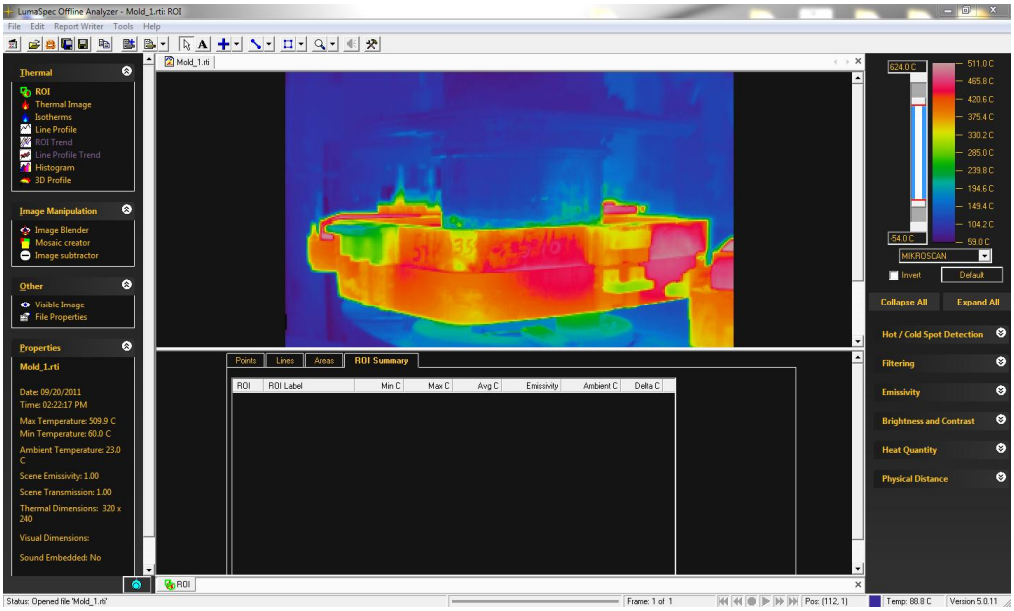
LUMASENSE® TECHNOLOGIES

MANUAL

LumaSpec™ Offline Analyzer

Advanced Thermal Image Processing, Analysis, and Report-Writing Software



LumaSpec™ Offline Analyzer

Thermal Image Processing, Analysis and Report-Writing Software

This manual (and all descriptions and specifications contained herein) is subject to change without notice as a result of manufacturing change or engineering improvements. For technical assistance, contact LumaSense Technologies, Inc. (LumaSense) at +1 800 631 0176 between the hours of 8:00 and 5:00 PST.

LumaSense License Agreement
This is a legal agreement between you (either an individual or an entity), the end user, and LumaSense Technologies, Inc. If you do not agree to the terms of this Agreement, promptly return the disk package and accompanying items (including written materials and binders or other containers) to the place you obtained them for a full refund.

Grant of License
This LumaSense License Agreement ("LICENSE") permits you to use one copy of the specified version of the LumaSense software product identified above ("SOFTWARE") on any single computer, provided the SOFTWARE is in use on only one computer at any time. If you have multiple Licenses for the SOFTWARE, then at any time you may have as many copies of the SOFTWARE in use as you have Licenses. The SOFTWARE is "in use" on a computer when it is loaded into the temporary memory (i.e., RAM) or installed into the permanent memory (e.g., hard disk, CD-ROM, or other storage device) of that computer, except that a copy installed on a network server for the sole purpose of distribution to other computers is not "in use". If the anticipated number of users of the SOFTWARE will exceed the number of applicable Licenses, then you must have a reasonable mechanism or process in place to assure that the number of persons using the SOFTWARE concurrently does not exceed the number of Licenses. If a Site License is purchased, the “COMPANY” may install the SOFTWARE on any machine that is owned or leased and operated by the “COMPANY”. A Site License may not be sold or transferred to any other individual or entity without the written consent of LumaSense Technologies.

Copyright
The SOFTWARE is owned by LumaSense and is protected by United States copyright laws and international treaty provisions. Therefore, you must treat the SOFTWARE like any other copyrighted material (e.g., a book or musical recording) except that you may either (a) make one copy of the SOFTWARE solely for backup or archival purposes, or (b) transfer the SOFTWARE to a single hard disk provided you keep the original solely for backup or archival purposes. You may not copy the written materials accompanying the SOFTWARE.

Other Restrictions
This LumaSense License Agreement is your proof of license to exercise the rights granted herein and must be retained by you. You may not rent or lease the SOFTWARE. You may not reverse engineer, decompile, or disassemble the SOFTWARE.

Limited Warranty
LumaSense warrants that the SOFTWARE will perform substantially in accordance with the accompanying written materials for a period of one (1) year from the date of receipt. Any implied warranties on the SOFTWARE are limited to one (1) year. Some states do not allow limitations on duration of an implied warranty, so the above limitation may not apply to you.

Customer Remedies
LumaSense entire liability and your exclusive remedy shall be, at LumaSense’s option, either (a) return of the price paid or (b) repair or replacement of the SOFTWARE or hardware that does not meet LumaSense’s Limited Warranty and that is returned to LumaSense with a copy of your receipt. This Limited Warranty is void if failure of the SOFTWARE or hardware has resulted from accident, abuse, or misapplication. Any replacement SOFTWARE will be warranted for the remainder of the original warranty period or thirty (30) days, whichever is longer.

No Other Warranties
LumaSense disclaims all other warranties, either express or implied, including but not limited to implied warranties of merchantability and fitness for a particular purpose, with respect to the SOFTWARE, the accompanying written materials, and any accompanying hardware. This limited warranty gives you specific legal rights. You may have others, which vary from state to state.

No Liability for Consequential Damages
In no event shall LumaSense or its suppliers be liable for any damages whatsoever (including, without limitation, damages for loss of business profits, business interruption, loss of business information, or other pecuniary loss) arising out of the use of or inability to use this LumaSense Technologies product, even if LumaSense Technologies has been advised of the possibility of such damages. Because some states do not allow the exclusion or limitation of liability for consequential or incidental damages, the above limitation may not apply to you.

U.S. Government Restricted Rights
The SOFTWARE and documentation are provided with RESTRICTED RIGHTS. Use, duplication, or disclosure by the Government is subject to restrictions as set forth in subparagraph (c) (1) (ii) of the Rights in Technical Data and Computer

Service Centers

LumaSense Technologies, Inc.
North America
Sales & Service
Santa Clara, CA
Ph: +1 800 631 0176
Ph: +1 408 727 1600
Fax: +1 408 727 1677

LumaSense Technologies GmbH
Other Than North America
Sales & Support
Frankfurt, Germany
Ph: +49 (0) 69 97373 0
Fax: +49 (0) 69 97373 167

Global and Regional Centers

Our Headquarters
LumaSense Technologies, Inc.
Santa Clara, CA
Ph: +1 800 631 0176
Fax: +1 408 727 1677

Americas, Australia, & Other Asia
LumaSense Technologies, Inc.
Santa Clara, CA
Ph: +1 800 631 0176
Fax: +1 408 727 1677

Europe, Middle East, Africa
LumaSense Technologies GmbH
Frankfurt, Germany
Ph: +49 (0) 69 97373 0
Fax: +49 (0) 69 97373 167

Brazil
LumaSense, Vendas Brasil
Campinas, Brasil
Ph: +55 19 3367 6533
Fax: +55 19 3367 6533

India
LumaSense Technologies, India
Mumbai, India
Ph: + 91 22 67419203
Fax: + 91 22 67419201

China
LumaSense Technologies, China
Shanghai, China
Ph: +86 133 1182 7766
Fax: +86 21 5877 2383

E-mail info@lumasenseinc.com
support@lumasenseinc.com
eusupport@lumasenseinc.com
supportdk@lumasenseinc.com
Website http://www.lumasenseinc.com

Part No. 512-0008-01-EN
Rev A
January 2014

To ensure consistent document formatting, this page was intentionally left blank.

Contents

To ensure consistent document formatting, this page was intentionally left blank.

1 Introduction

LumaSpec™ Offline Analyzer was designed by LumaSense Technologies, Inc., to analyze individual thermal and visual images in conjunction with LumaSense instruments. Images are analyzed using a variety of tools, and data can be displayed in the form of isotherms, histograms, 3-D profiles, etc. LumaSpec Offline Analyzer has many other exciting features, like blended thermal/visual overlays and the ability to assemble composite images in the Mosaic Creator. The desired images and data displays can be added to LumaSpec Offline Analyzer's Report Queue in units. In addition, professional, sophisticated reports are easily assembled from this information in the LumaSpec Report Writer. The Report Writer is easy to use and compatible with Microsoft Word.

LumaSpec Offline Analyzer software is provided on a disc with a case. The latest version of the software and PDF documentation are included on the disc. The software supports multiple languages (English, Japanese, German, French, Spanish, Russian, and Chinese).

1.1 Information About this Manual

This manual provides all of the information you need to configure and use the LumaSpec Offline Analyzer software with each software package.

This manual assumes you have a working knowledge of the Windows™ Operating System and its conventions; including how to use a mouse, standard menus and commands, and how to open, save, and close files. For help with any of these functions, refer to the documentation that came with your computer.

1.2 Conventions

- Section headings appear in **large Frutiger** type.
- Instruction sets appear with **Bold** headings.
- Menu, display, and keyboard options appear in **Bold** Title Case. (i.e., **File**, **Open**, **Save**, etc.)

Note: The note symbol indicates tips and useful information in this manual. All notes should be read to effectively operate the instrument.

1.3 System Requirements

LumaSpec Offline Analyzer is designed to operate on a Windows™ based computer with the following (minimum) components:

- 2 GHz or faster processor
- 512 MB Ram or higher
- Accelerated Video 24 bit or higher
- Windows XP (32 or 64 bit), Vista (32 or 64 bit), Windows 7 (32 or 64 bit), Windows 8 (32 or 64 bit)

1.4 Getting Started

1.4.1 Installing the Software

To install the LumaSpec Offline Analyzer Software, perform the following procedures:

1. Close all programs on your PC.
2. Insert the LumaSpec Offline Analyzer disc into your CD-ROM Drive.
3. Follow the on-screen instructions to complete the installation.

Note: Your computer may ask you to restart after installing the LumaSpec Offline Analyzer software. If your computer recommends a restart, follow the on-screen directions.

If you do not get on-screen instructions, it could mean that your auto play feature is disabled. In this case, open the disc files and click the setup.exe file to launch the application.

The installation places LumaSpec Offline Analyzer inside a LumaSpec Offline Analyzer folder on your hard drive, default locations:

32 bit: C:\Program Files\LumaSpec Offline Analyzer

64 bit: C:\Program Files (x86)\LumaSpec Offline Analyzer

In addition, the folder houses LumaSpec Offline Analyzer's Report Writer program. You can access the programs by going to the Windows Start Menu, to All Program Files, and finally to the LumaSpec Offline Analyzer folder.

1.4.2 Using LumaSpec Offline Analyzer For the First Time

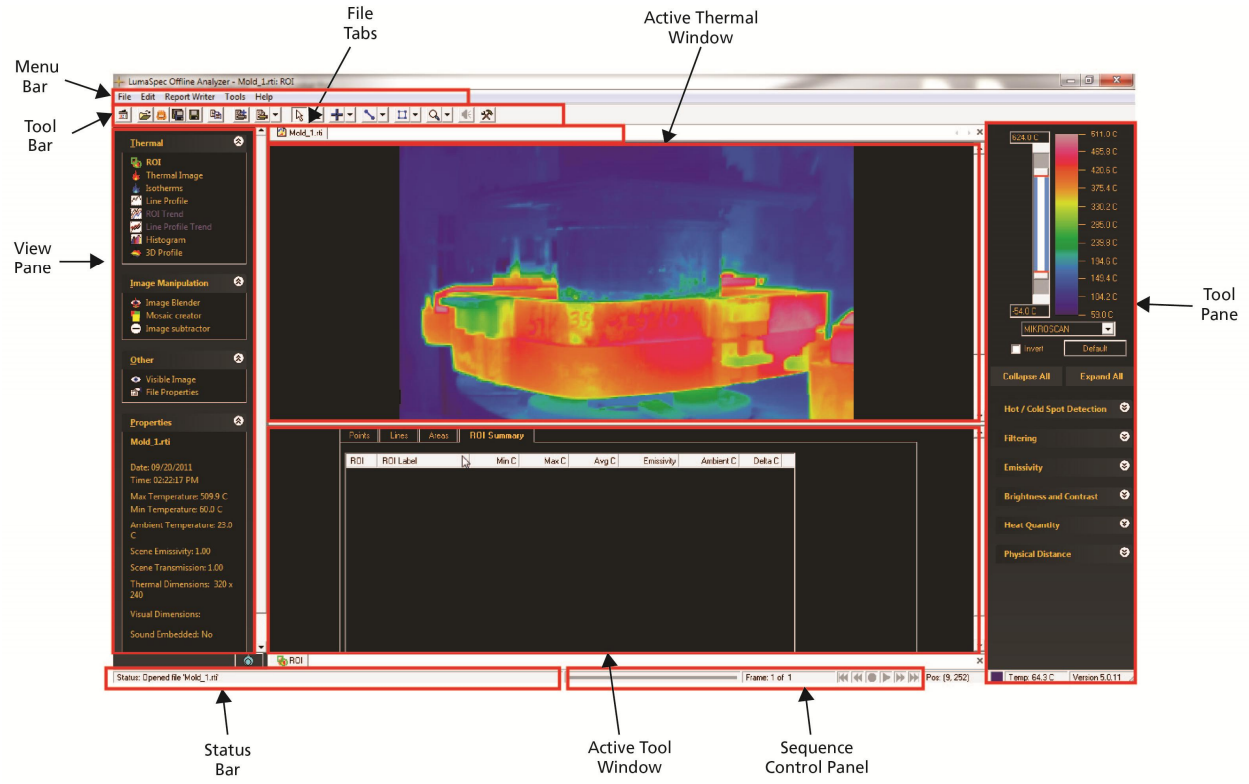
The first time LumaSpec Offline Analyzer is used after installation, it requires the entry of a valid serial number. (Your individual serial number is printed on your LumaSpec Offline Analyzer disc label.) Once a valid serial number is entered, the program will not request it again, unless uninstalled/reinstalled.

You may use LumaSpec Offline Analyzer for thirty days without a valid serial number. Click the **Use Evaluation** button. This evaluation option disappears once a valid serial number has been entered.

2 Working with the Software Interface

This chapter provides an overview of the user interface, step-by-step instructions for using many of the features, and how to configure your preferred options and appearance.

To make explanation of LumaSpec™ Offline Analyzer functionality easier, areas of the user interface have been named. This section will familiarize you with these different interface areas. More information will be given about these interface areas in later sections.

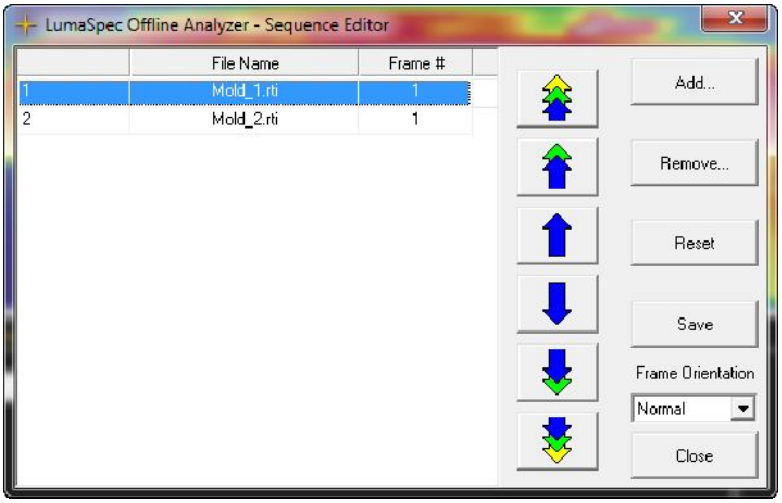


2.1 Menu Bar

The **Menu Bar** gives you access to File, Edit, Report Writer, Tools, and Help. These are standard text menus found at the top left of the LumaSpec Offline Analyzer screen. This section also provides their corresponding keyboard shortcuts (if applicable).

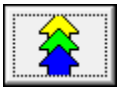
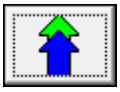
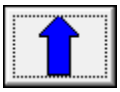
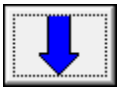
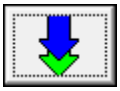
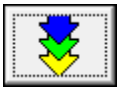
2.1.1 File Menu

Sequence Editor



The Sequence Editor allows you to create, modify, or combine an image sequence. The Sequence Editor interface consists of a Frames chart that displays the frames contained in the sequence and buttons that allow you to add, remove, or order the frames in the sequence, reset the sequence, and remove all frames. The Frames chart will be empty until you add frames using the **Add** button.

The function of each arrow button is described in the chart below:

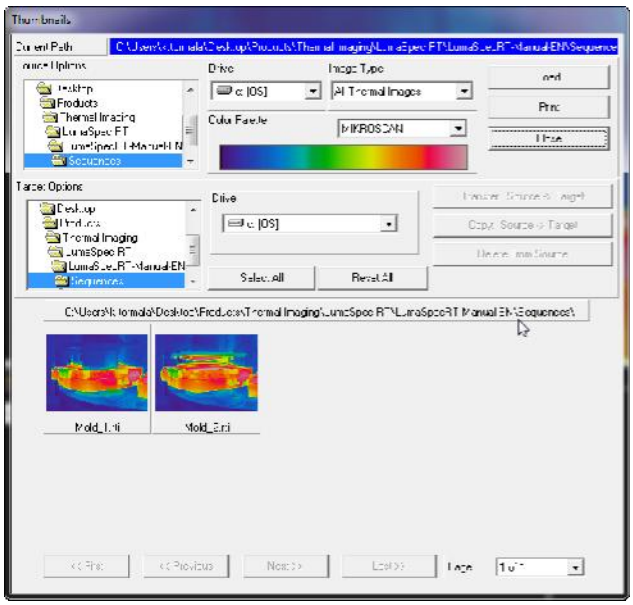
	**Move up 25 items**	Moves a selection up 25 items in the Frames Chart.
	**Move up 5 items**	Moves a selection up 5 items in the Frames Chart.
	**Move up 1 item**	Moves a selection up 1 item in the Frames Chart.
	**Move down 1 item**	Moves a selection down 1 item in the Frames Chart.
	**Move down 5 items**	Moves a selection down 5 items in the Frames Chart.
	**Move down 25 items**	Moves a selection down 25 items in the Frames Chart.

To move a frame:

1. Select the frame in the chart. You may select more than one frame by holding down the Shift or CTRL buttons (selected frames must be displayed consecutively in the chart to be moved).
2. Click the appropriate arrow button.

To create a new sequence or to combine/modify existing sequences:

1. Click the **Add** button.
2. The thumbnails dialog box will appear. Select the file or files that you want to add to the sequence.



3. Once you are done selecting files, click **Load.**

   If you selected a thermal image, it will be added as one frame to the Frames chart. If you selected a sequence file, each frame in the sequence will be added as a separate frame in the Frames chart.

4. If needed, add more thermal images or sequences to the Frames chart by using the **Add** button.

Note: All files added to the Sequence Editor must contain images that are the same size (320x240, 640x480, etc.). If they are not the same size, some files may not be added to the Sequence Editor.

---

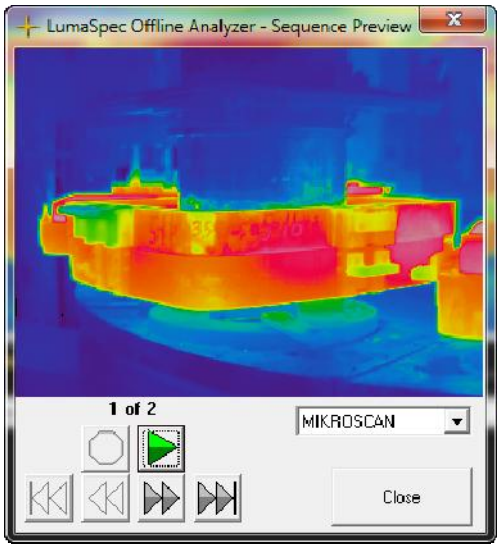
5. Adjust frames as needed: Move frames up and down in the Frames chart using the arrows. Remove a frame from the sequence by selecting it in the Frames chart and clicking the **Remove** button. You can also remove all frames from the chart by selecting the **Reset** button.

6. Once the sequence is complete, click the **Save** button.

7. A standard Windows™ Save box will appear. Type the name that you would like the file to have and click **Save**. The standard LumaSpec Offline Analyzer sequence file type (.RTV) will automatically append to the file.

8. The Sequence Editor Preview window will appear. It displays a preview of the sequence. Below the preview is a box that displays the number of frames in the sequence and the current frame being viewed, sequence control buttons, and a close button.

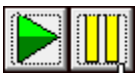
9. If you are not satisfied with the sequence, click the **Close** button to return to the Sequence Editor window and make additional modifications. To preview the file again, click **Save** and overwrite the existing file.



The following are the sequence control buttons available on the Sequence Editor Preview window:

Stop

Stops the playing of the sequence and returns to the first frame to allow playback from the beginning.



Play/Pause

When the sequence is stopped, the green play button is available to start the sequence. When the sequence is playing, it becomes a yellow Pause button, allowing you to pause the sequence and restart it later from that exact point.

Beginning

Allows you to return to the first frame of the sequence. If you are already at the first frame, this button is not available and will be grayed out.

Rewind

Allows you to move backward in the sequence. Press it to move back one frame. Hold it down to move quickly backward in the sequence. If you are already at the first frame, this button is not available and will be grayed out.

Fast-Forward

Allows you to move forward in the sequence. Press it to move forward one frame. Hold it down to quickly advance through a sequence. If you are already at the last frame, this button is not available and will be grayed out.

End

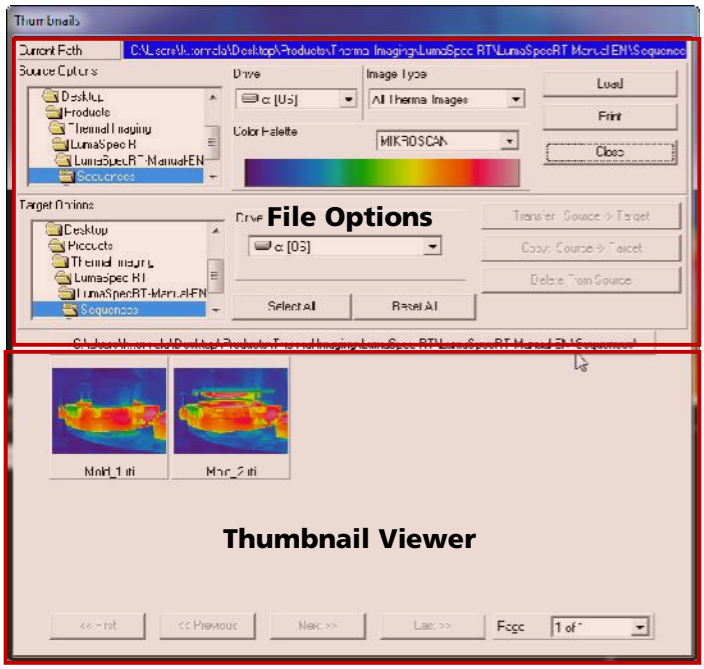
Allows you to skip to the last frame of the sequence. If you are already at the last frame, this button is not available and will be grayed out.

Palette Options

Allows you to select another color palatte.

Open Opens a new file.

Thumbnails



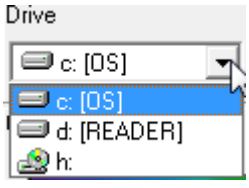
Unlike the Open or Save buttons, the Thumbnails button on the Toolbar does not open a standard Windows™ dialog box. Instead, it opens the Thumbnails window. The Thumbnails window allows you to preview and organize your LumaSpec Offline Analyzer files. The window is divided into two main areas: File Options (top) and Thumbnail Viewer (bottom).

The **File Options** half of the window helps you navigate your file system and locate LumaSpec Offline Analyzer-readable files. It also allows you to move, copy, and delete files without closing the window.

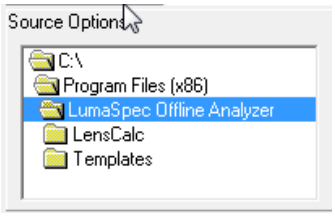
The **Thumbnail Viewer** half of the window allows you to select and open up to 10 files at once.

The Thumbnails window makes it easy to locate, organize, or delete LumaSpec Offline Analyzer files. By default, the Thumbnails window opens in the LumaSpec Offline Analyzer folder (C:\PROGRAM FILES\ LUMASPEC OFFLINE ANALYZER\). This is displayed in the Current Path box at the top of the window.

To change the folder or drive where LumaSpec Offline Analyzer looks for files:



1. Click the arrow next to the current drive letter in the **Drive** section of the window. Change it to the letter of the drive that your files are located.
2. In the **Source Options** area, navigate to the sub folder that contains your files.

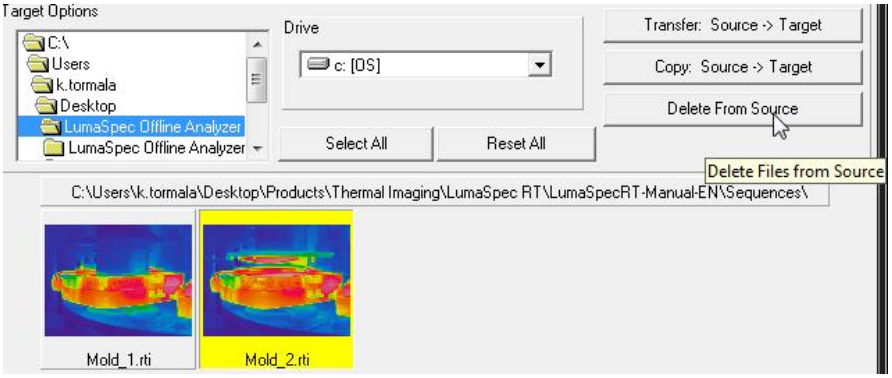


3. If you do not see any files, ensure that the proper file format is selected in the Image Type portion of the window (to the left of the Load button).

You may move, copy, and delete files using the buttons to the right of the Transfer options section of the window.

To delete files:

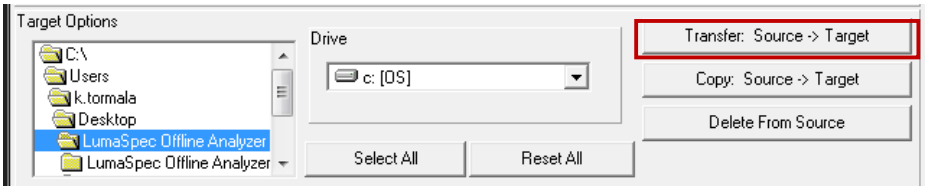
1. Select the files that you wish to delete in the Thumbnails Viewer.



2. Click **Delete From Source**.
3. A box will appear asking you to confirm deletion of the file. If you have selected the correct file, click **Yes.**

To move files to a different folder or drive:

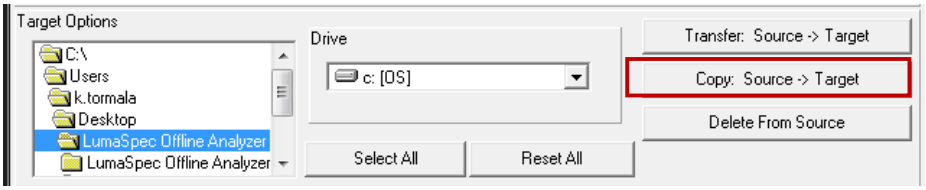
1. Select the files that you want to move.
2. In the **Target Options** section, select the correct drive and folder.
3. Click **Transfer: Source -> Target**.



4. A dialog box will appear informing you that the files have been moved. Click **OK**.

To copy files to a different folder or drive:

1. Select the files that you want to move.
2. In the **Target Options** section, select the correct drive and folder.
3. Click **Copy: Source -> Target**.



5. A dialog box will appear informing you that the files have been copied. Click **OK**.

The Thumbnail Viewer allows you to view your files 10 at a time. The Page box on the bottom right of the Thumbnails window tells you how many "pages" (groups of 10 files) are in your folder. Click the dropdown box to select a specific page, or click the Navigation Buttons to the left of the Page box to move forward and backward through the pages.

