 40A, 100A, 300A, 400A, 1000A, 3000A.
7. The current measurement of flexible coil has only three ranges, which are AC 30.00A; AC 300.0A; AC 3000A.

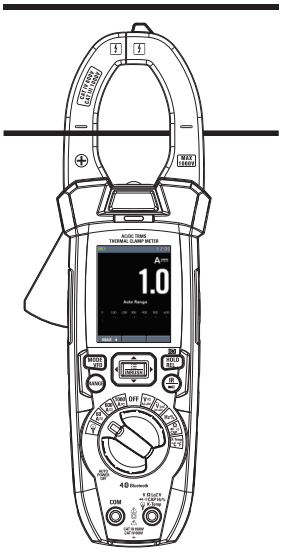


4.12. DC Clamp Current Measurement

1. For current measurements up to **60A** DC, set the function switch to the **60A** Position.
2. For current measurements up to **600A** DC, set the function switch to the **600A** Position.
3 For current measurements up to **1000A** DC, set the function switch to the **1000A** Position.
4. Press the MODE button to indicate " ⎓ " on the display.
5. **REL** Key to remove the dynamic zero.
6. Clamp the cable to be measured.
7. Read the current on the display.



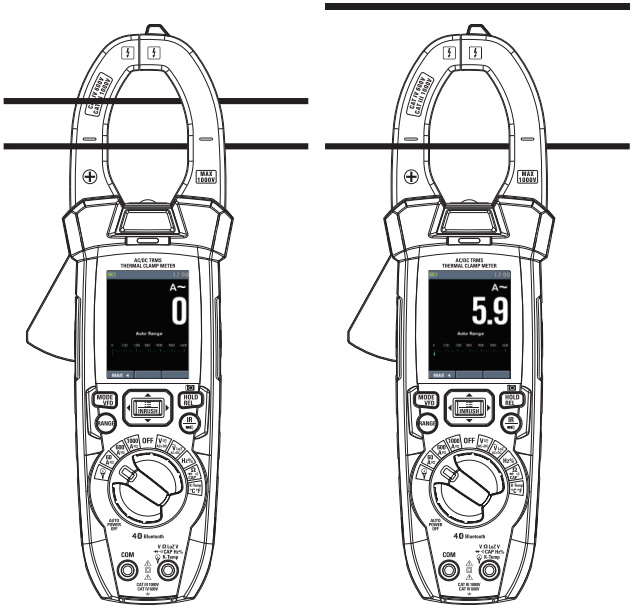
NO



YES

4.13. AC Clamp Current Measurement

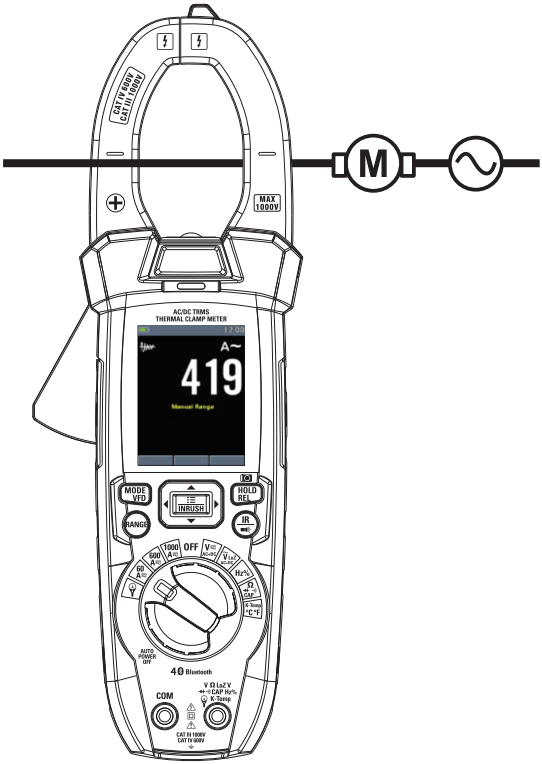
1. For current measurements up to **60A** AC, set the function switch to the **60A** Position.
2. For current measurements up to **600A** AC, set the function switch to the **600A** Position.
3 For current measurements up to **1000A** AC, set the function switch to the **1000A** Position.
4. Clamp the cable to be measured.
5. Read the current on the display.



