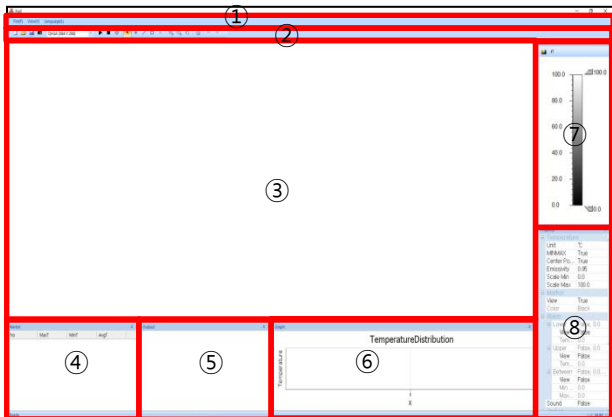


Thermal Expert Q1 software manual

- **Run Program**

Execute Thermal Expert Q1.exe or Thermal Expert shortcut



Running Screen

- | | |
|--------------------------------|--|
| ① Menu bar | ⑤ Print output message |
| ② Toolbar | ⑥ Show temperature graph on selected line marker |
| ③ Display image | ⑦ Set colormap, Level span |
| ④ Print temperature on markers | ⑧ Option setting |

- **File menu**

- **New:** When image files are loaded, it unloads all image files.

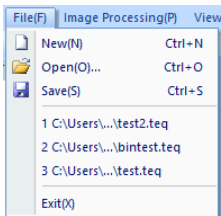
- **Open:** load image files of format png or teq. Only image will be loaded for png files, and image, temperature and other information are loaded for

teq format. For teq format images, you can check temperature, change colormap or other things (see below).

- **Save:** save currently displaying image in png or teq format.

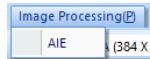
- **Recent** files: 5 most recently opened files are listed.

- **Exit:** Quit program



- **Image Processing menu**

- **AIE:** We provide Adaptive Image Enhancement (AIE) algorithm which shows more detailed image. (See AIE section)



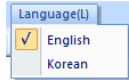
- **View menu**

- User can show/hide each docking window. In view – Docking Window menu, name of docking windows are listed. If docking window is hidden, it is unchecked, and if docking window is shown, it is checked state.

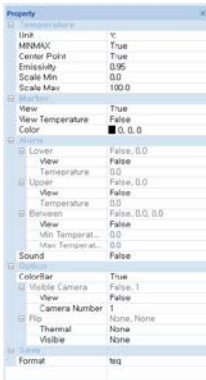


- Language menu

- This program provides two languages, English and Korean. English is set as default. To change language setting, select a language you want.



Ex)



Property menu (English) Property menu (Korean)

- **Toolbar**



① "New", "Open", "Save" buttons are same as file menu. Capture button is similar to save button. But, it save image file with file name IMG_(Date)_(Time). File format is set as the format in property window.

② It supports TE-Q1, V1 and EV1. Choose the appropriate model.

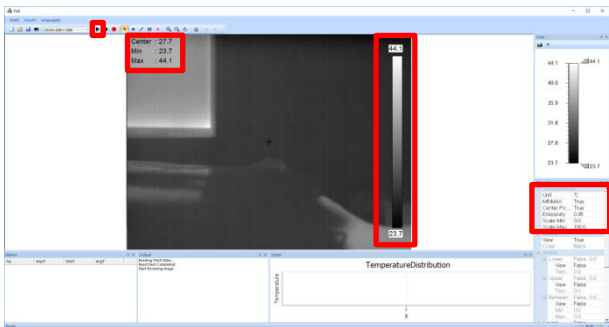
③ When TE is connected, play button displays thermal image received by TE. Stop button stops receiving data. Record button records images displayed with file name VID_(Date)_(Time).avi

④ User can add markers in image to see temperature information or delete markers. (See Markers)

- ⑤ It support digital zoom of 2x and 4x. And can move zoomed region by dragging image. (See Zoom)
- ⑥ Shutter Calibration button calculate one-point correction. If image quality goes worse while operating TE, do shutter calibration. Fix Dead Pixel button correct dead pixel which is generated while operating. To do these operations, set TE to see uniform scene and press button.
- ⑦ When user loads multiple image files, user can choose currently operating image by pressing move "next" or "prev" button.

