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1. Software Installation

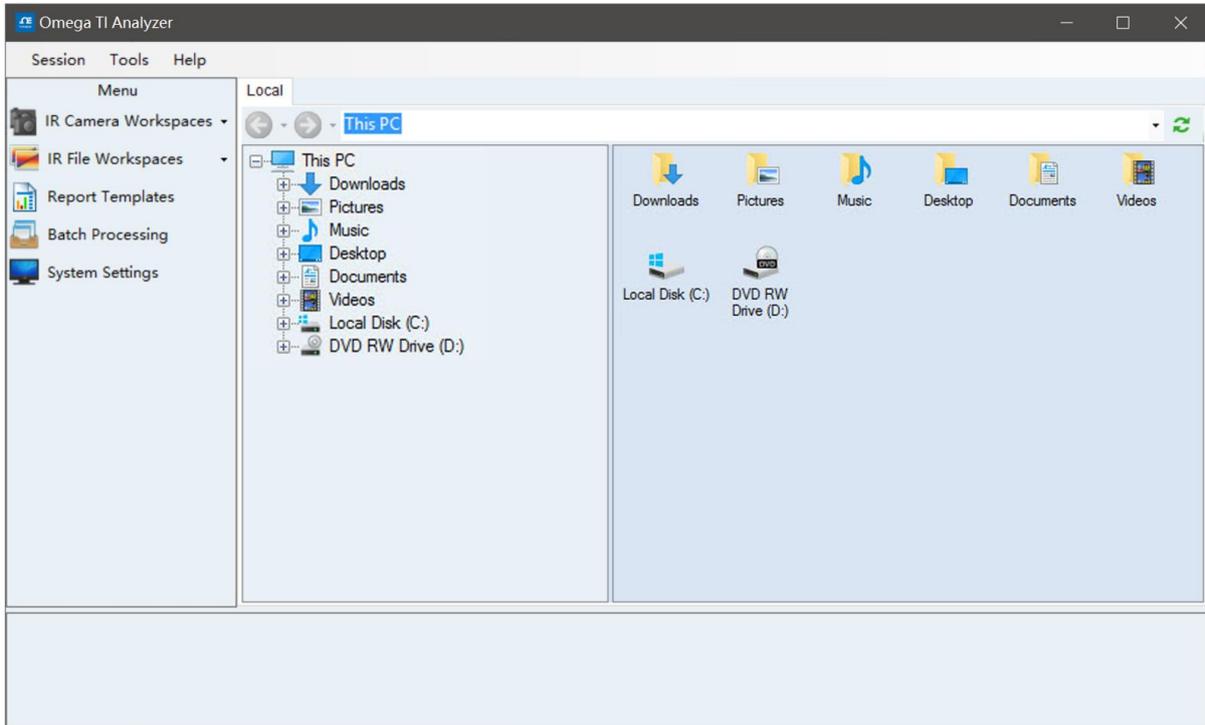
1.1 System Requirements

- ◆ Microsoft Windows XP (need to install .NET Framework 3.5, otherwise the program may not work properly)
- ◆ Microsoft Windows 7, 32-bit
- ◆ Microsoft Windows 7, 64-bit
- ◆ Microsoft Windows 10, 32-bit Professional Edition or higher version (need to enable .NET Framework 3.5 in windows)
- ◆ Microsoft Windows 10, 64-bit Professional Edition or higher version (need to enable .NET Framework 3.5 in windows)

1.2 Hardware Requirements

- ◆ CPU Intel Pentium IV 3.0 GHz or later
- ◆ Memory 4G or more
- ◆ Display 1024 x 768 or higher resolution

2. User Interface (UI)

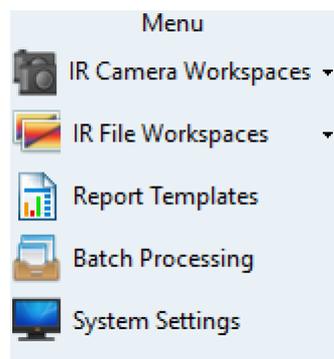


➤  Software control key (minimize, restore, and closed down)

➤ **Session Tools Help**

- Session: Menu of IR Camera Workspaces, IR File Workspaces, System Settings, and Quit
- Tools: Show report templates, batch processing, and data interface
- Help: Displays user manuals, product registration and some information about the software

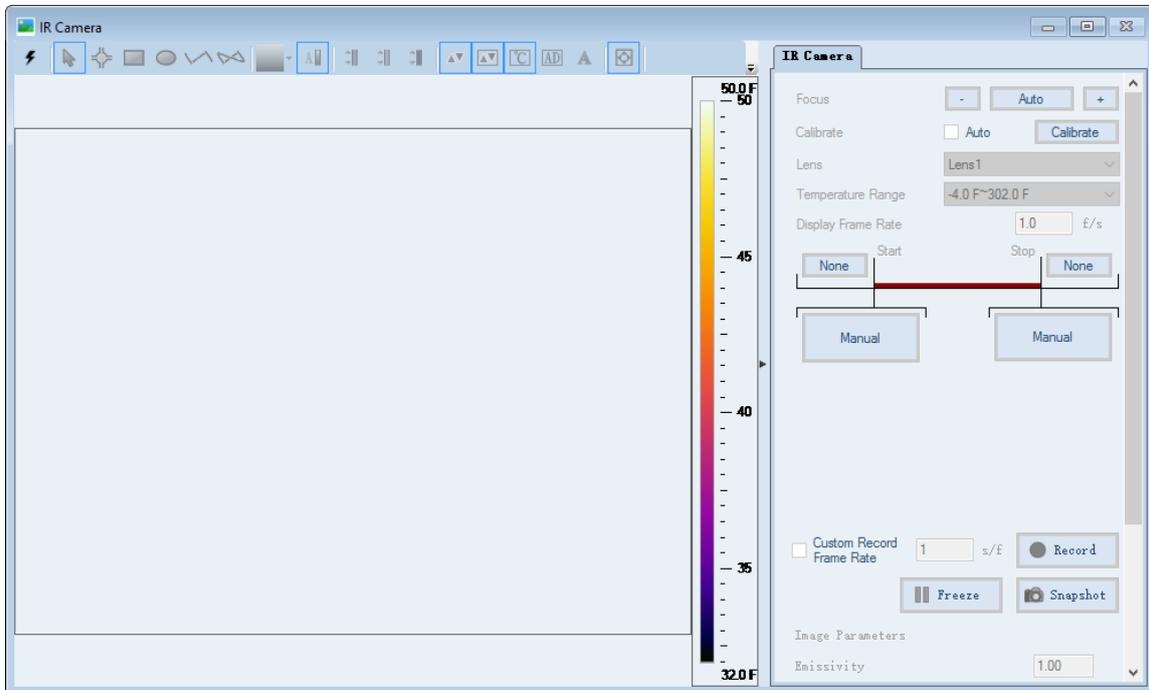
➤ **Menu** Following menus are displayed under



- IR Camera Workspace: Connect with an external device of a thermal imager or load .IRS file for analysis
- IR File Workspaces: Load .IRS file or thermography images for analysis.
- Report Templates: Import, export, or edit report templates
- Batch Processing: Batch image conversion processing, video synthesis, and report generation
- System Settings: Set up and modify system configuration parameters

