Thermal Imaging Camera IR281

Instruction Manual

Perfect Prime

www.perfectprime.com

Contents

1. Overview

IR281 is a thermal imaging camera that integrates surface temperature measurement and real-time thermal image. With this product, the potential problems can be identified on the color display screen which is helpful for users to locate problems, take readings and solve the issue.

The product has a visual camera integrated to increase the differentiation degree. The thermal and full vision images and videos can be stored in the internal memory card or an additional detachable SD card. The image or video can be stored in PC to generate a report and print.

The following are the major features of IR281:

1. High accuracy: The adjustable radiation coefficient increases the measurement accuracy of reflective surfaces.

2. Time-saving: The traditional infrared thermometer needs to measure every component one by one, this is not necessary for the IR281.

3. Easy to use: Turn on the device and start measuring temperature right away.

4. Image & Video: The IR281 has the capabilities to take both images and videos, making it easier for users to analyze the situation.

5. Adjustable: 9 types of color palettes and wide range of emissivity values provided.

1. Overview

The product can be utilized in many fields, for instance:

1. **Detect spills and leaks of chemicals** which have different thermal signatures to the surroundings.
2. **Fire fighting:** Vision can be obscured by smoke and debris in the event of a fire, thermal imaging can see through this and locate victims or re spots.
3. **Locate the source of abnormal leaking of heat** of a house or a machine, find out the problem area and fix it.
4. **Enable drug-enforcement** units to locate cannabis plants by detecting abnormal amount of heat spot in buildings.
5. **Moisture detection:** Areas with lower temperatures to its uniform surroundings can be a source of moisture staining or damage.
6. **Measure body temperatures:** Point the thermal imaging camera at a person to find their surface body temperature.
7. **Night vision:** Measuring the electromagnetic energies given off when objects emit heat, the IR281 translates those energies into visible light for users to see them in the dark.
8. **Building inspection:** Check that heat is retained uniformly in a building.

IR281 is the ideal selection for electrician, maintenance personnel, technicians and even the emergency personnel.

2. Safety & Considerations

DANGER

Please read the instructions carefully so as to ensure accurate measurement results and safety:

Do not use device in explosive, flammable or corrosive environment.

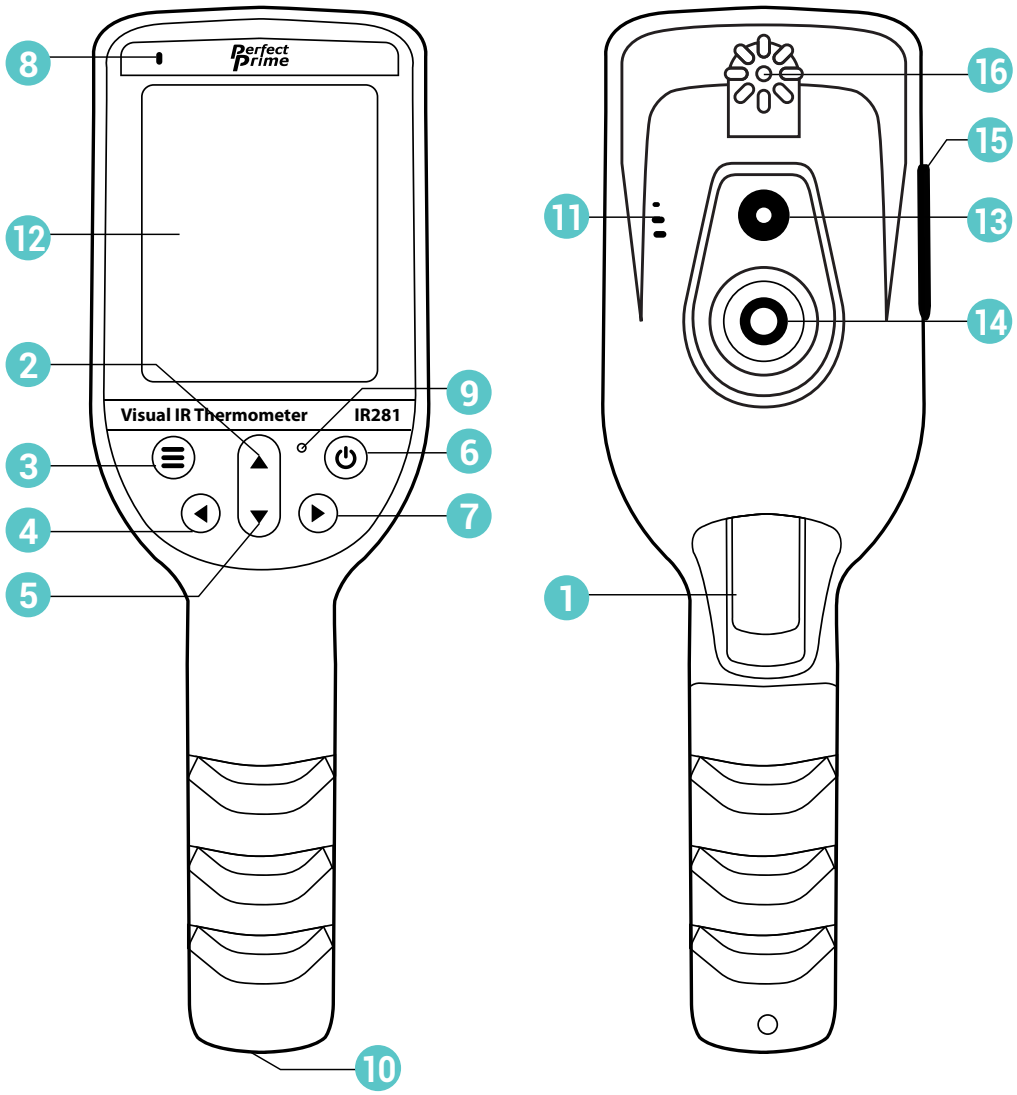
Do not dismantle the product, doing so can damage it and revoke the warranty.