NO **YES**

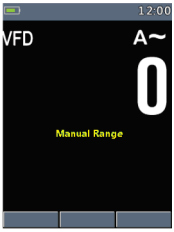
4.14. Inrush Current Measurement

1. Set the function switch to the **60A** or (**600A ,1000A**) Position.
2. Press the **INRUSH** Button (Enter key 2 second) to indicate " ⁓ " on the display, Then measurement display "**----**".
3. Clamp the cable to be motor.
4. Start the motor.
5. Read the inrush current on the display.



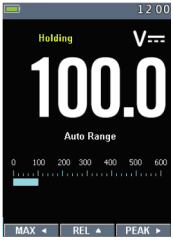
4.15. VFD Mode

1. Set the function switch to the **60A** or (**600A, 1000A**) Position to AC Current measurement, or switch to the **V** ≂ Position to AC Voltage measurement.
2. Press the **MODE/VFD** Button (2 second) to indicate "**VFD**" on the display, to variable frequency driver measurements.
3. Read measurement on the display.



4.16. Hold Mode

- To freeze the display for any function, press the **HOLD** key.
- Press the **HOLD** key to release the freeze mode.



4.17. Capturing Minimum and Maximum Values

- The MAX/MIN Record mode captures minimum and maximum input values.
- When the input goes below the recorded minimum value or above the recorded maximum value, the Meter beeps and records the new value.
- This mode is for capturing intermittent readings, recording minimum and maximum readings unattended, or recording readings while equipment operation precludes watching the Meter.
- To activate the MAX/MIN mode, press the "◀" key.
- If the meter is already in MAX/MIN function, press "◀" to turn off MAX/MIN function.

4.18. Relative Values

- REL key can be used as the "**ZERO**" function of DC current as well as relative value measurement of other functions.
- Hold down the **HOLD/REL** key to enter REL function.
- Hold down this key to quit REL.

4.19. Capturing Peak Values

- To activate the peak mode, press the "▶" key.
- If the Meter is already in the peak function, press "▶" to turn off the peak mode.

4.20. Non-Contact AC Voltage Detector (100 to 1000V AC)

WARNING: Risk of Electrocution, before use, always test the Voltage Detector on a known live circuit to verify proper operation.

WARNING: Insulation type and thickness, distance from the source, and other factors may effect operation, always verify live voltage using other methods before working on electrical circuits.

- The non-contact voltage detector operates when the meter is set to any measuring function.
- The detector does not operate when Auto Power Off turns the meter off or when the rotary function switch is set to the off position.
- Slowly move the detector probe closer to the conductor being tested.
- If AC voltage within the specified range is present, the indicator light will illuminate.

Notes: The detector is designed with high sensivity, static electricity and other sources of electrical energy may randomly activate the detector. This is normal operation, the detector only activates the indicator light when AC voltage is present, it does not indicate the voltage level on the LCD display.

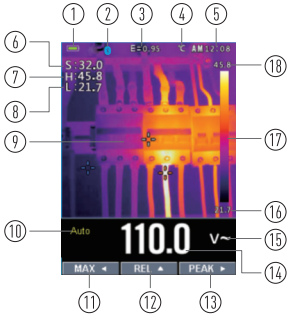
5. THERMAL IMAGER AND CLAMP METER OPERATION

5.1. Thermal Imager Basics

In the Thermal Imaging and Clamp Meter mode, the user can measure a targeted surface's temperature and use the Multimeter at the same time, the measured result will display under the thermal image.

- Press the red "**IR**" Button to open the Thermal Imager, in Fig the thermal image is set to colour palette IRON.
- Select other palettes in the Menu Settings.
- Open the protective lens cover on the back of the meter.