2.1 IR Camera Workspaces

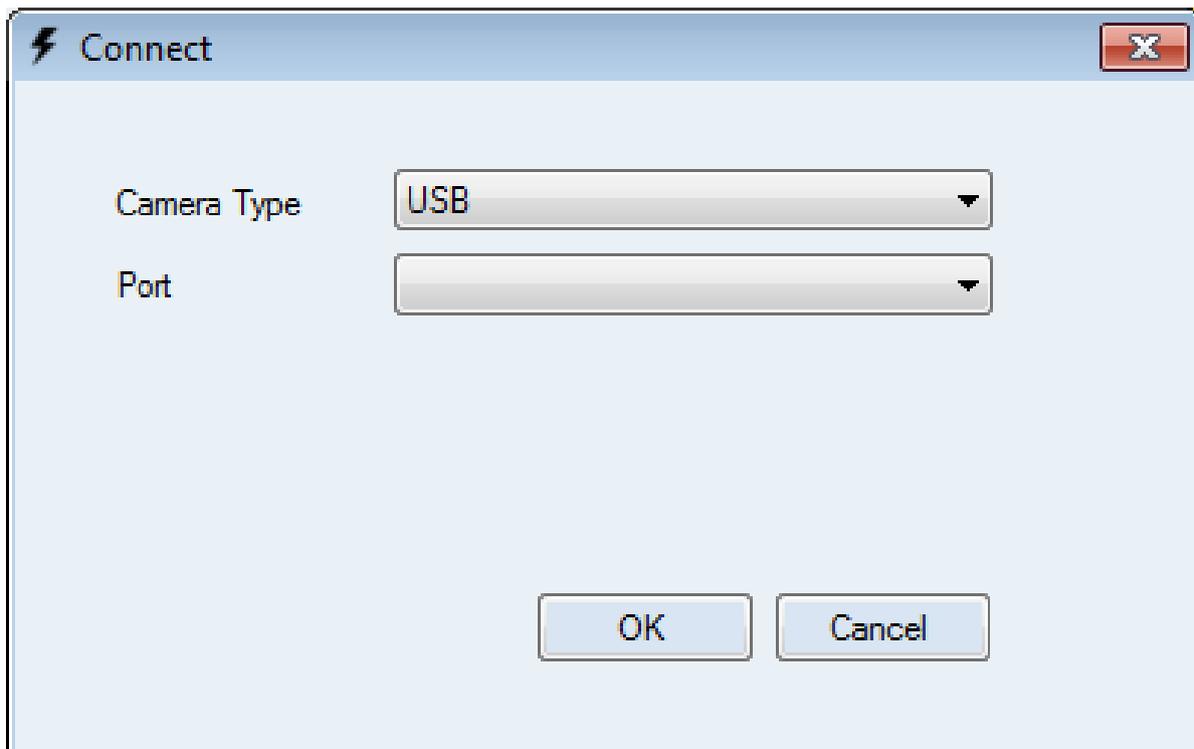
2.1.1 Main User Interface Window



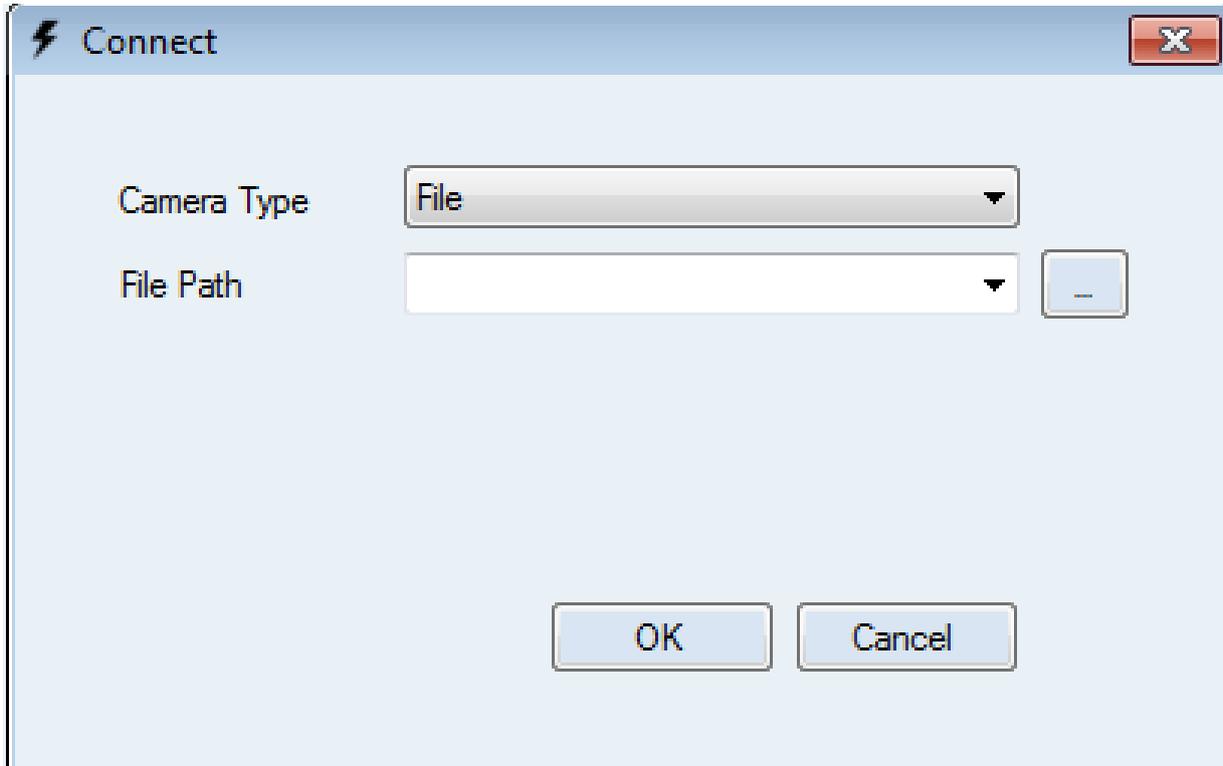
-  Open "Connect" window

Connection type

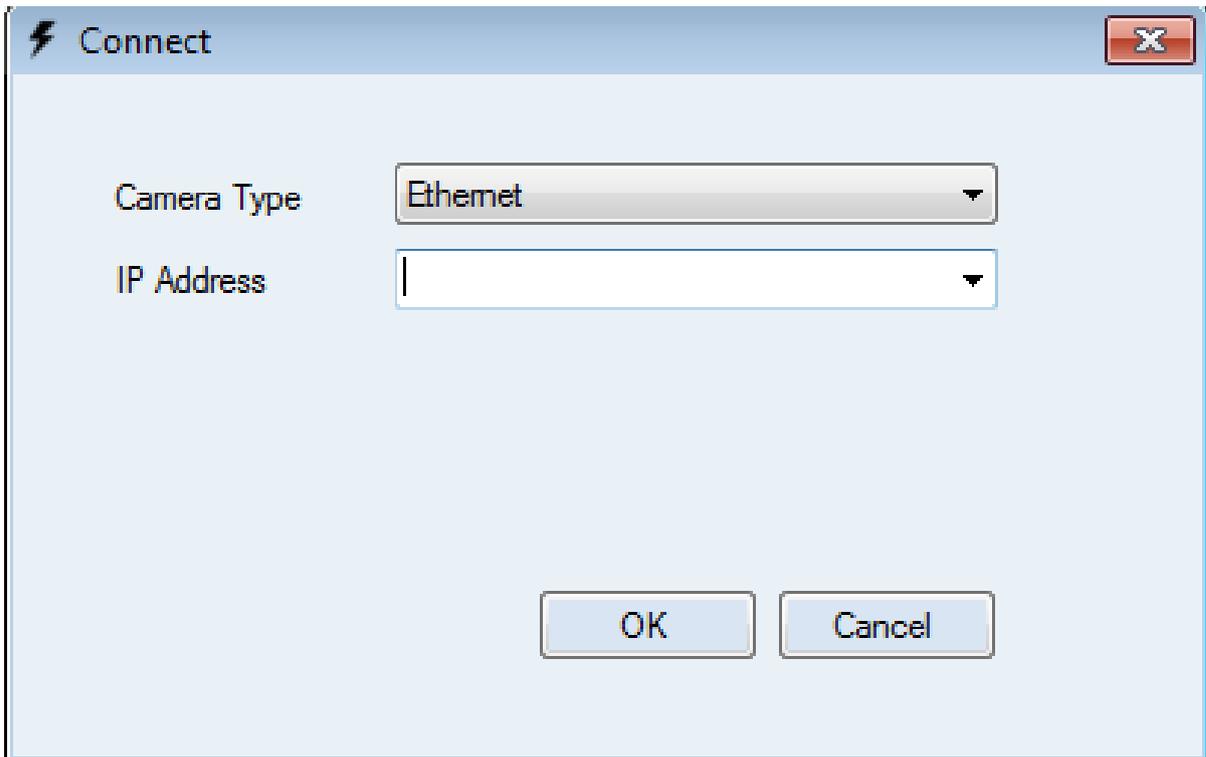
- Select USB for external device, the "Port" number is automatically recognized. Click OK to enter the workspace.



- Select File and click  to import .IRS file for analysis.

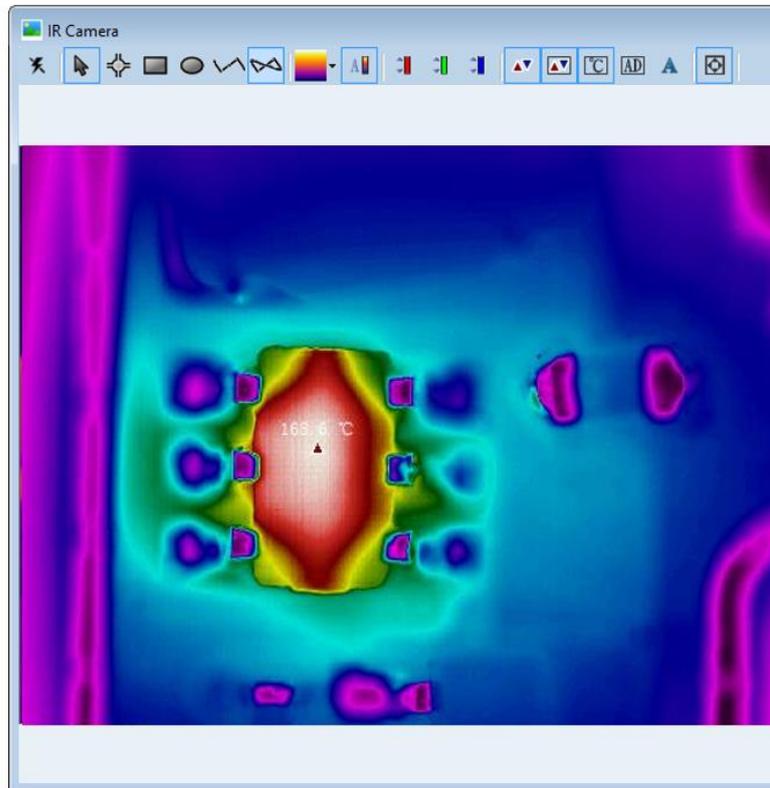


- Select Ethernet and enter the IP Address to connect with online equipment.



- Note: Only registered users can connect to online equipment through Ethernet.

2.1.2 IR Camera Workspace Analysis Interface



-  Restore, move, size, minimize and maximize the analysis window
-  Restore, move, size, minimize and maximize the analysis window
-  **Toolbar** with different analysis tools

 Disconnect

 Arrow

 Set spot and display the corresponding temperature value

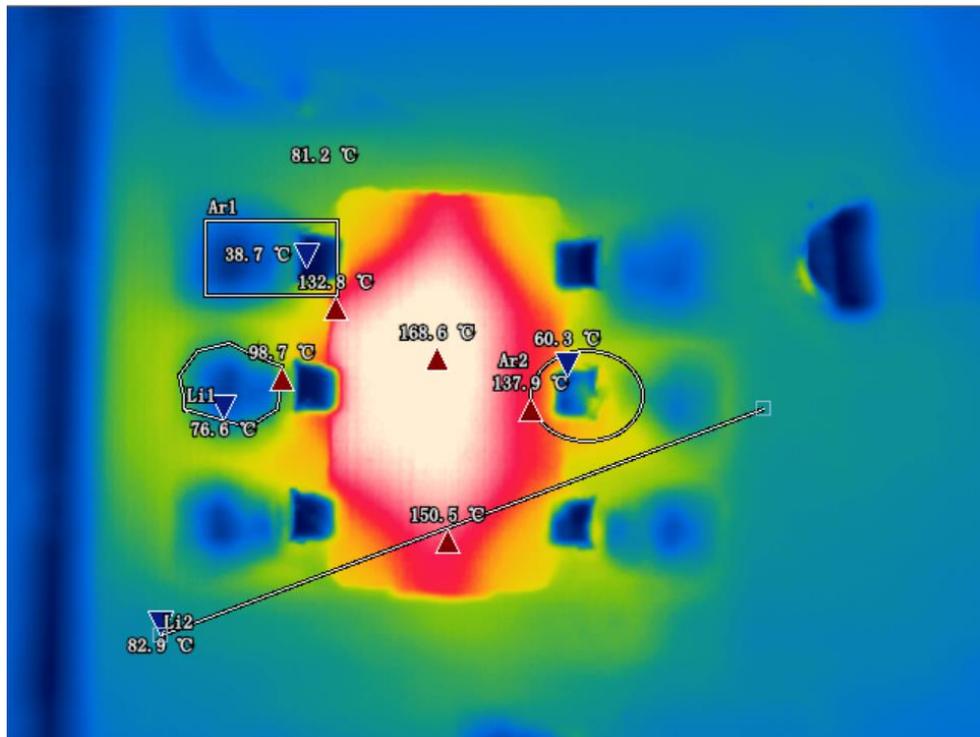
 Set rectangle and display the max, min, and average temperature values of this area (average temperature is the sum of temperature data of all points within the selected area divided by the number of points). It will track the location of max and min temperature automatically.

 Set ellipse and display the max, min, and average temperature values of this area (average temperature is the sum of temperature data of all points within the selected area divided by the number of points). It will track the location of max and min temperature automatically.

 Set polyline and display the max, min, and average temperature values of this area (average temperature is the sum of temperature data of all points along the polyline divided by the number of points). It will track the location of max and min temperature automatically. You can draw a plot of the temperature distribution along the polyline.

 Set polygon and display the max, min, and average temperature values of this area (average temperature is the sum of temperature data of all points within the selected area divided by the number of points). It will track the location of max and min temperature automatically.

Below is an example thermal image with various defined test areas.



Note: You can move each spot or area to obtain the temperature information of the desired area.