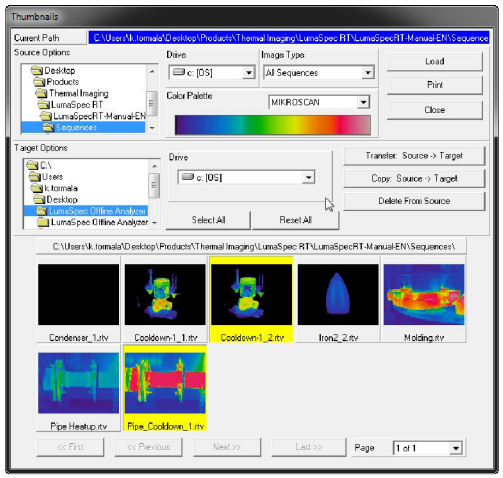
When you locate the files that you wish to open, click on their thumbnail representations. You may select up to 10. You can even select files from multiple pages as long as you do not select more than 10. To deselect a file, click on it again.

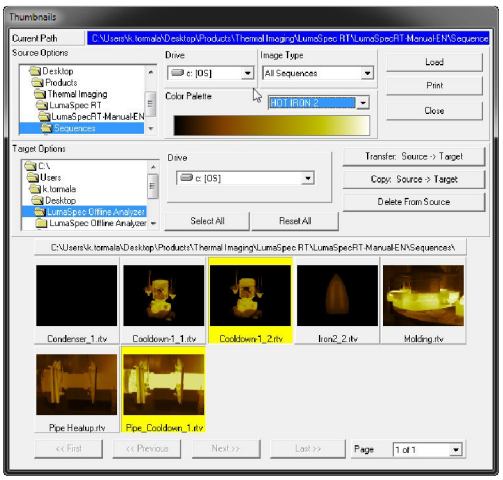
Use the **Select All** or **Reset All** buttons to select/deselect all of the files. If **Select All** results in more than 10 selected files, only the first 10 will be opened when you press **Load**.

At times, you may need to change the color palette to better see an image in the Thumbnail Viewer.

To change the palette:

1. Click on the arrow of the drop-down menu in the **Color Palette** section of the window.
2. Select a new palette.





Note: Changing the color palette in the Thumbnails window only changes the palette of the Thumbnail Viewer. When the images load, they will load in the default LumaSense color palette.

Recent	(Alt + F, R) Displays the last five recently opened files for easy reference.
Save As	(Alt + F, A) - Saves the current file, but gives you an opportunity to re-name.
Save	Saves the current file, overwriting the previous version.
Close this file	(Alt + F, C) - Closes the current file.
Close all but this file	(Alt + F, B) - Closes all but the current file.
Close all files	(Alt + F, F) - Closes all files.
Exit	Exits the entire program.

2.1.2 Edit Menu

Copy Copies an image or data to the clipboard. The default item copied is what is displayed in the Active Tool Window (lower half of mid-screen).

Copy Special Allows you to copy specific data in several formats.

- Thermal image - Copy the Thermal image (.BMP format).
- Thermal image with palette - Copy the Thermal image with palette (in .BMP format).
- Thermal image and line profile - Copy the Thermal image with line profile (in .BMP format).
- Thermal image and histogram - Copy the Thermal image with histogram (in .BMP format).
- Thermal image and 3D profile - Copy the Thermal image with 3D profile (in .BMP format).
- Thermal image with visible image - Copy the Thermal image with visible image (in .BMP format).
- Thermal image with visible image and palette - Copy the Thermal image with visible image and palette (in .BMP format).
- Visible image - Copy only the Visible image (in .BMP format).
- Thermal image and ROI trend graph - Copy the Thermal image with ROI trend graph (in .BMP format).
- Thermal image and line profile trend - Copy the Thermal image with line profile trend (in .BMP format).

Export Allows you to export data in several formats.

- **Excel** - Exports data to Microsoft™ Excel. You can choose:
  - Thermal image - Creates an Excel document with a tab for ROI Data and a tab for Image Data, which charts the temperature of each pixel of the thermal image.
  - ROI data - Creates an Excel document with a summary tab and a tab for each ROI that charts the temperature of each pixel of the ROI.
  - Thermal image and ROI data - Creates an Excel Document with ROI Summary tab, an Image Data tab, and a tab for each ROI.
  - Line profile trend data - When a line is selected in the Line Profile Trend, this feature creates a line profile trend from your current frame position forward and generates an Excel document with an ROI summary tab and a tab with a chart displaying the temperatures along the line for each slice of the line profile trend.
  - ROI trend data - When one or more lines are added to the ROI Trend chart, this feature creates and ROI trend and exports an Excel document with an ROI Summary tab and a tab with a chart displaying the data point per frame along the line.
- **Text** – Exports a .TXT file. You can choose:
  - Current frame - Exports the current frame as a tab deliminated

chart.

- All frames - Exports each frame as a separate file with an incrementing number automatically appended to the end of the file name.

- **BMP** – Exports a .BMP file. You can choose:
  - Thermal image - Copies the Thermal image.
  - Thermal image with palette - Copies the Thermal image with palette.
  - Thermal image and line profile - Copies the Thermal image with line profile.
  - Thermal image and histogram - Copies the Thermal image with histogram.
  - Thermal image and 3D profile - Copies the Thermal image with 3D profile.
  - Thermal image with visible image - Copies the Thermal image with visible image.
  - Thermal image with visible image and palette bar - Copies the Thermal image with visible image and palette.
  - Visible image - Copies only the Visible image.
  - Thermal image and line profile trend - Copies the Thermal image with line profile trend.
  - Thermal image and ROI trend graph - Copies the Thermal image with ROI trend graph.
- **JPEG** – Exports a .JPG format file. You can choose:
  - Thermal image - Copies the Thermal image.
  - Thermal image with palette - Copies the Thermal image with palette.
  - Thermal image and line profile - Copies the Thermal image with line profile.
  - Thermal image and histogram - Copies the Thermal image with histogram.
  - Thermal image and 3D profile - Copies the Thermal image with 3D profile.
  - Thermal image with visible image - Copies the Thermal image with visible image.
  - Thermal image with visible image and palette bar - Copies the Thermal image with visible image and palette.
  - Visible image - Copies only the Visible image.
  - Thermal image and line profile trend - Copies the Thermal image with line profile trend.
  - Thermal image and ROI trend graph - Copies the Thermal image with ROI trend graph.

- **AVI** – Exports a sequence to an .AVI format file.
  - Thermal image - Copies the Thermal image.
  - Thermal image with palette - Copies the Thermal image with palette.
  - Thermal image and line profile - Copies the Thermal image with line profile.
  - Thermal image and histogram - Copies the Thermal image with histogram.
  - Thermal image and 3D profile - Copies the Thermal image with 3D profile.
  - Thermal image and line profile trend - Copies the Thermal image with line profile trend.
  - Thermal image and ROI trend graph - Copies the Thermal image with ROI trend graph.

2.1.3 Report Writer Menu

Report Writer	Launches LumaSpec Offline Analyzer Report Writer.
Open Report Queue	Opens a saved LumaSpec Offline Analyzer Report Queue.
Save Report Queue	Saves your current collection in the Report Queue.
Edit Report Queue	Brings up the currently open LumaSpec Offline Analyzer Report Queue.
Clear Report Queue	Clears the current collection in the Report Queue.
Add file to Report Queue	Adds the currently opened file to the Report Queue. If you have more than one file open, only the one whose tab is currently selected will be added to the queue.

2.1.4 Tools Menu

Mouse	Selects the Mouse after using other tools like Text or Zoom.
Text	Use this tool to add text labels to an image. Click anywhere on the thermal image to open the Configure Text, box which allows you to enter the desired text, configure text alignment, and choose text and background colors or a transparent background. To modify an existing text label, select the mouse pointer tool and right-click the thermal image and select Edit>Text Labels> and then either Configure all Text Labels or Configure Text Label> and then the the label you want to configure. To delete a text label, right-click the thermal image and select Edit>Text Labels> and then either Delete all Text Labels or Delete Text Label and then the label you want to delete.
Point	This tool collection creates Point Region of Interests (ROIs), which monitor only one pixel. A Point ROI can measure the Maximum, Minimum, or Point (simply the temperature at that XY coordinate). The Arrow Point ROI does not measure temperature and is used only for a visual aide.
Line	This tool collection creates Line ROIs. Choose Broken Line, Free, or simply Line.

Area	This tool collection creates Area ROIs: Annulus, Oval, Polygon, Region, Rotated Rectangle, and Rectangle shaped ROIs.
Zoom	Allows you to zoom in or out of an image. You can choose Manual zoom to change the mouse pointer to a magnifying glass; left-click an image to zoom in or right-click to zoom out. You can also choose to zoom to a specific magnification, either 1/2X, 1X, 2X, 4X, or 8X. If you have a thermal or visual image open in the Active Tool Window, selecting a magnification will zoom the image in the Active Tool Window. If you do not have a thermal or visual image open in the Active Tool Window, the image in the Active Thermal Window will zoom.
Options	This tool opens the Options menus discussed in Section 2.2.

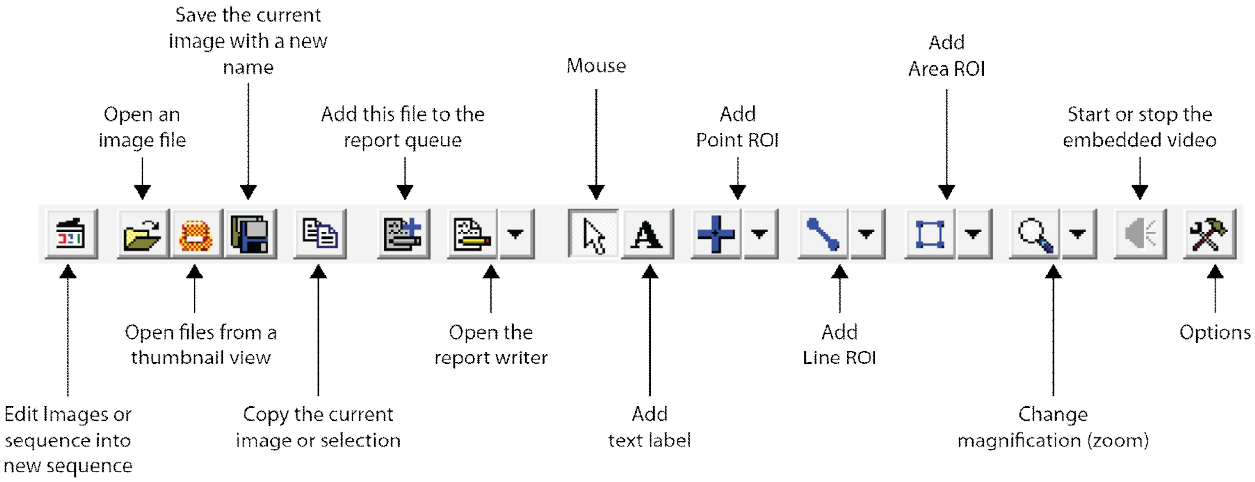
2.1.5 Help Menu

Contents	Loads the help files.
About	A dialog box with LumaSpec Offline Analyzer program information appears, including Version and Build Numbers. LumaSense's company information is also displayed.

2.2 Tool Bar

The **Tool Buttons** on the **Tool Bar** provide convenient access to the most frequently used tools of the program.

If you do not see a toolbar when LumaSpec Offline Analyzer loads, select **Tools** > **Options** from the Menu Bar to open the **Options Window** and click on the **Appearance Tab.** In the upper left General area, check the box next to **Show Toolbar**.



Tool Buttons

	**Open Sequence Editor**	Opens the Sequence Editor window.
	**Open File**	Opens an image file.
	**Thumbnails**	Opens a menu that allows you to view files as thumbnails and open up to 10 at once.
	**Save As**	Saves the current image to disk, but with the option to re-name it.

Copy	Copy the current image or selection.
Add to Report Queue	Add the current file to the Report Queue
Report Writer	Clicking the arrow next to this icon brings up six choices: • **Report Writer -** Launches LumaSpec Offline Analyzer Report Writer. • **Open Report Queue** - Opens a saved LumaSpec Offline Analyzer Report Queue. • **Save Report Queue** - Saves your current collection in the Report Queue. • **Edit Report Queue** - Brings up the currently open LumaSpec Offline Analyzer Report Queue. • **Clear Report Queue** - Clears the current collection in the Report Queue. • **Add file to Report Queue** - Adds the currently opened file to the Report Queue. If you have more than one file open, the one whose tab is selected will be added to the queue.
Mouse	Use the mouse to manipulate existing objects.
Text Label	Use this tool to add text labels to an image. Click on the thermal image to open the Configure Text box. You may enter the desired text, configure text alignment, and choose text and background colors or a transparent background. To modify an existing text label, right-click the thermal image and select Edit >Text Labels > and then either Configure all Text Labels or Configure Text Label > and then the the label you want to configure. To delete a text label, right-click the thermal image and select Edit >Text Labels > and then either Delete all Text Labels or Delete Text Label and then the label you want to delete.
Point ROIs	Clicking the arrow next to this icon brings up four choices: • **Maximum** - Point ROI that records maximum temperature. • **Minimum** - Point ROI that records minimum temperature. • **Arrow** - Point ROI that adds an arrow to the image. • **Point** - Point ROI that records the temperature at a single point.
Line ROIs	Clicking the arrow next to this icon brings up four choices: • **Broken Line -** ROI made of an unlimited number of straight line segments. • **Free -** Draw a freestyle line ROI. • **Line -** Single line ROI.
Area ROIs	Clicking the arrow next to this icon brings up four choices:

- **Annulus** - ROI defining a ring-like space between two concentric circles.
- **Oval** - Oval-shaped ROI, hold down Shift to create a perfect circle.
- **Region -** Draw a freestyle region ROI.
- **Polygon** - Multi-sided ROI of any shape.
- **Rotated Rectangle** - Rotate a rectange-shaped ROI.
- **Rectangle** - Rectangle-shaped ROI, hold down Shift to create perfect square.

Zoom Tool

Clicking the arrow next to this icon brings up five choices:

- **Manual -** Changes the mouse pointer to a magnifying glass. Left-clicking on an image will zoom in, while right-clicking will zoom out.
- **1/2X Zoom 0.5x -** Shrinks the current image to half its size.
- **1X Zoom 1x -** Returns the current image to its normal size.
- **2X Zoom 2x -** Magnifies the current image twice.
- **4X Zoom 4x -** Magnifies the current image four times.
- **8X Zoom 8x -** Magnifies the current image eight times.

If you have a thermal or visual image open in the Active Tool Window, selecting a specific magnification (1X, 2X, 4X, or 8X) will zoom the image in the Active Tool Window. If you do not have a thermal or visual image open in the Active Tool Window, the image in the Active Thermal Window will zoom.

Start/Stop Embedded Audio

Starts/Stops the embedded audio file (originating with cameras that support this feature).

Options

Opens the Options dialog box, allowing you to edit options.

2.3 File Tabs

These tabs sit under the Tool Bar, over the Active Thermal Window, and correspond to opened files. When a new file is opened, a corresponding File Tab is added for easy navigation amongst multiple files.

2.4 View Pane

These menus and submenus control which view appears below the thermal image. As each view is selected, a corresponding Tool Tab opens in the View Tabs section of the LumaSpec Offline Analyzer interface (near the bottom of the window). In these menus, images are analyzed and graphs are made. You may choose to have the View Pane constantly open or only open when you move the mouse to the left side of the screen. Click the tack button in the lower right corner of the View Pane to toggle between choices.

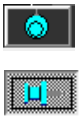
The View Pane is located down the left side of the LumaSpec Offline Analyzer User Interface. This set of menus controls the tools shown in the Active Tool Window (lower half of mid-screen). View Pane menus also show the current file's properties.

2.4.1 Show/Hide Function of the View Pane

The View Pane can be made visible or made to appear only when a user moves the mouse to the left side of the screen. Making the View Pane "show/hide" like this allows for more horizontal display space for the Active Thermal and Active Tool Windows.

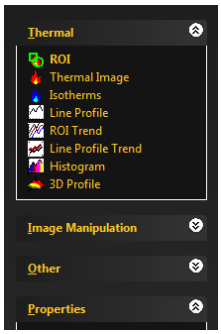
There are two ways to show/hide the View Pane. The first is simply selecting the "Clean" theme in the LumaSpec Offline Analyzer Options Window. However, this also hides the top Toolbar and changes the color scheme. To activate the show/hide function of the View Pane with any appearance theme, check the corresponding box under Appearance in the Options window or use the View Pane Show/Hide Tack located in the bottom right corner of the View Pane.

The View Pane Show/Hide Tack, shown below, is by default, "tacking down" the View Pane, or making it a permanent part of LumaSpec Offline Analyzer's user interface.



If you click on the Tack button, the View Pane is no longer "tacked down," and goes into show/hide mode (see the image below.) Then it is only visible when the mouse is moved over the left side of the screen. You may "tack"or "untack" the View Pane at any time.

2.4.2 View Pane Interface/Controls



You can separately expand/collapse the View Pane Menu Headings (Thermal, Image Manipulation, Other, and Properties). You can do this by clicking on the **Menu Header Bar**.

When expanded, the submenus below each Menu Heading are displayed, and the arrows on the white round button at the end of the Menu Header Bar point up.

When a Menu Header is collapsed, the submenus are hidden and the arrows on the white button point down.

2.4.3 View Pane Menus

Thermal

This section of the manual only briefly describes the Thermal tools. For more information about these tools, see Chapter 3.

ROI

An ROI (Region of Interest) is a specifically defined monitored region of a thermal image. ROIs may be defined in a variety of shapes, including points, lines, and two-dimensional areas like ovals and rectangles. You may save a collection of drawn ROIs as an ROI Template and load the ROI Template for use in another image. This is especially useful when you are inspecting similar scenarios repeatedly and want to apply the same ROIs to many thermal images.

ROI data is displayed in a table in the Active Tool Window (lower half of mid-screen). The table displays the temperature readings, emissivity, Delta temperature (C, F, or K), area, and heat quantity for each ROI. You may also delete, configure, or set the reference of an ROI by right-clicking on it in the ROI data chart. Points, Lines, and Area ROIs are each shown in their own table. Toggle between the tables by using the Point, Lines, and Areas tabs at the top of the ROI tables.

Thermal Image This View Pane selection has the simple function of showing only the original thermal image in the Active Tool Window. When the Thermal Image is clicked in the Thermal View Pane menu, the Active Tool Window displays the original thermal image, with no ROIs.

Isotherms An Isotherm is a simplified visual representation of the temperature breakdown on a thermal image.

LumaSpec Offline Analyzer's Isotherm feature allows you to define up to eight temperature ranges, replace each range with a single color, and apply the ranges/colors to the thermal image to create a simplified Isotherm representation of temperature ranges.

Line Profile The Line Profile feature generates a two-dimensional graph (based on distance and temperature) using data from an existing line ROI on a thermal image sequence. To use the Line Profile chart, you must open a sequence file and define Line ROIs. You may define up to 10 Line Profiles using the pre-defined colors in the Line Profile chart.

ROI Trend The ROI Trend feature generates a two-dimensional graph using data from user-defined ROIs on a thermal image sequence. To use the ROI Trend chart, you must first define ROIs. You may define any sort of ROI you like.

Line Profile Trend The Line Profile Trend feature generates a three-dimensional representation, based on distance and temperature, of the surface of user-defined Line ROI on a thermal sequence. To use the Line Profile Trend chart, you must first define Line ROIs.

Histogram The Histogram feature in LumaSpec Offline Analyzer shows the distribution of pixel intensity values within a thermal image. The X-axis of the histogram represents pixel intensity and the Y-axis represents the percent of color count for each pixel intensity value.

3D Profile The 3D Profile feature of LumaSpec Offline Analyzer generates a three-dimensional temperature profile of the current thermal image. The three axes of the graph represent horizontal distance, vertical distance, and temperature.

Image Manipulation

This section of the manual only briefly describes the Image Manipulation tools. For more information about these tools, see Chapter 4.

Image Blender The Image Blender feature of LumaSpec Offline Analyzer allows the creation of a composite blended thermal and visible image. The Temperature Range Slider Bar allows you to control the area of the overlaid thermal image based on temperature.

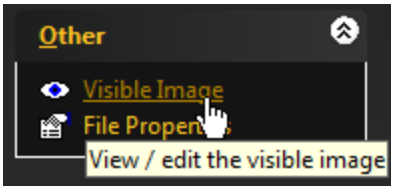
Mosaic Creator The Mosaic Creator feature of LumaSpec Offline Analyzer allows you to create a larger thermal image by "stitching" together several smaller thermal images. LumaSpec Offline Analyzer uses mathematical formulas to average thermal data where individual images overlap. You can rotate and overlap images to line them up accurately.

To use the Mosaic Creator, first open the images you would like to stitch together. Then, click the Mosaic Creator under Image Manipulation on the View Pane.

Image Subtractor Image Subtractor is a feature of LumaSpec Offline Analyzer that subtracts one thermal image from another, producing a third, resulting thermal image with subtracted thermal data. Image Subtractor can be used to produce a true Delta T thermal image, unaffected by ambient temperature, by subtracting an image of ambient temperature from an image depicting a temperature change.

Other

Visible Image

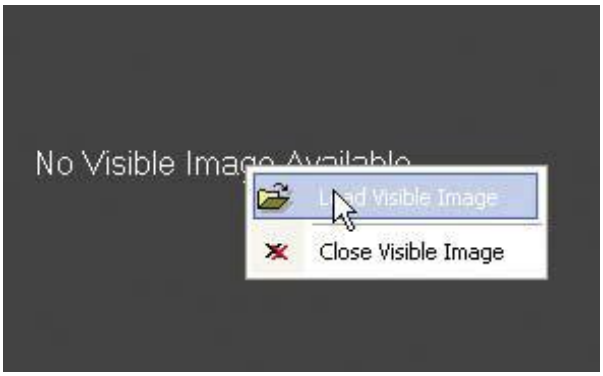


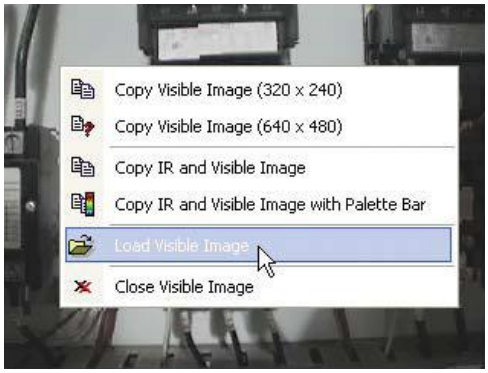
The Visible Image feature of LumaSpec Offline Analyzer provides a way to quickly view and manipulate a thermal image's corresponding visible image in the Active Tool Window. When the Visible Image is opened in the Active Tool Window, it can be referenced via the View Tabs on the bottom of the user interface.

To load a visible image:

The Visible Image feature allows you to load or replace a thermal image's corresponding visible image file.

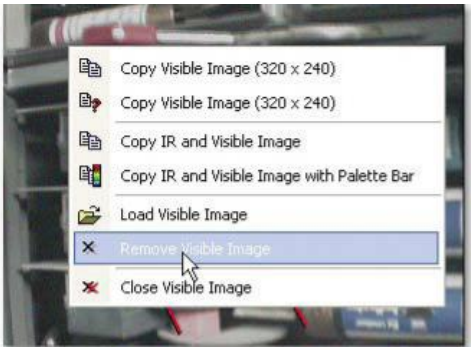
1. If the thermal image doesn't already have visible image, right-click the words **No Visible Image Available** or right-click the existing visible image and click **Load Visible Image.**





2. A standard Windows™ Load dialog box will appear. Select the visible image (a .BMP, .JPEG, or .TIFF image file) that you would like to associate with the thermal image and click **Load.**
3. The new visible image will appear in the Active Tool Window. It will also now be displayed in the Image Blender.

To remove the visible image:



1. Right-click the visible image.
2. Select **Remove Visible Image**.
3. This will cause the thermal image to either revert to its default visible image or to display no visible image at all if it does not have a visible image.

To close the visible image:

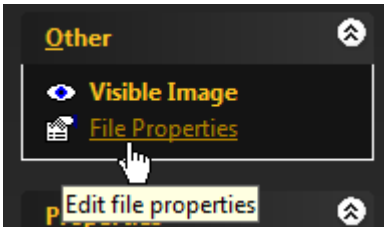
1. Right-click the visible image.
2. Select **Close Visible Image**. However, this only closes the tool view. It does not remove the visible image.

To copy the visible image to the Windows™ clipboard:

1. Right click on the image.
2. Select **Copy Visible Image (320 x 240)** or **Copy Visible Image (640 x 480)**, depending on the size (in pixels) that you want the copied image to be. To include the Thermal image, select either **Copy IR and Visible Image** or **Copy IR and Visible Image with Palette Bar**.

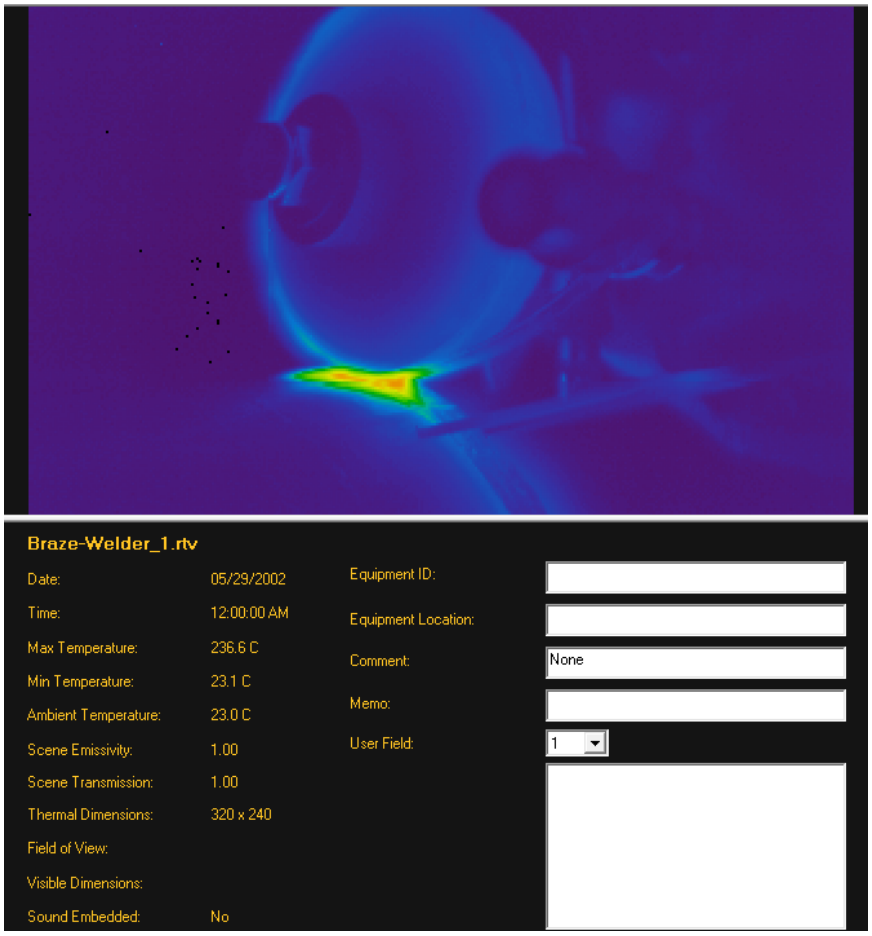
File Properties

The File Properties feature of LumaSpec Offline Analyzer allows you to edit certain file information for each Thermal or Thermal/Visual combination image file.



To edit the File Properties:

1. Select **File Properties** under the **Other** heading on the **View Pane**.
2. The **File Properties** appear in the **Active Tool Window:**



The File Properties displayed on the left are fixed fields set when the image is taken with the camera. The fields on the right are editable in LumaSpec Offline Analyzer. If you add a comment or memo using the imager in the field, those comments will display in the File Properties (however, they will still be editable). Editable fields listed below:

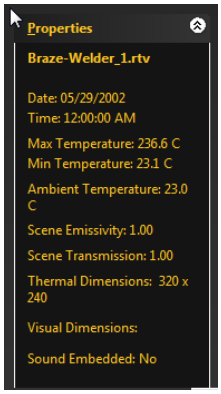
Equipment ID	Record serial numbers, model numbers or other identifying data about equipment in this field.
Equipment Location	Record information about equipment location here.
Comment	Record comments about the thermal or visible image here.
Memo	Record a memo about the thermal or visible image here.
User Fields	These fields are adaptable to your individual use. To use the User Fields, first choose a field number (as shown below) and then enter the corresponding number or wording that you wish to include. Then, in LumaSpec Offline Analyzer Report Writer, all ten of these User Fields are available to include as template fields in your custom template.