1. The Battery capacity indicator.
2. Bluetooth icon, if this icon is displayed, the Bluetooth is accessible.
3. The currently selected Emissivity value. Use the Thermal Settings Menu to change the Emissivity value.
4. The temperature unit icon, use the Thermal Settings Menu to select "°C,°F, K".
5. Current time Display
6. Center cross of the thermal imager temperature measurement, represents the center spot temperature of the scene.
7. Highest temperature spot of the thermal imager temperature measurement, represents the highest spot temperature of the scene.
8. Minimum temperature spot of the thermal imager temperature measurement, represents the Minimum spot temperature of the scene.
9. Current scene on the thermal image frame.
10. Range icon of the meter.
11. Max soft button.
12. REL soft button.
13. PEAK soft button.
14. DMM measurement is shown below the thermal image.
15. Unit of the meter.
16. Lowest reading measured in the current frame.
17. The Thermal scale shows the range colour for thermal images, The lighter the colour, the warmer the temperature; the darker the colour, the cooler the temperature.
18. Highest reading measured in the current frame.



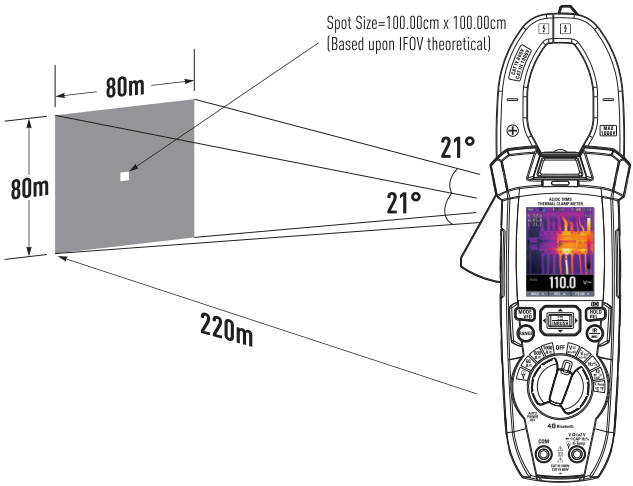
5.2. Using the Thermal Imager

For basic operation follow these steps:

1. Set the function switch to any position.
2. Press the "**IR**" button to switch the thermal imager ON, Target the object by the thermal imager lens.
3. The display will show the temperature measurement in the upper left hand corner for the targeted area along with the currently selected Emissivity value.
4. In the Thermal imaging mode, the laser pointer and display cross hairs can be used to assist in targeting, these tools can be switched on or off in the setting menu.
5. In the Thermal imaging mode, the highest temperature will be auto marked by a red cross, and the lowest temperature will be auto marked by a blue cross, the two spots can be switched on or off in the setting menu.
6. In the Thermal imaging mode, the meter continues to operate normally as a multimeter allowing any of the electrical functions to be used.
7. Press the HOLD Button to hold the thermal image frame, then hold down the HOLD Button, you will capture the screen and save a bitmap with measure data into SD card, the saved bitmap later can be analysed by the PC software or smart phone APPs.
8. The thermal imager's FOV (Field of view) is 21 by 21 degrees.
9. FOV is the largest area that your imager can see at a set distance.
10. This table lists the horizontal FOV, vertical FOV and IFOV for lens.

Focal Length	**Horizontal FOV**	**Vertical**	**FOV IFOV**
7.5mm	21°	21°	4.53mrad

- **IFOV** (Instantaneous Field of View) is the smallest detail within the FOV that can be detected or seen at a set distance, the unit is rad, The formula is this: IFOV = (Pixel Size)/(Lens focal length)
- D:S theoretical (= 1/IFOV theoretical) is the calculated spot size based on the pixel size of the Thermal Imager detector array and lens focal length.
  Example: If Thermal Imager uses 9mm lens, because the Pixel size of detector is 34um.
- Horizontal FOV is 21°, Vertical FOV is 21°, the IFOV is 34um/7.5mm = 4.53mrad; D:S theoretical (=1/IFOV theoretical) = 220:1.
- D:S measure (=1/IFOV measure) is the spot size needed to provide an accurate temperature measure; Typically D:S measure is 2 to 3 times smaller than D:S theoretical, which means the temperature measurement area of the target need to be 2 to 3 times larger than that determined by the calculated theoretical D:S.

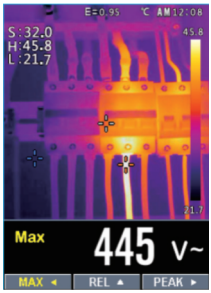


5.3. Using the Clamp Meter with the Thermal Imager

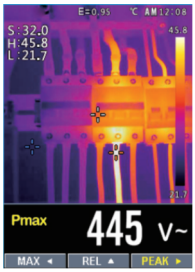
On IR+Clamp Meter mode, MODE key, RANGE key, HOLD key and REL Function is the same in Clamp Meter mode.