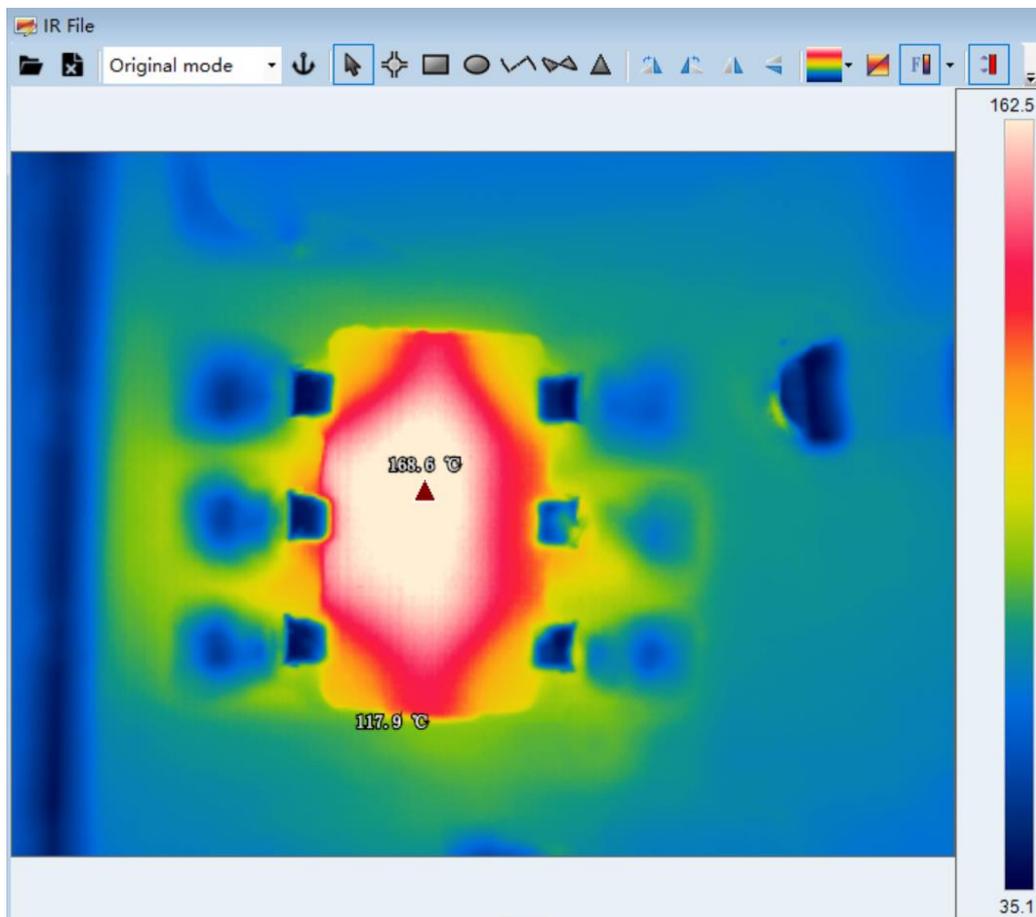
-  Choose color palette, including Grey, Iron, Rainbow etc.
-  Temperature scale (temperature bar range). Three (3) options are available
 -  Automatically temperature scale, the upper and lower limits are the maximum and minimum temperatures of the image. It requires minimum 8°C difference between the upper and lower limits in the scale.
 -  Smart temperature scale, removes 5% non-obvious temperature point, improves the image contrast.
 -  Fixed temperature scale click the triangle ▾ to set up the upper and lower limit of the scale with minimum 8°C difference.
-  Isotherm 1, click the triangle ▾ to set up the upper and lower limit to highlight the areas in red with the desired temperature range.
-  Isotherm 2 and 3 with different colors.
-  Display max. and min. temperature of the selected measurement areas. Click the triangle mark to turn off or turn on the display.
-  Display max. and min. temperature of the whole thermal image. Click the triangle mark to turn off or turn on the display.

-  Turn on or off the display of temperature values
-  Turn on or off the display of AD values.
-  Click to display the hidden tool when window is smaller

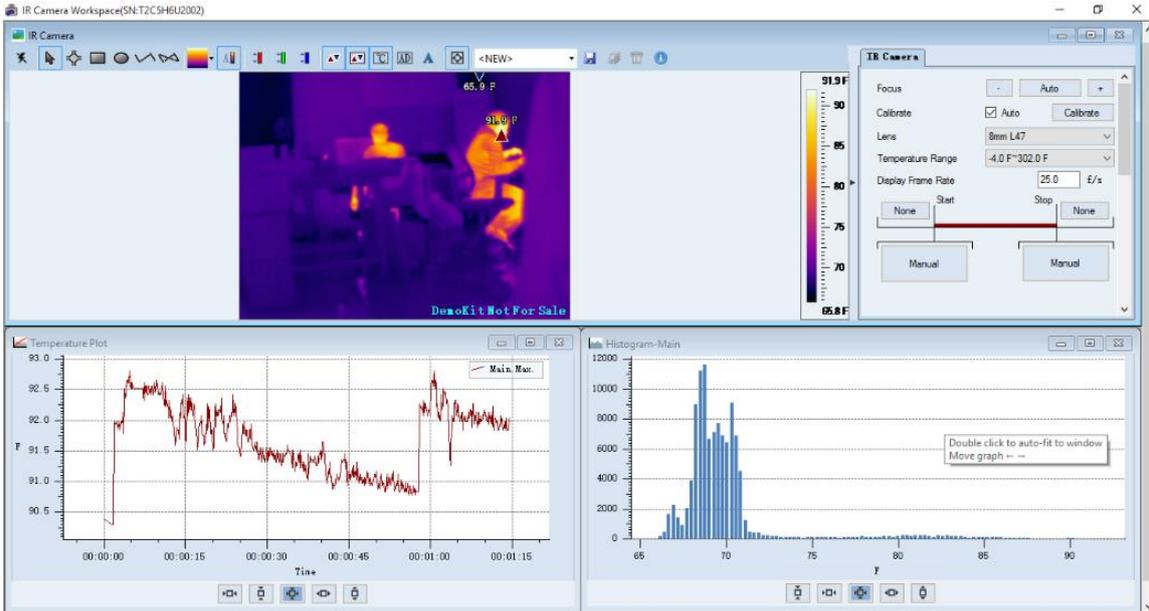


-  Name of the saved template
-  Save current screen settings as a template
-  Save current template as another template
-  Delete the selected template

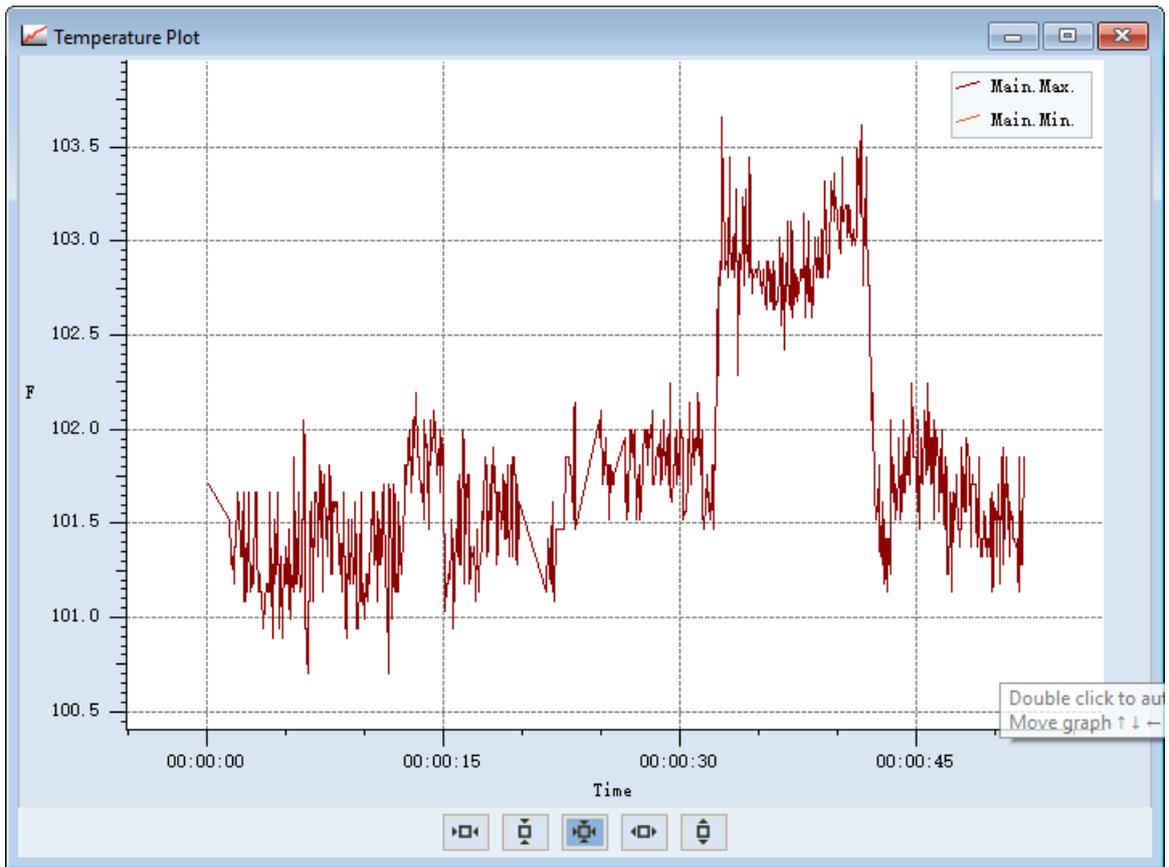
➤ Thermal Image Display Area



- Temperature scale (temperature bar) is on the right side of the thermal image. When double clicked, it's automatically switched to fixed temperature scale, you can change the upper and lower limit by dragging the mouse.
- Right click the image, you can generate the profile of temperature vs. time (temperature may vary with the time), and display the histogram graph (intuitive temperature distribution).



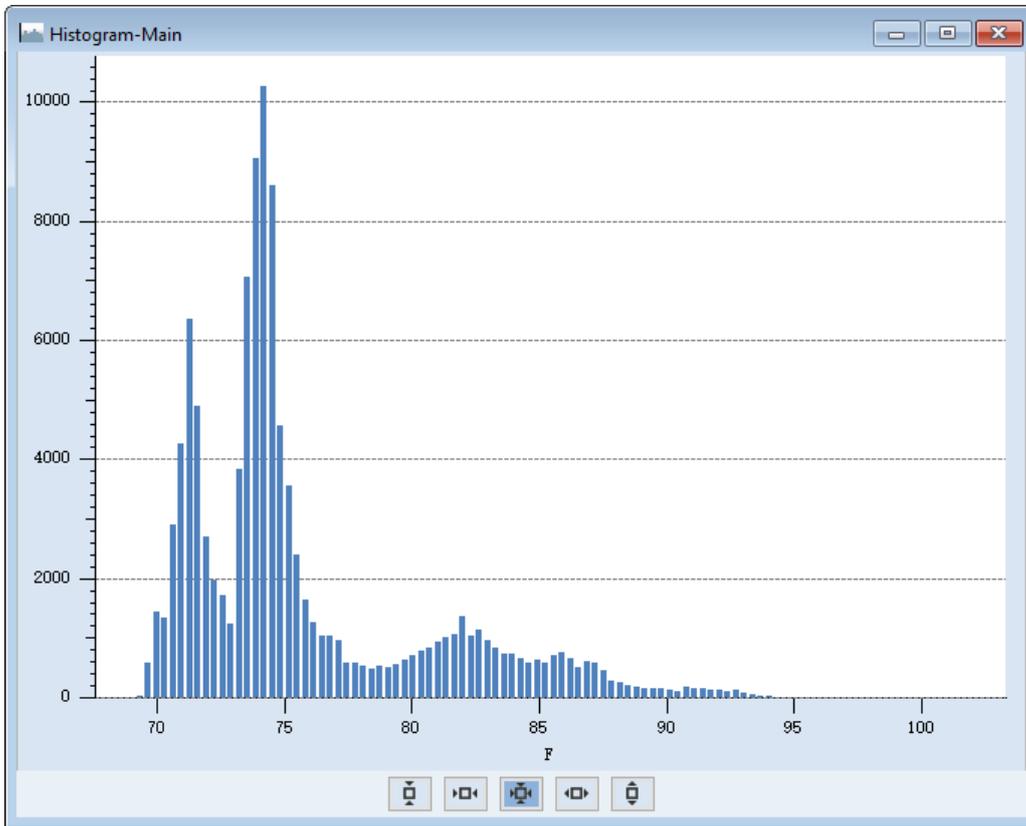
Temperature vs. time curve (max. temperature of the entire image as an example)



-  Zoom out the horizontal axis
-  Zoom out the vertical axis
-  Restore to the default axis setting
-  Zoom in the horizontal axis
-  Zoom in the vertical axis