Since the product is a precision electronic and sensitive optical device. Do not drop it or allow impacts to occur to prevent damage.

Please use a damp cloth or gentle soap to clean the enclosure of the device. Do not use abradant, isopropanol or solvent to clean. Special optical lens cleaner should be used to clean the screen.

It is suggested to used the attached USB cable.

3. Product Features



1. Trigger
2. Up navigation button
3. Menu button
4. Left navigation button
5. Down navigation button
6. Power button
7. Right navigation button
8. LED indicator for charging
9. Mic
10. Tripod nut
11. Speaker
12. Display
13. Visual camera
14. Thermal camera
15. Rubber cover (for MicroSD slot and USB-Type-C port)
16. Ventilation holes (for cooling purpose)

4. Product Specifications

4.1. Product Specifications

Power Supply	3.7V Li-ion rechargeable battery, 3200mAh, Size 18650
Panel	2.8" Display TFT IPS panel
Touch Panel	Resistive type Touch Panel
Keys	7 keys (Power, Up/Down/Left/Right, Menu, Measure)
Sensors	206 x 156 Module, 640x 480 CMOS Sensor
Storage Memory	32GB SD Card Included
USB connection	Photo upload to PC, and USB charging battery
Battery life	3.5hrs
Auto Power-off time	Adjustable, from 30sec to Never
Operating temperature	-10°C ~ +50°C (14°F ~ 122°F)
Storage temperature	-20°C ~ +60°C (-4°F ~ 140°F)

4.2. Thermal Image Specifications

Resolution of infrared image	206 x 156
Frame Rate	9Hz
Wavelength	7.8um ~ 14um
Field of View, Horizontal	35.4°

4. Product Specifications

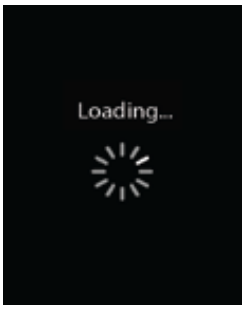
Field of View, Vertical	26.8°
Minimum focus	4mm
Measurement Range	-30°C to 330°C (-22°F to 626°F)
Accuracy	
-10°C to 100°C	±2.5°C (Typical), ±5°C (Max)
100 to 330°C	±2.5% (Typical), ±5% (Max)
Repeatability	
-10°C to 100°C	±1°C (Typical), ±2°C (Max)
100 to 330°C	±1% (Typical), ±2% (Max)