File Properties correspond to preset properties by the same name in LumaSpec Offline Analyzer's Report Writer. The User Field Properties, especially, allow for customization of fields for a variety of information that is easily accessed in LumaSpec Offline Analyzer's Report Writer.

2.4.4 Properties

This item on the View Pane is for display only and displays the file properties recorded by the thermal imager used to take the selected image. As with all the other View Pane submenus, the Properties submenu is collapsible/expandable. Leave Properties open for a constant display of File Properties, or expand/collapse it for quick reference. The File Properties refer to the properties of the currently selected image file.

Shown right is the properties menu expanded to show details.



2.5 Active Thermal Window

This is the upper half of the main screen. It displays the current thermal image, drawn ROIs, mosaic image, etc.

2.6 Active Tool Window

This is the lower half of the main screen. It displays the current view of tooling being used, chart/graph being created, isotherm, visible image, etc.

2.7 View Tabs

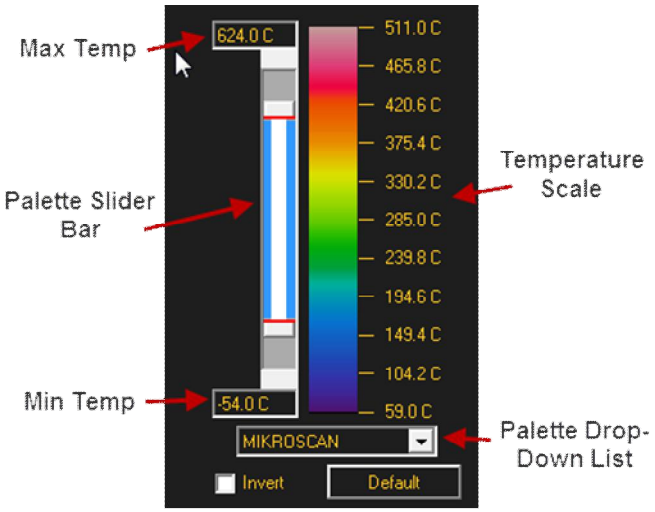
As each view is selected in the View Pane, a Tool Tab appears under the Active Tool Window, allowing for easy navigation between different views.

2.8 Tool Pane

These are the controls for the different views, filtering, emissivity settings, brightness and contrast (of visible images), heat quantity calculator, and physical distance calculator.

2.8.1 Temperature Palette

The Temperature Palette is a unique part of the Tool Pane. While the rest of the Tool Pane Menu Headers are expandable/collapsible, the Temperature Palette is a permanent feature of the LumaSpec Offline Analyzer user interface. The Temperature Palette allows you to customize the thermal image displayed in the Active Thermal Window by changing the color scheme and specifying minimum and maximum temperature values.



To the far right of the Temperature Palette is a Palette Temperature Scale and, next to it, the corresponding colors being applied to the temperatures. To the left of the Temperature Scale are the Palette Slider Bar and the Max and Min Temperature boxes. Below the Min Temperature box is the Palette Drop-Down List, the Invert check box, and the Default Button.

You can change the temperature displayed on the Temperature Scale by right-clicking the Scale and selecting Celsius, Fahrenheit, or Kelvin. All temperature values in LumaSpec Offline Analyzer will change to the new unit of measure.

Note: You can also set the default temperature unit in the Options menu, accessible from the Toolbar or Text Menus. See Section 2.2 for more information about configuring default options.

To set a Temperature Range Using the Min/Max Boxes:

LumaSpec Offline Analyzer allows you to control the range of temperatures to be used when viewing or analyzing images and image sequences. Ideally, the span should embrace most of the temperatures of interest and be equally displaced about some median temperature in the target area.

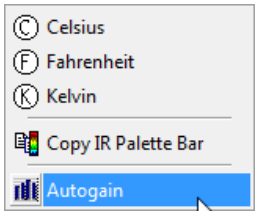
1. Click inside the Min Temperature Box located below the Palette Slider Bar.
2. Enter a new minimum temperature value.
3. Press Enter to see the new minimum range applied to the thermal image.
4. Repeat steps 1-3 for the Max Temperature Box (located above the Palette Slider Bar).

To Set a Temperature Range Using the Palette Slider Bar:

The **Palette Slider Bar**, located between the Max and Min boxes, allows you to fine-tune the temperature range displayed on the thermal image. The upper Slider Bar handle controls the maximum temperature visible. The lower Slider Bar handle controls the minimum temperature visible.

1. Use the gray and red handles to expand or contract the temperature range.
2. Click and drag the between the two handles to move the slider up or down along the temperature range.

   OR,



Alternately, you can automatically find the level (center temperature) of the entire image by right-clicking the Temperature Scale and selecting the Autogain feature.

To Return to the Default Temperature Range Values:

LumaSpec Offline Analyzer allows you to easily return to the default Min and Max temperature range values and Palette Slider position.

1. Click the Default button located at the bottom of the Temperature Palette.
2. The temperature range and palette slider will return to the default position as decided by the program.

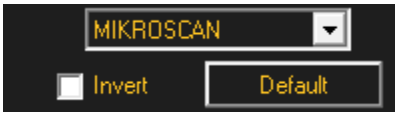
To Set a New Temperature Color Palette:

It is often useful to change the color palette in order to bring out details in the thermal image that may be hidden or difficult to see. The Palette drop-down list, found below the Palette Temperature Scale, allows you to choose from a list of pre-defined color palettes.

1. Click on the arrow next to the current palette name to show the palette drop-down list.
2. Select the name of the new color palette from the list of options. Once the new color palette is selected, it is immediately applied to the thermal image as it appears in the Active Thermal Window.

To Invert the Temperature Color Palette:

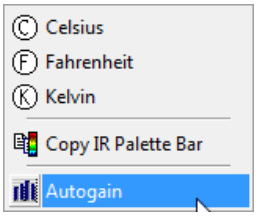
LumaSpec Offline Analyzer also has the ability to invert the selected color palette, which may also help to better define details in the image. Inverting the palette will cause the colors of the palette to "flip" upside-down, applying the color for the hottest values to the coldest temperatures and applying the color for the coldest values to the hottest temperatures.



1. To invert the color palette, check the Invert box below the Color Palette Drop-Down box.

To Copy the Temperature Color Palette:

It may be useful to copy the Temperature Scale and paste it into another program. To do this, right-click on the Temperature Scale and select Copy IR Palette Bar. The Temperature Scale and corresponding palette colors will be copied to the Windows™ clipboard. From there, you can paste the image into many different programs.



2.8.2 Hot/Cold Spot Detection

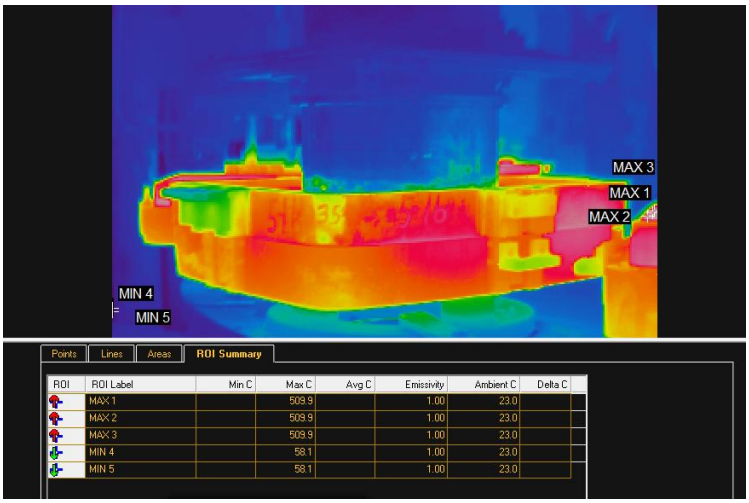
The Hot/Cold Spot Detection feature allows you to plot up to 20 of the hottest and/or coldest spots in an entire image or in a specific ROI shape.

To Plot Hot or Cold Spots:

1. Click on the arrow next to the Hot Spots drop-down box and select the number of hot spots that you want to display. You may choose to plot between 0 and 20 hot spots.
2. Click on the arrow next to the Cold Spots drop-down box and select the number of cold spots that you want to display. You may choose to define between 0 and 20 cold spots.
3. To plot hot or cold spots on the whole image, select **Entire Image** from the Area drop-down list. To plot hot or cold

spots for a specific Area ROI, choose the name of the ROI from the drop-down list.

4. Select the size of the pixel region for each hot or cold spot from the Pixel Size drop-down box.
5. Click **Apply**.



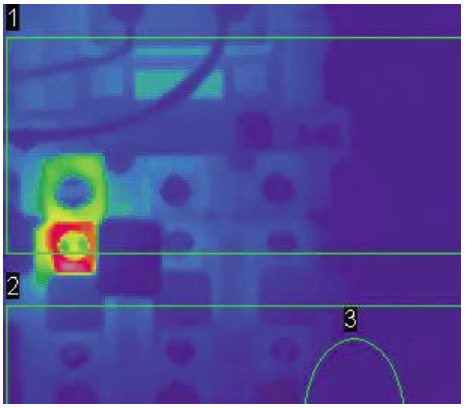
The defined points will appear on the image in the Active Thermal Window. They are automatically labeled MAX or MIN, depending on whether they are hot or cold spots. The new hot or cold spots are numbered consecutively starting with the hottest or coldest spot. If any ROIs already exist, the numbering of the hot or cold spots will be included in this numbering system to avoid confusion.

The Active Tool Window displays the new hot or cold spots as Point ROIs, with the Temperature, Emissivity, and Ambient for each displayed in the Point ROI chart. Each temperature is displayed in the selected temperature type: C, F, or K. To view the ROI chart, click on ROI under the Thermal Menu Header on the View Pane. The new hot or cold spots can be configured and deleted like normal Point ROIs, but they cannot be moved. For more information about how to configure Point ROIs, see Section 3.1.4 Configuring ROIs.

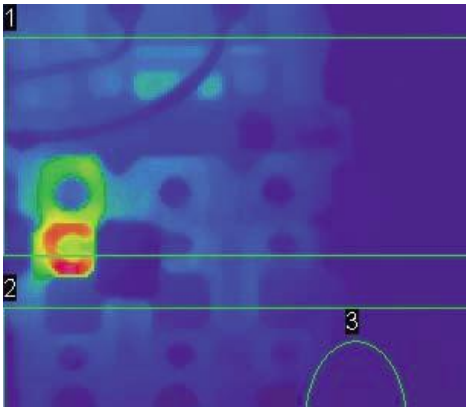
2.8.3 Filtering

The filtering feature allows you to apply different effects to your image to make the image easier to see or to highlight certain aspects of the image. Below is a list of filters and what they can be used for.

Averaging



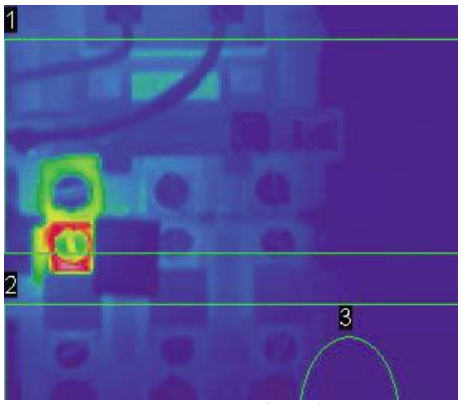
An image with 3x3 averaging applied twice.



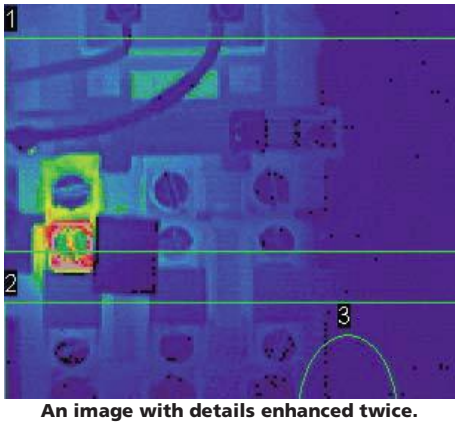
An image with 5x5 averaging applied twice.

The **Averaging** filter eliminates noise by computing the mean (average) of an area and applying that value to the pixels within that area, smoothing the image. You may choose to compute the average of the image by either 3x3 or 5x5 pixel area. Selecting 3x3 from the Advanced Filter Options drop-down menu provides a smaller, more refined calculation, while selecting 5x5 produces a broader, more noticeable effect. You may apply one or both of the effects multiple times to reach the desired averaging level.

Focus



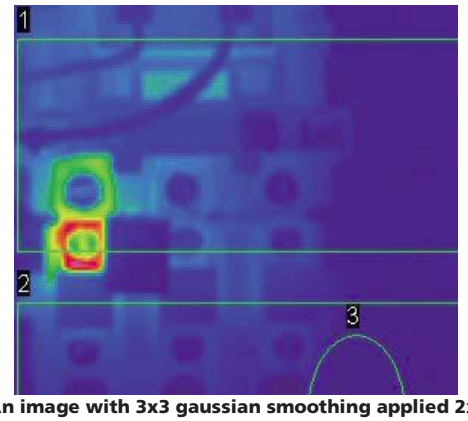
An image with default focus.



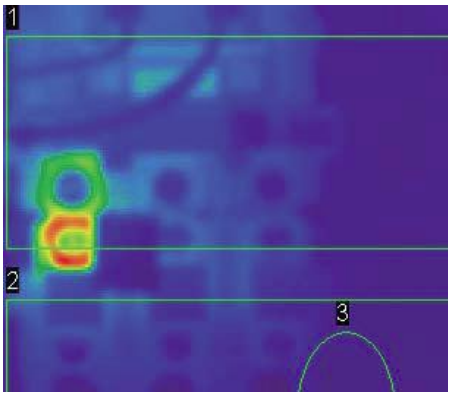
An image with details enhanced twice.

The **Focus** filter allows you to enhance the details of an image. Select the + from the Advanced Filter Options drop-down menu to enhance different details. You may enhance different details as many times as you like by clicking Apply more than once. To decrease visible details on the picture without completely resetting, use the - setting on the Advanced Filtering Options drop-down menu. However, you may only decrease visible details only until image will reach default settings. The focus filter cannot be used to blur the image.

Gaussian



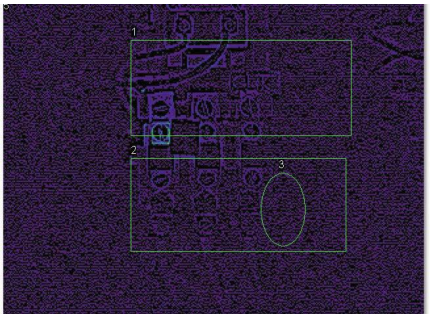
An image with 3x3 gaussian smoothing applied 2x.



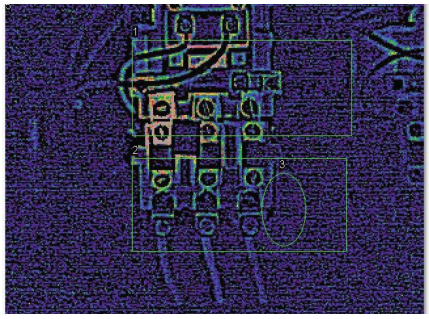
An image with 5x5 gaussian smoothing applied 2x.

The **Gaussian** smoothing filter is used to blur images to remove detail and noise. You may choose to apply gaussian smoothing in either 3x3 or 5x5 pixel areas. Selecting 3x3 from the Advanced Filter Options dropdown menu provides a smaller, more refined effect, while selecting 5x5 produces a broader, more noticeable effect. You may apply one or both of the effects multiple times to reach the desired smoothing level.

Laplacian



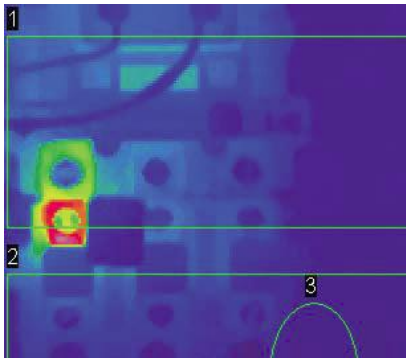
An image with 3x3 laplacian filtering applied 1x.



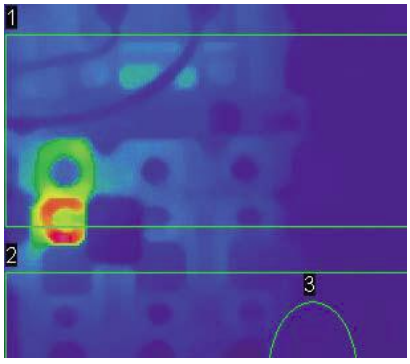
An image with 5x5 laplacian filtering applied 1x.

The **Laplacian** filter highlights the edges in an image by enhancing regions of rapid-intensity change. You may choose to apply laplacian filtering in either 3x3 or 5x5 pixel areas. Selecting 3x3 the Advanced Filter Options drop-down menu provides a smaller, more refined effect, while selecting 5x5 produces a broader, more noticeable effect. You may apply one or both of the effects multiple times to reach the desired highlight level.

Median



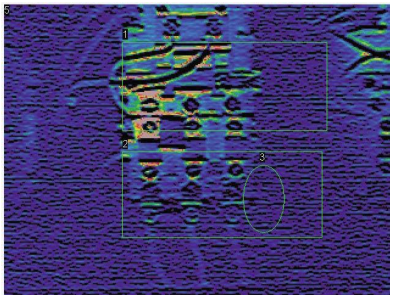
An image with 3x3 median smoothing applied twice.



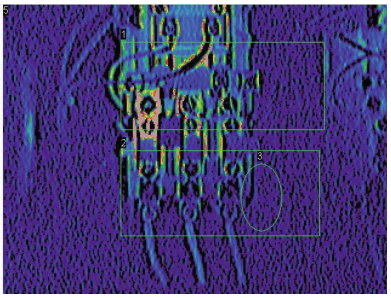
An image with 5x5 median smoothing applied twice.

Median filtering reduces speckle noise and salt and pepper noise. Its edge-preserving nature makes it useful in cases where edge blurring is undesirable. You may choose to apply median smoothing in either 3x3 or 5x5 pixel areas. Selecting 3x3 from the Advanced Filter Options drop-down menu provides a smaller, more refined effect, while selecting 5x5 produces a broader, more noticeable effect. You may apply one or both of the effects multiple times to reach the desired smoothing level.

Prewitt



An image with its horizontal edges highlighted/

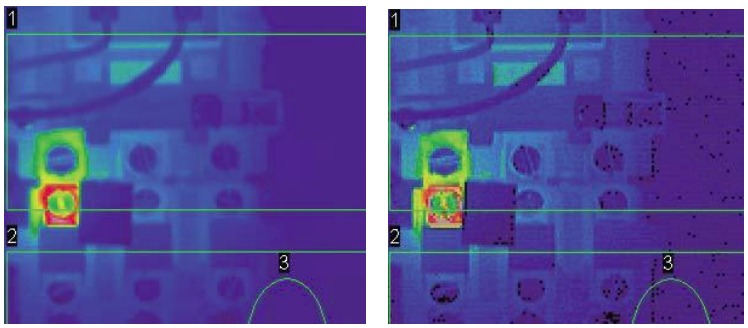


An image with its vertical edges highlighted.

The **Prewitt** filter highlights edges by finding the edge orientation for each pixel in the image. You may choose to highlight either vertical or horizontal edges. To highlight all horizontal edges in the

image, select Horizontal from the Advanced Filtering Options; to highlight all vertical edges in the image, select Vertical. You may apply either effect multiple times to reach the desired highlight level. However, you may not highlight both vertical and horizontal edges at the same time. Thus, highlighting horizontal edges will undo any highlighting of the vertical edges, and vice versa.

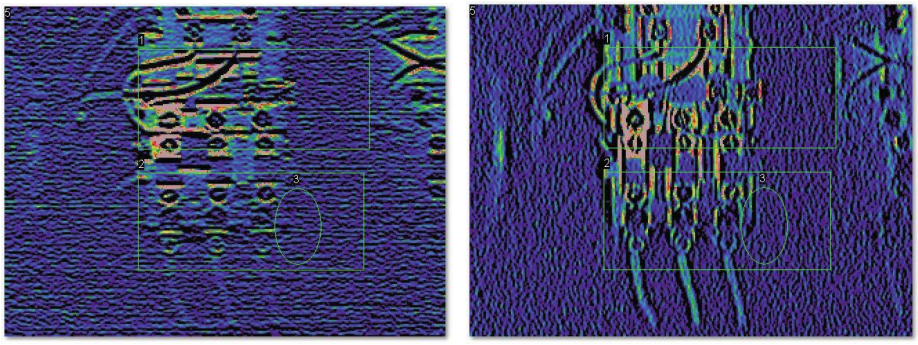
Sharpen



An image with default sharpness. A sharpened image.

The **Sharpen** filter enhances the details and edges in a picture. Select the + from the Advanced Filter Options drop-down menu to sharpen the picture. You may sharpen the image as much as you like by clicking Apply more than once. If you would like to unsharpen the picture without completely resetting, use the - setting on the Advanced Filtering Options drop-down menu. However, you may only unsharpen the image until it reaches reaches the image default. The Sharpen filter cannot be used to blur the image.

Sobel



An image with its horizontal edges highlighted. An image with its vertical edges highlighted.

The **Sobel** filter highlights edges by comparing gradients within the image to determine which parts of the image represent an edge and how that edge is likely to be oriented. You may choose to highlight either vertical or horizontal edges. To highlight all horizontal edges in the image, select Horizontal from the Advanced Filtering Options. To highlight all vertical edges in the image, select Vertical from the Advanced Filtering Options. You may apply either effect multiple times to reach the desired highlight level. However, you may not highlight both vertical and horizontal edges at the same time.

Thus, highlighting horizontal edges will undo any highlighting of the vertical edges, and vice versa.

To apply a filter:

1. Click on the **Filtering** menu header in the Tool Pane.
2. Select the desired filter from the Filtering drop-down box.

3. Select the desired pixel size from the Advanced Filter Options drop-down box. Depending on the filter you have selected, you will be able to select pixel size (3x3 or 5x5), Increase or Decrease (- or +), or alignment (Horizontal or Vertical).

2.8.4 Emissivity

Emissivity is the ratio of the infrared energy radiated from the surface of a target to the infrared energy radiated from a blackbody at the same temperature. The emissivity varies with the surface condition of the object and also with temperature variation and wavelength.

Depending upon the camera selected, LumaSpec Offline Analyzer provides the ability to control the camera's Scene Emissivity. Emissivity for the correction can be selected within the range of 0.01 to 1.00.

LumaSpec Offline Analyzer also allows you to take into account the ambient temperature of the area in which the camera is installed and the attenuation factor of a reading as it is transmitted through the lens. These values are configured in the Ambient and Transmission areas of the Emissivity menu and are included in the instructions below.

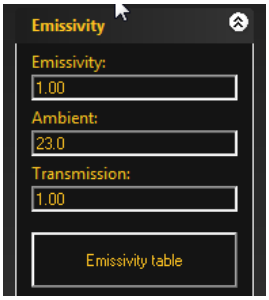
In addition, if an image is opened and it contains a coefficients table (available with most handheld camera files), the Emissivity tool will display a **Correction Type** dropdown list with three available selections:

None	Uses Emissivity Value and Ambient Value for correction.
Transmission	Uses Emissivity Value, Ambient Value, and Transmission Value for correction.
Distance	Uses Emissivity Value, Ambient Value, Distance Value, and Relative Humidity Value for correction.

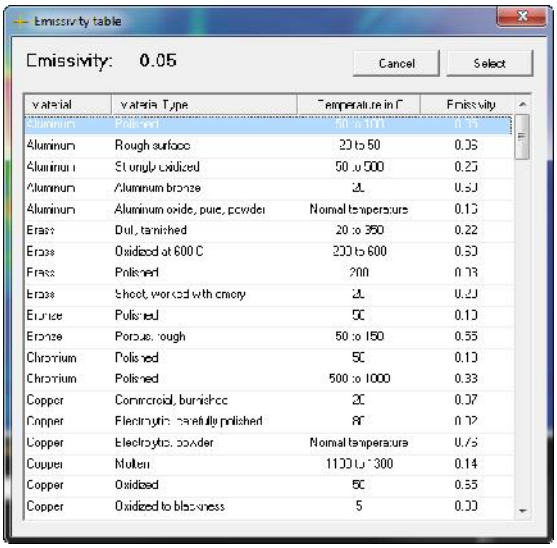
Note: This section deals with setting scene emissivity. To learn how to configure emissivity for specific ROIs, see Section 3.1.5.

To control the emissivity for an image with no coefficients table:

1. On the **Tool Pane**, click on the **Emissivity** menu header.
2. Enter the appropriate emissivity value in the Emissivity text box.

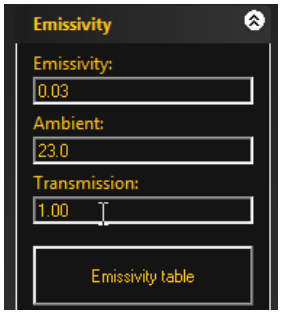


If you need to find the emissivity of a certain material, click the **Emissivity table** button to see a table with common materials and their emissivity values. Select the appropriate material and the emissivity value appears at the top of the dialog box. Click **Select** and the emissivity will automatically be entered into the **Emissivity** box.



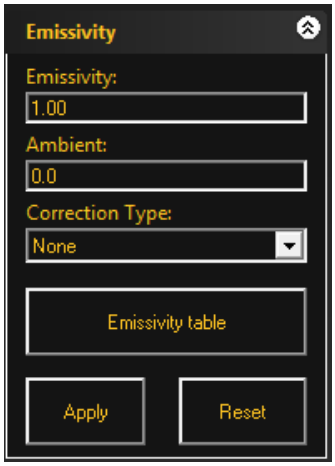
3. Enter the appropriate ambient value in the **Ambient** text box.
4. Enter the appropriate transmission value in the **Transmission** text box.
5. Click **Apply**.

   To revert to camera presets and undo your changes, press the **Reset** button.



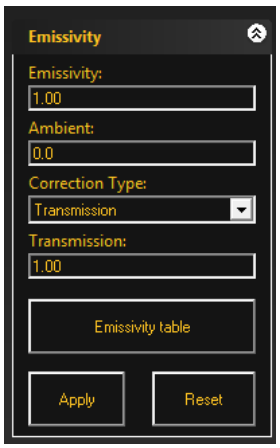
To control the emissivity for an image with a coefficients table:

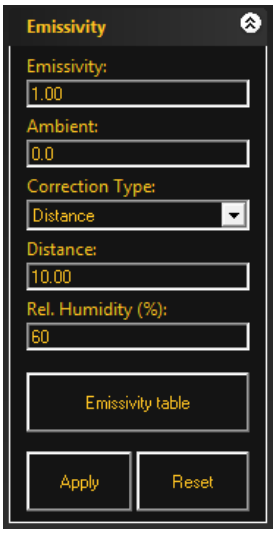
1. On the **Tool Pane**, click on the **Emissivity** menu header.
2. Enter the appropriate emissivity value in the Emissivity text box.



If you need to find the emissivity of a certain material, click the **Emissivity table** button to see a table with common materials and their emissivity values. Select the appropriate material and the emissivity value appears at the top of the dialog box. Click **Select** and the emissivity will automatically be entered into the **Emissivity** box.

3. Enter the appropriate ambient value in the **Ambient** text box.
4. If desired, select the **Correction Type** using the dropdown box and enter the appropriate values into the additional fields.

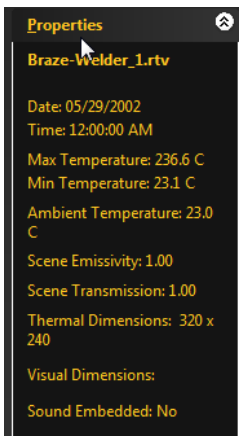


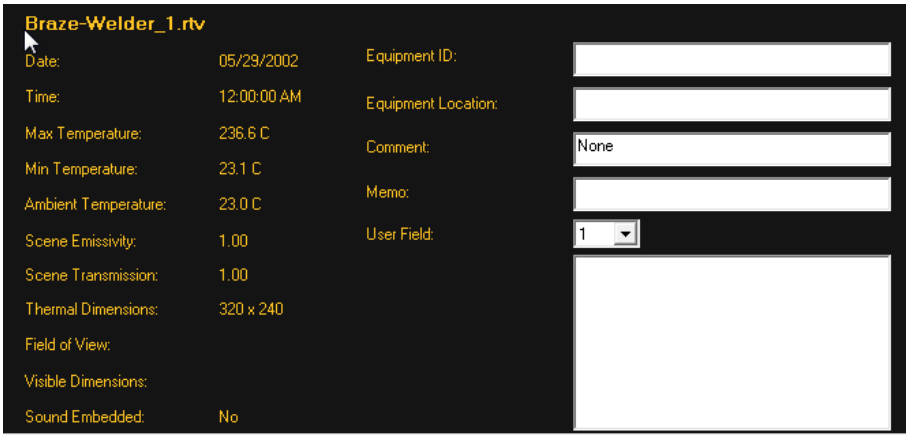


5. Click **Apply**.

   To revert to camera presets and undo your changes, press the **Reset** button.