5.3.1. Capturing MAX/MIN Values on IR+Clamp Meter Mode

1. To activate the maximum in mode, press the "◀" key to display the max value.
2. If the Meter is already in the maximum function, then press the "◀" key to display the min value, then press the "◀" key to display the current measurement value. Next press "◀" key to return to the max value.
3. Press and hold the "◀" key for more than 1 second to turn the Meter off maximum.



5.3.2. Capturing Peak Values on IR+Clamp Meter Mode

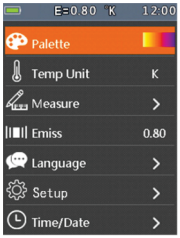


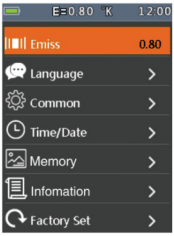
1. To activate the peak mode, press the "▶" key to display the Peak max value.
2. If the Meter is already in peak function, then press the "▶" key to display Peak min value, then press the "▶" key to display the current measurement value. Next press "▶" key to return to the Peak max value.
3. Press and hold the "▶" key for more than 1 second to turn the meter off peak mode.

6. SETTINGS MENU

6.1. Using Settings Menus

- Press **MENU** button to open the Settings Menus, as show below.



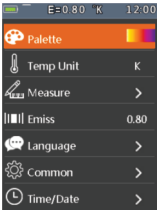


- Press **UP/DOWN** button to select the menu item or change the value of the current focus item.
- Press **RIGHT/MENU** button to enter the sub menu or set focus on the current selected item.
- Press **LEFT** button to return to the previous menu.
- If you want to exit the settings menu, press **MODE/RANGE/HOLD/IR** button or press the **LEFT** button in the root menu.

6.2. Settings Details

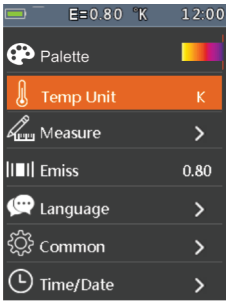
6.2.1. Palette Mode

- Thermal imager has five kinds of palette, such as: "
- Press **RIGHT/MENU** button to select one of the display colour palettes.



6.2.2. Temp Unit

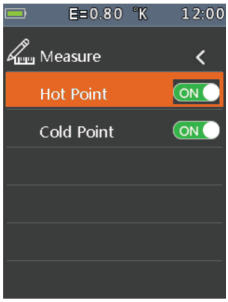
- Press **RIGHT/MENU** button to set focus on this option and the colour of option value will change to black °C.
- In focus state, use the **RIGHT/MENU** Button to toggle °C, °F and K, use **LEFT/RIGHT/MENU** button to exit focus state and the colour of option value will change white K.



6.2.3. Measure

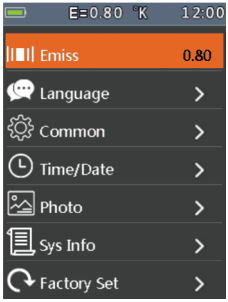
- Press **RIGHT/MENU** button to enter measure menu.
- Two selections are available: Hot Point and Cold Point, Press RIGHT/MENU button to set or select item on or off.

Hot Point: This option enables the thermal imager to automatically detect the highest temperature point.
Cold Point: This option enables the thermal imager to automatically detect the lowest temperature point.



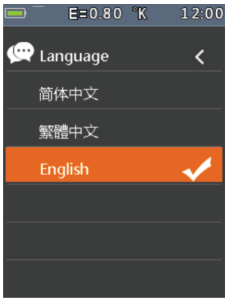
6.2.4. Emissivity

- Press the **RIGHT/MENU** button to set focus on this option.
- In focus state, use **UP/DOWN** Button to increase or decrease emissivity's value, use **LEFT/RIGHT/MENU** Button to exit focus state.
- The available range is 0.01 to 0.99 in 0.01 steps.