4.3. Software Features

Temperature Alert	High or Low Temperature Alert
Image & Video recording	BMP/JPG (Image), MP4 (Video)
Brightness	Adjustable Brightness
Auto off function	Adjustable Auto-off function
Cast screen to Android TV	Available
Software update from server	Available

5. Operation Flow

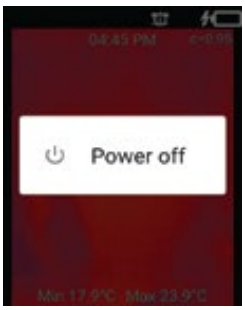
5.1. Power ON: Press & Hold Power button for 2 sec.



Opening Screen (wait for initialization)

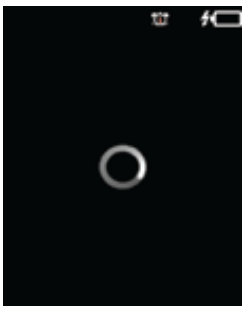
Measurement Screen

5.2. Power OFF: Press & Hold Power button for 2 sec.



A pop-up menu appears for Power Off. Then, press .Measure button to power off.

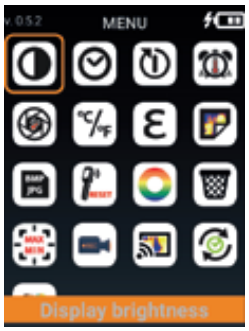
5.3. Display OFF (Sleep Mode): Press Power button once to turn off display. Press Power button again to turn on it.



Remark:
Due to the sensor initialization, there is around ~4sec loading screen (see below) before displaying thermal display.

5. Operation Flow

5.4. Menu Screen: Press the Menu button to enter Menu mode.



The default selection is first icon (i.e. Display brightness)

- Use Up/Down/Left/Right button to select the icon. Then, press Measure button to open the selected item.
- Press Menu button to back to Measurement Screen.

The summary of Menu icons:

	Display Brightness: To set the brightness of display
	Date and Time: To set time and date
	Auto-Off Timer: To set the auto-off timer for the Display
	Hi-Low Temperature Alarm: To set the high or low temperature alarm
	Auto-monitor Alarm: To capture the thermal image when over the Temperature Alarm over a period of time
°C/°F	**Temperature Unit:** To set temperature unit degree C° / degree F°
ε	**Emissivity:** To adjust the emissivity from 0.01 to 1.0

5. Operation Flow

View Image: To view the captured thermal image/video

Image format: To set the image output format (Bitmap or JPEG)

Factory Reset: To reset factory setting

Color Palette: To select the thermal image color palette

Trash: To delete image/video permanently

Max/Min: To show/ not show the maximum and minimum points

Cast screen: To cast from the unit to the Android TV

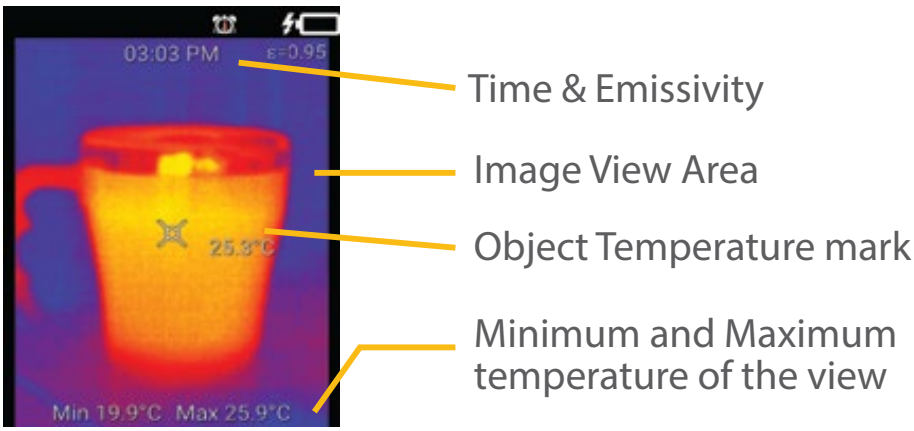
Software Update: To update the latest software from the server