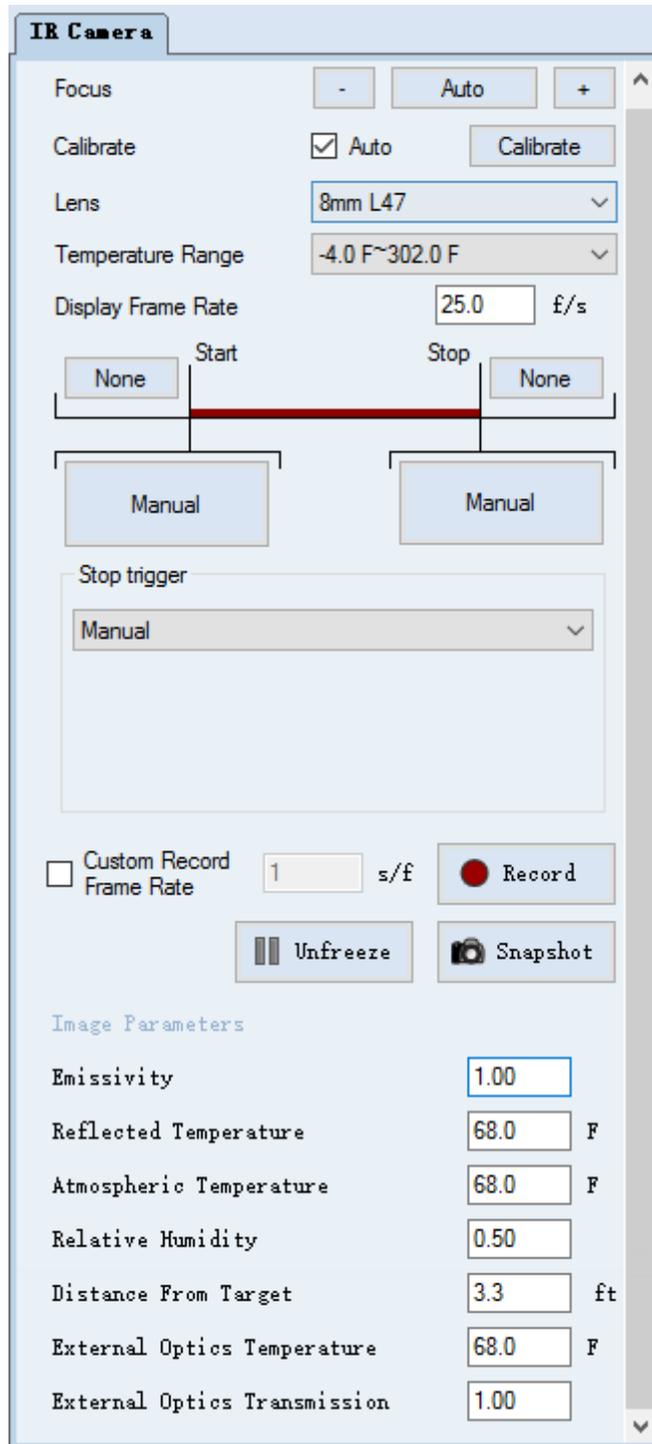
Same layout for both temperature curve and histogram plot. Name of the plot is displayed on the upper right corner.

- Hisgotram



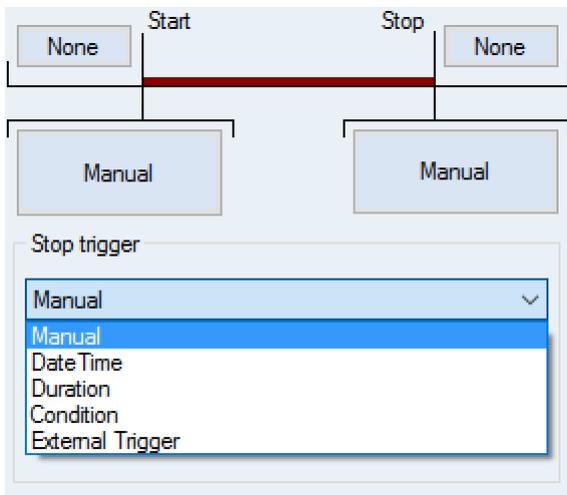
- Copy: Copy the position information of spot or area selections in the current thermal image which can be copied to other files.
- Paste: Paste the copied information.
- Remove all: Remove all spot and area selections.

2.1.3 IR Camera Parameter Setting Panel



- Focus Auto focus, no need to set.
- Calibrate After the thermal camera connected, click calibration to automatically start NUC.
- Lens Select the lens. The default is the standard lens
- Temperature Range Select the temperature range according to the connected thermal camera, low-temperature range (-4.0°F - 302.0°F), middle-temperature range (32.0°F - 662.0°F) and high-temperature range (392.0°F - 1202.0°F).

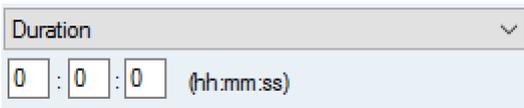
- **Display Frame Rate** f/s Set up frames per second (1-60).



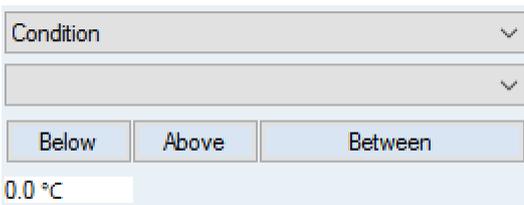
- - Set up start and stop triggers to control the start and end of the thermal video recording.
 - Manual: Manually trigger the device to start or stop thermal video recording, the default setting is manual.
 - Date and time: Set up date and time to trigger the device to start or stop thermal video recording. You can fill the date and time manually.



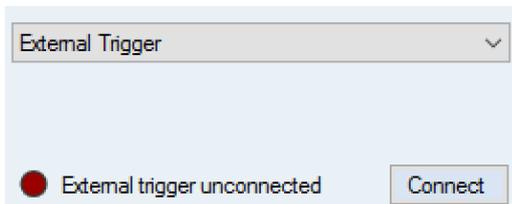
- Duration (Delay): Set up the delay time to start the recording after triggered.



- Conditional trigger: Set up conditional trigger. Once a condition is met, trigger the start or stop of recording.



- External trigger: Connect to I/O module to trigger the start or stop of recording.



➤ **Record Thermal Video Stream**



- Custom Record Frame Rate s/f User defined recording interval between frames

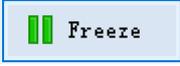
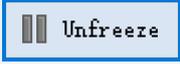
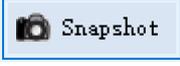
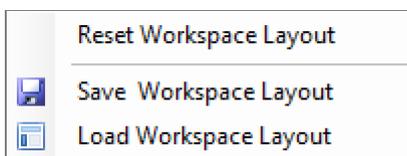
-  Click to start recording. After clicked, it switches to
-  Click to stop recording.
-  Click to freeze the current thermal image. After clicked, it switches to
-  Click to un-freeze and display live stream of the thermal image.
-  Click to shoot a thermal image and saved to the pre-defined folder.
- Object Parameters Setting. Real-time updates in thermal image/video with modified parameters.

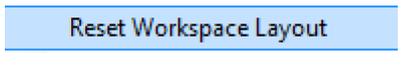
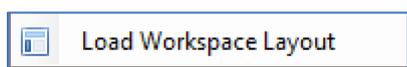
Image Parameters	
Emissivity	<input type="text" value="1.00"/>
Reflected Temperature	<input type="text" value="68.0"/> F
Atmospheric Temperature	<input type="text" value="68.0"/> F
Relative Humidity	<input type="text" value="0.50"/>
Distance From Target	<input type="text" value="3.3"/> ft
External Optics Temperature	<input type="text" value="68.0"/> F
External Optics Transmission	<input type="text" value="1.00"/>

- - Emissivity
 - Reflected temperature
 - Atmospheric temperature
 - Relative humidity
 - Distance to object
 - External optics temperature (when IR window or external optics placed between thermal camera and object)
 - External optics transmittance (when IR window or external optics placed between thermal camera and object)

2.1.4 Page Layout

- Right click on the blank area of the toolbar to set up the page

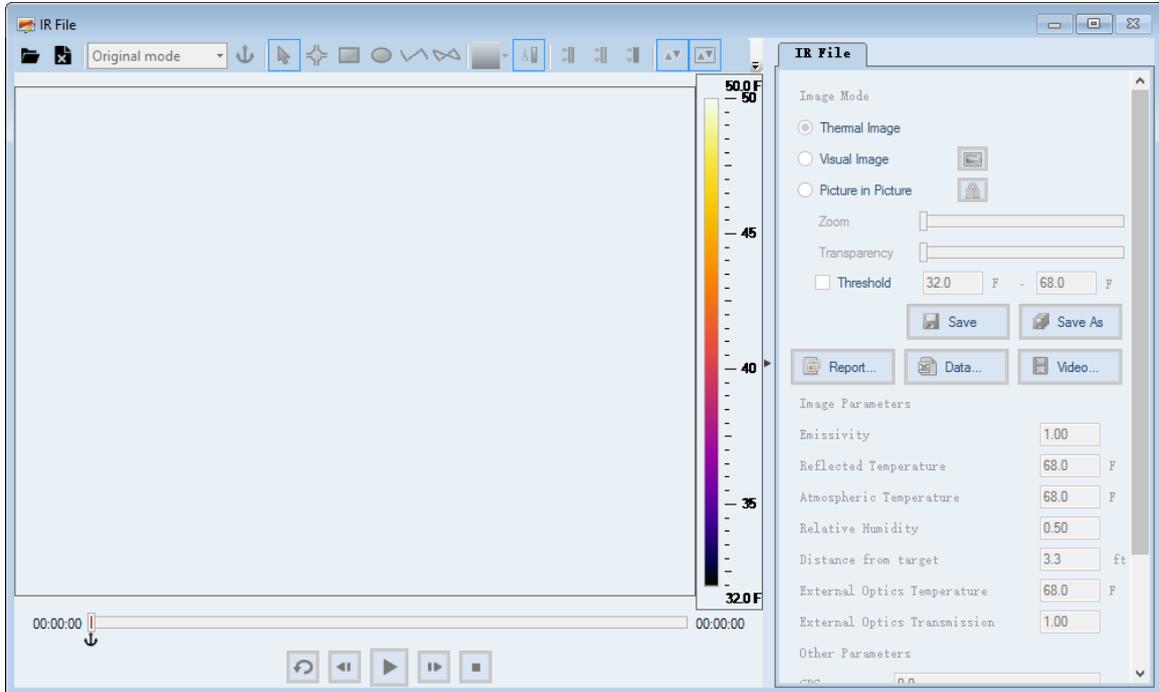


-  Fill all pages within the workspace.
-  Save current page layout. The workspace will be opened and displayed with the saved page layout.
-  Load saved page layout.

Note: User can import and play .IRS file in the IR Camera Workspace window. The UI is same as when an external thermal camera is connected.