To see the changes to scene emissivity, scene transmission, and the temperature values, click on **Properties** in the **View Pane** (pictured below, left)**,** or select **File Properties** from the **Other** menu on the **View Pane** (pictured below,right).





2.8.5 Brightness/Contrast

You can modify the brightness and contrast of a visible image using the Brightness and Contrast feature of the Tool Pane. Increasing or decreasing the brightness of an image increases or decreases its overall brightness. Increasing or decreasing the contrast of an image will increase or decrease the dynamic range of the image and affect its highlights and shadows.

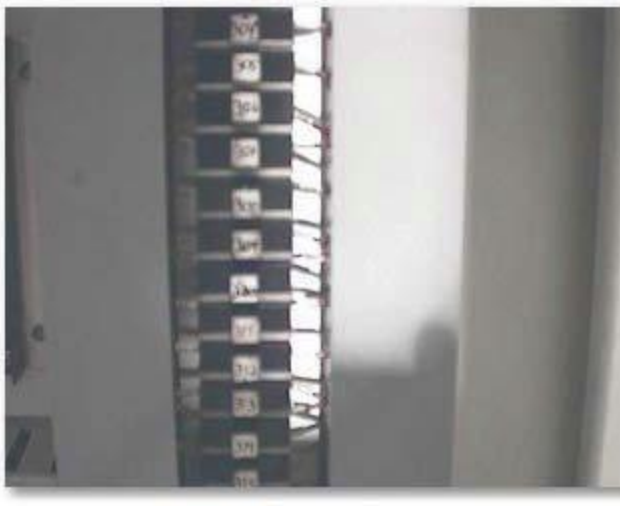
To change the brightness or contrast of an image:

1. Choose or open a file with a visible image in it.
2. Select either **Image Blender** or **Visible Image** from the **View Pane** so that you can see the visible image.

3. Click on the **Brightness and Contrast** menu header on the **Tool Pane.**
4. Click on the **Increase or Decrease Brightness and/or Contrast buttons** until the desired effect has been achieved.

You may also select whether the effect applied to the image is coarse or fine by selecting the Coarse or Fine options at the bottom left of the Brightness and Contrast box. The Coarse option will apply brightness or contrast more heavily than the Fine option.

Brightness increased five times with the Fine setting enabled.



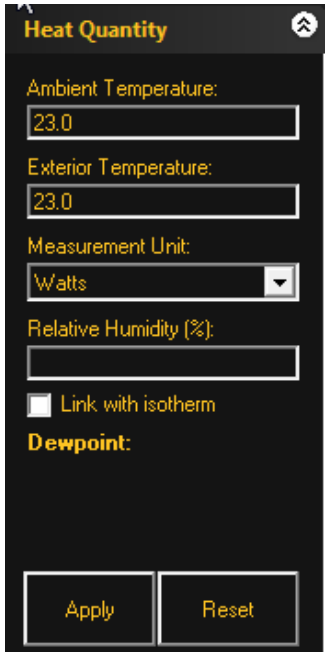
Brightness increased five times with the Coarse setting enabled.

To undo modifications to the brightness and contrast of the picture, press the **Reset** button at the bottom right of the picture to restore the visible image to its original appearance.

2.8.6 Heat Quantity

The Heat Quantity feature calculates the heat in a thermal image using ambient and external temperatures and the calibrated area supplied by the Physical Distance feature (see the next section).

To calculate heat quantity, you must first calibrate the Physical Distance menu of the Tool Pane. This gives LumaSpec Offline Analyzer the needed dimensions to properly determine heat quantity. However, the dewpoint can still be calculated without specifying physical distance.



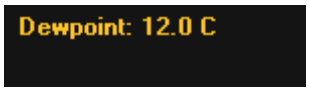
To calculate heat quantity:

1. Open or select the thermal image for which you wish to calculate heat quantity.
2. Click the **Heat Quantity** menu of the **Tool Pane** to expand it.
3. Enter the **Ambient Temperature** value.
4. Enter the **Exterior Temperature** value.
5. Select the unit of measurement you'd like the heat quantity displayed in from the **Measurement Unit** drop-down box. The heat in a thermal image can be calculated in Watts, BTU/Hr, or R Value.
6. If applicable, enter the percentage of humidity in the environment in the **Relative Humidity** box. You must do this to see a Dewpoint value calculated.

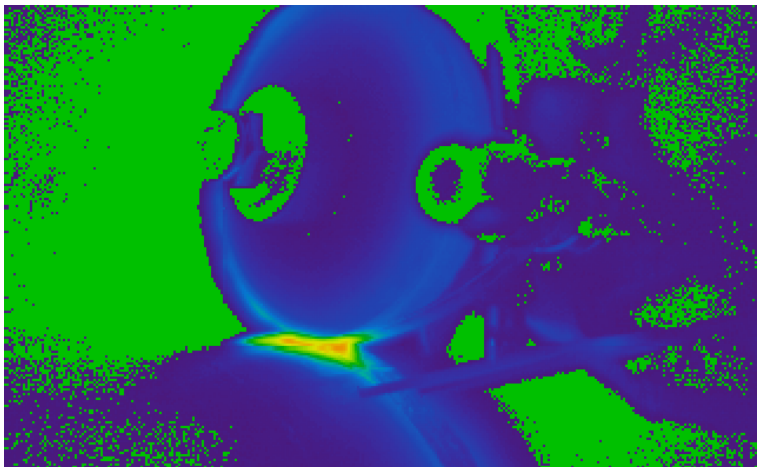
7. To generate an isotherm value for all temperatures below dew point temperature, check the **Link with Isotherm** box. If no value is given for Relative Humidity, an Isotherm won't be created.
8. Click **Apply.**

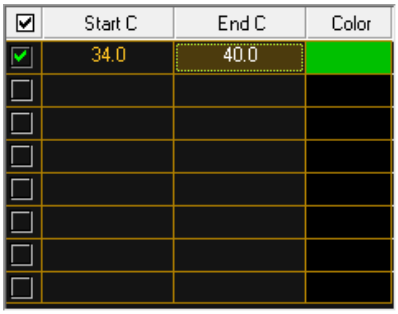
Note: Temperature values are calculated in degrees Celsius, Fahrenheit, or Kelvin, depending on the temperate units you have selected. To change your temperature units, right click the Temperature Scale of the Temperature Palette.

Heat quantity measurements are calculated for all Area ROIs. If you entered a humidity value, the calculated dewpoint for the thermal image will be displayed next to the Dewpoint text label.



If you checked the **Link with Isotherm** box, the Isotherm will be applied to the Thermal image:





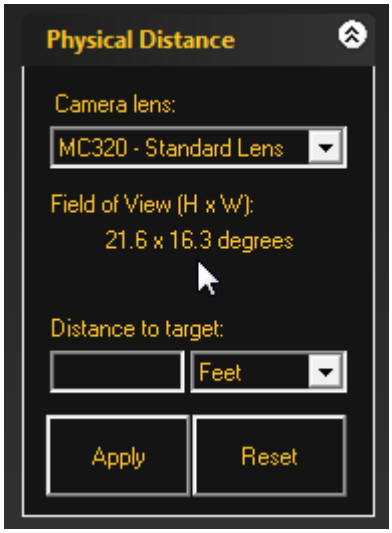
You can view the isotherm values by selecting **Isotherms** from the **Thermal** menu of the **View Pane**.

You can view each heat quantity measurement by selecting ROI from the Thermal menu of the View Pane. Heat quantity values appear in a column that is labeled with the unit of measure that you selected from the Measurement Unit drop-down box.

You can remove heat quantity data by clicking **Reset** in the **Heat Quantity** menu of the **Tool Pane**.

2.8.7 Physical Distance

The Physical Distance feature calculates dimensions of calibrated area based on the camera lens you are using and the distance from the camera to the target object.



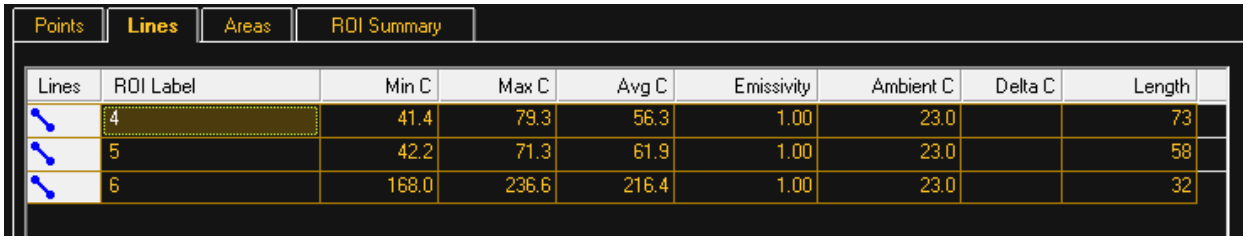
To calculate dimensions:

1. Select or open the thermal image for which you wish to calculate dimensions.
2. Click on the **Physical Distance** menu header on the **Tool Pane** to expand it.
3. Ensure that the correct camera lens type is selected from the Camera Lens drop-down box.
4. Enter the distance from the camera to the target object in the text box of the Distance to Target area and select the correct unit of measure from the drop-down menu. You may express distance in inches, feet, millimeters, meters, or kilometers.
5. Click **Apply**.

The dimensions of the thermal image are now calculated in the unit of measure that you chose in the **Distance to Target** drop-down menu. The dimensions of the thermal image can be viewed by clicking on the **File Properties** submenu of the **Other** menu on the **View Pane.**

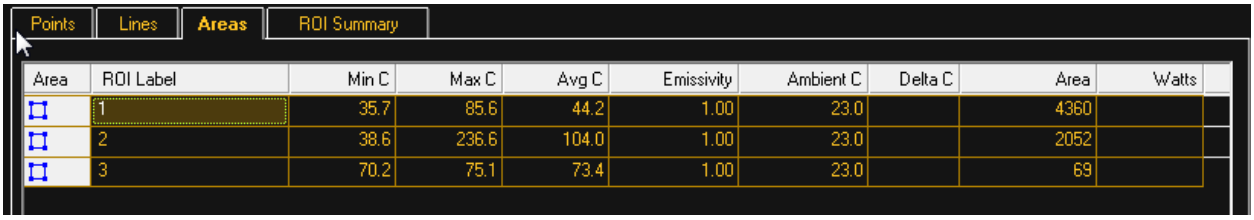
You can also view the length of Line ROIs and the area of Area ROIs by clicking on **ROI** in the **Thermal** menu of the **View Pane.**

The lengths of the Line ROIs are displayed in the Length column of the Lines tab:



Lines	ROI Label	Min C	Max C	Avg C	Emissivity	Ambient C	Delta C	Length
	4	41.4	79.3	56.3	1.00	23.0		73
	5	42.2	71.3	61.9	1.00	23.0		58
	6	168.0	236.6	216.4	1.00	23.0		32

The area of Area ROIs is displayed on the Areas tab in the column labeled Area followed by your chosen unit of measure squared.



Area	ROI Label	Min C	Max C	Avg C	Emissivity	Ambient C	Delta C	Area	Watts
	1	35.7	85.6	44.2	1.00	23.0		4360	
	2	38.6	236.6	104.0	1.00	23.0		2052	
	3	70.2	75.1	73.4	1.00	23.0		69	

To remove these measurements, click **Reset** on the **Physical Distance** menu of the **Tool Pane**. All dimensions will revert to being measured in pixels.

Note: Clicking Reset on the Physical Distance menu of the Tool Pane also causes all Heat Quantity measurements to be removed from the Area ROI chart. However, all Heat Quantity values will remain configured in the Heat Quantity menu of the Tool Pane and will reappear if Physical Distance is applied later.

2.9 Status Report

Found in the lower left corner of the LumaSpec Offline Analyzer interface, this area displays current or recently completed actions.

2.10 Sequence Control Panel

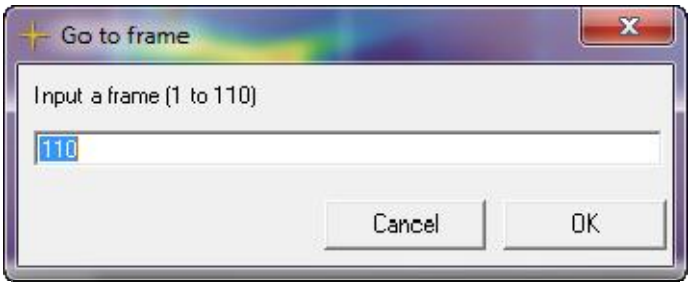
Found in the lower middle of the LumaSpec Offline Analyzer interface, this is a standard set of controls for playing, stopping, and fast-forwarding or rewinding through frames of a recorded sequence.

When a sequence file is loaded, the number of frames in the sequence and the current frame being displayed are shown in the Frame Position box. Also, the Play, Fast-Forward, and Beginning buttons become un-grayed and may now be used to view the sequence.

When a sequence is playing, the Stop and Pause buttons are available. When the sequence is paused and not at the end or beginning of the sequence, the Beginning, Rewind, End, Fast-Forward are available for moving forward or backward in the sequence, and the Stop and Play buttons are available to either stop playing the sequence and return to the beginning or to resume playback of the sequence from where it left off.

When a sequence has reached its last frame, it stops at that frame unless you have checked the Continuous Playback box in the Select Frame Delay box (See below for more information about the Select Frame Delay dialog box), in which case the sequence will loop and begin playing again from the beginning. When the sequence is stopped at the last frame, the Play, Rewind, and Beginning buttons are available.

To move to a specific frame in the sequence, you can double-click the Frame Position box. A Go to frame dialog box will appear telling you the frame that you are currently on and allowing to enter the number of the frame you'd like to move to.

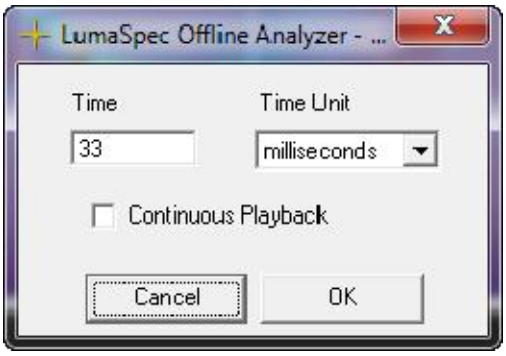


You may also move forward or backward through a sequence using the Frame Slider Bar. To do this, click on the slider bar to the left of the Frame Position box and drag it forward or backward. Watch the Frame Position box to determine the exact frame you are viewing.

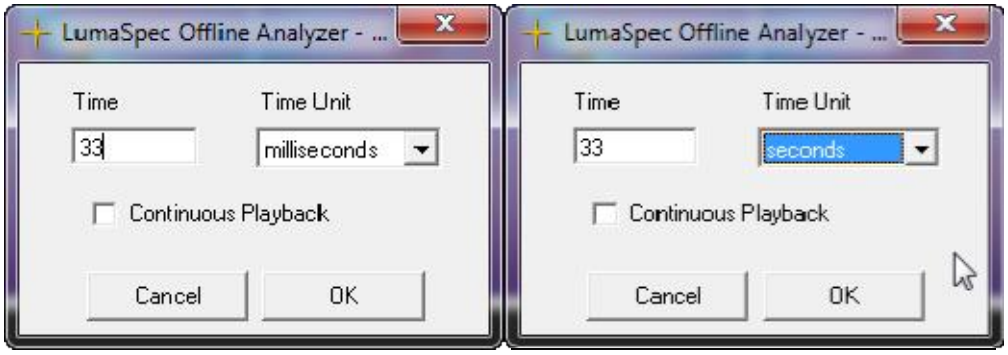
You may also right-click on the Sequence Control Panel (or anywhere on the lower bar of the LumaSpec Offline Analyzer interface) to get a Select Frame Delay box. Here you can set the frame rate and enable/disable Continuous Playback. It is useful to modify the frame rate if you want your sequence to play faster or slower.

To alter the frame rate:

1. Right click the bar at the bottom of the LumaSpec Offline Analyzer interface. The **Select Frame Delay** dialog box appears.



2. Enter a new frame rate in the **Time** box and select either milliseconds or seconds from the **Unit** drop-down box.



3. To repeat the sequence, check the **Continuous Playback** box. This causes the sequence to loop, beginning at the end again as soon as it finishes. (To stop playback, click the Stop or Pause buttons on the Sequence Control bar.)
4. Click **OK.**

2.11 XY Coordinates, Color Box, and Temperature Point

In the lower right corner of the LumaSpec Offline Analyzer interface is the area that displays the XY coordinates of your mouse (current pixel), the temperature of the pixel, and the color representation of that temperature.

2.12 Setting Options

The software allows you to establish various customized user preferences and control settings.

2.12.1 Accessing the Options window

To access the Options window:

Select **Tools** from the **Menu Bar** at the top of the display and then select **Options**

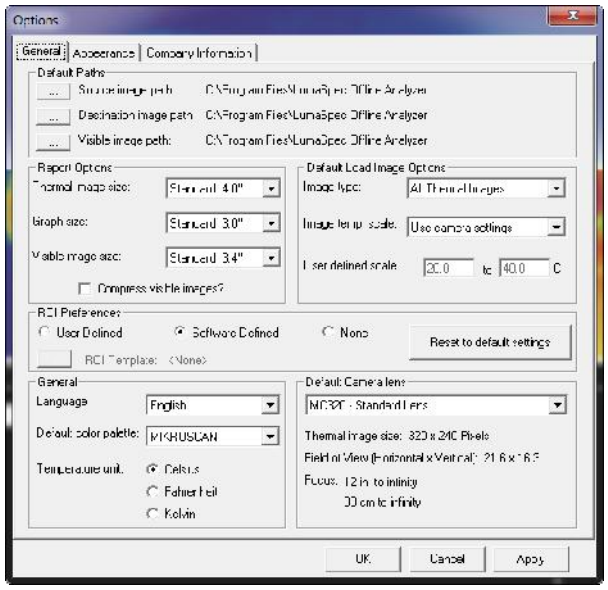
OR,

Select the **Options button** from the **Tool Bar** also located at the top of the display.

The Options window will appear.

2.12.2 Setting General Options

The **General** tab of the **Options window** is used to establish general software settings relating to Language, Decimal Format, Temperature Unit, Pop-Up Tools, and File Location Paths used for Default Sequences and ROI Collections.



Setting Default Paths

Setting default paths allow you to save time by automatically navigating to a set path.

To set the source image path::

1. Select the **General** tab from the **Options window**.
2. Click on the ... button next to **Source image path** to bring up a standard Windows™ dialog box where you will be able to browse for an existing folder or to create a new folder in a directory of your choice.
3. Choose a location.
4. Click **OK** to save the location and to close the Windows™ dialog box.
5. Select another option to be configured

   OR,

   Click **OK** to close out of the **Options window**.

To set the default destination image path:

1. Select the **General** tab from the **Options window**.
2. Click on the ... button next to **Destination image path** to bring up a standard Windows™ dialog box where you will be able to browse for an existing folder or to create a new folder in a directory of your choice.
3. Choose a location.
4. Click **OK** to save the location and to close the Windows™ dialog box.
5. Select another option to be configured

   OR,

Click **OK** to close out of the **Options window**.

To set the default visible image path:

1. Select the **General** tab from the **Options window**.
2. Click on the button next to **Visible image path** to bring up a standard Windows™ dialog box where you will be able to browse for an existing folder or to create a new folder in a directory of your choice.
3. Choose a location.
4. Click **OK** to save the location and to close the Windows™ dialog box.
5. Select another option to be configured

   OR,

   Click **OK** to close out of the **Options window**.

Setting Report Options

These options allow you to choose the size (or quality) of the images included in reports. This section also allows you to select the option to compress visible images.

To set the thermal image size:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to **Thermal image size** to expose the drop-down list.
3. Select the desired size.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

To set the graph size:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to **Graph size** to expose the drop-down list.
3. Select the desired size.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

To set the visible image size:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to **Visible image size** to expose the drop-down list.
3. Select the desired size.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.

5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

To compress visible images:

1. Select the **General** tab from the **Options window**.
2. Click the checkbox next to **Compress visible image?**.
3. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
4. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

Setting Default Load Image Options

To set the image type:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to **Image type** to expose the drop-down list.
3. Select the desired image type.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

To set the image temperature scale:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to **Image temp. scale** to expose the drop-down list.
3. Select the desired image temp. scale.
4. If you select **User defined**, type the appropriate values in the scale boxes.
5. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
6. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

Setting ROI Preferences

To set the ROI preferences:

1. Select the **General** tab from the **Options window**.
2. Select the desired ROI preference.
3. If selection is **User Defined**, select ... to navigate to the ROI template.

4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

Setting General Options

To set the language preference:

Note: Languages currently supported include English, Japanese, French, German, Spanish, Russian, and Chinese. Note that this list is subject to change at any time by the manufacturer.

---

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to the **Language** choice to expose the **Language drop-down list.**
3. Select the desired **Language**.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

To set the default color palette:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow next to the **Default Color Palette** to expose the drop-down list.
3. Select the desired color palette.
4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option(s) and close out of the **Options window.**

To set the temperature unit:

1. Select the **General** tab from the **Options window**.
2. Click on the radio button next to the **Temperature Unit** (Celsius, Fahrenheit, or Kelvin) you wish to set as the default.
3. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
4. Select another option to be configured

   OR,

   Click **OK** to set your option and close out of the **Options window**.

Setting the Default Camera Lens

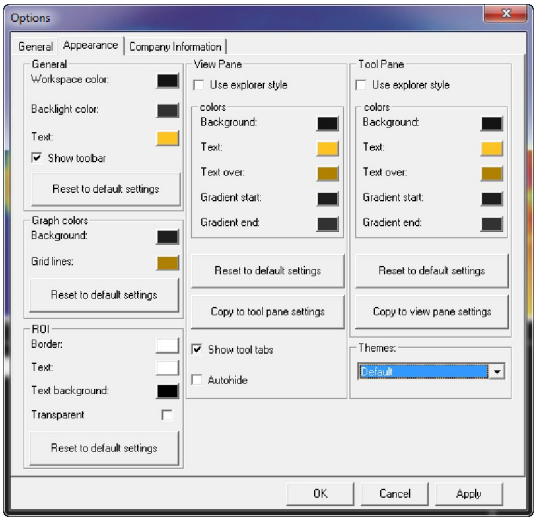
To set the default camera lens:

1. Select the **General** tab from the **Options window**.
2. Click on the arrow ▾ under **Default Camera lens** to expose the drop-down list.
3. Select the desired camera lens.
4. Click **Apply**.
5. Select another option to be configured

   OR,

   Click **OK** to set your option(s) and close out of the **Options window.**

2.12.3 Setting Appearance Options

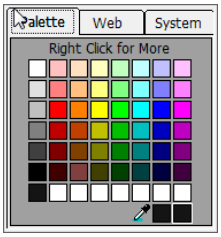


The **Appearance** tab of the **Options window** is used to establish settings for Appearance of text and colors relating to the workspace, view pane, tool pane, graphs, and ROIs.

Setting Appearance

To change colors:

1. Select the **Appearance** tab from the **Options window**.
2. Click the **color box** to bring up the color dialog box. Note that you can select Palette, Web, or System colors. For more color options, right click the Palette tab to get a Windows™ color box that allows you to define colors by their hue, saturation, and lightness or red, green, and blue (RGB) values.

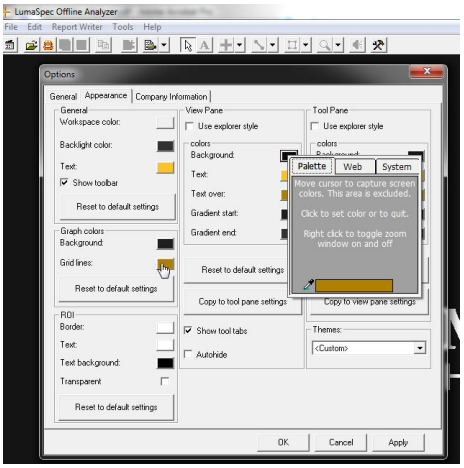
   

   To select a specific color from any element visible on the screen, select the eyedropper at the bottom of the Palette tab and move it over the desired color with the mouse. The color will be previewed in the color menu. Left-click to capture the color to the bottom of the Palette tab.
3. Select a new color.
4. Click **OK** to apply the theme you have selected and to close the dialog box.

   OR
5. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
6. Select another option to be configured

   OR,

   Click **OK** to set your color and close out of the **Options window**.



Note: As you are selecting colors, you may hit Apply at any time to view your choices within LumaSpec Offline Analyzer. You can easily copy settings from the View Pane to the Tool Pane with the "Copy to tool pane settings" button, or vice versa. You can reset any custom color settings to their default settings using the "Reset to default settings" button in each respective section.

To set a theme:

1. Select the **Appearance** tab from the **Options window**.
2. Click the drop-down arrow under **Themes** to choose a pre-defined color scheme.
3. Click **OK** to apply the theme you have selected and to close the dialog box.

   OR

4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your theme and close out of the **Options window**.

To use explorer style:

1. Select the **Appearance** tab from the **Options window**.
2. Mark the checkbox next to **Use explorer style** (either View Pane or Tool Pane).
3. Click **OK** to apply the theme you have selected and to close the dialog box.

   OR

4. Click **Apply** if you would like to set the change and see the effect on the display before closing the **Options window**.
5. Select another option to be configured

   OR,

   Click **OK** to set your theme and close out of the **Options window**.

To turn off the Tool Bar:

1. Select the **Appearance** tab from the **Options window**.
2. Unmark the checkbox next to **Show tools tabs**.
3. Select another option to be configured

   OR,

   Click **OK** to set this option and close out of the **Options window**.

To autohide the View Pane:

Autohide allows you to hide the View Pane until you move your mouse over the left side of the program window.

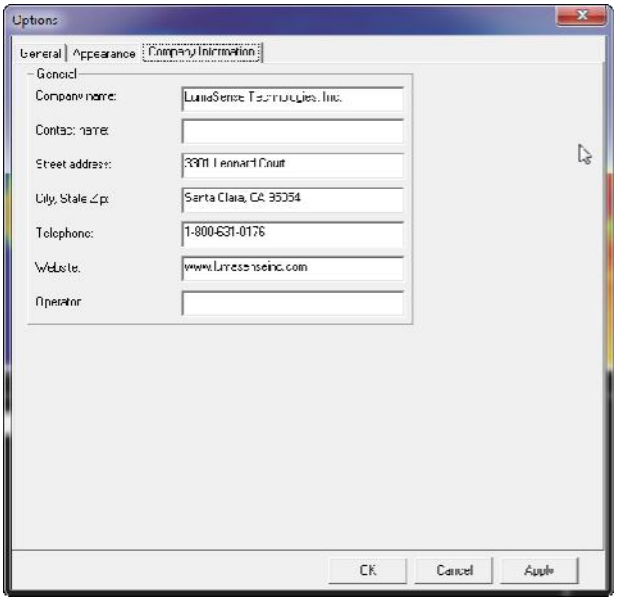
1. Select the **Appearance** tab from the **Options window**.
2. Mark the checkbox next to **Autohide.**
3. Select another option to be configured

   OR,

Click **OK** to set this option and close out of the **Options window**.

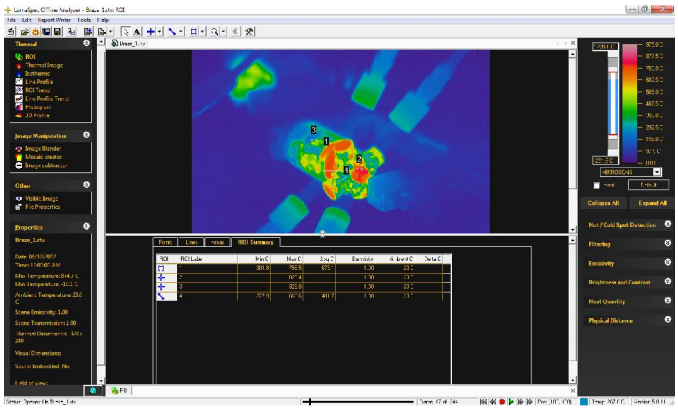
2.12.4 Setting Company Information

In the **Company Information** tab, fill in your own company information. This will become the default information for your LumaSpec Offline Anaylzer Reports.