Recording: To turn on/off the recording mode

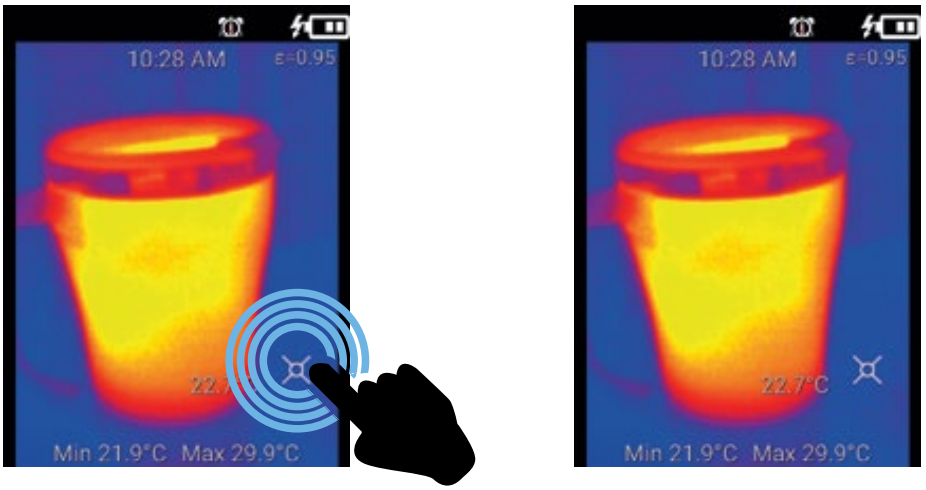
Image Alignment: To adjust the alignment between thermal image and visual image

5. Operation Flow

5.5A Measurement Screen



Select the temperature detecting target on the screen

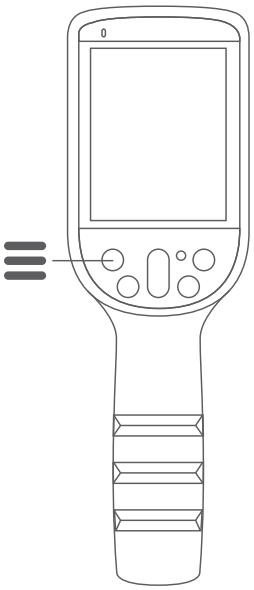


a.) Touch the screen directly with finger to adjust the location of Touchable thermal mark.(The target will be setted automatically after touching the screen.)

b.) Temperature will be detected and the Thermal readout will be shown according to the lastest target.

5. Operation Flow

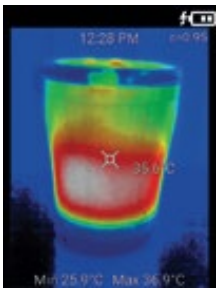
5.5B Selection of measurement screen modes



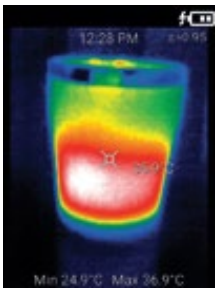
a.) Press ☰ to enter measurement screen

b.) Press ▲ up/ ▼ down to select different modes

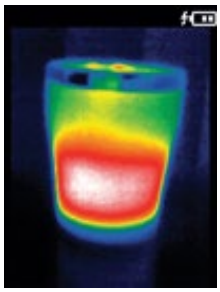
Visual image mode



Blend image mode



Thermal image mode
(With temperature reading)



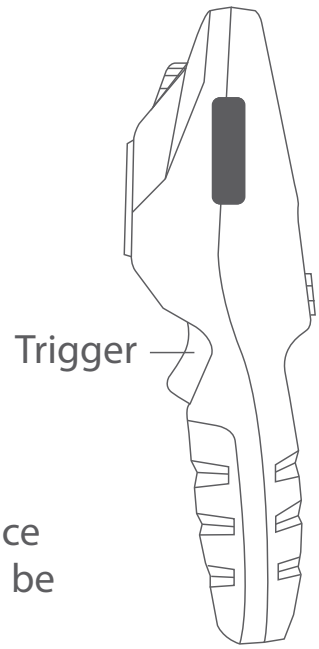
Thermal image mode
(With temperature reading)

5.5C Capture and save images

- Press Trigger to capture the image which temperature readout will be saved in CSV format also.