2.2 IR File Workspace

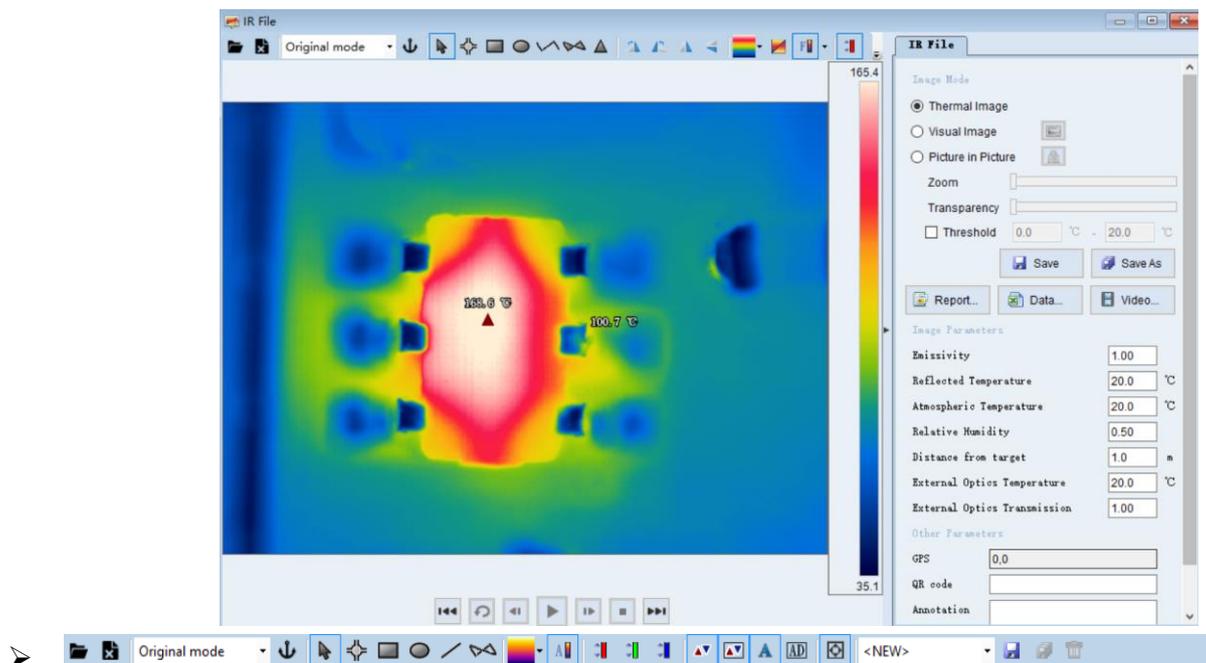
2.2.1 Main User Interface Window



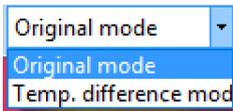
-  Restore, move, size, minimize and maximize the workspace
-  Import .IRS file
-  Close the opened .IRS file

2.2.2 IR File Workspace Analysis Interface

An example of importing .IRS file



Toolbar with different analysis tools

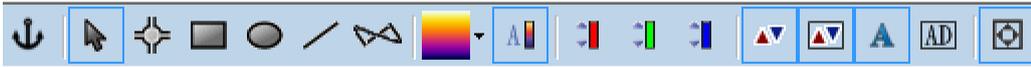


Analysis Type

- Original Mode: Default mode. Display temperature of imported thermal image.
- Temperature difference mode: Display the temperature difference between the current frames to the defined base frame.



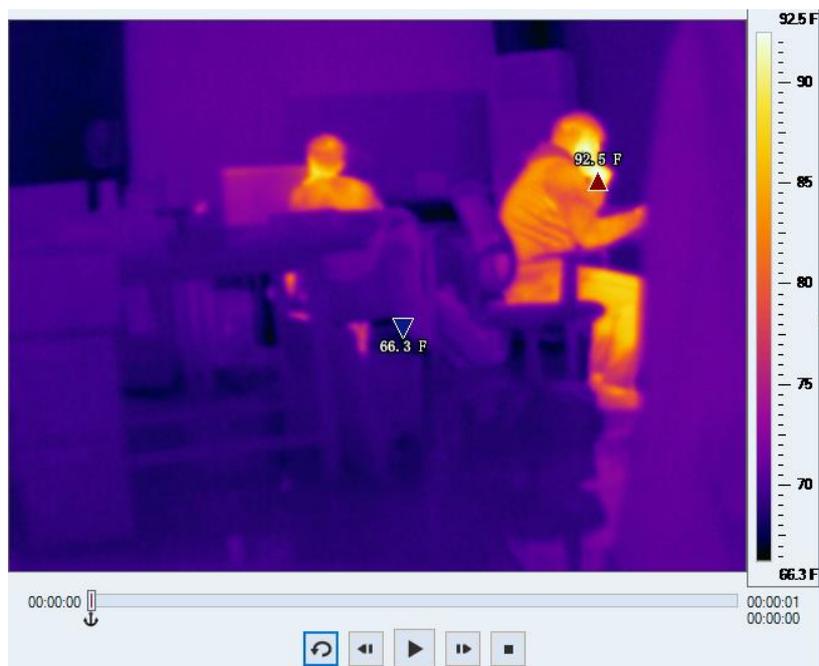
Set up the current frame as the base frame under temperature.



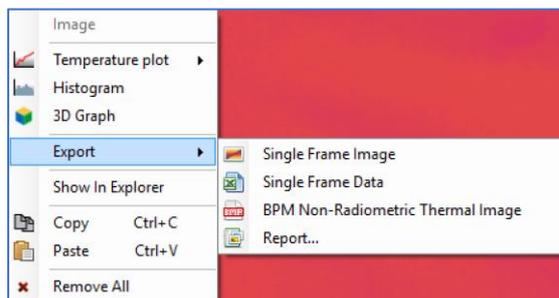
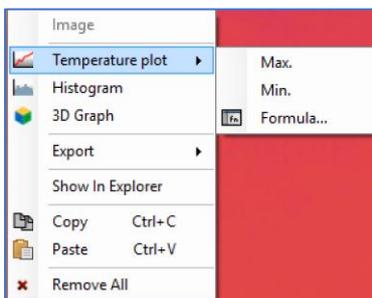
Toolbar with

different analysis tools. Same functions as IR Camera Workspace. Refer to section 2.1.2 for more information.

➤ Thermal Video Display Window



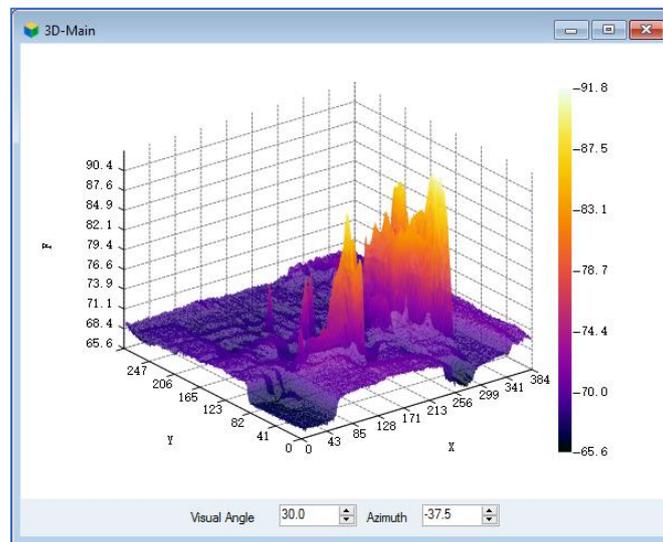
- Temperature scale (temperature bar) is on the right side of the thermal image. When double clicked, it's automatically switched to fixed temperature scale, you can change the upper and lower limit by dragging the mouse.



Right click on the thermal video image, you can access other functions.

- Temperature plot: Generate the profile of temperature vs. time. Besides the Max. and Min. temperatures, you can define your own temperature by creating the Formula.
- Histogram: Display the histogram graph (intuitive temperature distribution).

- 3D Graph: Display the current thermal image in 3D. You can change the view angle and azimuth angle to change the viewing angle of the 3D picture.



- Export
 - Single Frame Image: Export current frame as a thermal picture file (with temperature data and can be analyzed later).
 - Single Frame Data: Export temperature data of current frame as a .csv file.
 - BPM Non-Radiometric Thermal Image: Export current frame as a .bpm file (without temperature data and cannot be analyzed later).
 - Report: Export to report template. You can fill other information to make a complete report.
- Show in Explorer: Open the folder where current thermal video/image is from.
- Copy: Copy the position information of spot or area selections in current thermal image which can be copied to other files.
- Paste: Paste the copied information.
- Remove all: Remove all spot and area selections.

Report Number:

1. Basic Information

Company	<input style="width: 90%; height: 20px;" type="text"/>	Department	<input style="width: 90%; height: 20px;" type="text"/>
Contact	<input style="width: 90%; height: 20px;" type="text"/>	Phone	<input style="width: 90%; height: 20px;" type="text"/>
Address			
<input style="width: 95%; height: 20px;" type="text"/>			

2. Inspection Information

a. Inspection Images

Infrared thermal image



02_171102_191935.JPG

Visible light reference photo



b. Test Environment

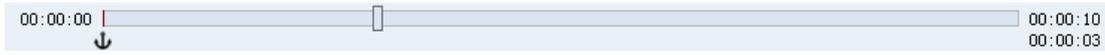
Test instruments	<input style="width: 90%; height: 20px;" type="text"/>	Lens configurations	<input style="width: 90%; height: 20px;" type="text"/>
Weather	<input style="width: 90%; height: 20px;" type="text"/>	Ambient temperature (°C)	68.0 F



Thermal video file playback control options

-  Click to switch the display of duration

- Time difference starting with 0



- Recording time



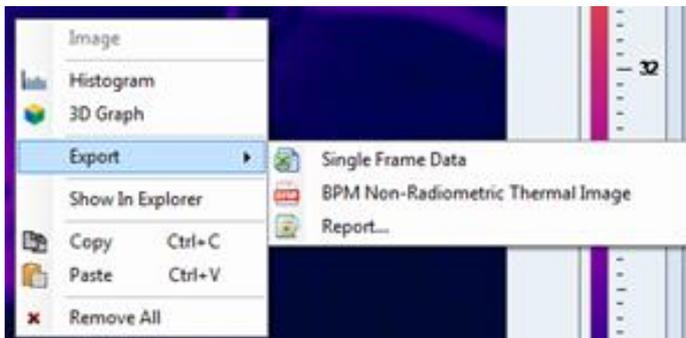
- Number of frames of recording file.



-  Loop playback.
-  Last frame.
-  Next frame.
-  Play and pause.
-  Stop and revert back to the beginning.

➤ Thermal Image Display Window

Note: Same operations as Thermal Video Display Window above. Right click on the thermal image and you can access other functions.