6.2.5. Language

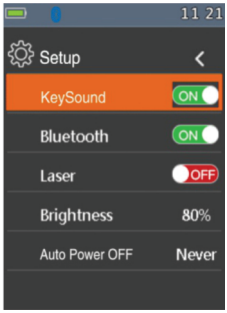
- Press **RIGHT/MENU** Button to enter the language menu.
- Three options are available: Simplified Chinese, Traditional Chinese and English.
- Use **UP/DOWN** Button to select language and use **RIGHT/MENU** Button to set selected language to be valid.



6.2.6. Setup

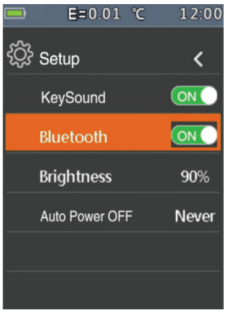
- Press the **RIGHT/MENU** Button to enter Setup menu.
- Five options are available: **Beep, Bluetooth, Laser, Brightness and Auto Off.**

Beep: Use the **RIGHT/MENU** button to set beep on or off.
Bluetooth: Use the **RIGHT/MENU** button to set bluetooth power on or off.
Laser: Use the **RIGHT/MENU** button to set laser pointer on or off.
Brightness: Press the **RIGHT/MENU** button to set focus on this option. In focus state, use the **UP/DOWN** button to change the LCD's brightness, use the **LEFT/RIGHT/MENU** button to exit focus state. The available brightness range is 100% to 10% in 10% steps.
Auto Off: Press the **RIGHT/MENU** button to set focus on this option. In focus state, use the **UP/DOWN** button to choose the time period after which the meter enters the sleep mode.

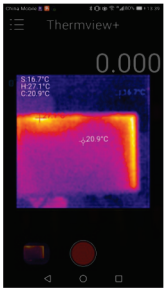


6.2.7. Bluetooth Connect

1. Turn on the Bluetooth function on the instrument.



2. Turn on the bluetooth of the smart phone, press the icon Thermview+ and enter into the home interface, then press Connect Device icon on the Home interface, bluetooth device name will appear.

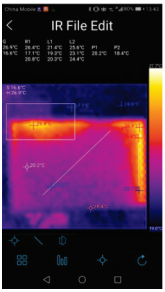


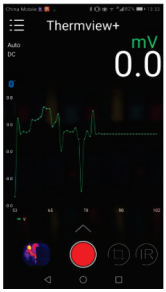
3. Touch the device name listed on the Bluetooth device list to connect the device.

The detail information about Thermview+, please refer to Thermview+ APP help file.

Thermview+ for Android: Please search in Google Play with keyword "Thermview+", download and run.

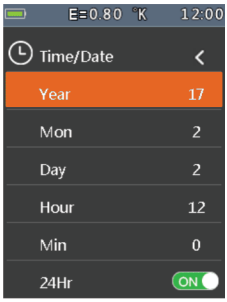
Thermview+ for iOS: Please search in Apple Store with keyword "Thermview+", download and run.





6.2.8. Time/Date

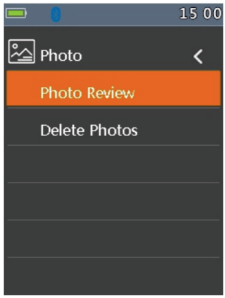
- Press the **RIGHT/MENU** Button to enter time menu.
- In this menu, year, month, day, hour, minute and time format can be set.
- The changes take effect after exiting settings menu.



6.2.9. Photo

- Press the **RIGHT/MENU** Button to enter photo menu.
- Two options are available: Photo Review and Delete Photo.

Photo Review: Press the **RIGHT/MENU** Button to enter image browser function, and exit settings menu immediately.

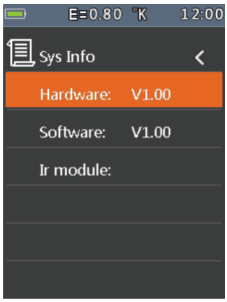


Delete Photo: After pressing the **RIGHT/MENU** Button, dialog box will be displayed as shown.

Warning: Select "**YES**", will delete all the photos in the memory card which captured by user.

6.2.10. System Info

- Press the **RIGHT/MENU** Button to enter system information menu.
- This menu contains the software version, hardware version and thermal imager version.