5.5D Capture and save videos:

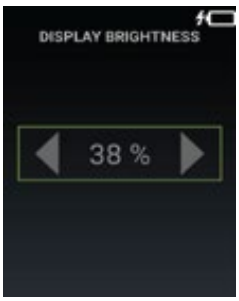
- Long press and hold Trigger to capture the video.



Remark:
The images/videos will be saved in micro-SD card once micro-SD is ready; otherwise the images / videos will be saved in internal memory).

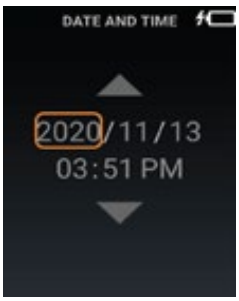
5. Operation Flow

5.6. Display Brightness



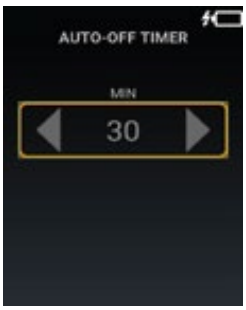
- Press Left/Right button to increase/ decrease the % of display brightness.
- Press Measure to confirm.
- Press Menu to return to the previous screen.

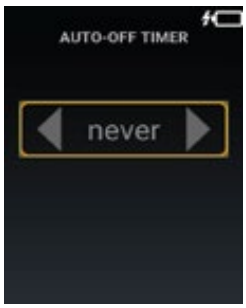
5.7. Date and time



- Press Up/Down button to increase/decrease the selected item.
- Press Left/Right button to select the item for change.
- Press Measure to confirm.
- Press Menu to return to the previous screen.

5.8. Auto-off timer





- Press Left/Right button to increase/decrease the auto-off timer.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.

Remark:
The Auto-off timer is from 0min 30sec (minimum) to 30min (maximum), or it can set to “never” (always on). This timer is for display off only, not power off.

5.9. Hi-Low Temperature Alarm

- Press and hold the Measure button to turn ON or OFF the Hi-Lo temperature alarm setting. (The default Hi-Lo Temperature Alarm is OFF)

When Hi-Lo Temperature alarm is ON:

- Press Left/Right button to increase/decrease the temperature.
- Press Up/Down button to select the High or Low Temperature.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.

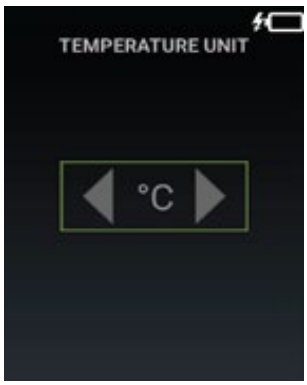
5.10. Auto-Monitor Alarm

- Press and hold the Measure button to turn ON or OFF the Auto-monitor alarm. (The default Auto-monitor alarm is OFF)

When Auto-monitor alarm is ON:

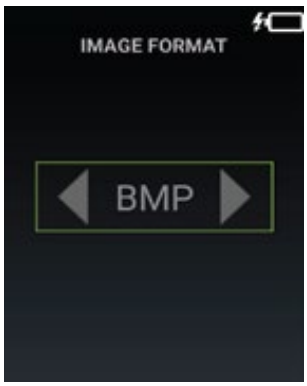
- Press Left/Right button to increase/decrease the selected item.
- Press Up/Down button to select the Temperature or Duration.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.
- Duration is from 15min, 30min, 45min, 60min, 90min and 120min.

5.11. Temperature Unit



- Press Left/Right button to select degree °C or degree °F.
- Press Measure to confirm.
- Press Menu to return to the previous screen.

5.12. Image Format



- Press Left/Right button to select BMP or JPG image format.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.

5.13. Factory Reset

- Press Left/Right button to select YES or NO.
- Press Measure to confirm.
- Press Menu to back to the previous screen.

5.14. Color palette

- Press Up/Down button to select the color palette.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.