2.2.3 Thermal Image Parameter Setting Panel

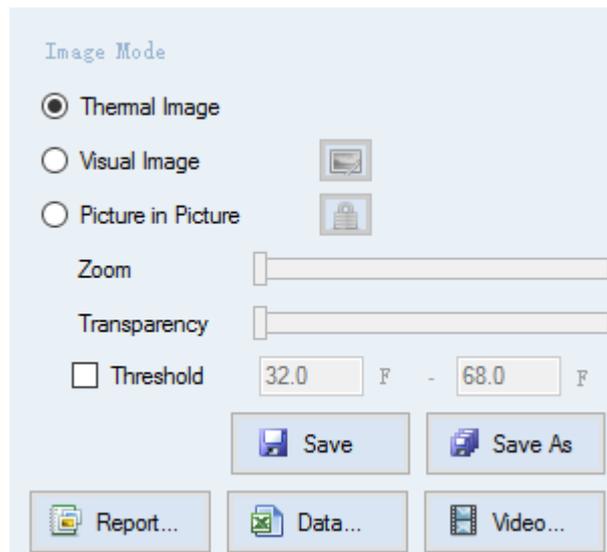
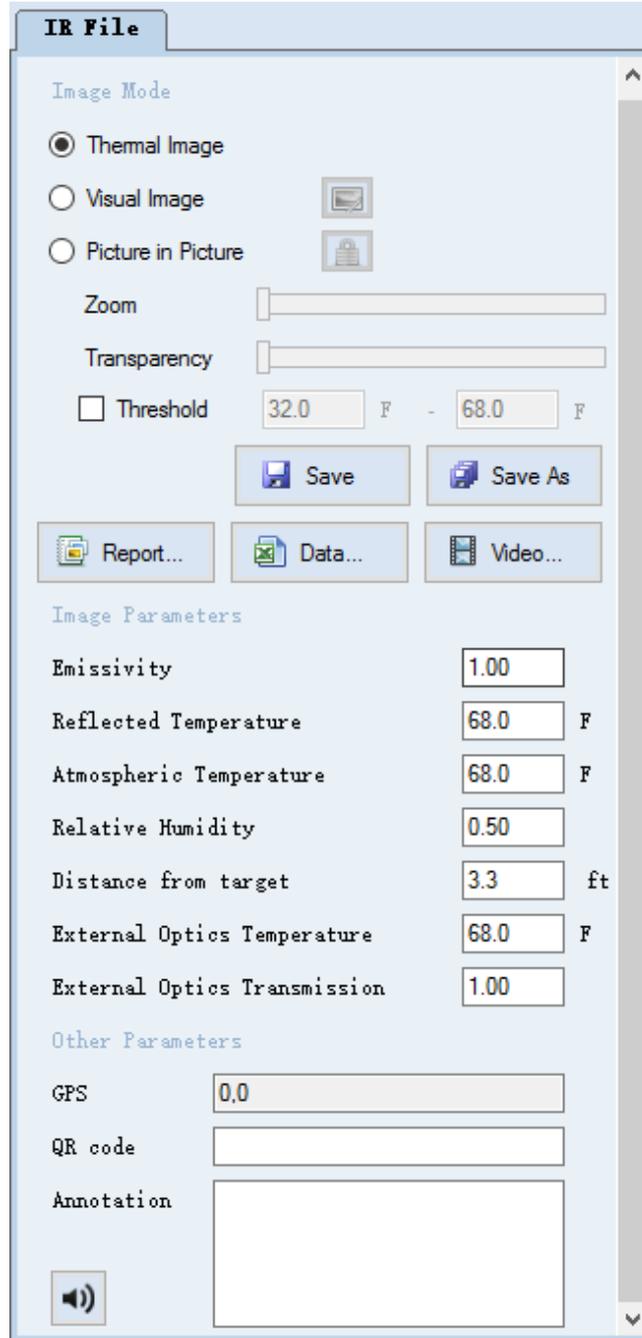


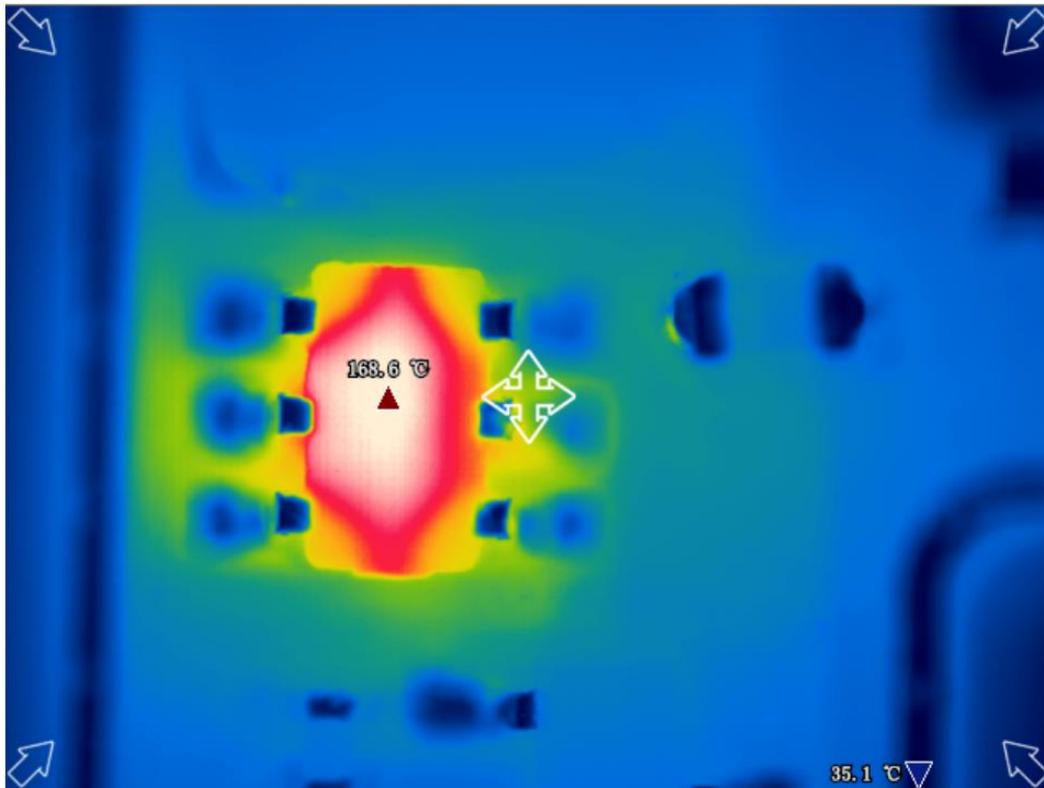
Image Mode,

- Thermal Image: Display thermal image in the workspace window.

- Visual Image  Visual Image: Display visible image in the workspace window.

- Picture in Picture  Picture in Picture: Display the thermal image inside the visible image.

- Click the  Lock flag to change the size of the thermal image by dragging the thermal image.

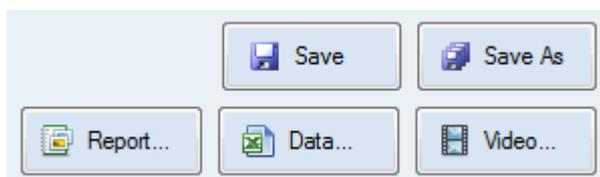


- Zoom in and out the image.

- Change the transparency of the image.

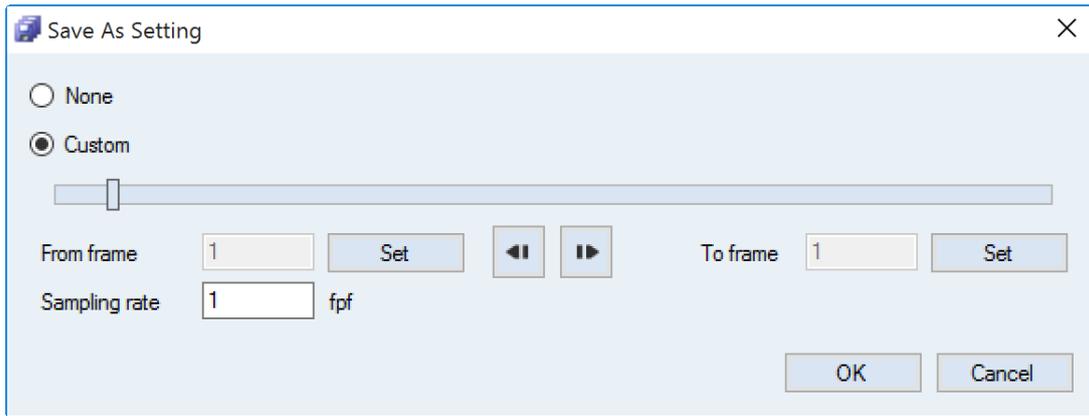
- Threshold °C - °C Check to display the thermal image areas with the temperature between the defined thresholds mixed with the visible image.

➤ Save, Save As, Report, Data Export, Video Export



-  Save Save current thermal image with all operations to the original file.

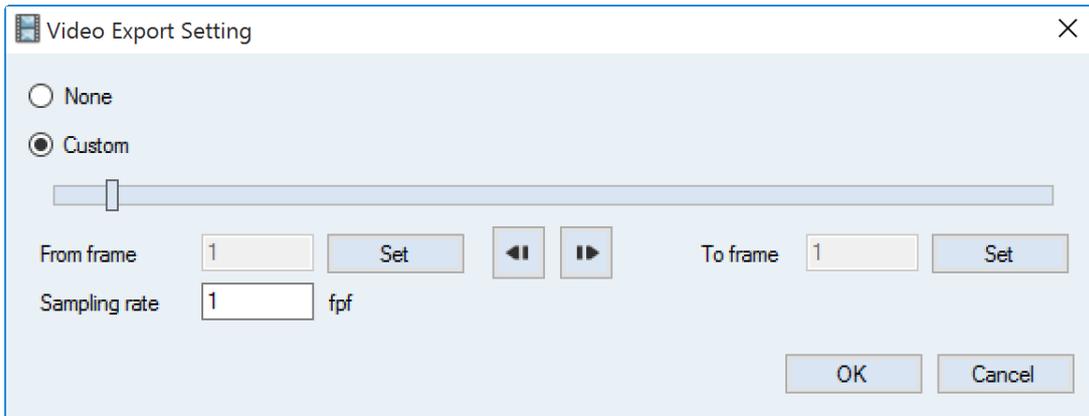
-  Save As Save current thermal image with all operations as a new file. A window pops out to configure the settings of Save As.



You can drag the progress bar shown, click "settings" to set the start and end frames. If the progress bar keeps rolling, please close the settings screen, pause the video play and then open. Or, manually input the start and end frames.

Sampling frequency: Define the interval between frames to be recorded.

-  Report... Export current image into a report template.
-  Video... Export current file as a video file. A window pops out to configure the settings.



You can drag the progress bar shown, click "settings" to set the start and end frames. If the progress bar keeps rolling, please close the settings screen, pause the video play and then open. Or, manually input the start and end frames.

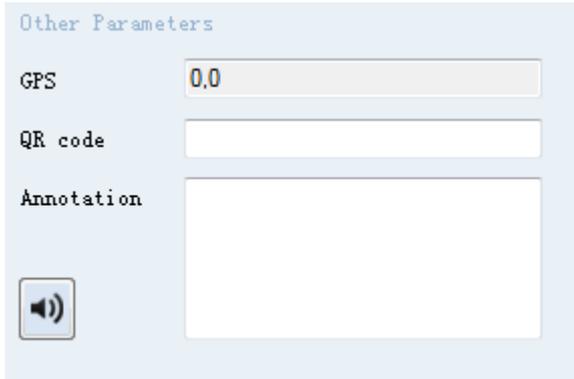
➤ Object Parameters Setting. Real-time updates in thermal image/video with modified parameters.