3 Working With Thermal Tools

3.1 Working with Regions of Interest (ROI)



Regions of Interest (ROIs) are used to indicate points or other areas of interest on the thermal image for monitoring temperature readings and other details. ROIs may be defined in a variety of shapes, including points, lines, and two-dimensional areas like ovals and rectangles.

You may save a collection of drawn ROIs as an ROI Template and load the ROI Template for use in another image. This is especially useful when you are inspecting similar scenarios repeatedly and wants to apply the same ROIs to many thermal images.

ROI data is displayed in a table in the Active Tool Window (lower half of mid-screen). The table displays the temperature readings, emissivity, Delta temperature (C, F, or K), area, and heat quantity for each ROI. You may also delete, configure, or set the reference of an ROI by right-clicking on it in the ROI data chart. Points, Lines, and Area ROIs are each shown in their own table. Toggle between the tables by using the Point, Lines, and Areas tabs at the top of the ROI tables.

3.1.1 Creating an ROI Object

Point ROIs

A **Point ROI** is used to mark a single pixel on the image so that its temperature can be displayed and monitored through the ROI, Trend, Histogram, and Alarm Active Tool Window and pop-up windows.

LumaSpec™ Offline Analyzer software also allows you to set the Point temperature value as the ROI Reference for comparison against the temperature reading of other ROIs in the image. The temperature differences for each ROI based on this reference will be shown in the Delta C, Delta F, or Delta K Column of the applicable ROI Charts**.**

See Section 3.1.3 for more information on Working with the ROI Charts.

There are four Point ROI types available:

Maximum	A point monitoring the maximum temperature within a thermal image. Moves with maximum temp. point during sequence playback.
Minimum	Point measuring the minimum temperature within a thermal image. Moves with minimum temp. point during sequence playback.
Point	A point you plot on the thermal image and temperature is monitored at a single set of pixel coordinates.
Arrow	Not a true ROI, but an indicator that is used to highlight areas or ROIs.

Note: Use the Arrow selection provided under the Point ROI menu to draw attention to a section of the thermal image or an ROI. The Arrow is not a true ROI since it does not measure temperature data or appear in the ROI Data Table in the Active Tool Window.

To create a point ROI:

1. Select **Point** from the **Tools Menu** or from the Tools Button located at the top of the display.
2. Left click on the thermal image at the place where you would like to place your Point ROI.

Note: Maximum and Minimum Point ROIs are automatically assigned to the minimum and maximum temperature points within a thermal image. Once you select these ROI options (from the Text Menus or Toolbar), the point is automatically plotted. If you have already assigned a Minimum or Maximum Point and choose these ROI tools again, the Minimum or Maximum ROI tool will default to a normal Point ROI, and you must plot it on the thermal image.

Line ROIs

The **Line** ROI object shape allows you to mark a region of interest with a straight line, broken line, or free line. With a Line ROI, you will be able to monitor changes to the minimum, maximum, and average temperature values of all the pixels along the line.

Temperature values and other details of this Line ROI can be monitored through the ROI, Line, Trend, Histogram, and Alarm Active Tool Window and pop-up windows.

LumaSpec Offline Analyzer also allows you to set the Line Minimum, Maximum, or Average temperature value as the ROI Reference for comparison against the temperature reading of other ROIs in the image. The temperature differences for each ROI based on this reference will be shown in the Delta C, Delta F, or Delta K Column of the applicable ROI Charts**.**

There are three Line ROI types available:

Broken	The **Broken Line** ROI object allows you to mark a region of interest with a number of connected line segments. With a Broken Line ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels along the line segments.
Free	The **Free Line** ROI object shape allows you to mark a region of interest with a freehand line. With a Free Line ROI, you will be able to monitor changes to the minimum, maximum, and average temperature values of all the pixels along the non-linear line.
Line	The **Line** ROI object shape allows you to mark a region of interest with a straight line.

See Section 3.1.3 for more information on Working with the ROI Charts.

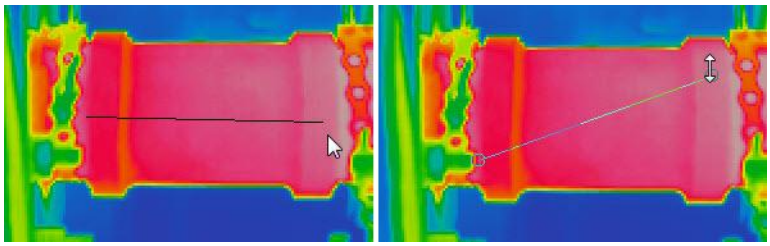
To create a line ROI:

1. Select the **Line** ROI object from the **Tools Menu** or from the **Tools Button** located at the top of the display.
2. Select the type of line you would like to use.
3. Left click on the thermal image at the place where you would like to start your **Line** ROI.

4. Drag the mouse to form the **Line** ROI. (For a **Free Line** ROI, drag your mouse along the path you would like your ROI to appear.)
5. Click the left mouse button where you would like the **Line** ROI to end. (Repeat as necessary to add additional lines for a **Broken Line** ROI).

To change the shape of a line ROI:

1. Move the mouse over an endpoint of the **Line** ROI until the resize handle icon appears.
2. Hold the left mouse button down and drag the end point to change the length or angle of the **Line** ROI.
3. Release the mouse button to complete the change.



Adjustments to a Line ROI

Area ROIs

The **Area** ROI object allows you to mark a region of interest with various shapes. With an Area ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area of the shape.

Temperature values and other details of this Area ROI can be monitored through the ROI, Trend, Histogram, and Alarm Active Tool Window and pop-up windows.

LumaSpec Offline Analyzer also allows you to set the Area Minimum, Maximum, or Average temperature value as the ROI Reference for comparison against the temperature reading of other ROIs in the image. The temperature differences for each ROI based on this reference will be shown in the Delta C, Delta F, or Delta K Column of the applicable ROI Charts.

See section 3.4 for more information on Working with the ROI Charts.

There are six area types available:

Annulus Allows you to mark a region of interest with ring-like shape. With an Annulus ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area between the inner radius and the outer radius of the annulus.

Oval Allows you to mark a region of interest with an elliptical shape. With an Oval ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area of the circle.

Region Allows you to mark a region of interest with a freehand region shape. With the Region ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the region.

Rectangle Allows you to mark a region of interest with a rectangle shape. With a Rectangle ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area of the rectangle.

Rotated Rectangle Allows you to mark a region of interest with a rectangle shape, which can then be rotated. With a Rotated Rectangle ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area of the rectangle.

Polygon Allows you to mark a region of interest with a multi-sided shape. With a Polygon ROI, you will be able to monitor any changes to the minimum, maximum, and average temperature values of all pixels within the area of the polygon.

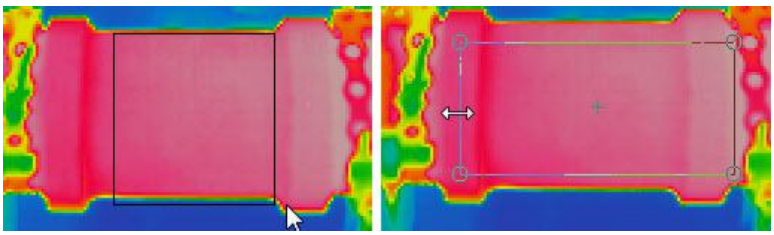
To create an area ROI:

1. Select the **Area** ROI object from the **Tools Menu** or from the **Tools Button** located at the top of the display.
2. Left click on the thermal image at the place where you would like to start your **Area** ROI. If you want a perfect rectangle or circle (oval), hold the Shift key down as you perform the following step.
3. Hold the left mouse button down and drag the mouse to form the **Area** ROI.
4. Release the mouse button when you are finished drawing your **Area** ROI.

Note: You can obtain a perfect rectangle or circle (oval) by holding down the Shift key as you draw the shape.

To change the shape of an area ROI:

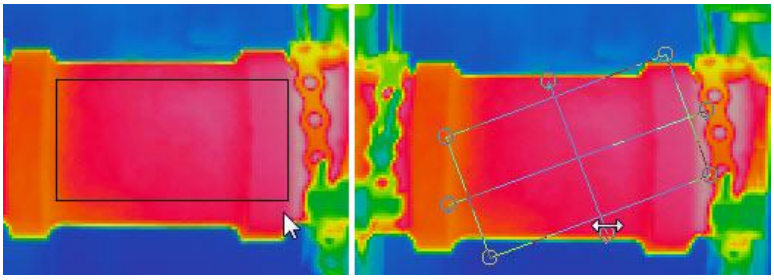
1. Move the mouse over an edge of the **Area** ROI object until the resize handle icon appears.
2. Hold the left mouse button down and drag the edge of the **Area** ROI to make your adjustment.
3. Release the mouse button to complete the change.
4. Repeat steps 1 through 3 until all desired adjustments are made.



Adjustments to Rectangle ROI

To change the orientation of a rotated rectangle ROI:

1. Move the mouse over an outer edge along a side of the **Rotated Rectangle** ROI until the resize handle icon appears.
2. Hold the left mouse button down and drag the mouse to rotate the rectangle.
3. Release the mouse button to complete the change.

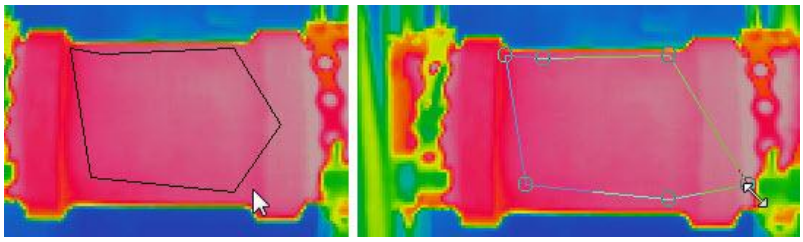


Adjustments the Orientation of a Rotated Rectangle ROI

To create a polygon ROI:

1. Click the **Area** ROI object from the **Tools Menu** or from the **Tools Button** located at the top of the display.
2. Select the **Polygon** ROI from the **Area** ROI submenu.
3. Left click on the thermal image at the place where you would like to start your **Polygon** ROI.
4. Drag the mouse to form a **Polygon** ROI line segment.
5. Click the left mouse button where you would like the line segment to end.
6. Repeat steps 3 through 4 to add additional line segments.
7. Double click the left mouse button when you are finished drawing your **Polygon** ROI. This will automatically connect your first and last line segments to form this multi-sided region of interest.

To change the shape of a polygon ROI



1. Move the mouse over an endpoint of a Polygon ROI line segment until the resize handle icon appears.
2. Hold the left mouse button down and drag the end point to change the length or angle of the **Polygon** ROI line segment.
3. Release the mouse button to complete the change.
4. Repeat steps 1 through 3 to change additional line segments.

3.1.2 Moving an ROI Object

To Move an ROI:

1. Move the mouse over the desired **ROI** until the move icon appears.
2. Hold the left mouse button down and drag the **ROI** to a new location on the image.
3. Release the mouse button to complete the move. Once the **ROI** has been moved, the **ROI Label** will appear next to the **ROI** in the **Active Thermal Window**.

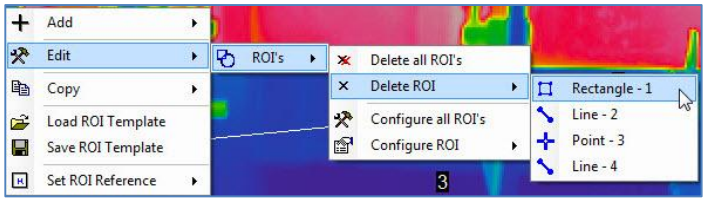
3.1.3 Deleting ROI Objects

Deleting a Single ROI Object Using the Main Image Context Menu

The **Delete ROI** function allows you select and clear individual ROIs from the Image in the Active Thermal Window.

To delete a Single ROI Object using the Main Image Context Menu:

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Edit > ROIs > Delete ROI > [select desired ROI you want to delete].**



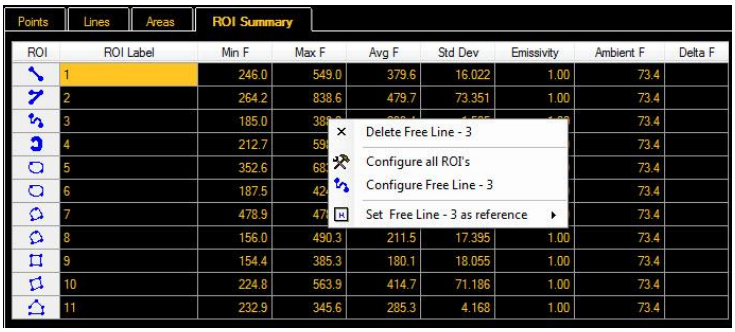
3. Repeat steps 1 and 2 to delete additional ROIs.

Deleting a Single ROI Object Using ROI Tools

The ROI Chart found in the Active Tool Window provides an ROI Context Menu that allows you to delete individual ROI objects. Once deleted, the ROI will no longer appear on the image in the Active Thermal Window. All references to that ROI will also be removed from all views in the Active Tool Window Viewer.

To delete a Single ROI Object Using ROI Tools

1. Select the **ROI** menu option from the **Active Tool Window Drop-Down Menu**.
2. Select the **ROI Summary** tab or the select the tab for the ROI type that would contain the ROI you want to delete.
3. Right click on the row containing the ROI you want to delete. This will bring up the **ROI Context Menu** of choices.



4. Click the **Delete** option for the ROI you selected.
5. Repeat steps 2 through 4 to delete additional ROIs.

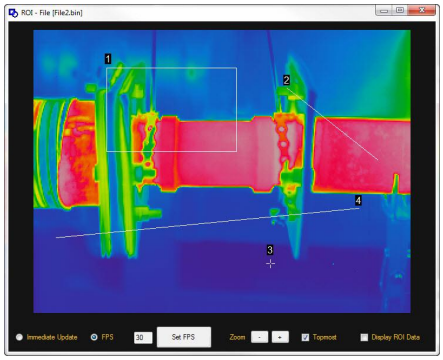
Deleting All ROI Objects

The **Delete all ROIs** function will clear all ROIs from the Image in the Active Thermal Window. All references to the ROIs will also be removed from all views in the Active Tool Window Viewer and Pop-Up Tools.

To Delete All ROI Objects:

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Edit > ROIs > Delete all ROIs.**

3.1.4 Working with the ROI Charts



LumaSpec Offline Analyzer provides **ROI Charts** in the Active Tool Window with details relating to each ROI as it appears in the Active Thermal Window. The ROI Summary Tab contains information relating to all ROIs as they appear in the Active Thermal Window, while the Points, Lines, and Areas tabs provide information relating to the ROIs that fall in those categories.

All tabs contain columns of information regarding ROI Type, ROI Label, Minimum temperature, Maximum temperature, Average temperature. It also contains columns showing the Standard Deviation for all the pixels temperatures in an ROI as well as the Emissivity setting, Ambient temperature setting, and Delta T (if set) results for each ROI.

See section 3.1.5 for more information ROI Configuration Options.

Accessing ROI Charts

To access the ROI Charts Workspace Tool:

Select the **ROI** under **Thermal** in the **View Pane**.

3.1.5 Configuring ROIs

Once ROIs have been created, they may be configured individually or as a set by choosing different colors, label types, and options. ROI configurations apply to ROIs as they currently appear in the Active Thermal Window. ROI configuration settings do not carry forward to another camera or image sequence view unless they are saved as an ROI Template file.

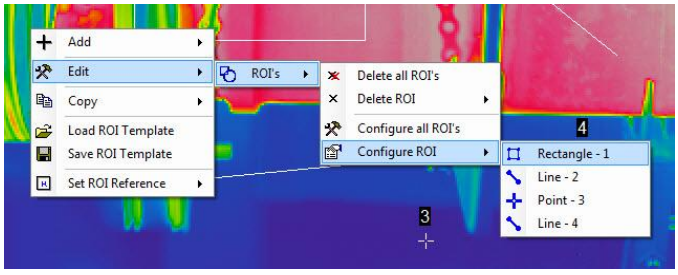
See section 3.1.6 for more information on Working with ROI Templates.

Accessing ROI Configuration Options

To access the configuration options for a single ROI using the Main Image Context Menu:

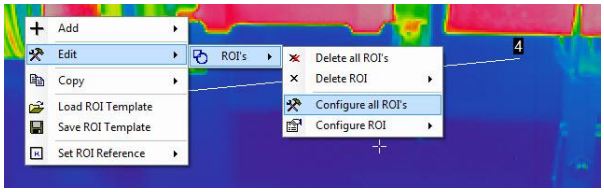
1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Edit > ROIs > Configure ROI > [select desired ROI you want to configure].**

This will bring up the configuration window for the individual ROI you chose. If you choose a Rectangle ROI, the window will be called Configure Rectangle, and so on. Through this window, you will be able to set configuration options for the specific ROI as currently displayed in the Active Thermal Window.



To access the configuration options for all ROIs using the Main Image Context Menu:

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Edit > ROIs > Configure all ROIs.**



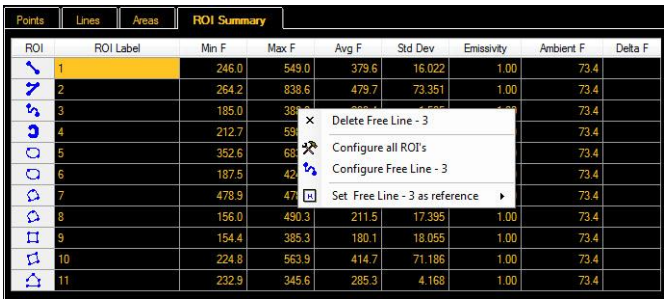
This will bring up the Configure ROIs configuration window. Through this window, you will be able to set configuration options for all ROIs as displayed in the Active Thermal Window.

A context configuration menu can be found in the ROI tab of the Active Tool Window Viewer and through the ROI Pop-Up Tools. Using the ROI Context Menu, you will gain access to configuration options for individual ROIs and for all ROIs as displayed in the Active Thermal Window.

To access configuration options for a single ROI using the ROI tools:

1. Select the **ROI** under **Thermal** on the **View Pane.**
2. Select the **ROI Summary** tab or the select the tab for the ROI type that would contain the ROI you want to configure.
3. Right click on the row containing the ROI you want to configure. This will bring up the **ROI Context Menu** of choices.
4. Click the **Configure** option for the ROI you selected.

   This will bring up the configuration window for the individual ROI you choose. If you chose a Rectangle ROI, the window will be called Configure Rectangle, and so on. Through this window, you will be able to set configuration options for the specific ROI as currently displayed in the Active Thermal Window.

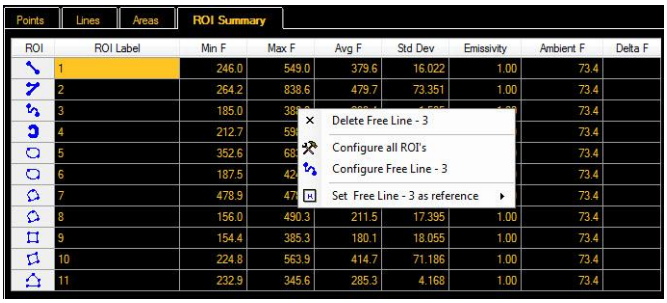


   See Section 3.1.5 for information on Working with ROI Configuration Options.

To access configuration options for all ROIs using the ROI tools:

1. Select the **ROI** menu option from the **Active Tool Window Drop-Down Menu** or from the **Pop-Up Tools Drop-Down Panel**.
2. Right click on any row to bring up the **ROI Context Menu** of choices.
3. Click the **Configure all ROIs** option.

   This will bring up the Configure ROIs configuration window. Through this window, you will be able to set configuration options for all ROIs as displayed in the Active Thermal Window.



   See Section 3.1.5 for information on Working with ROI Configuration Options.

Working with ROI Configuration Options

ROIs may be labeled in several different ways and displayed in different ROI Colors. You can choose where you want the ROI Label Position and whether or not you want to Display ROI Label and/or Display Temperature Data as part of the ROI Label. You also have the option of setting the Emissivity value and Ambient Temperature associated with a single ROI or all ROIs.

For individual ROIs, you have the option of changing the name of the ROI Label to something more descriptive. You also have the option of designating whether or not to use the ROI as an ROI Reference for comparison against the temperature reading of other ROIs in the image.

It is important to note that any ROIs configured through the ROI Configuration Window will only apply to current ROIs as they appear in the Active Thermal Window. This configuration will not apply to ROIs as they appear in other camera or image sequence views unless saved and loaded into the other views as an ROI Template.

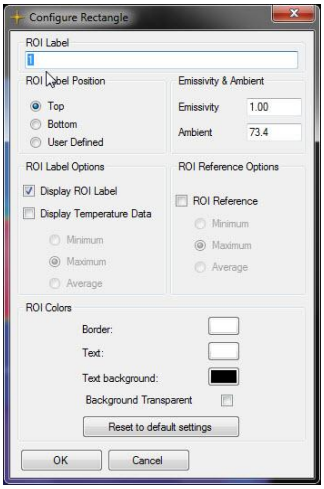
The ROI configuration also does not apply to any new ROI shapes as they are drawn in the Active Thermal Window. The reason for this is that ROI shapes are based upon the default ROI setting you established in the default ROI Options menu.

Note: The ROI configuration options only apply to current ROIs as they appear in the **Active Thermal Window**.

These options do not apply to new ROIs nor do they apply to ROIs as they appear in other image sequence views.

ROI Labels

ROIs are consecutively auto-labeled with numbers, starting with the number one. However, a more descriptive **ROI label** can be set for individual ROIs using numbers, letters or special characters.



To change the ROI Label using the ROI Configuration window:

1. Access the single **ROI Configuration Options window** using the **ROI Context Menu**.

   The **ROI Label** is an editable text field located at the top of the configuration window.

2. Type in the new label, using any alphanumeric combination.

3. Select another option to be configured

   OR,

   Click **OK** to apply the **ROI Label** change and close out of the ROI configuration window.

Note: The **Reset to default settings** button located at the bottom of the **Configuration Window** will allow you to return to your last set of saved changes.

To change the ROI Label through the ROI Charts:

1. Click to select the ROI label you want to change in the **ROI Label** Column of the chart.

2. Click again to enable the editing mode.

3. Type in the new label, using any alphanumeric combination.

4. Repeat steps 1 through 3 to change additional **ROI Labels**.

ROI	ROI Label	Min F	Max F	Avg F	Std Dev	Emissivity	Ambient F	Delta F
1	1	277.5	552.6	398.1	10.503	1.00	73.4	119.0
2	2	280.4	941.9	620.8	116.613	1.00	73.4	508.3
3	3	195.3	420.8	315.3	1.000	1.00	73.4	-12.8
4	4	250.3	839.5	565.5	84.843	1.00	73.4	405.9
5	5	407.8	837.7	770.2	24.466	1.00	73.4	404.1
6	6	199.9	(R) 433.6	326.8	5.469	1.00	73.4	REF
7	7	779.4	779.4	779.4	0.000	1.00	73.4	345.8
8	8	166.5	504.7	224.2	16.263	1.00	73.4	71.1
9	9	165.2	386.1	190.8	17.380	1.00	73.4	-47.5
10	10	239.7	797.4	551.1	125.596	1.00	73.4	363.8
11	11	263.7	399.6	325.9	7.273	1.00	73.4	-34.0
12	12	352.6	396.7	374.0	38.469	1.00	73.4	-36.9
13	13	282.6	449.2	323.6	17.779	1.00	73.4	15.7
14	14	181.2	479.5	219.2	10.443	1.00	73.4	45.9
15	15		199.2			1.00	73.4	-234.4

The new ROI Labels will also automatically appear on the active image or image sequence in the Active Thermal Window.

ROI Label Position

The position of the ROI Labels can be set to appear above the ROI or below the ROI. They can also be set so you have the ability to move the ROI Labels to other locations on the thermal image as needed.

The **ROI Label Position** options can be applied to an individual ROI or to all ROIs as currently viewed in the **Active Thermal Window**. They do not affect new ROIs nor ROIs as they appear in any image sequence view.

Note: Individual ROI Labels can be moved on the image even if the configuration settings have been set to top or bottom.

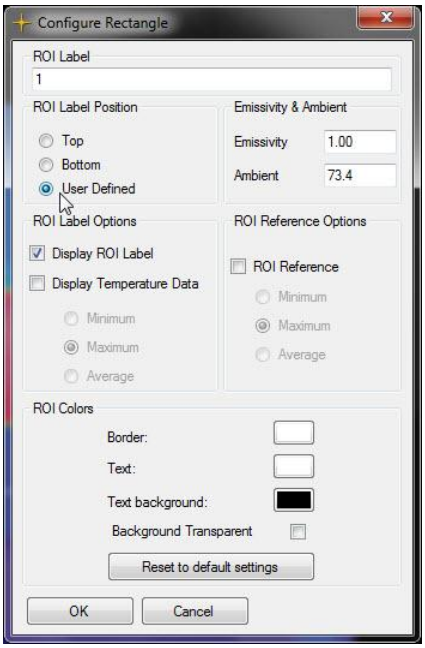
To change the position of the ROI Label:

1. Access the ROI **Configuration Options window** using the **ROI Context Menu.**

   The ROI Label Position choices are located directly under the ROI Label editable text field.

2. Select either the **Top**, **Bottom**, or **User Defined** radio button for the **ROI Label Position**.

   - The **Top** position will remain at the Top of the ROI when the ROI is resized or moved to a new location in the Active Thermal Window.
   - The **Bottom** position will remain at the Bottom of the ROI when the ROI is resized or moved to a new location in the Active Thermal Window.
   - The **User Defined** position is variable. It remains separate from the ROI as the ROI is resized or moved to a new location in the Active Thermal Window. However, it does allow you to "grab" it with the mouse and move it to any location on the thermal image.



3. Select another option to be configured

   OR,

   Click **OK** to apply the **ROI Position** change and close out of the ROI configuration window.

Note: The **Reset to default settings** button located at the bottom of the **Configuration Window** will allow you to return to your last set of saved changes.

To move an ROI Label on the Active Thermal Window:

1. Move the mouse over the **ROI Label** on the **Active Thermal Window**.
2. Hold the left mouse button down and drag the **ROI Label** to a new location on the image.
3. Release the mouse button to complete the move.

Once the ROI Label has been moved, it is no longer attached to the ROI Shape. If you change the size of the ROI or move the ROI to a new position on the display, you will need to move the ROI Label as well.

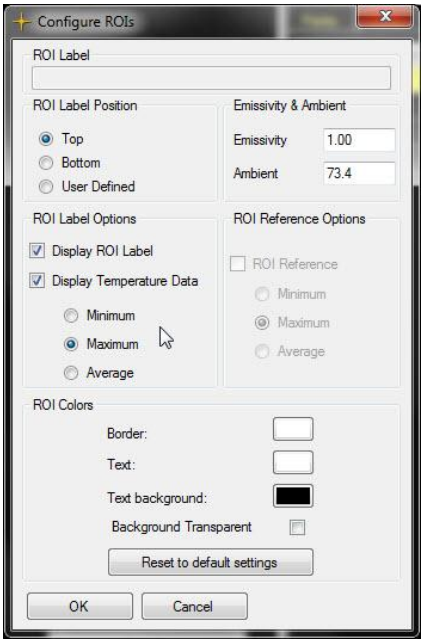
Note: Once you have already moved an ROI Label, the ROI Label will not automatically move with the ROI when you change the size of the ROI or move the ROI to a new position.

ROI Label Options

The **ROI Label Options** feature allows you to define whether or not you want to Display the ROI Label and/or Display the Temperature Data for your current ROIs.

The ROI Label Options can be applied to an individual ROI or to all ROIs as currently viewed in the Active Thermal Window. They do not affect new ROIs nor ROIs as they appear in any other camera or image sequence view.

To set the ROI Label Options:



1. Access the ROI **Configuration Options window** using the **ROI Context Menu.** The ROI Label Options choices are located directly under the ROI Label Position options.
2. Click to mark the **Display ROI Label** checkbox if you want to display the **ROI Labels** in the **Active Thermal Window**

   OR,

   If already marked, click to unmark the **Display ROI Label** checkbox if you do not want the **ROI Labels** to be displayed.
3. Click to mark the **Display Temperature Data** checkbox if you want to display the temperature data with the ROI in the **Active Thermal Window**. Then select whether you want the **ROI Label** to include the **Minimum**, **Maximum**, or **Average** temperature data.

   OR,

   If already marked, click to unmark the **Display Temperature Data** checkbox if you do not want the ROI Temperature Data to be displayed.
4. Select another option to be configured

   OR,

   Click **OK** to apply the **ROI Label Options** changes and close out of the ROI configuration window.