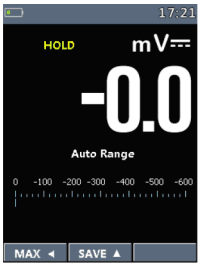


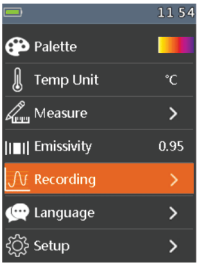
6.2.11. Factory Set

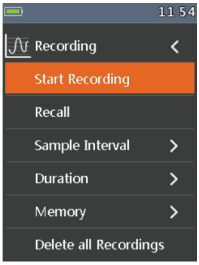
- When selecting the Factory Set option, after pressing the **RIGHT/MENU** button, a dialog box will be displayed as shown.
- Select "YES" Button, system parameter will be reset.

6.3. Record Measurements

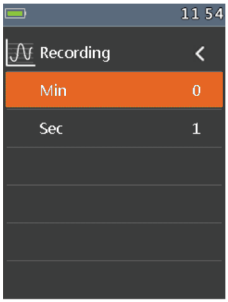
- With a measurement on the display, press the Menu key to enter the instrument's general menu.
- The screen is shown on the display, press the Button "▲" or "▼" key to select record Item.
- Press the button "▶" Enter Record Menu.



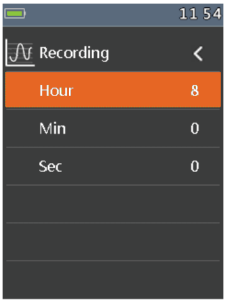




- In Record Menu, press the Button "▲" or "▼" key to select Sample Interval Item or Duration Item.
- Press the Button "▶" Enter Record setting, Then Press the Button "▲" or "▼" to adjust time.



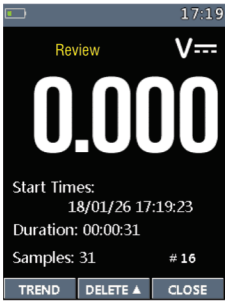
Setting of sampling interval from 1s to 59min: 59s.



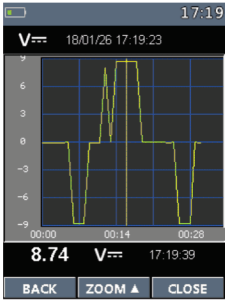
Setting of recording duration from 1min to 9h: 59min.

- In Record Menu, press the Button "▲" or "▼" key to select Start record Item.
- Press the Button "▶" Enter Save Record measurement.
- In Save Record measurement, Press the Button "▶" to stop record and Press the Button "▲" Save.

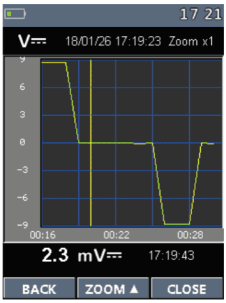
- In Record Menu, Press the Button "▲" or "▼" key to select Review Item.
- Press the Button "▶" Enter View Record measurement.



- Press the Button MODE key to Trend record, and Press the Button "◀" or "▶" key to select previous record measurement or next record measurement.
- And press the ESC key to exit view record measurement.



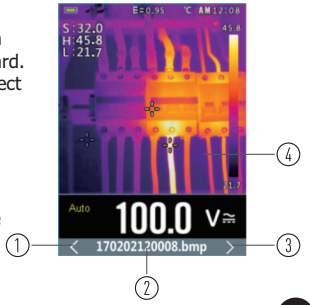
- In Record View Display, press the "◀" or "▶" key to move the cursor on the graph.
- And the button "▲" to activate the Zoom function of the graph, increasing resolution (symbol "Zoom Xy" where y=max zoom dimension appears at the top of the display on the right side).
- You can zoom X1 for at least 10 measuring points, X2 for at least 20 measuring points, X3 for at least 40 measuring points and so on for maximum 6 zooming operations.



- In Record Menu, press the button "▲" or "▼" key to select Delete all Recordings Item.
- Press the button "▶" Enter Delete Box, and select Yes or No.