Image Parameters	
Emissivity	<input type="text" value="1.00"/>
Reflected Temperature	<input type="text" value="68.0"/> F
Atmospheric Temperature	<input type="text" value="68.0"/> F
Relative Humidity	<input type="text" value="0.50"/>
Distance from target	<input type="text" value="3.3"/> ft
External Optics Temperature	<input type="text" value="68.0"/> F
External Optics Transmission	<input type="text" value="1.00"/>

- Emissivity
- Reflected temperature
- Atmospheric temperature
- Relative humidity
- Distance to object

- External optics temperature (when IR window or external optics placed between thermal camera and object)
- External optics transmittance (when IR window or external optics placed between thermal camera and object)

➤ Other Object Parameters Setting



Other Parameters

GPS

QR code

Annotation

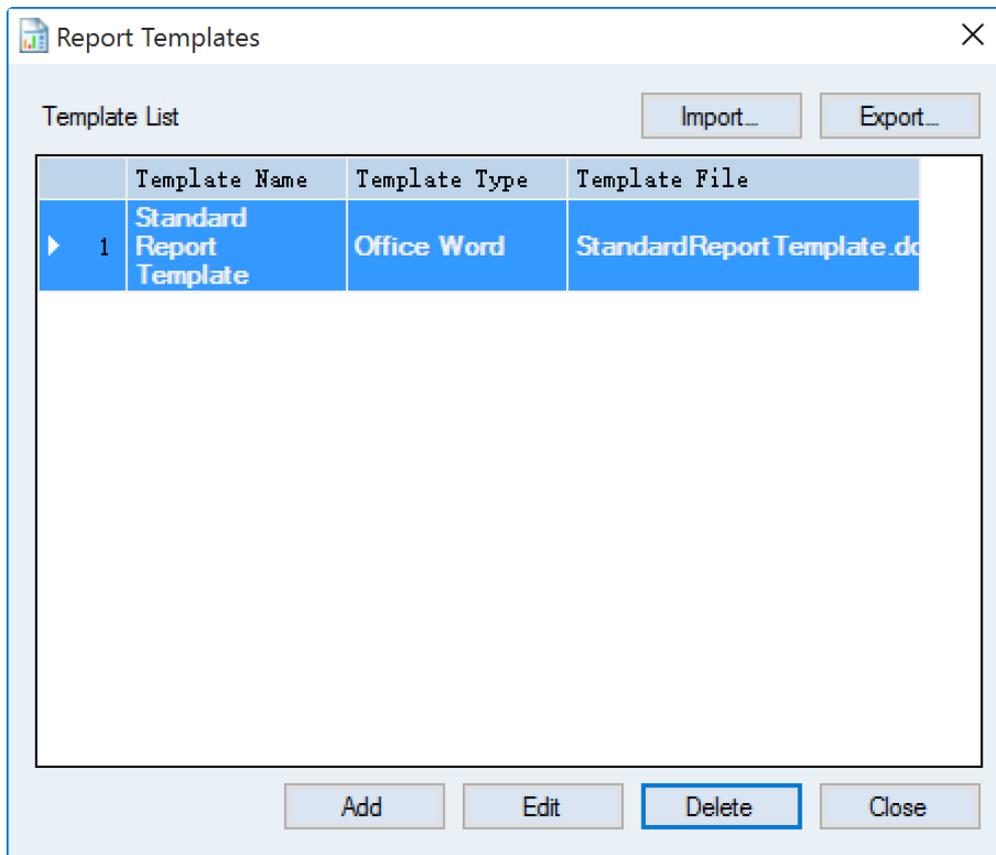


- GPS: Automatically imported data, related to the device.
- QR code: Equipment QR code.
- Annotation: Add descriptions of equipment or test.

2.2.4 Page Layout

Refer to section 2.1.4.

2.3 Report Template



Provide report templates for user to generate an inspection report. Right click to "Set As Default".

2.3.1 Import and Export the Report Template



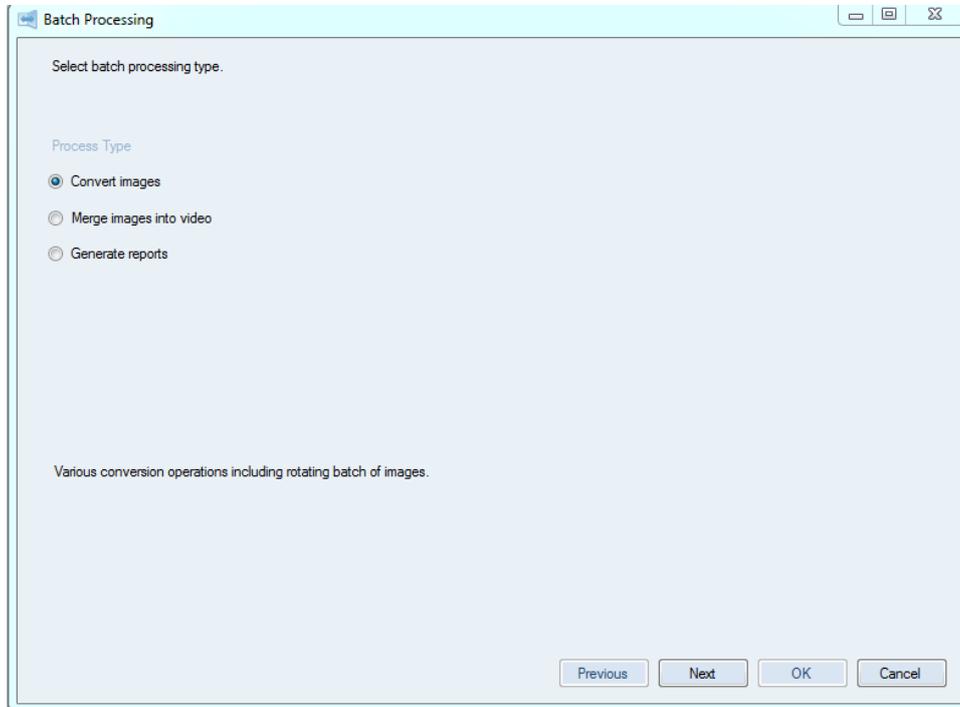
- ▶ Import external report template package into the software.
- ▶ Export selected report template as a report template package.

2.3.2 Add/Edit/Delete/Close report template

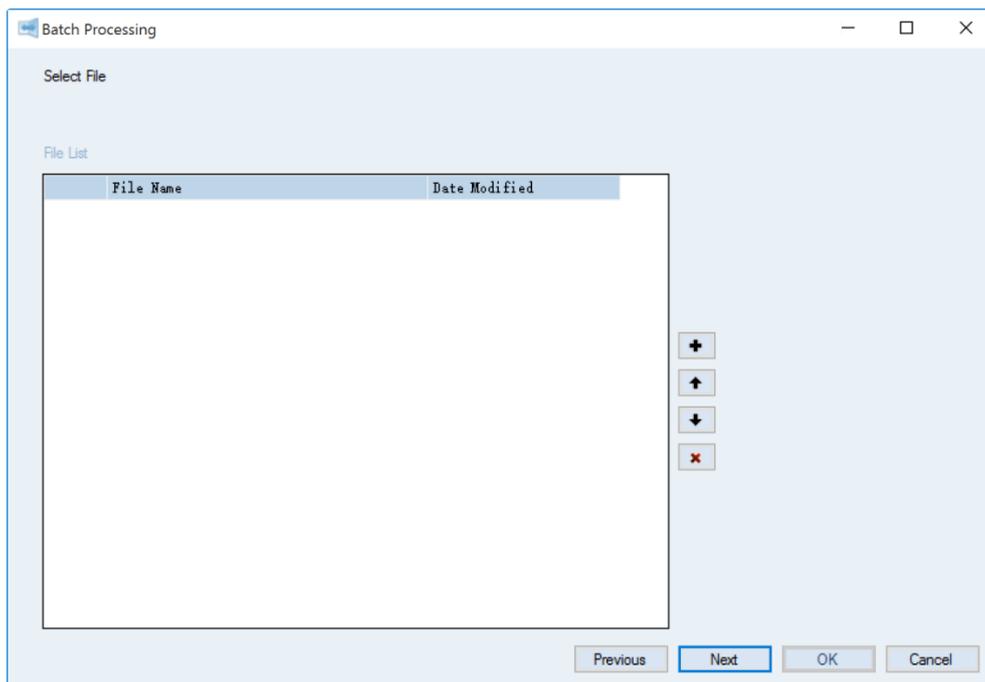


- ▶ Add report template (including name, type, and file). User can define a report template.
- ▶ Edit selected report template.
- ▶ Delete selected report template.
- ▶ Close "Report Template" window.

2.4 Batch Processing

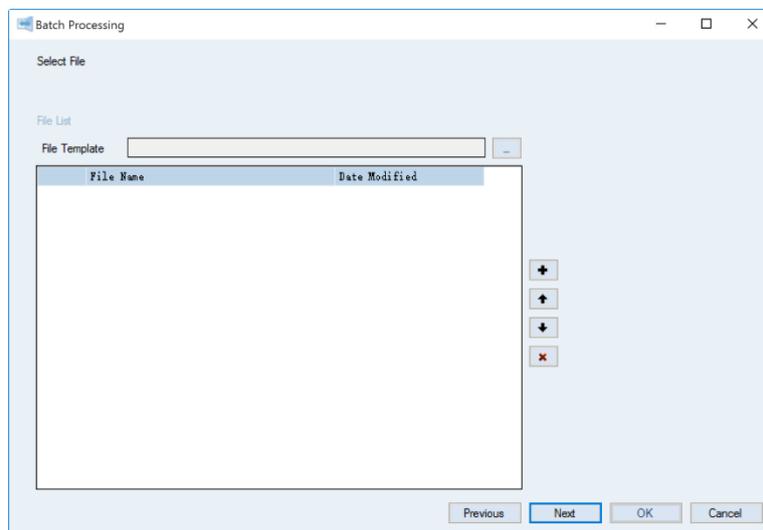


2.4.1 Convert Images



-  Add thermal image files (cannot add visible image).
-  Move up the image file location.
-  Move down the image file location.
-  Delete the selected thermal image file.

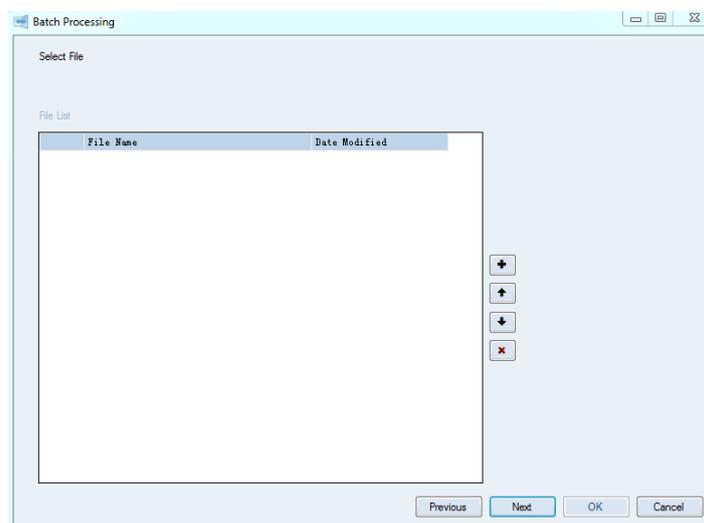
2.4.2 Merge Images into Video



- File template: Select the start image/video file (thermal image file or .IRS file)., Added files must be taken from the same thermal camera as the file template.
-  Add thermal image/video files (cannot add visible image). Added files must be taken from the same thermal camera as the file template.
-  Move up the image file location.
-  Move down the image file location.
-  Delete the selected thermal image file.

2.4.3 Generate Reports

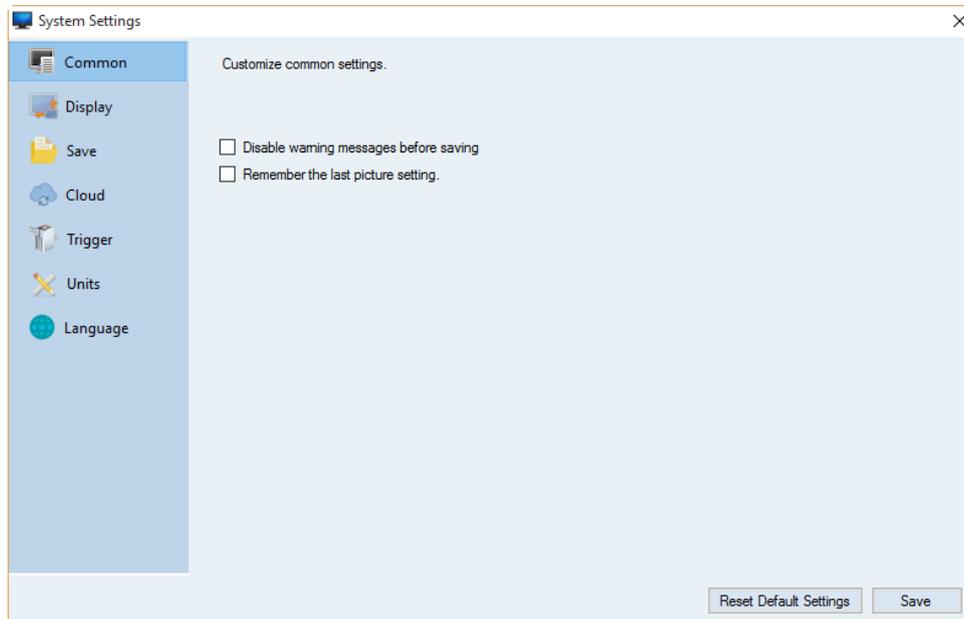
Create reports in batch.