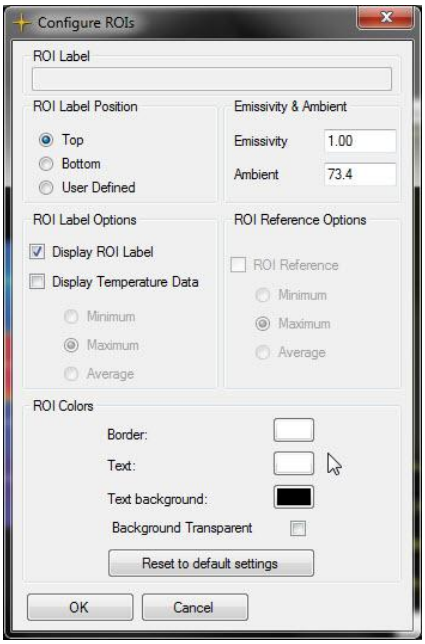
Note: The **Reset to default settings** button located at the bottom of the **Configuration Window** will allow you to return to your last set of saved changes.

ROI Colors

The ROI Colors Section of the ROI Configuration window allows you to assign colors to your ROI Labels as they appear in the Active Thermal Window. You have the ability to change the color of the Border, Text, and Text Background. You also have the option to make the Background Transparent and to Reset to the default color settings.

The ROI label colors can be applied to an individual ROI or to all ROIs as currently viewed in the Active Thermal Window. They do not affect new ROIs nor ROIs as they appear in any other camera or image sequence view.

To set the ROI Colors:



1. Access the ROI **Configuration Options window ROI Context Menu.** The ROI Colors choices are located directly under the ROI Label Options.
2. Click the color bar for the **Border** color bar to bring up the Windows™ color dialog box.
3. Select a new color for the border of your currently displayed ROIs.
4. Click **OK** to apply the color you have selected and to close the dialog box.
5. Repeat steps 2 through 4 to change the color of the **ROI Text** for your currently displayed ROIs.
6. Repeat steps 2 through 4 to change the color of your ROI **Text background**

   OR,

   Click the **Background Transparent** checkbox to make your label background transparent.
7. Select another option to be configured

   OR,

   Click **OK** to apply the **ROI Colors** change and close out of the ROI configuration window.

Note: The **Reset to default settings** button located at the bottom of the **Configuration Window** will allow you to return to your last set of saved changes.

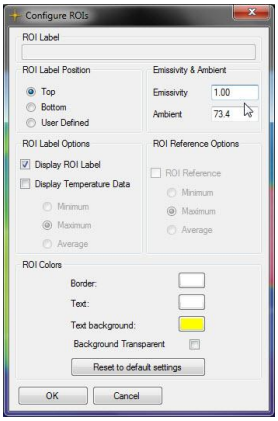
ROI Emissivity & Ambient Settings

Emissivity is the ratio of the infrared energy radiated from the surface of a target to the infrared energy radiated from a blackbody at the same temperature. The emissivity varies with the surface condition of the object and also with temperature variation and wavelength. If this value is not accurate, then true temperature cannot be measured. In other words, a variation or change in emissivity will cause a change in the image results from the camera.

LumaSpec Offline Analyzer allows you to set individual emissivity values for each ROI or set a general emissivity value that will apply to all ROIs. The software also allows you to take into account the ambient temperature of the defined area.

Note: Emissivity and **Ambient** information for ROIs can be viewed through the ROI charts found in the **ROI Active Tool Window** and **ROI Pop-Up Tools.**

To set ROI Emissivity & Ambient values using the ROI Configuration Window:



1. Access the ROI **Configuration Options window** using the **Main Image Context Menu** or the **ROI Context Menu** option.

   The **Emissivity & Ambient** option fields are located to the right of the **ROI Label Position** options.

2. Enter values in the **Emissivity & Ambient** fields of the configuration window.

3. Select another option to be configured

   OR,

   Click **OK** to apply the **Emissivity & Ambient** value changes and close out of the ROI configuration window.

To set ROI Emissivity & Ambient Values through the ROI Charts:

ROI	ROI Label	Min F	Max F	Avg F	Std Dev	Emissivity	Ambient F	Delta F
	1	304.3	577.4	422.4	14.713	1.00	73.4	
	2	298.9	949.6	701.4	135.932	1.00	73.4	
	3	211.3	535.5	351.5	11.199	1.00	73.4	
	4	307.9	949.6	667.2	101.218	1.00	73.4	
	5	518.4	932.0	898.0	15.961	1.00	73.4	
	6	220.1	463.6	338.4	4.111	1.00	73.4	
	7	926.1	926.1	926.1	0.000	1.00	73.4	
	8	179.1	552.4	240.1	17.151	1.00	73.4	
	9	177.3	424.8	204.3	19.592	1.00	73.4	
	10	255.4	939.6	648.9	54.410	1.00	73.4	
	11	287.6	447.8	359.8	10.757	1.00	73.4	

1. Select the **ROI** menu option from the **Active Tool Window Drop-Down Menu** or from the **Pop-Up Tools Drop-Down Panel** to open the **ROI Chart**.
2. Click on the value you want to change in the **Emissivity** Column of the chart.
3. Type the new value and press **Enter**.
4. Click on the value you want to change in the **Ambient Column** of the chart.
5. Type the new value and press **Enter.**
6. Repeat steps 2 through 5 to change **Emissivity & Ambient** values for additional ROIs.

The temperature values on the chart will automatically adjust in accordance with the new Emissivity & Ambient values.

Working with ROI Reference

ROI	ROI Label	Min F	Max F	Avg F	Std Dev	Emissivity	Ambient F	Delta F
	1	272.8	554.4	384.1	11.412	1.00	73.4	-155.5
	2	270.7	896.9	541.0	94.228	1.00	73.4	45.4
	3	189.3	398.5	299.7	1.340	1.00	73.4	-196.0
	4	223.5	711.0	**(R) 495.7**	66.261	1.00	73.4	REF
	5	365.4	753.4	649.4	22.195	1.00	73.4	153.
	6	192.2	424.0	320.4	6.448	1.00	73.4	-175.3
	7	598.6	598.6	598.6	0.000	1.00	73.4	103.0
	8	159.6	494.1	216.1	16.859	1.00	73.4	-279.5
	9	158.4	385.7	183.9	17.644	1.00	73.4	-311.8
	10	229.3	663.3	471.4	94.377	1.00	73.4	-24.3
	11	246.0	367.2	301.8	5.173	1.00	73.4	-193.9

LumaSpec Offline Analyzer allows you to define an ROI temperature value as a reference temperature. This **ROI Reference (REF)** is used to calculate the difference between the reference temperature and the temperature readings of other ROIs in the image. This temperature difference is known as the Delta T.

The Delta T readings can be found in the Delta C, Delta F, or Delta K column of the ROI Chart. The reference temperature will appear with an (R) next to it, while **REF** will appear in the Delta (C, F, or K) column.

When a Point ROI is selected as a reference, the software will calculate the difference between the maximum temperature of the point and the maximum temperature for each ROI in the image.

When a line type or area type ROI is used, you need to select whether or not you want to the ROIs Minimum, Maximum, or Average temperatures to be used in your Delta T calculations.

If you select the minimum temperature value of a line type or area type ROI to be used as a reference, the resulting Delta T calculations will be based on the minimum value of each ROI in the image. Likewise, if you select the maximum temperature value as your reference, the calculations will be based on the maximum temperature of each ROI in the image. And, if you select the average value of a line type or area type ROI as your reference, the resulting Delta T calculations will be based on the average temperature of each ROI in the image.

To set the ROI Reference Using the Configuration Window

1. Access the ROI **Configuration Options window** using the **Main Image Context Menu** or the **ROI Context Menu** option.

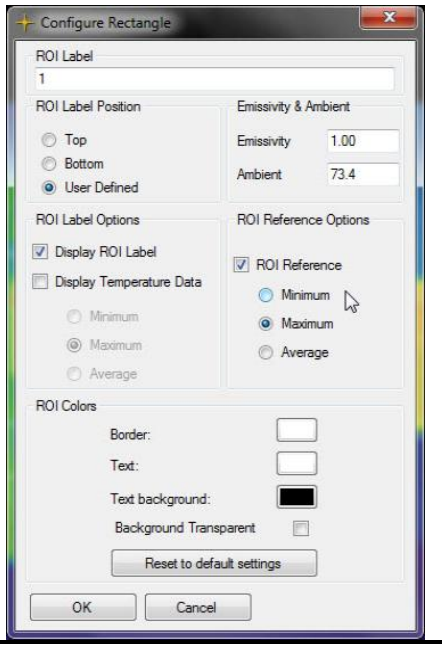
   The ROI Reference Options are located below the Emissivity & Ambient options on the right side of the configuration window.

2. Click to mark the **ROI Reference Options** checkbox. If you have chosen a line type or area type ROI, then you will also need to select whether you want the **Minimum**, **Maximum**, or **Average** temperature data to be used as the **ROI Reference**.

3. Select another option to be configured

   OR,

   Click **OK** to apply the **ROI Reference Options** change and close out of the ROI configuration window.



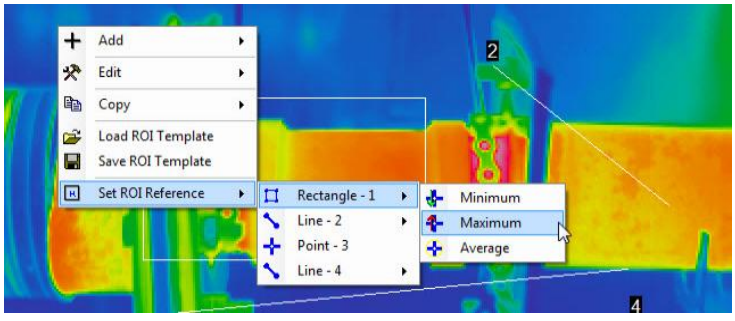
Note: When using a Point ROI, the Delta T will be based on the maximum temperature value of the Point ROI.

When using a line type or area type ROI, you will need to choose whether or not to base the Delta T on the minimum, maximum, or average temperature value of the selected ROI.

To set the ROI Reference Using the Workspace Main Image Context Menu

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.

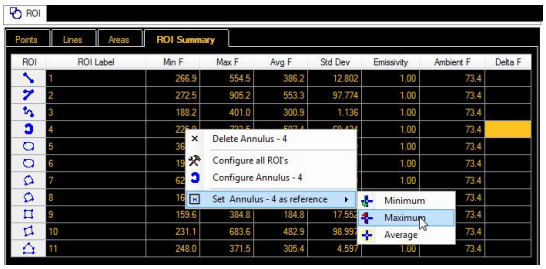
2. Select **Set ROI Reference > [select the desired ROI you want to use as a Reference].**



This will allow you to set the ROI Reference for the selected ROI. If you selected a Point ROI, the comparisons will be based on the maximum temperature value of the Point ROI.

If you selected a line type or area type ROI, you will need to choose whether or not to base your comparisons on the minimum, maximum, or average temperature values of the selected ROI.

To set the ROI Reference Using the ROI Context Menu:



1. Right click on the row for the ROI you want to use as a reference. This will reveal the **ROI Context Menu**.
2. Select **Set [type and name of ROI] as Reference.**

This will allow you to set the ROI Reference for the selected ROI. If you selected a Point ROI, the comparisons will be based on the maximum temperature value of the Point ROI.

If you selected a line type or area type ROI, you will need to choose whether or not to base your comparisons on the minimum, maximum, or average temperature value of the selected ROI.

To clear an ROI Reference

LumaSpec Offline Analyzer offers a number of methods to clear an **ROI Reference**. These methods are as follows:

ROI Configuration Options Window

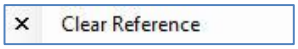
1. Access the ROI **Configuration Options window** using the **Main Image Context Menu** or the **ROI Context Menu** option.
2. Click to unmark the **ROI Reference Options** checkbox.
3. Click **OK** to apply the change and close out the **ROI Configuration Window**.

ROI Context Menus

1. Right click anywhere on the thermal image in the **Active Thermal Window** to bring up the **Main Image Context Menu**

   OR,

   Right click on the **ROI chart** in either the **ROI Active Tool Window View** or the **ROI Pop-Up Window** to bring up the **ROI Context Menu**.
2. Select **Clear ROI Reference**



Note: You can also clear an existing ROI reference by creating a new ROI reference.

Reset to default settings

The **Reset to default settings** function of the ROI Configuration Options window allows you to revert back to your last set of customized ROI configuration settings.

This feature only reverts back to your last saved settings in the configuration window and not the Default ROI Options as set through the Options window.

See Section 2.12.2 for more information on Setting ROI Preferences.

3.1.6 Working with ROI Templates

When ROIs are created for one situation, it is often useful to apply the ROI information to other situations as well. LumaSpec Offline Analyzer allows you to save and recall **ROI Template** files as needed.

When an image or image sequence appears in the **Active Thermal Window**, it does not contain any ROIs. With the ROI Templates feature, you have the ability to load a previously saved template file to apply to your image or image sequence.

When new ROIs are created or changes are made to existing ROIs, you have the ability to save the information as a part of the existing ROI Template file or save the changes as a new ROI Template file.

Saving an ROI Template File

To save an ROI template:

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Save ROI Template.**

Clicking **Save ROI Template** will bring up a standard Windows™ dialog box allowing you to save your file to your default **ROI Collections** folder or to create a new folder in a directory of your choice.

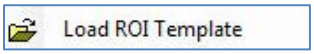
If you want to save your template to a different location, select the new location before proceeding to the next step.

3. Create a **File Name** for your **ROI Template**.
4. Click **Save** to save your **ROI template**.

Loading an ROI Template File

To load an ROI template:

1. Right click anywhere on the thermal image in the **Active Thermal Window**. This will reveal the **Main Image Context Menu**.
2. Select **Load ROI Template.**



This will allow you to load your **ROI Template** from the **ROI Collection Path** you previously established.

If you saved your template to a different location, you will be able to select the location before proceeding to the next step.

3. Select the **File Name** for the **ROI Template** you want to load.
4. Click **Open** to open your **ROI Template**.

The saved ROIs will appear on the active image in the Active Thermal Window and will be used for displaying the ROI data for that camera or image sequence.

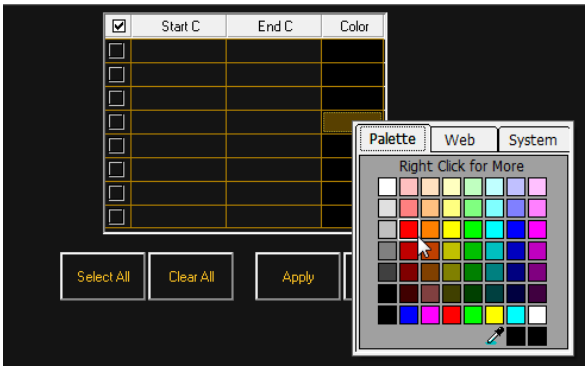
3.2 Working with Isotherms

An isotherm is a simplified visual representation of the temperature breakdown on a thermal image. LumaSpec Offline Analyzer's Isotherm feature allows you to define up to eight temperature ranges, replace each range with a single color, and apply the ranges/colors to the thermal image to create a simplified Isotherm representation of temperature ranges.

3.2.1 Creating Isotherms

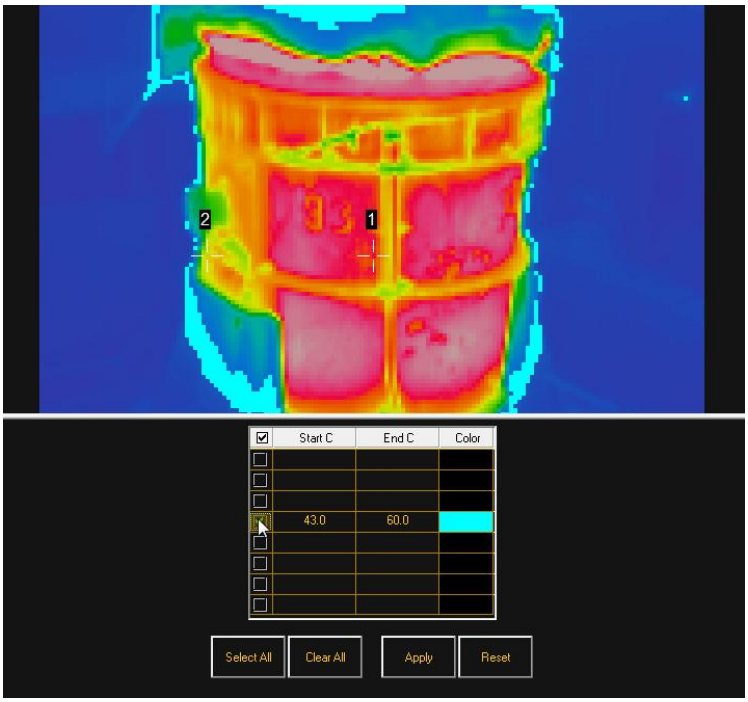
To create and apply an isotherm palette:

1. On the View Pane under Thermal, select **Isotherms.**
2. The **Isotherm Table** will appear in the **Active Tool Window**. Each row corresponds to one of the eight available Isotherm ranges. Enter a temperature range, beginning with the lowest end of

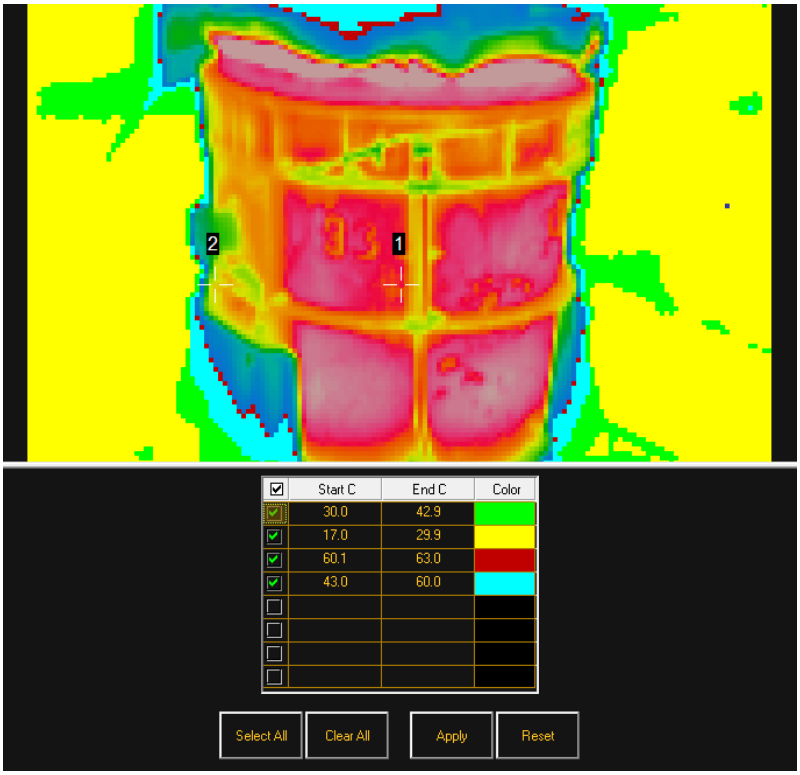


the range in the “Start” column and then the highest end in the “End” column.

3. Click the box under the Color column that corresponds to the row in which you are working. A color palette appears. Choose a color to represent the temperature range you have previously entered.
4. Once you have chosen the color you’d like to represent the range, check the box in the column to the left of the starting temperature to apply the isotherm.

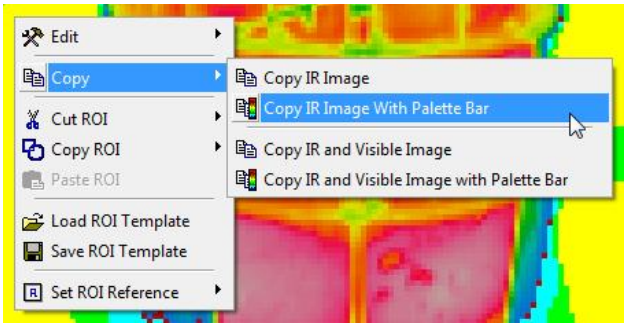


5. Add additional ranges as desired by repeating steps 2-4. Again, make sure to check the box in the column to the left of the starting temperature to actually apply the isotherm. Individual ranges may be turned on/off by checking and un-checking these boxes.



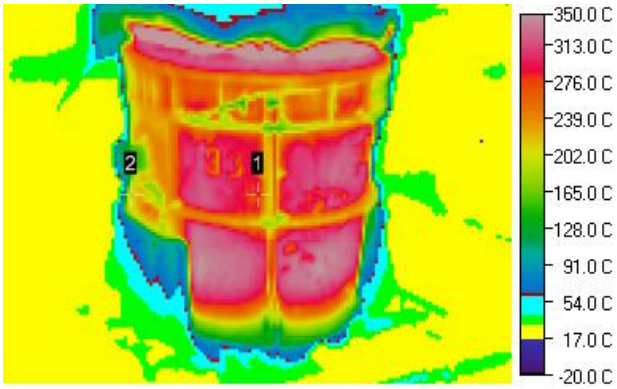
3.2.2 Copying an Isotherm Image to the Windows™ System Clipboard

To copy an Isotherm:



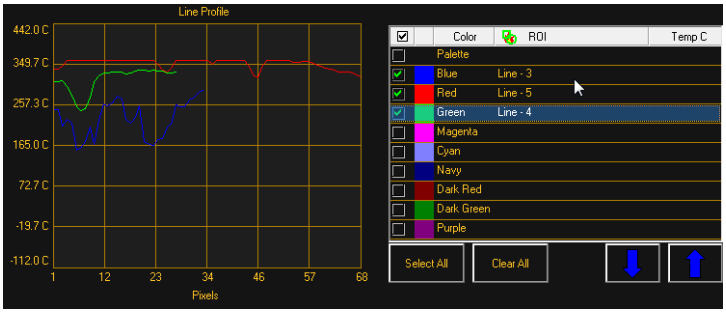
Isotherm images may be copied to your Windows™ clipboard by right-clicking the Active Thermal Windowand choosing **Copy**> and **Copy IR Image** or **Copy IR Image with Palette Bar**. If the thermal image has an associated visible image, the options Copy IR and Visible Image and Copy IR and Visible Image with Palette Bar will also be available in the Copy menu.

If you choose to copy the image with the palette bar, keep in mind that the altered Isotherm Palette Bar will be copied with the image. Below is the copied isotherm image with Palette Bar.



Copied Isotherm image with palette bar

3.3 Working with Line Profiles



LumaSpec Offline Analyzer offers a two-dimensional **Line Profile Graph,** which represents the temperature of each pixel along a selected line type ROI. The graph can be used to analyze temperature information.

The graph always displays the temperatures from the left to the right side of the line. The X-axis displays the number of pixels in the line and the Y-axis displays the temperature value for each pixel in the line.

To use the Line Profile chart, you must open a sequence file and define Line ROIs. You may define up to 10 Line Profiles using the pre-defined colors in the Line Profile chart.

3.3.1 Accessing the Line Profile Tool

To access the Line Profile Tools:

1. Open or select the tab of the thermal image sequence for which you want to create a line profile.
2. Select **Line Profile** from the **Thermal Menu** on the **View Pane**.

3.3.2 Working with the Line Profile Graph

The Line Profile feature generates a two-dimensional graph (based on pixels and temperature) using data from existing line ROIs on the live camera feed or image sequence as shown in the Active Thermal Window.

To use the Line Profile feature, you must define **Line** type **ROIs** on the image appearing in the **Active Thermal Window**. These line type ROIs can be any combination of straight lines, broken lines, or free lines.

LumaSpec Offline Analyzer allows you to graph line profiles for up to 10 line type ROIs using the preset colors in the **Line Profile Selection Table**.

Adding Line ROIs to a Line Profile

When you add previously created Line ROIs to the **Line Profile Selection Table**, they will appear on the graph using the preset colors shown in the table. The **Palette** color at the top of the table will show the line with the line color corresponding to the currently selected **Temperature Palette** as shown in the **Active Thermal Window**.

To add individual line ROIs to the Line Profile:

1. Right click on the color that you would like your line to be on the **Line Profile Graph**.
2. Select **Add Line** and choose the ROI you would like to display from the list of existing line type ROIs.
3. Repeat steps 1 and 2 to add additional ROIs.

   When a line ROI is added to the Line Profile Selection Table, it will automatically appear in the Line Profile Graph with the color you selected for that ROI.

To add all line ROIs to the Line Profile:

1. Right click on the **Line Profile ROI Selection Table**.

   This will bring up the Line Profile ROI Selection Table Context Menu.

2. Select **Add All Lines** to add all ROIs from the **Line Profile Selection Table and Graph.**

Removing Line ROIs from the Line Profile

Removing Line ROIs from the Line Profile will only affect the Line Profile Selection Table and Graph. It will not affect the ROIs as they appear in the Active Thermal Window. To delete ROIs in their entirety, refer to Section 3.1.3 Deleting ROI Objects.

To remove individual Line ROIs from the Line Profile:

1. Right click on the **Line Profile ROI Selection Table**.

   This will bring up the Line Profile ROI Selection Table Context Menu.

2. Select **Remove Line** and choose the **ROI** you would like to remove from the list of existing line type ROIs.
3. Repeat steps 1 and 2 to remove additional ROIs from the **Line Profile Selection Table and Graph**.

To remove all line ROIs from the Line Profile:

1. Right click on the **Line Profile ROI Selection Table**.

   This will bring up the Line Profile ROI Selection Table Context Menu.

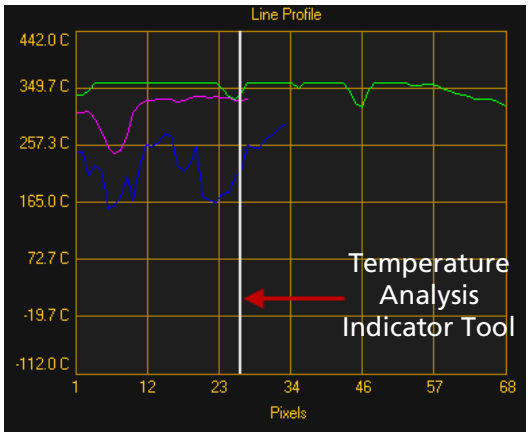
2. Select **Remove All Lines** to remove all ROIs from the **Line Profile Selection Table and Graph.**

Using the Line Profile Temperature Analysis Indicator Tool

The software provides a temperature analysis indicator tool in the form of a vertical line that allows you to focus on specific temperatures for each ROI appearing across that line.

To add the Temperature Analysis Indicator Tool:

1. Move your mouse over the graph to display and move the **Temperature Analysis Indicator Tool**.
2. If desired, click the left mouse button to set the **Temperature Analysis Indicator Tool** to a fixed spot on the **Line Profile Graph**.



To move the Temperature Analysis Indicator Tool from its fixed position:

1. Position the mouse over the **Temperature Analysis Indicator Tool**.
2. Click the left mouse button to unlock the tool from its fixed position.
3. Move your mouse over the graph to move the **Temperature Analysis Indicator Tool** to a new location on the graph.
4. If desired, click the left mouse button to set the **Temperature Analysis Indicator Tool** to its new spot on the **Line Profile Graph**.

To remove the Temperature Analysis Indicator Tool from the Line Profile Graph:

1. Position the mouse over the **Temperature Analysis Indicator Tool**.
2. Click the left mouse button to unlock the tool from its fixed position.
3. Move your mouse over the graph to move the **Temperature Analysis Indicator Tool** to the side of the graph.

3.3.3 Modifying a Line Profile Graph

LumaSpec Offline Analyzer provides a number of functions that allow you to customize the Line Profile Graph according to your specific needs.

Setting the Line Profile Temperature Range

The LumaSpec Offline Analyzer **Line Profile Graph** uses the same temperature range as the Active Thermal Window shown in the Tool Pane.

To adjust the Temperature Range values:

1. Click on one of the ends of the Temperature scale in the Tool Pane and drag it to the temperature desired.
2. Repeat for the other end to create the desired temperature range.

3.3.4 Copying a Line Profile Image to the Windows™ System Clipboard

It is often necessary to save a **Line Profile Image** for further analysis and/or reporting purposes. By copying a Line Profile Image to the Windows™ System Clipboard, it can be viewed and saved as a Windows™ System Clipboard image.