5.15. View Image

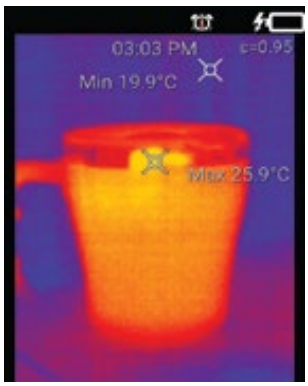
- Press Up/Down/Left/Right button to select Image Icon.
- Press Measure to open the image or video.
- Press and hold Measure to move the selected item to delete folder.
- Press Menu to back to the previous screen.

5.16. Delete

- Press Up/Down/Left/Right button to select Image Icon.
- Press Measure to open the image or video.
- Press and Hold Measure to pop-up the recover or permanent delete menu.
- Press Menu to back to the previous screen.

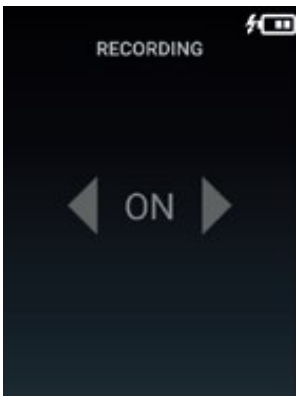
5.17. Min/Max Crosshairs

This is the function to chase the minimum and maximum points of the view.

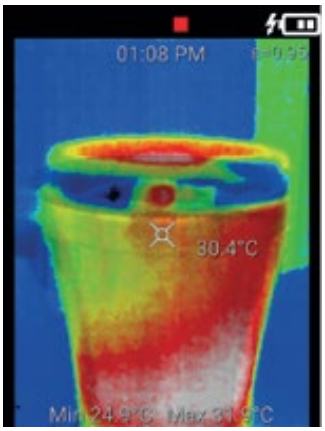


- Press Left/Right button to turn ON of OFF the Min/Max crosshair
- Press Measure to confirm.
- Press Menu to back to the previous screen.

5.18. Recording Mode



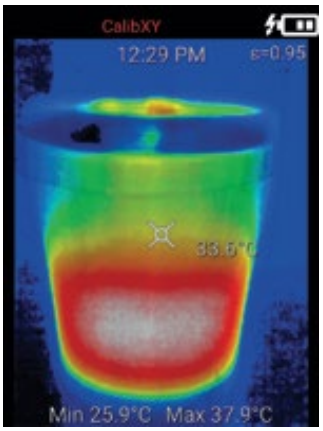
a.) Press ◀left / ▶ right to turn ON or OFF the recording mode.
b.) Press Trigger to confirm and back to the menu screen.
c.) Press ☰ to exit menu mode.



d.) Press the Trigger button to start the recording and press again to stop the recoding.

Remark:
Recording will be stopped automatically when the memory is full or return to MENU mode.

5.19. Image Alignment

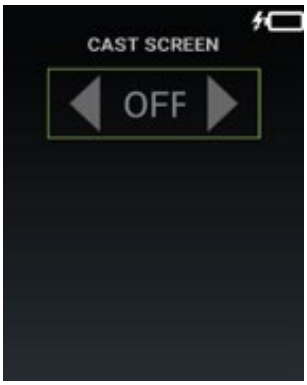


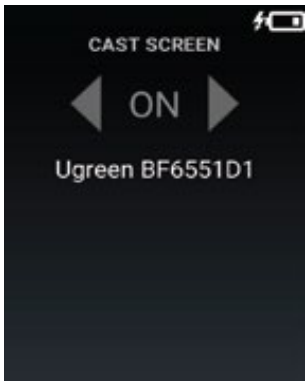
a.) Press ▲ up / ▼ down / ◀ left / ▶ right to turn ON or OFF the recording mode.

b.) Press ☰ to exit menu mode.