- **Receive Image**

Click play button. If Thermal Expert is connected, loading message will appear and after a few moments, images will be displayed. Otherwise, "USB Open Failed" message will appear. To stop receiving images, click Stop button. For V1 and EV1, Shutter calibration operation is automatically applied when play button is pressed, so put any uniform temperature object in front of TE.





User can set emissivity value (default 0.95) and change temperature unit between Celsius and Fahrenheit. Then, the

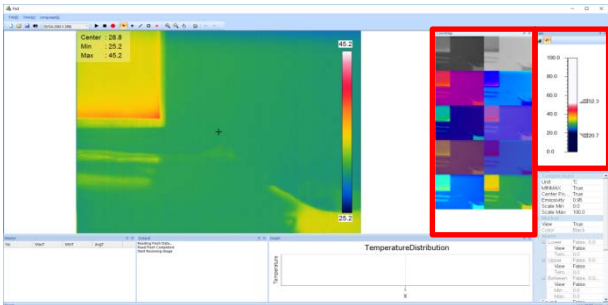
temperature values displayed in image will change accordingly. And, Color bar and min, max, center point temperature will appear by default. It can be modified in the property window.

If displayed image is flipped (due to incorrect placement of TE or other reasons) user can flip image by changing flip option in Property window. It support "Upside Down", "Mirror", "Both". "Upside Down" converts upper side of image into lower side image. "Mirror" converts left part of image to right part. "Both" applies both Upside Down and Mirror operations.


- **Colormap, Level span**


If colormap button () is clicked, Colormap window will appear. There are 10 different color map and select image of which color map you want to apply.

Received image is fitted to 0 ~ 255 at default setting regardless of temperature. If you want to see images fitted to pre-defined temperature range, press AGC button (). Then, you can set temperature range.

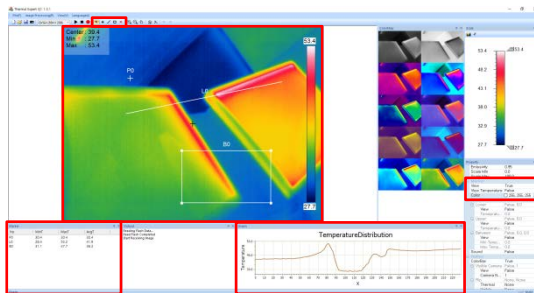


- **Markers**

Point, line, box markers can be added to see temperature of some region. Select marker button (), and then click some point at which you want to see temperature. Minimum, maximum, average temperature will be printed in Marker window. In addition, if you select line marker, a graph which display temperature distribution will be generated.

To erase marker, select marker and press “Delete” key. If you want to erase all markers, click delete button ().

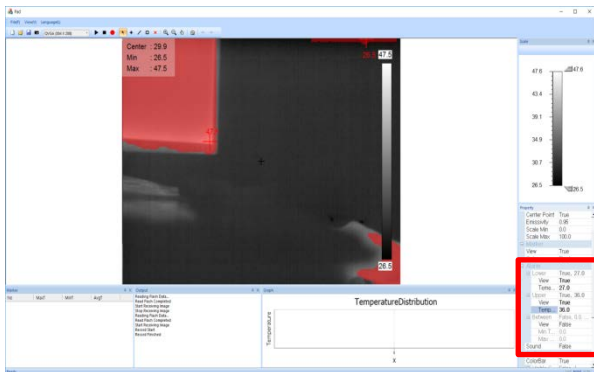
User can hide markers, display temperature in image, or change marker color in property window.






- **Alarm**

If you want to check whether temperature is out of some limits, you can use Alarm function.