7. Image Browser

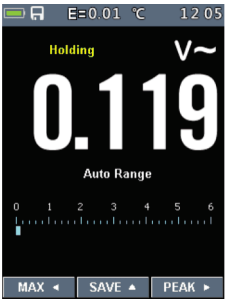
- In Image Browser mode, the user can browse the pictures in the memory card.
- Press the **LEFT/RIGHT** button to select prev or next picture.
- Press any other keys to exit Image Browser mode.

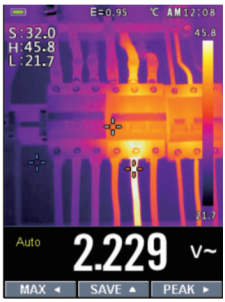


1. LEFT Key Instruction
2. Current Displayed Picture's File name
3. RIGHT Key Instruction
4. Picture Display Area

7.1. How to Capture a Screen

- When in clamp meter mode or thermal imaging+clamp meter mode, use the **HOLD** button to enter hold mode, as shown below.
- Then press the **UP** Button to capture screen.
- After saving to TF card completely, Clamp Meter will exit hold mode.





8. SPECIFICATIONS

8.1. General Specifications

Basic Functions	Range
Reference Standards	
Safety	IEC/EN61010-1
EMC	IEC/EN 61326-1
Insulation	Double Insulation
Pollution Level	2
Overvoltage Category	CAT IV 600V, CAT III 1000V
Max Operating Altitude	2000m (6562ft)
Power Supply	
Battery Type	1 x 7.4V Rechargeable Li-ion Battery, 1200mAh
Battery Charger Power Supply	100/240VAC, 50/60Hz, 12VDC, 2A
Low Battery Indication	Symbol "▭" on the Display
Auto Power Off	After 15 to 60 minutes idling (May be disabled)
Display	
Conversion	TRMS
Characteristics	Colour TFT, 6000 Dots with Bargraph
Sampling Frequency	3 times/s
Environmental Conditions for Use	
Reference Temperature	18 to 28°C (64 to 82°F)
Operating Temperature	5 to 40°C (41 to 104°F)
Allowable Relative Humidity	<80%RH
Storage Temperature	-20 to 60°C (-4 to 140°F)
Storage Humidity	<80%RH

8.2. Thermal Imager Specifications

Function	Range
Field of View (FOV)/ Minimum Focus Distance	21° x 21°/0.5m
Spatial Resolution (IFOV)	4.53mrad
IR Resolution	80 x 80 pixels
Thermal Sensitivity/NETD	<0.1°C at 30°C (86°F)/100mK
Image Frequency	50Hz
Focus Mode	Focus free
Focal Length	7.5mm
Focal Plane Array (FPA)/ Spectral Range	Uncooled microbolometer/8-14μm
Object Temperature Range	-20 to 260°C (-4 to 500°F)
Accuracy	±3°C (5.4°F) or ±3% of reading (Environment temperature 10-35°C, object temperature >0°C)

Accuracy Calculated as [%reading + (num. digits*resolution)] at 18-28°C; <75%RH.

8.3. TRMS Clamp Meter Specifications

8.3.1. DC Voltage

Range	Resolution	Accuracy
600.0mV	0.1mV	±(0.8% + 8 digits)
6.000V	0.001V	±(0.5% + 5 digits)
60.00V	0.01V	
600.0V	0.1V	±(0.8% + 5 digits)
1500V	1V	

Input impedance >10MΩ; Protection against overcharge: 1500VDC/ACrms

8.3.2. AC TRMS Voltage

Range	Resolution	Accuracy
6.000V	0.001V	50Hz-60Hz: ±(1.2% + 5 digits) 61Hz-1kHz: ±(2.5% + 5 digits)
60.00V	0.01V	
600.0V	0.1V	
1000V	1V	

Protection against overcharge: 1000VDC/ACrms.
Accuracy specified from 10% to 100% of the measuring range, sine wave;
Input impedance: > 9MΩ;
Accuracy PEAK function: ±10%rdg, PEAK response time: 1ms.

8.3.3. LowZ AC TRMS Voltage

Range	Resolution	Accuracy
6.000V	0.001V	±(3.0% + 40 digits)
60.00V	0.01V	
300.0V	0.1V	

LowZ Input impedance: 3kΩ; Protection against overcharge: 1000V DC/ACrms. Accuracy specified from 10% to 100% of the measuring range, sine wave.