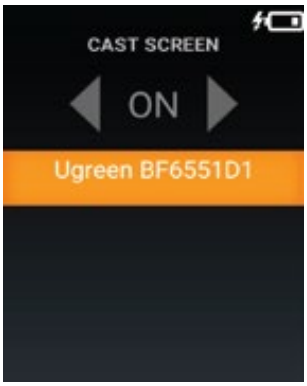
5.20. Cast screen

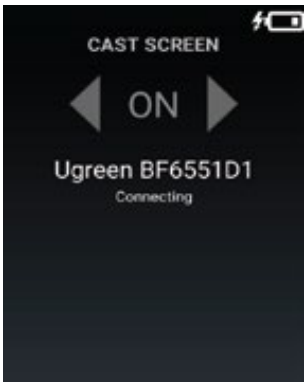
The Cast screen function is to cast the display on the TV. (The TV must be Android TV or connected with Android Miracast receiver)



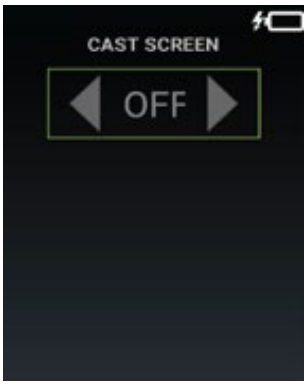


- Press Left/Right button to turn ON or OFF Cast screen function.
- If the Android TV (or Android Miracast receiver) is found, it will show on the display.





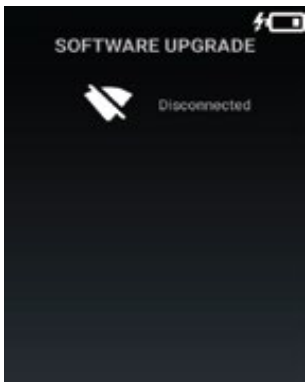
- Press Up or Down to select the device for sending the display.
- Press Measure to connect with the selected device.

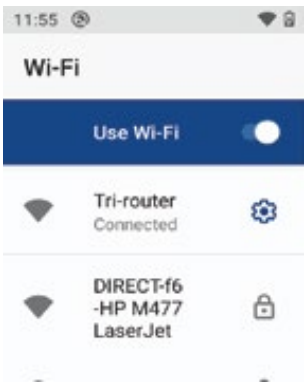


- To Turn off the cast screen function, it is just switch OFF the cast screen function.

5.21. Software Update

It can check the latest software available for update the unit.





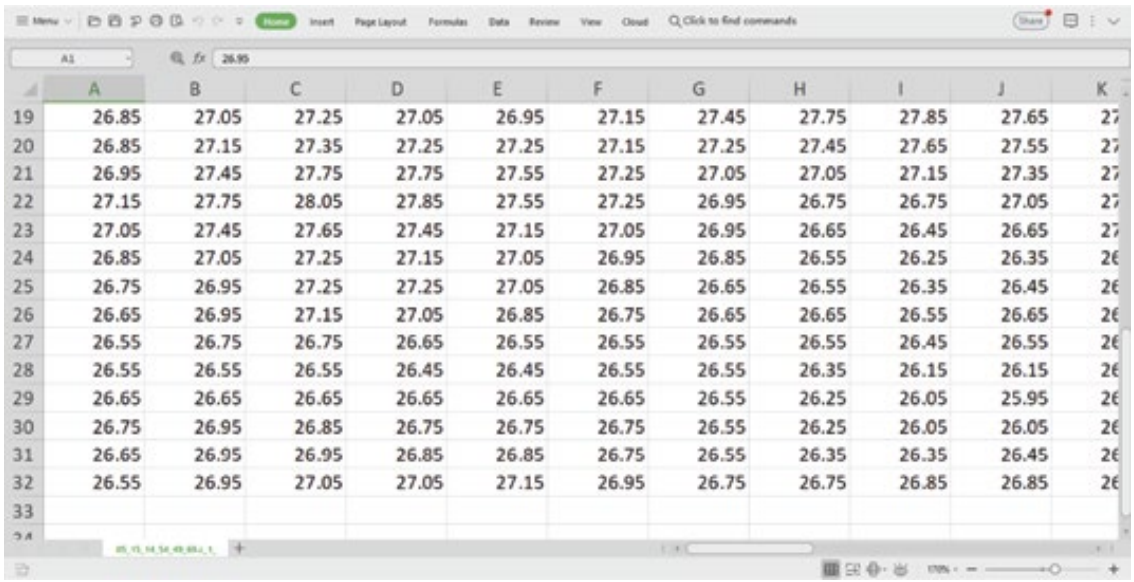
- If the Wifi is not connected, press the display “Disconnected” to enter the WiFi setting.
- In the Wifi setup, select the Wifi SSID and input the password to connect with the WiFi.
- Press Menu button to back to the Software update.