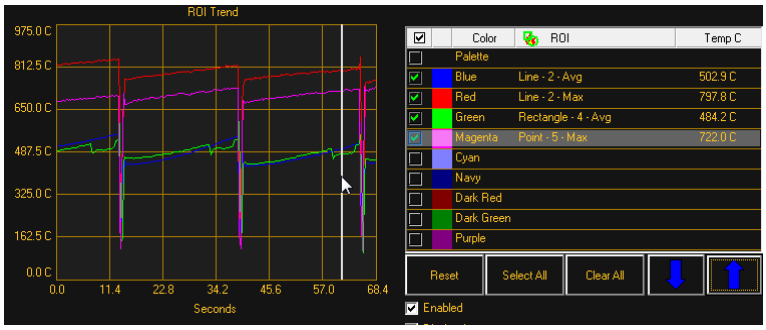
It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

To copy the Line Profile Image:

1. Right click anywhere on the **Line Profile Graph** to reveal the **Line Profile Graph Context Menu**.
2. Select **Copy > Copy Line Profile Image.**

   Once you have copied the Line Profile Image, it is saved to the Windows™ System Clipboard where it can be viewed or saved through the Windows™ System Clipboard Viewer. It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

3.4 Working with ROI Trends



LumaSpec Offline Analyzer offers a two-dimensional time vs. temperature graph, which can display the minimum, maximum, or average temperature of multiple ROI channels. The Trend graph can be used to analyze temperature information.

The X-axis represents the time in seconds or number of frames that have passed through the Active Thermal Window for live image feeds and image sequences. The Y-axis represents the user-selected Minimum, Maximum, or Average temperature of the selected ROIs.

3.4.1 Accessing the ROI Trend Graph

To access the ROI Trend Graph:

Select **ROI Trend** under **Thermal** on the **View Pane.**

3.4.2 Creating an ROI Trend Graph

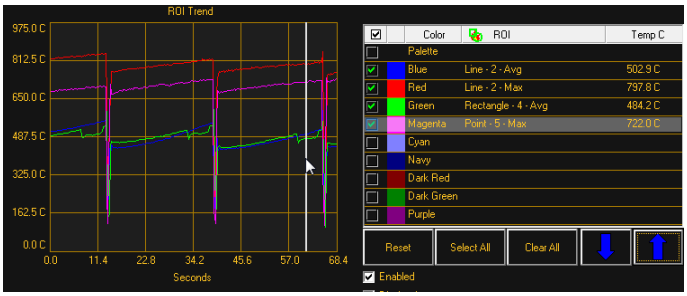
The Trend feature generates a two-dimensional graph (based on time and temperature) using data from existing ROIs on a thermal image sequence.

To use the Trend graph, you must define ROIs on the image. These ROIs can be any combination of points, line type ROIs, or area type ROIs. LumaSpec Offline Analyzer allows you to define Trends for up to 10 ROI channels using the preset colors.

Adding ROI Temperatures to an ROI Trend

When you add previously created ROIs to the **ROI Trend ROI Selection Table**, they will appear on the Trend graph using the present colors shown in the table. The "Palette" color at the top of the table will show the line with line color corresponding to the currently selected Temperature Palette.

To add individual ROI Data to the Trend:



1. Right click on the color that you would like to appear on the Trend graph.

   This will bring up the **ROI Trend Context Menu**.

2. Select **Add ROI** and choose the **ROI** you would like to display from the list of existing line type ROIs.

3. Select the **Minimum**, **Maximum**, or **Average** temperature of that **ROI** to be displayed in the Trend Graph.

   Point ROIs will automatically be displayed with their **Maximum** temperature values.

4. Repeat steps 1 through 3 to add additional ROI data.

   When ROI data is added to the Trend ROI Selection Table, it will automatically appear in the Trend Graph with the color you selected for that data.

Removing ROI Data from the ROI Trend

Removing ROI data from the **Trend ROI Selection Table** will only affect the Trend ROI Selection Table and Graph. It will not affect the ROI as it appears in the Active Thermal Window. To delete an ROI in its entirety, refer to Section 3.1.3 Deleting ROI Objects.

To remove individual ROI data from the Trend:

1. Right click on the **Trend ROI Selection Table**.

   This will bring up the **ROI Trend Context Menu**.

2. Select **Remove ROI** and choose the ROI data you would like to remove from the chart.

3. Repeat steps 1 and 2 to remove additional ROI data.

To remove all ROI data from the Trend:

1. Right click on the **Trend ROI Selection Table**.

   This will bring up the **ROI Trend Context Menu**.

2. Select **Remove All ROIs**.

3.4.3 Viewing Details in an ROI Trend Graph

Once ROI data is plotted as a line on the graph, it shows the temperature fluctuations along the line over time. The temperatures from an image sequence are viewed as captured.

Using the ROI Trend Temperature Analysis Indicator Tool

The software also provides a temperature analysis indicator tool in the form of a vertical line that allows you to focus on specific temperatures for each ROI appearing across that line.

To add the ROI Temperature Analysis Indicator Tool:

1. Move your mouse over the graph to display and move the **Temperature Analysis Indicator Tool**.
2. If desired, click the left mouse button to set the **Temperature Analysis Indicator Tool** to a fixed spot on the **ROI Trend Graph**.

To move the Temperature Analysis Indicator Tool from its fixed position:

1. Position the mouse over the **Temperature Analysis Indicator Tool**.
2. Click the left mouse button to unlock the tool from its fixed position.
3. Move your mouse over the graph move the **Temperature Analysis Indicator Tool** to a new location on the graph.
4. If desired, click the left mouse button to set the **Temperature Analysis Indicator Tool** to new fixed spot on the **ROI Trend Graph**.

To remove the Temperature Analysis Indicator Tool from the Trend Graph:

Uncheck the **Enable Indicator** checkbox located in the upper right panel above the **Trend ROI Selection Table**.

3.4.4 Modifying an ROI Trend Graph

LumaSpec Offline Analyzer provides a number of functions that allow you to customize the Line Profile Graph according to your specific needs.

Setting the Trend Graph Temperature Range

The LumaSpec Offline Analyzer **ROI Trend Graph** uses the same temperature range as the Active Thermal Window shown in the Tool Pane.

To adjust the Temperature Range values:

1. Click on one of the ends of the Temperature scale in the Tool Pane and drag it to the temperature desired.
2. Repeat for the other end to create the desired temperature range.

3.4.5 Copying an ROI Trend Image to the Windows™ System Clipboard

It is often necessary to save a **Trend Image** for further analysis and/or reporting purposes. By copying a Trend Image to the Windows™ System Clipboard, it can be viewed and saved as a Windows™ System Clipboard image.

It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

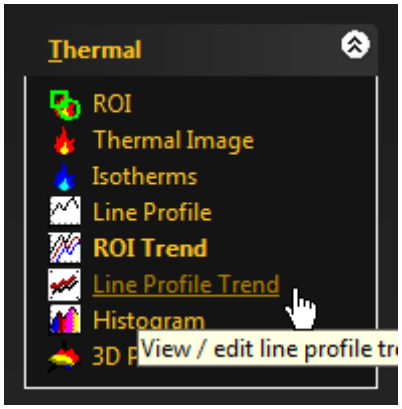
To copy the ROI Trend Image::

1. Right click anywhere on the **ROI Trend Graph** to reveal the **ROI Trend Graph Context Menu**.
2. Select **Copy > Copy ROI Trend Image.**

Once you have copied the Trend Image, it is saved to the Windows™ System Clipboard where it can be viewed or saved through the Windows™ System Clipboard Viewer. It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

3.5 Working with Line Profile Trends

The Line Profile Trend feature generates a three-dimensional representation, based on distance and temperature, of the surface of user-defined Line ROI on a thermal sequence.



3.5.1 Accessing the Line Profile Trend

To use the Line Profile Trend chart, you must first define Line ROIs.

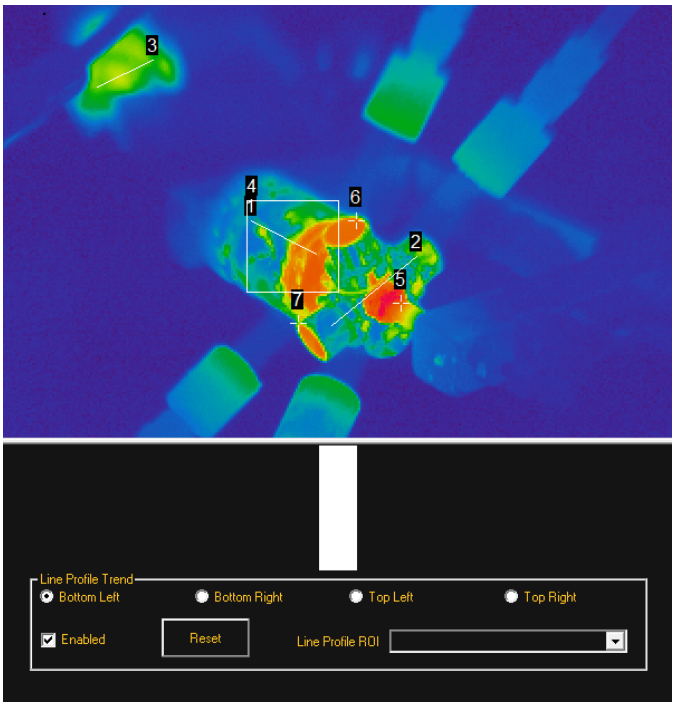
To access the Line Profile Trend:

Select **Line Profile Trend** under **Thermal** on the **View Pane.**

3.5.2 Creating a Line Profile Trend

To create a line profile trend:

1. Open or select the tab of the thermal image for which you wish to create a **Line Profile Trend**.
2. Select **Line Profile Trend** under the **Thermal** menu on the **View Pane**.
3. A blank line profile trend appears:

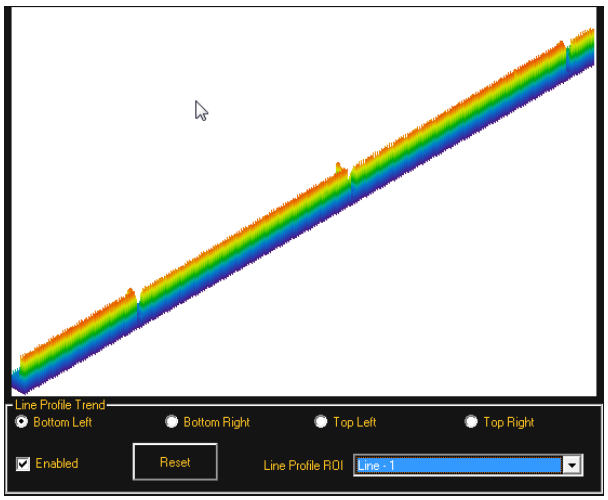


4. Select a previously created Line ROI from the Line Profile ROI drop-down box to see it rendered in 3D on the graph. A 3D representation of the temperature data along the ROI will appear in the pre-set palette colors.

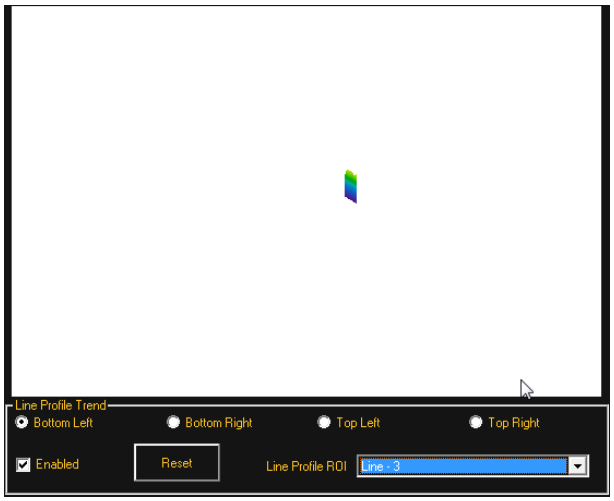
Note: You may need to resize the Active Thermal Window in order to see the entire line profile trend. To do this, click and drag on the gray horizontal divider between Active Thermal Window and the Active Tool Window.

To create a line profile trend from a sequence:

1. Open or select the tab of the sequence for which you wish to create a **Line Profile Trend**.
2. Select **Line Profile Trend** under the **Thermal** menu on the **View Pane**.
3. An ROI graph displays a series of slices representing each frame in 3D:



If you are viewing a static image or if the sequence is stopped, only one slice will appear:



You can change the Orientation of the 3D Line Profile Trend by clicking the radio buttons below the 3D graph: Bottom Left (default), Bottom Right, Top Left, and Top Right:

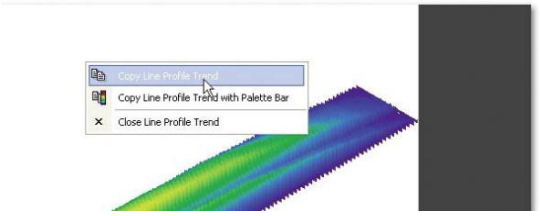
The **Reset** button clears the 3D graph but preserves your orientation and Line ROI selections.

3.5.3 Copying a Line Profile Trend to the Windows™ System Clipboard

It is often necessary to save a **3D Image** or **Line Profile Trend** for further analysis and/or reporting purposes. By copying a 3D Image to the Windows™ System Clipboard, it can be viewed and saved as a Windows™ System Clipboard image.

It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

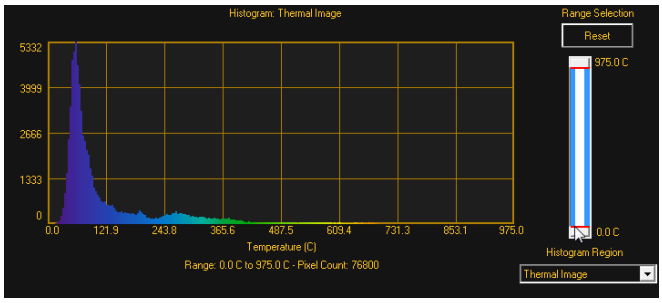
To copy the 3D Image:



1. Right click anywhere on the **3D Graph** to reveal the **3D Graph Context Menu**.
2. Select **Copy > Copy Trend Image.**

   Once you have copied the Trend Image, it is saved to the Windows™ System Clipboard where it can be viewed or saved through the Windows™ System Clipboard Viewer. It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

3.6 Working with Histograms



The LumaSpec Offline Analyzer Histogram Tool gives you an indication of the distribution of temperature values within the thermal image.

The X-axis of the histogram represents pixel intensity and the Y-axis represents the percent of color count for each pixel intensity value. See the example of a histogram below.

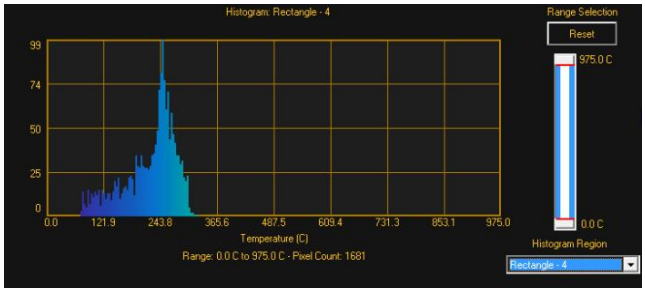
3.6.1 Accessing the Histogram Tool

To access Histogram:

Select **Histogram** under **Thermal** on the **View Pane.**

3.6.2 Creating a Histogram Chart

Creating ROI Histogram Views



When a Histogram is opened, it is based on the Entire Image by default. However, the software provides you with the ability to change the Histogram view based on a specific ROI.

To create ROI Histogram views, you must first define ROIs on the image as it appears in the Active Thermal Window.

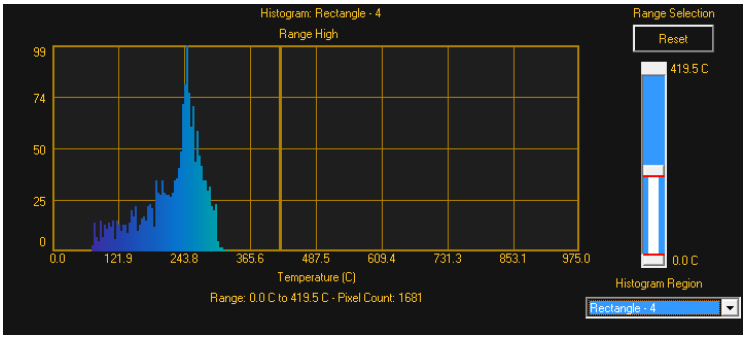
To create ROI Histogram Views:

1. Define **ROIs** on the image in **Active Thermal Window**.
2. Open the **Histogram** Chart.
3. Click the **Histogram Region** selection box to expose the drop-down list of available views.
4. Select the **Histogram Region** you would like to chart.

The histogram immediately changes to reflect the new distribution of pixel intensity that exists within the selected Region of Interest.

3.6.3 Setting the Appearance of the Histogram Graph

Selecting a Histogram Measurement Range



You may use the **Histogram Range Selection Slider Bar** to narrow the range of pixels being measured. Once set, the Range and Pixel Count located beneath the graph will automatically adjust according to the Range Selection Slider Bar settings.

The **Upper Slider Bar Handle** sets the upper limit temperature for the range. The **Lower Slider Bar Handle** sets the lower limit temperature for the range. The **Slider Bar** allows you adjust the temperature span within the defined temperature range.

To Adjust the Histogram Range:

1. Click and hold the **Upper Temperature Slider Bar** handle as you slide the handle to the desired upper limit temperature reading for the range. This will set the **Range High** vertical bar on the graph.
2. Click and hold the **Lower Temperature Slider Bar** handle as you slide the handle to the desired lower limit temperature reading for the range. This will set the **Range Low** vertical bar on the graph.
3. If desired, click, hold, and move the center of the slider bar to adjust the span as needed.

To reset the range back to original values:

Click the **Reset** button located at the bottom of the Slider Bar.

3.6.4 Copying a Histogram Image to the Windows™ System Clipboard

It is often necessary to save a **Histogram Image** for further analysis and/or reporting purposes. By copying a Histogram Image to the Windows™ System Clipboard, it can be viewed and saved as a Windows™ System Clipboard image.

It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

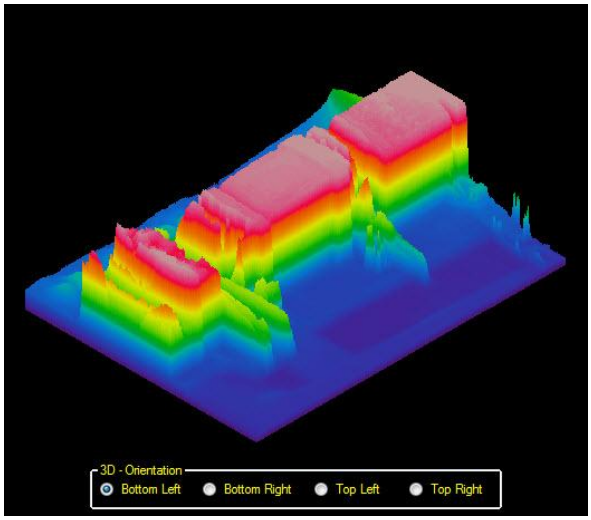
To copy the Histogram Image:

1. Right click anywhere on the **Histogram** to reveal the **Histogram Context Menu**.
2. Select **Copy > Copy to Clipboard.**

   Once you have copied the Histogram Image, it is saved to the Windows™ System Clipboard where it can be viewed or saved through the Windows™ System Clipboard Viewer. It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

3.7 Working with 3D Profiles

The LumaSpec Offline Analyzer **3D Profile** provides a three-dimensional representation of pixel intensity values within a thermal image that is generated from a loaded sequence as it appears in the Active Thermal Window.



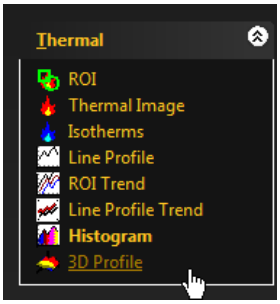
LumaSpec Offline Analyzer 3D View Panel

Note:
X Axis = Pixel Width

Y Axis = Pixel Height

Z Axis = Temperature

3.7.1 Accessing the 3D Profile Tool



To access the 3D profile tool:

Select **3D Profile** under **Thermal** on the **View Pane.**

3.7.2 Working with 3D Profile Tool

Changing the Active Tool Window 3D Orientation

To Change the Workspace 3D Orientation View

Click to mark the **Bottom Left**, **Bottom Right**, **Top Left**, or **Top Right** orientation view.

3.7.3 Copying a 3D Profile Image to the Windows™ System Clipboard

It is often necessary to save a 3D Profile image for further analysis and/or reporting purposes. By copying a 3D Profile image to the Windows™ System Clipboard, it can be viewed and saved as a Windows™ System clipboard image with or without the Palette Bar attached.

It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

To copy the 3D Profile Image using the 3D Profile Workspace and Pop-Up Tools:

1. Right click anywhere on the **3D Profile** to reveal the **3D Profile Context Menu**.
2. Select **Copy > Copy 3D Profile.**

OR,

Select **Copy** > **Copy 3D Profile with Palette.**

Once you have copied the 3D Profile image, it is saved to the Windows™ System Clipboard where it can be viewed or saved through the Windows™ System Clipboard Viewer. It can also be pasted into programs outside of the LumaSpec Offline Analyzer software.

To ensure consistent document formatting, this page was intentionally left blank.

4 Working with Image Manipulation Tools

4.1 Working with Image Blender

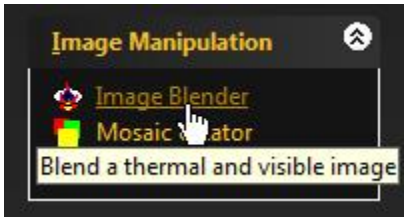
The Image Blender feature of LumaSpec™ Offline Analyzer allows the creation of a composite blended thermal and visible image. The Temperature Range Slider Bar allows you to control the area of the overlaid thermal image based on temperature.

4.1.1 Accessing Image Blender

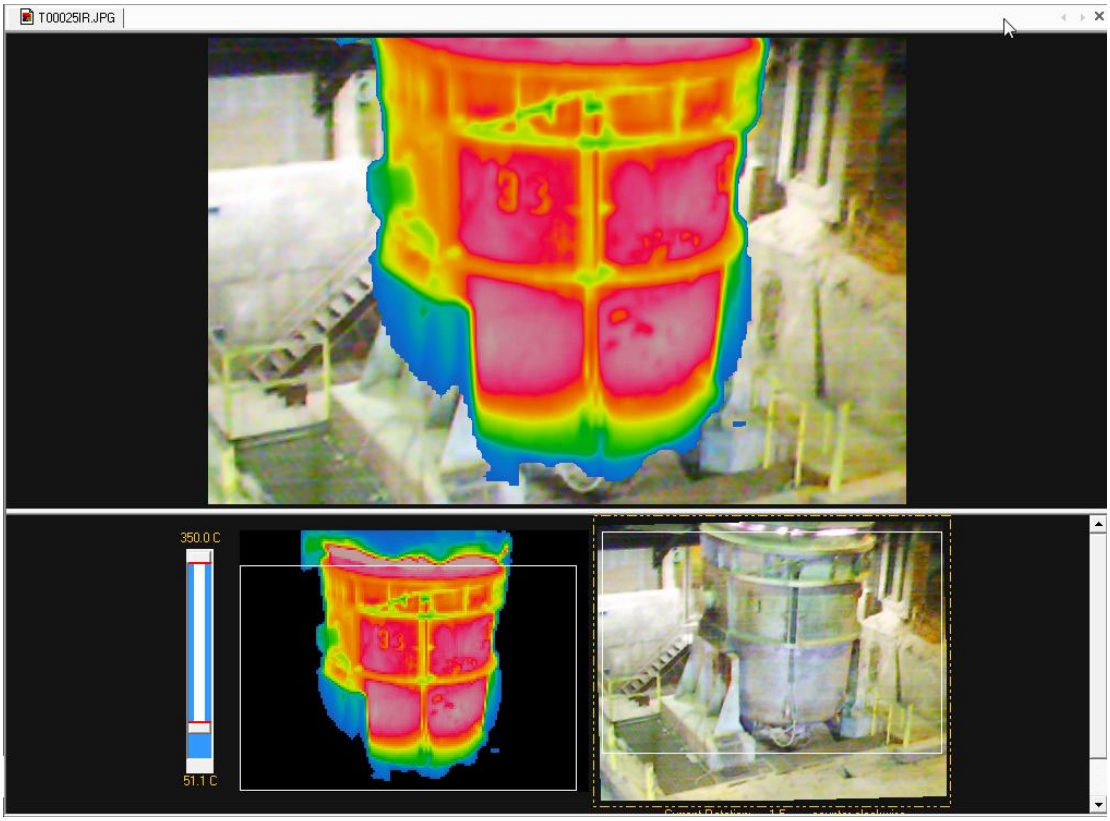
1. Open an image file or select the tab of a previously opened image that contains both a thermal and visible image file.

Note: If the thermal image doesn't have a visible image, you can attach one. See Section 2.4.3 for Loading a Visible Image, for information about adding a visible image to the file.

2. Click on the **Image Blender** selection under the **Image Manipulation** header on the **View Pane**.



3. The Active Thermal Window contains the thermal image and will show the composite image as you define it. The Active Tool Window contains both the thermal and visible images and tools to line up and rotate the thermal image over the visible image.

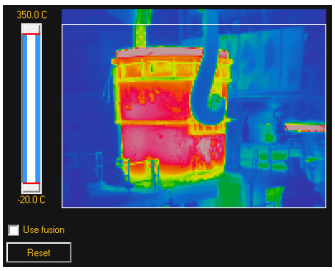


Note: You can modify the brightness and contrast of a Visible Image by clicking on the Brightness and Contrast feature of the Tool Pane. See Section 2.8.5 Brightness/Contrast, for more information about altering the brightness and contrast of a visible image.

4.1.2 Lining Up the Thermal and Visible Images

Lining up the thermal and visible images is important in order for the thermal and visual data to correspond as they should. Use a combination of the **Temperature Range Slider Bar** (to the left of the thermal image), the **fusion feature** (changes the slider bar when the **Use fusion** box is checked), the **Rotation Buttons** (underneath the visible image), and the **Cropping Box** on both the visual and thermal images to line up the images.

Using the Temperature Range Slider Bar



Use the **Temperature Range Slider Bar** to determine which range of pixels (and their corresponding color scheme) you want to be visible over the visible image. The upper Slider Bar Handle controls the maximum temperature visible. The lower Slider Bar Handle controls the minimum temperature visible.

Try to choose a few distinct thermal features that you can match to edges, borders, or shapes on the visible image. You may adjust the overall Temperature Palette or Temperature Palette Color Scheme for the best visibility.

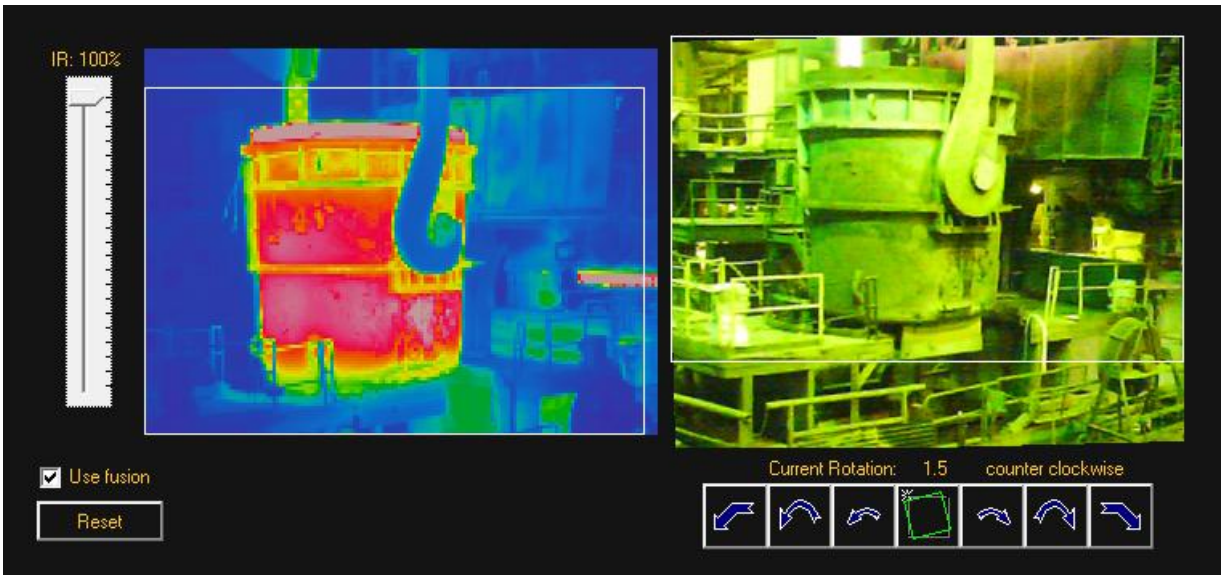
If you are unhappy with the results of your adjustment, click the **Reset** button provided at the bottom of the Temperature Range Slider Bar for a full reset back to the original Maximum and Minimum temperatures.