It can check if temperature is below the limit or over the limit or between some limits. Set True for View option you want to choose and type temperature limit. Then, it will paint red in regions where temperature is out of limit. Also, you can select sound which alarms you when some region is out of temperature limit.



- **Zoom**

Image can be zoomed in. Press Zoom in button (), and click in image. Then, zoomed image will be displayed. It offers 2-fold and 4-fold expansion. To zoom out, press Zoom out button () and click image. In order to move zoomed region, select Move button () and drag in image.



<Before zoom>



<After zoom 2x>

- **AIE**

We provide edge enhancement algorithm AIE. To apply AIE algorithm, click AIE button in Image Processing menu. Then, AIE window will popup. Check AIE On button. You can select whether AIE level is set automatically or manually. Automatic AIE level control changes AIE level based on received thermal image data. If greater value is set, the edge enhancement quality increases, but image becomes noisier. Below images show a result of AIE algorithm.



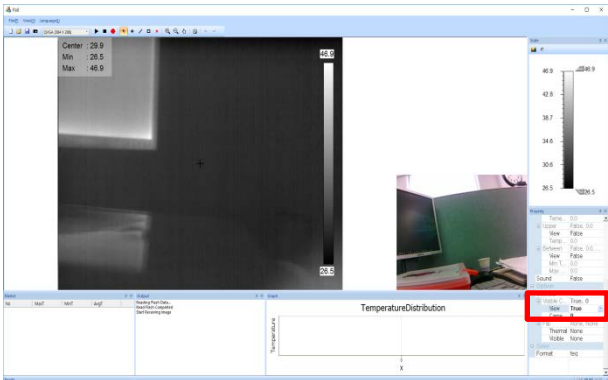
<Original Image>





<After AIE>

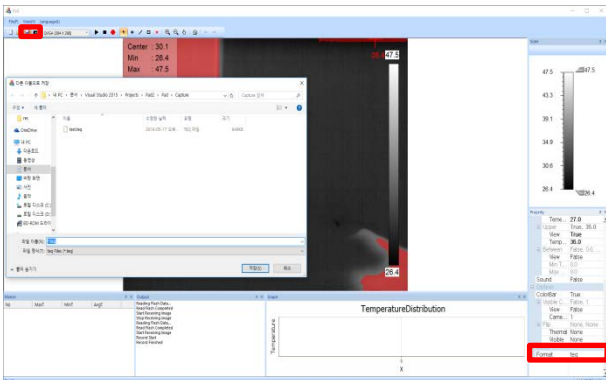
- **Visible Image**

If visible camera is connected, visible image can be displayed. Select visible camera number and set Visible Camera View option to True. Then, visible image will appear at the right of IR image. If user save image in teq format while visible camera is on, visible image data is also saved in file. And, visible image can be flipped same as thermal image.




- **Save Image**

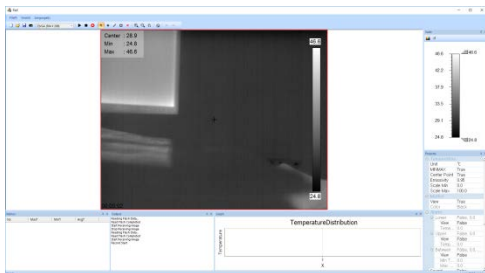
You can save image in PNG or teq file format. Click save button (), type file name and save. If capture button () is clicked, it will automatically set file name IMG_(Date)_(Time) with selected format. Image files are saved in “Documents\Thermal Expert Q1\Capture” directory. Saved files can be loaded in this software.



Note: teq is customized format for saving Thermal Expert image information in Thermal Expert Q1 program. It saves current image information which contains temperature data, colormap, visible image (if exist), number and position of markers, and emissivity. When teq file is loaded, those information are loaded and applied automatically. Since this format is customized format, it cannot be used in ordinary image viewer.

- **Record**

Received images can be saved as video file. Click Record button (), then it will record images. While recording, recording time will be displayed at the bottom left of image. To stop recording, click record button one more time. avi file will be saved in Video folder with name AVI_(DATE)_(TIME).avi.