- If the Wifi is connected, it will search for the latest software, which are available for update.
- Press Up or Down to select the software version.
- Press Measure to start the software update. The selected software will download from server and update the unit automatically.

5.22. CSV Files

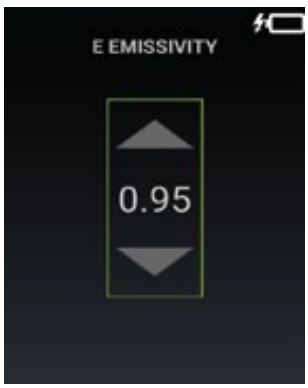
For every image you take, CSV Files of each image would be saved for you to analyze and generate reports. The file shows the temperature point of each 32 x 32 pixel. You can view these files in **Internal Storage/SD Card -> DCIM -> Csv**.

Here is an example of what the file looks like:



	A	B	C	D	E	F	G	H	I	J	K
19	26.85	27.05	27.25	27.05	26.95	27.15	27.45	27.75	27.85	27.65	27
20	26.85	27.15	27.35	27.25	27.25	27.15	27.25	27.45	27.65	27.55	27
21	26.95	27.45	27.75	27.75	27.55	27.25	27.05	27.05	27.15	27.35	27
22	27.15	27.75	28.05	27.85	27.55	27.25	26.95	26.75	26.75	27.05	27
23	27.05	27.45	27.65	27.45	27.15	27.05	26.95	26.65	26.45	26.65	27
24	26.85	27.05	27.25	27.15	27.05	26.95	26.85	26.55	26.25	26.35	26
25	26.75	26.95	27.25	27.25	27.05	26.85	26.65	26.55	26.35	26.45	26
26	26.65	26.95	27.15	27.05	26.85	26.75	26.65	26.65	26.55	26.65	26
27	26.55	26.75	26.75	26.65	26.55	26.55	26.55	26.55	26.45	26.55	26
28	26.55	26.55	26.55	26.45	26.45	26.55	26.55	26.35	26.15	26.15	26
29	26.65	26.65	26.65	26.65	26.65	26.65	26.55	26.25	26.05	25.95	26
30	26.75	26.95	26.85	26.75	26.75	26.75	26.55	26.25	26.05	26.05	26
31	26.65	26.95	26.95	26.85	26.85	26.75	26.55	26.35	26.35	26.45	26
32	26.55	26.95	27.05	27.05	27.15	26.95	26.75	26.75	26.85	26.85	26
33											

5.23. Emissivity



- Press Up/Down button to adjust the emissivity.
- Press Measure to confirm and back to the previous screen.
- Press Menu to back to the previous screen.

5. Operation Flow

There are four types of object measurement mode:

1. Coarse object (easy to give out energy)(0.95);
2. Semi-matte object (0.80);
3. Semi-shiny object (0.60);
4. Shiny object (0.30);

The table of Emissivity Table:

Substance	Thermal radiation	Substance	Thermal radiation
Bitumen	0.90-0.98	Black cloth	0.98
Concrete	0.90	Human skin	0.88
Cement	0.96	Foam	0.75-0.80
Sand	0.90	Charcoal dust	0.96
Earth	0.92-0.96	Paint	0.80-0.95
Water	0.92-0.96	Matte paint	0.97
Ice	0.96-0.98	Black rubber	0.9
Snow	0.83	Plastic	0.85-0.95
Glass	0.90-0.95	Timber	0.90
Ceramics	0.90-0.94	Paper	0.70-0.94
Marble	0.94	Chromium hemitrioxide	0.81
Gypsum	0.80-0.90	Copper oxide	0.78
Mortar	0.89-0.91	Ferric oxide	0.78-0.8
Brick	0.93-0.96	Textile	0.90

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Thank you for your understanding.

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