8.3.4. AC+DC TRMS Voltage

Range	Resolution	Accuracy
6.000V	0.001V	50Hz-1kHz: ±(2.5% + 20 digits)
60.00V	0.01V	
600.0V	0.1V	
1000V	1V	

Input impedance>10MΩ; Protection against overcharge: 1000VDC/ACrms.

8.3.5. LowZ AC+DC TRMS Voltage

Range	Resolution	Accuracy
6.000V	0.001V	±(3.5% + 40 digits)
60.00V	0.01V	
300.0V	0.1V	

LowZ Input impedance: 3kΩ; Protection against overcharge: 1000V DC/AC rms.

8.3.6. DC Current

Range	Resolution	Accuracy
60.00A	0.01A	±(2.0% + 8 digits)
600.0A	0.1A	
1000A	1A	

Protection against overcharge: 1000ADC/ACrms.

8.3.7. AC TRMS Current

Range	Resolution	Accuracy
60.00A	0.01A	50Hz-60Hz: ±(2.5% + 5 digits)
600.0A	0.1A	
1000A	1A	

Protection against overcharge: 1000ADC/ACrms.
Accuracy specified from 10% to 100% of the measuring range, sine wave.
Accuracy Inrush function integral time 100ms, and reading for reference only.

8.3.8. Flexible Coil Current

Range	Resolution	Accuracy
30.00A	0.01A	50Hz-400Hz: ±(3.0% + 5 digits)
300.0A	0.1A	
3000A	1A	

Protection against overcharge: 1000ADC/ACrms.
Accuracy specified from 10% to 100% of the measuring range, sine wave.

8.3.9. Resistance and Continuity Test

Range	Resolution	Accuracy
600.0Ω	0.1Ω	±(1.0% + 10 digits)
6.000kΩ	0.001kΩ	±(0.8% + 5 digits)
60.00kΩ	0.01kΩ	
600.0kΩ	0.1kΩ	
6.000MΩ	0.001MΩ	
60.00MΩ	0.01MΩ	±(2.5% + 10 digits)

Buzzer<50Ω; Protection against overcharge: 1000VDC/ACrms.

8.3.10. Duty Cycle

Range	Resolution	Accuracy
10.0%-90.0%	0.1%	±(1.2% + 8 digits)

Pulse frequency range: 40Hz-10kHz; Pulse amplitude: ±5V (100us-100ms).

8.3.11. Frequency (Electronic Circuits)

Range	Resolution	Accuracy
60.00Hz	0.01Hz	±(0.2% + 5 digits)
600.0Hz	0.1Hz	
6.000kHz	0.001kHz	
60.00kHz	0.01kHz	
600.0kHz	0.1kHz	
6.000MHz	0.001MHz	
10.00MHz	0.01MHz	

Protection against overcharge: 1000VDC/ACrms.
Sensitivity: >2Vrms (at 20%-80% duty cycle) and f<100kHz;
>5Vrms (at 20%-80% duty cycle) and f>100kHz.

8.3.12. Capacitance

Range	Resolution	Accuracy
60.00nF	0.01nF	±(3.0% + 20 digits)
600.0nF	0.1nF	±(3.0% + 8 digits)
6.000µF	0.001µF	
60.00µF	0.01µF	
600.0µF	0.1µF	
6000µF	1µF	±(3.5% + 20 digits)
60.00mF	0.01mF	Unspecific
100.0mF	0.1mF	

Protection against overcharge: 1000VDC/ACrms.

8.3.13. Temperature with K-Type Probe

Range	Resolution	Accuracy
-40.0 to 600.0°C	0.1°C	±(1.5% + 3°C)
600 to 1000°C	1°C	
-40.0 to 600.0°F	0.1°F	±(1.5% + 5.4°F)
600 to 1800°F	1°F	
245.0 to 600.0K	0.1K	±(1.5% + 3K)
600 to 1273K	1K	

Protection against overcharge: 1000VDC/ACrms.

8.3.14. Diode Test

Range	Accuracy
Test Current: <1.5mA	Max Voltage with Open Circuit: 3.3VDC

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