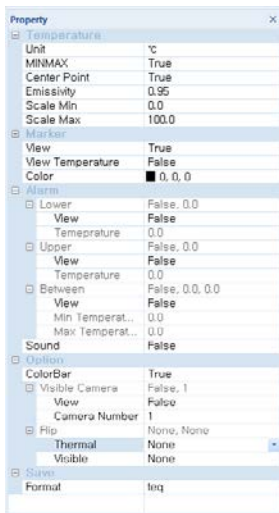
AVI_20160517_1
10611.avi

- **Property**

Each parts of property window is explained separately. In this part, property options are summarized.

- **Temperature:**

- Unit: Temperature Unit (Celsius, Fahrenheit)
- MINMAX: display minimum and maximum temperature in image
- Center Point: display center point temperature
- Emissivity: emissivity value applied to calculate temperature
- Scale Min: minimum value of colorbar
- Scale Max: maximum value of colorbar



- **Marker:**

- View: show/hide marker
- View Temperature: display temperature of marker in image
- Color: color of marker

- **Alarm:**

- Lower
 - View: mark as red in image of which temperature is out of lower limit temperature
 - Temperature: lower limit temperature to alarm
- Upper:
 - View: mark as red in image of which temperature is out of upper limit temperature
 - Temperature: upper limit temperature to alarm
- Between:
 - View: mark as red in image of which temperature is between some range of temperature
 - Min Temperature: lower limit temperature to alarm
 - Max Temperature: upper limit temperature to alarm
- Sound: play sound when temperature is out of limit


- **Option:**

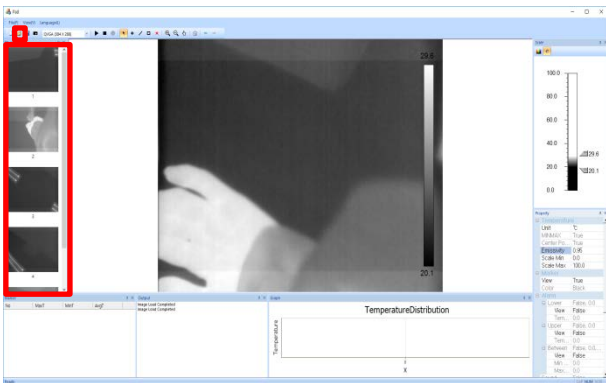
- ColorBar: Show colorbar in image
- Visible Camera
 - View: show visible camera image
 - Camera Number: visible camera number to display
- Flip
 - Thermal: Flip thermal image
 - Visible: Flip visible image

- **Save:**

- Format: image format(png or teq) when saving image file

- **Open Image Files**

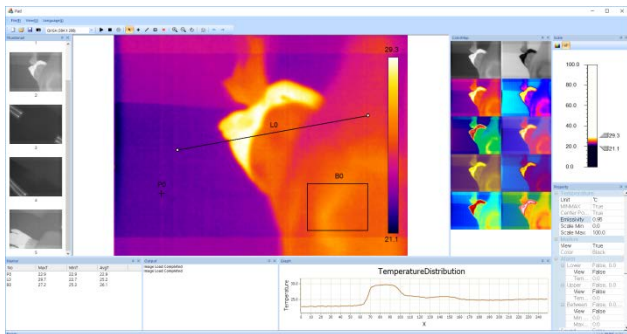
Previously saved image files can be loaded. Click Open button and select files to open. Then images will be loaded. At the left of program, Thumbnail window will appear and downsized images will be displayed. You can switch current image by clicking Previous or Next button () or double clicking thumbnail image.



- **Operation on image files**

Colormap, level span, marker, zoom in/out, AIE, save functions all can be applied to the loaded image with the same procedure as before.

If you want to clear all images, click "New" button.



Date : 2016. 11. 30

Contact : yongrae.jo@i3system.com

i3system, Inc.