-  Add thermal image files (cannot add visible image).
-  Move up the image file location.
-  Move down the image file location.
-  Delete the selected thermal image file.

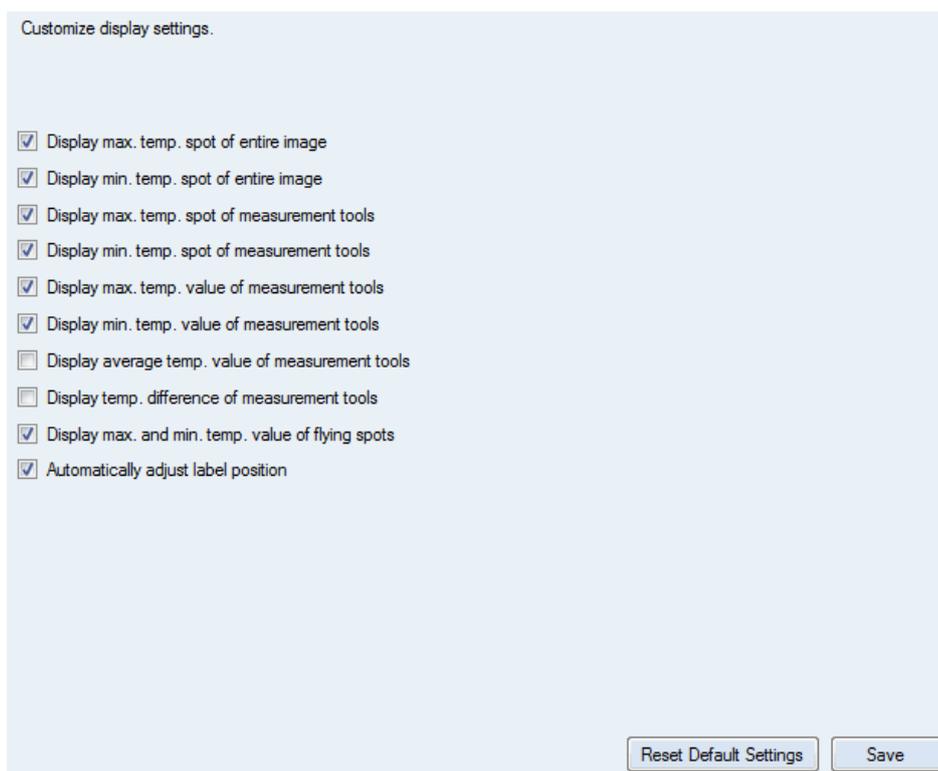
2.5 System Settings

2.5.1 Common



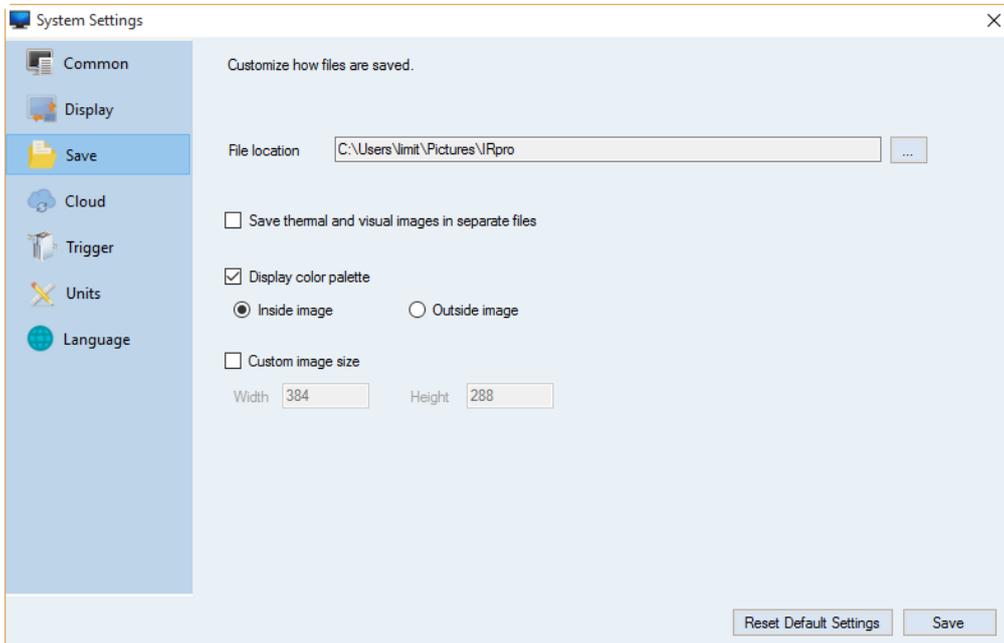
- Disable warning messages before saving After checked, no warning messages pop out before saving.

2.5.2 Display



- Options to set up the data display in workspaces.

2.5.3 Save

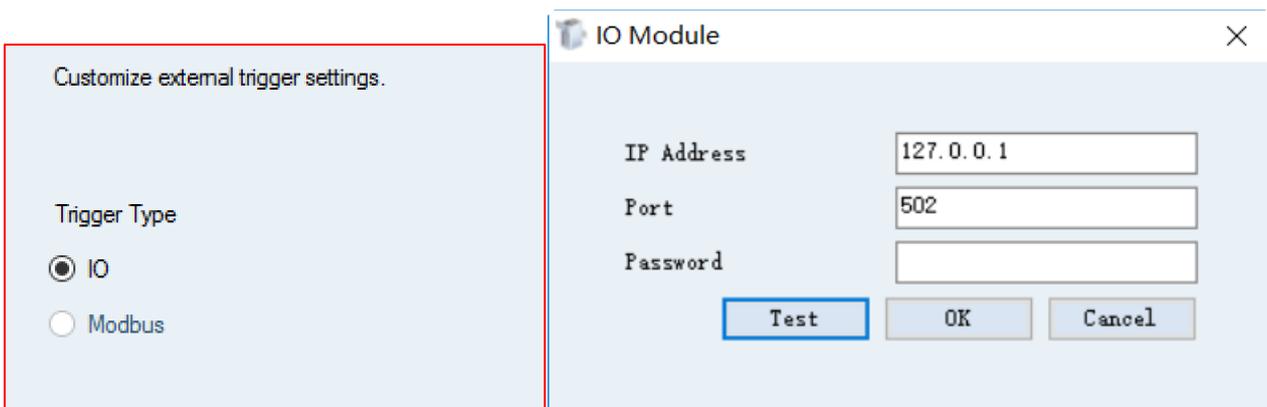


Set up the default folder to save files

- Save thermal and visual images in separate files After checked, it will save thermal and visible images from the picture in picture window separately with different file names.
- Display color palette
 Inside image Outside image Locations of temperature color bar display.
- Custom image size
Width Height User defined image size (pixels).

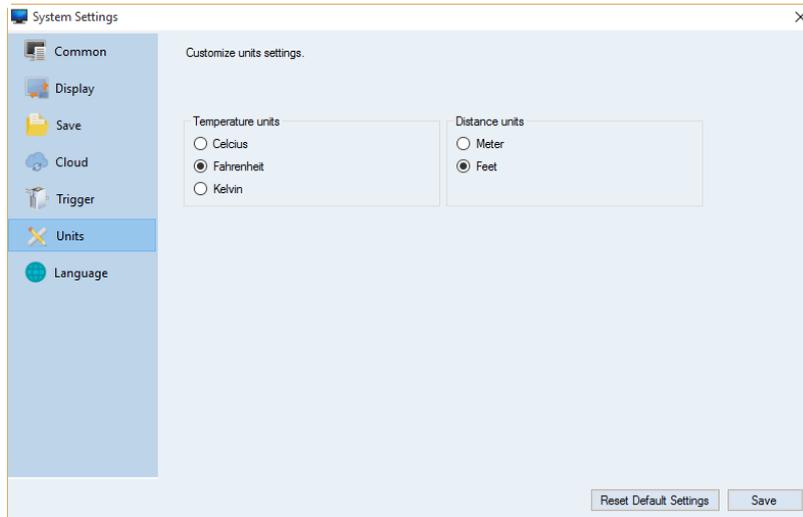
Note: Width and Height must be even numbers.

2.5.5 Trigger



Connect to external modules. Control the start and stop of thermal video recording in IR Camera Workspace.

2.5.6 Units



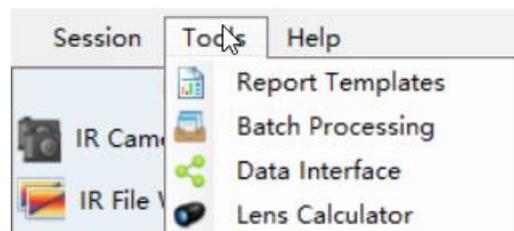
Set up temperature and distance units of workspaces. The default is “Fahrenheit” for temperature and “Feet” for Distance.

2.5.7 Language



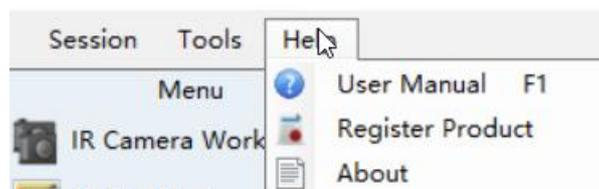
Configure the display language of the user interface (UI). The default is “Auto” which is same as display language of the operation system (OS).

2.6 Tools



Note: Manually input the “Marker Name” in the “Data Interface”, and the addresses cannot be same.

2.7 Help



- User Manual F1: Open user manual file.
- About: Check the version of the software.

Note: When registering product, user needs Administrator authority of the computer, otherwise registration may fail.

WARRANTY/DISCLAIMER

OMEGA ENGINEERING, INC. warrants this unit to be free of defects in materials and workmanship for a period of **37 months** from date of purchase. OMEGA's WARRANTY adds an additional one (1) month grace period to the normal one **(3) years product warranty** to cover handling and shipping time. This ensures that OMEGA's customers receive maximum coverage on each product.

If the unit malfunctions, it must be returned to the factory for evaluation. OMEGA's Customer Service Department will issue an Authorized Return (AR) number immediately upon phone or written request. Upon examination by OMEGA, if the unit is found to be defective, it will be repaired or replaced at no charge. OMEGA's WARRANTY does not apply to defects resulting from any action of the purchaser, including but not limited to mishandling, improper interfacing, operation outside of design limits, improper repair, or unauthorized modification. This WARRANTY is VOID if the unit shows evidence of having been tampered with or shows evidence of having been damaged as a result of excessive corrosion; or current, heat, moisture or vibration; improper specification; misapplication; misuse or other operating conditions outside of OMEGA's control. Components in which wear is not warranted, include but are not limited to contact points, fuses, and triacs.

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The purchaser is responsible for shipping charges, freight, insurance and proper packaging to prevent breakage in transit.

FOR WARRANTY RETURNS, please have the following information available BEFORE contacting OMEGA:

1. Purchase Order number under which the product was PURCHASED,
2. Model and serial number of the product under warranty, and
3. Repair instructions and/or specific problems relative to the product.

FOR NON-WARRANTY REPAIRS, consult OMEGA for current repair charges. Have the following information available BEFORE contacting OMEGA

1. Purchase Order number to cover the COST of the repair,
2. Model and serial number of the product, and
3. Repair instructions and/or specific problems relative to the product

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