Using Fusion

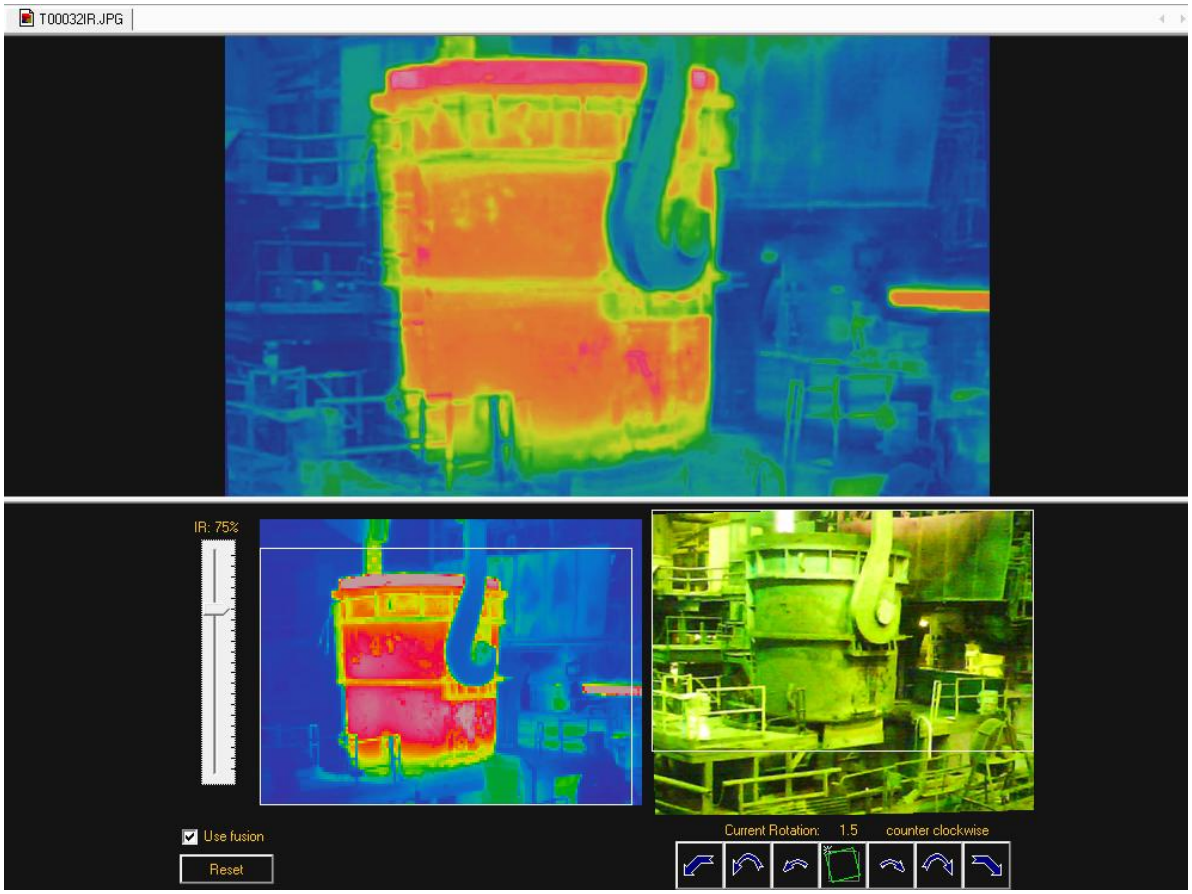
The fusion feature allows the actual blending of the thermal image with a grayscale version of the visible image.

To use the fusion feature:

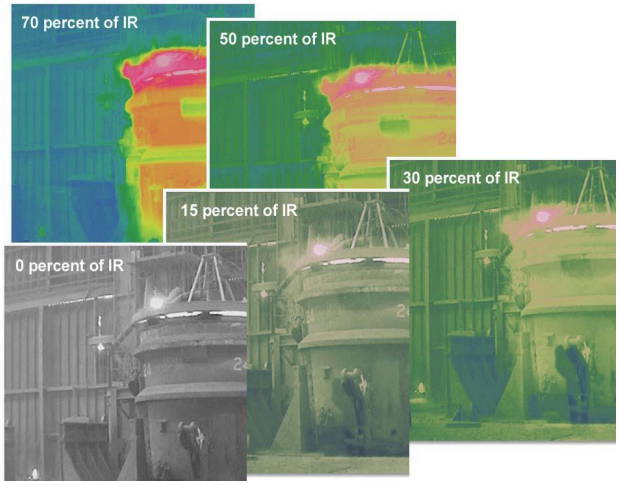
1. Check the **Use fusion** box below the thermal image in the **Active Tool Window**. The Temperature Range Slide Bar becomes a fusion Slider Bar and now controls the percentage of the thermal image showing.



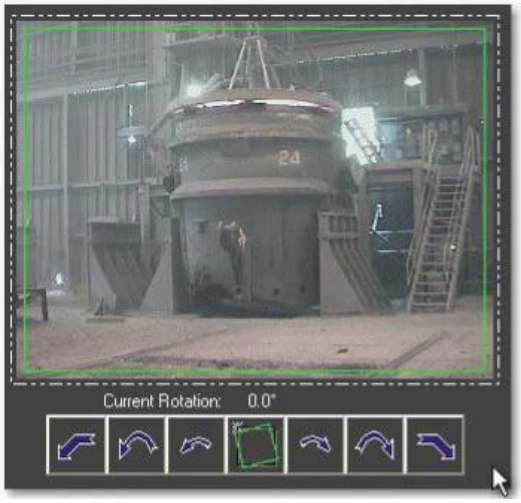
The IR image percentage is controlled by sliding the fusion Slider Bar:



The fusion Slider Bar controls the percentage of IR image showing over the visible image. See examples of the different percentages below.



Using Rotation Buttons



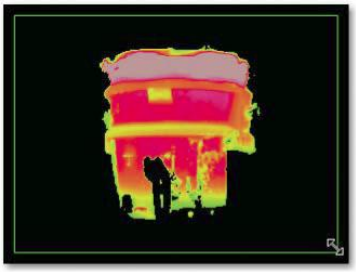
The Rotation Buttons are located below the visible image in the Active Tool Window. They allow you to rotate the visible image only, in increments of 45°, 5° and 0.5°, either clockwise or counterclockwise.

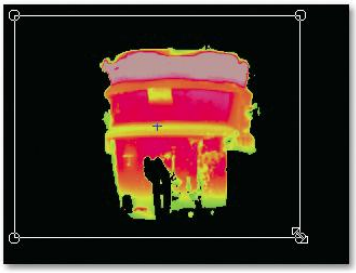
To undo a rotation choice (for example, Rotate 5° CCW), simply choose the opposite button (Rotate 5° CW), or hit the RESET button in the middle of the set.

A line of text underneath the visible image displays the Current Rotation of the image. To rotate 10° CCW, hit the Rotate 5° CCW button twice, and so forth.

Using Cropping Boxes

Both the visual and thermal images may be cropped using the green Cropping Boxes that outline both the visual and thermal images shown in the Active Tool Window.

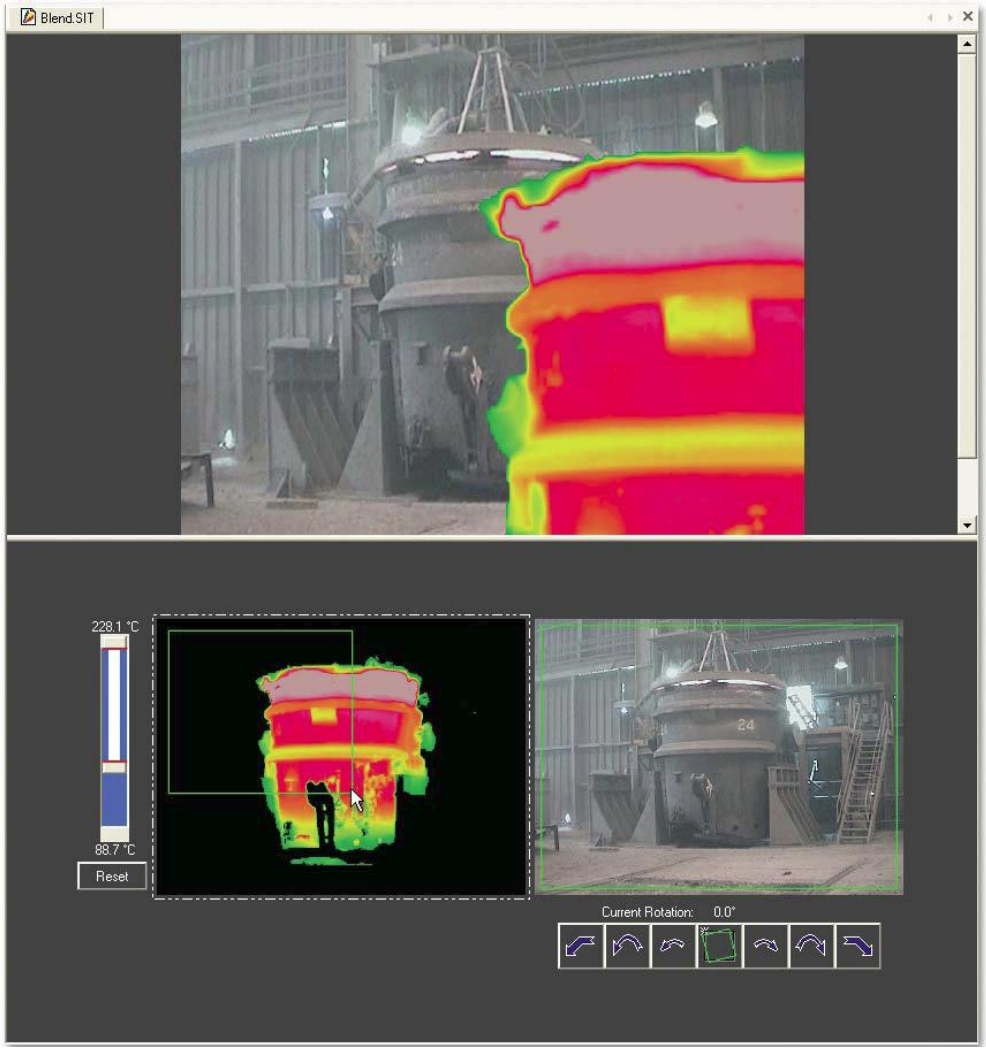




To adjust a cropping box:

1. Click on the image you wish to crop--either the visual or thermal image. A white, dashed line indicating selection should appear around the selected image.
2. Position the mouse over one of the corners or sides of the image. The mouse will change to a double-headed arrow.
3. Left-click and drag the green border. It will turn to a white border with corner handles for adjustment. Watch as the image in the Active Thermal Window changes to correspond with the cropping box you are adjusting below in the Active Tool Window.
4. Adjust the thermal and visible images as desired. You can move the cropping box to a different part of the thermal or visible image by putting your mouse in the center of the box, where it will turn into a quad-arrow moving tool, and clicking and dragging until the box is where in the desired position.

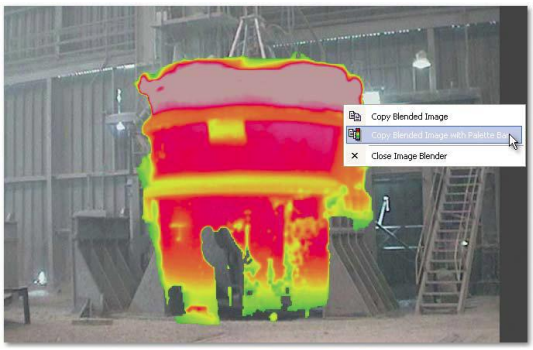
Note: Use a combination of the Temperature Range Slider Bar, fusion Feature, Rotation Buttons and Cropping Boxes to adjust and nudge the images into very close alignment. The best results may be achieved by switching between tools several times as you make fine adjustments.



The thermal image being cropped in the Active Tool Window below is affecting the composite image in the Active Thermal Window Above.

4.1.3 Copying Blended Images

You may copy the Blended Image to the Windows™ clipboard for use in other applications.



To copy blended images:

1. Right-click on the composite image in the Active Thermal Window.
2. Choose **Copy Blended Image** or **Copy Blended Image with Palette Bar**. This copies the image to your Windows™ clipboard where it may be pasted into the program of your choice.

4.2 Working with Mosaic Creator

The Mosaic Creator feature of LumaSpec Offline Analyzer allows you to create a larger thermal image by "stitching" together several smaller thermal images. LumaSpec Offline Analyzer uses

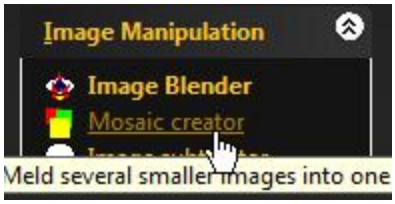
mathematical formulas to average thermal data where individual images overlap. You can rotate and overlap images to line them up accurately.

4.2.1 Accessing Mosaic Creator

To access Mosaic Creator:

1. Open the images that you would like to stitch together.
2. Click **Mosaic Creator** under **Image Manipulation** on the **View Pane**.

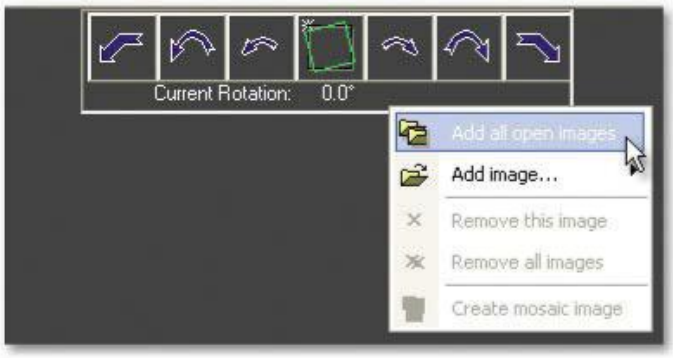
   Initially, the phrase "No Mosaic Image Available" displays in the Active Thermal Window. Images must be added to the Mosaic Creator.

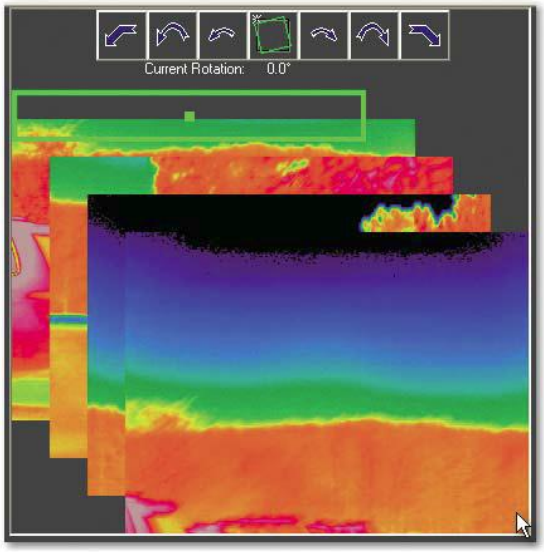


4.2.2 Adding Images to the Mosaic Creator

To add images to the Mosaic Creator:

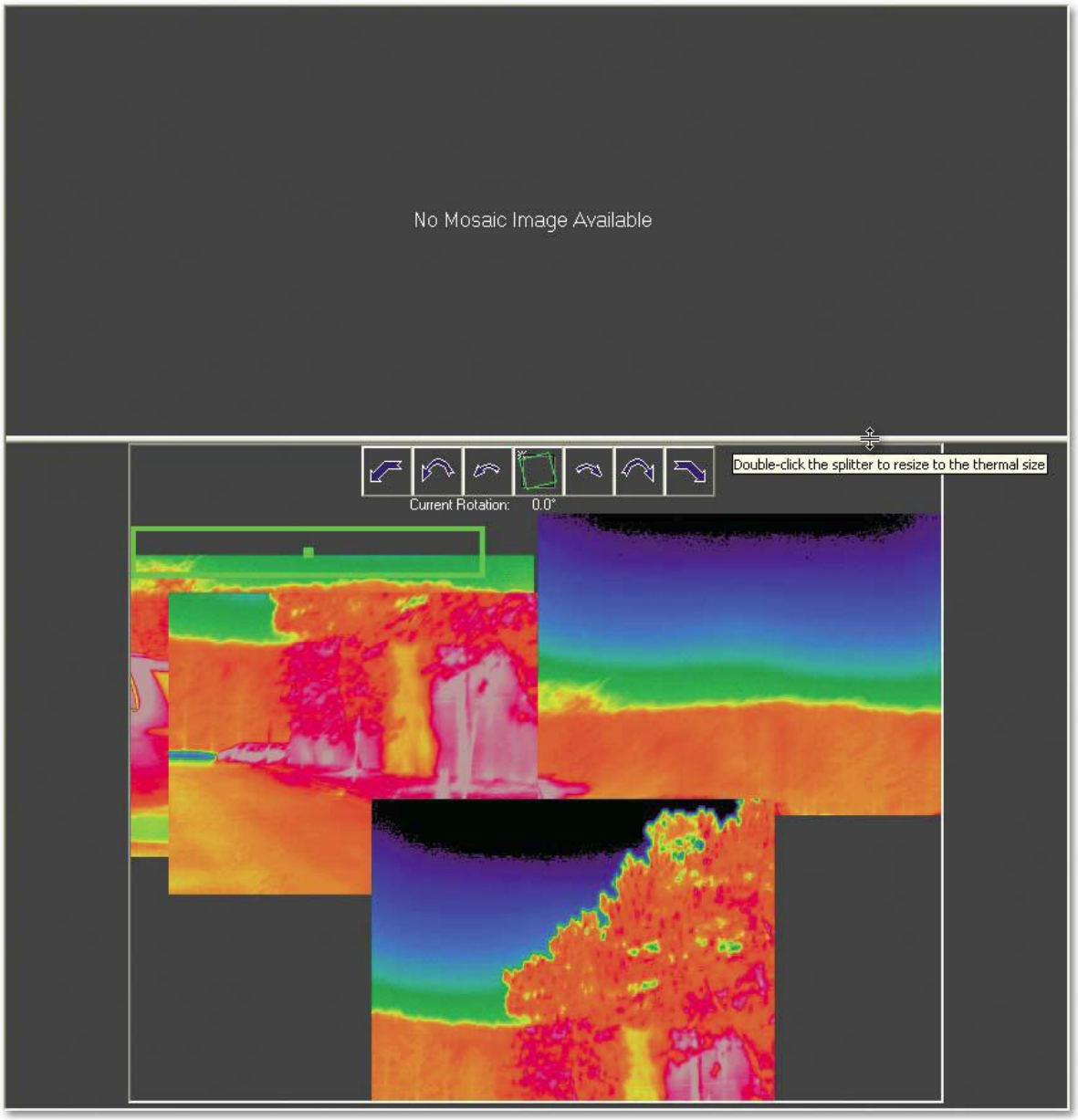
1. Right-click the **Rotation Tools** displayed in the Active Tool Window of Mosaic Creator.
2. You may add images one at a time by choosing **Add image…** or you may **Add all Open Images** at once.
3. After adding all open images (in this case, four images), the display looks like this:





4.2.3 Creating a Mosiac Image

Individual images may be arranged as desired. The Mosaic Work Area expands to fit the images as they are arranged. You may also expand the Active Tool Window to increase the Mosaic Work Area by clicking and dragging the bar that splits the Active Thermal Window and the Active Tool Window:

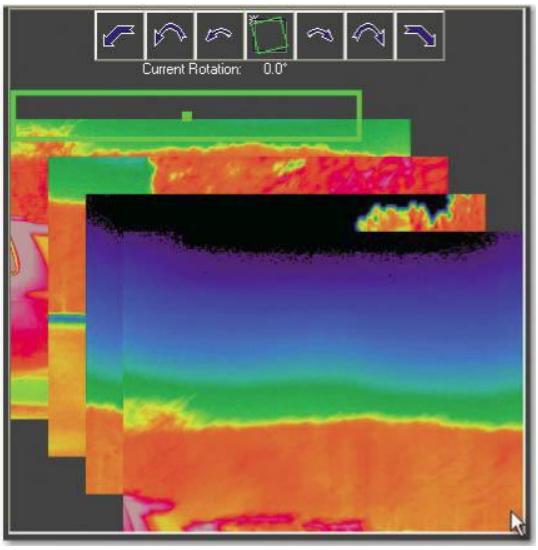


To create a Mosaic image:

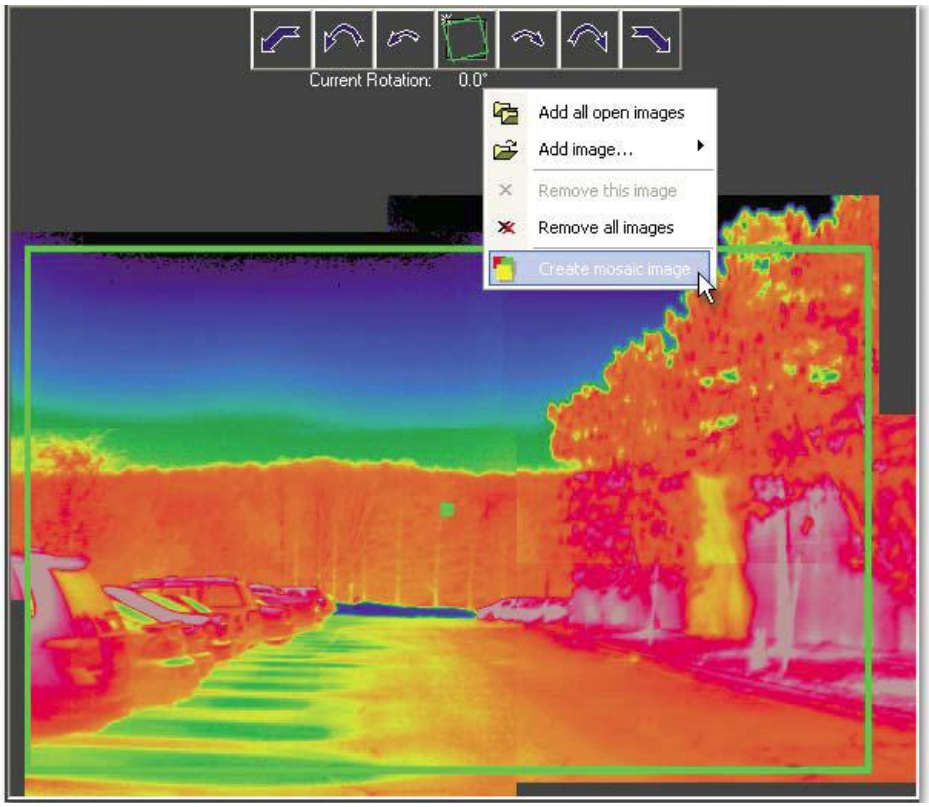
1. Arrange the images as accurately as possible.

Note: Lining up images is tricky because they are not transparent. One way to easily line up images is to quickly click back and forth between the top and bottom images. This allows you to perform subtle adjustments.

Rotate individual images to better line them up. In the screen shot to the right, the upper right image is being rotated counter clockwise to line up the tree line in the background. The black border that appears has a temperature value of absolute zero and will not affect the temperature averaging between images.

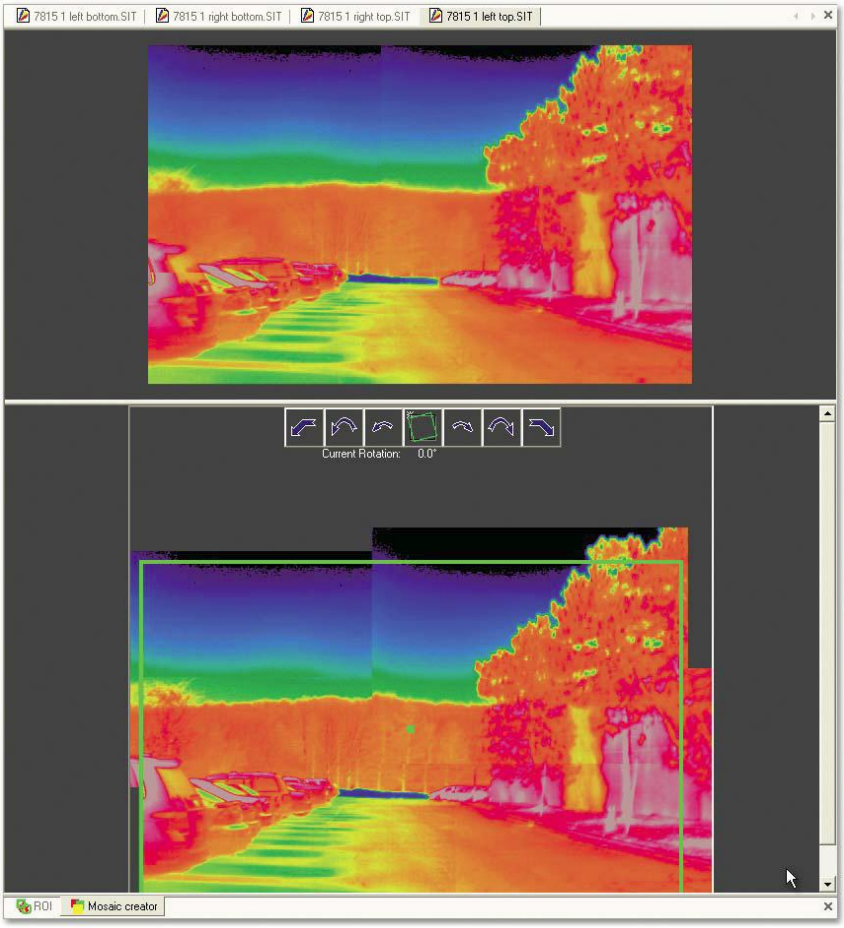


3. Once the images are arranged to your satisfaction, click and drag the green bordered box to crop the image as desired. The area defined by this box will determine the final area of the created mosaic.
4. Right-click within the Active Tool Window (try not to click your thermal images, as you will cause the one you click to come to the front), and choose Create Mosaic Image.

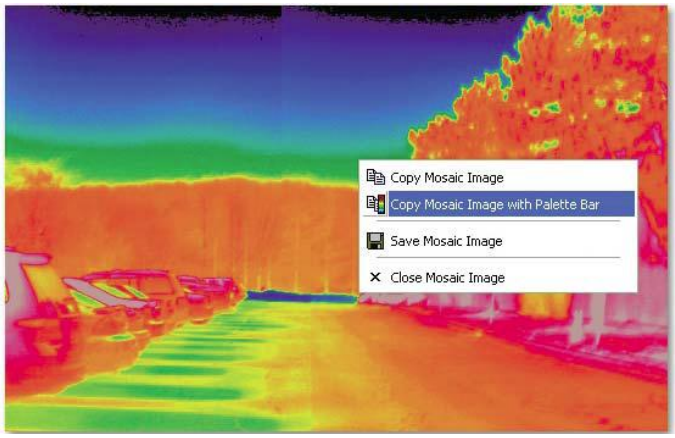


5. LumaSpec Offline Analyzer stitches multiple images together, averaging temperature data and displays a progress dialog box.

6. The final Mosaic Image is created and displayed in the Active Thermal Window:



To copy the mosaic image to the Windows™ clipboard:



1. Right-click on the composite Mosaic image in the Active Thermal Window
2. Select **Copy Mosaic Image** or **Copy Mosaic Image with Palette Bar** (to include Temperature Palette Bar to the right of the Mosaic Image). You can also save the mosaic image as a new Thermal image file by selecting **Save Mosaic Image**.
3. When you have copied the image to your Windows™ clipboard, you may paste it into the program of your choice.

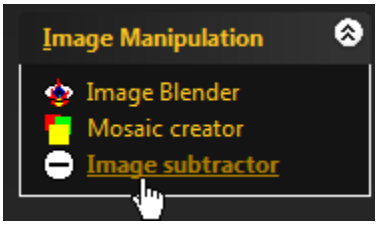
4.3 Working with Image Subtractor

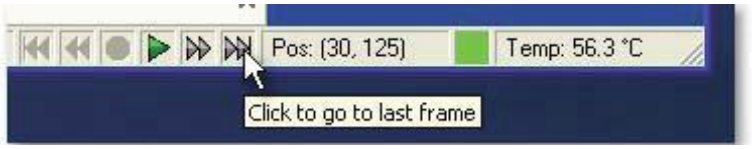
Image Subtractor is a feature of LumaSpec Offline Analyzer that subtracts one thermal image from another, producing a third, resulting thermal image with subtracted thermal data.

Image Subtractor can be used to produce a true Delta T thermal image, unaffected by ambient temperature, by subtracting an image of ambient temperature from an image depicting a temperature change. In this example, the first and last frames of a sequence showing a heating condensor will be used. However, any thermal image may subtracted from another.

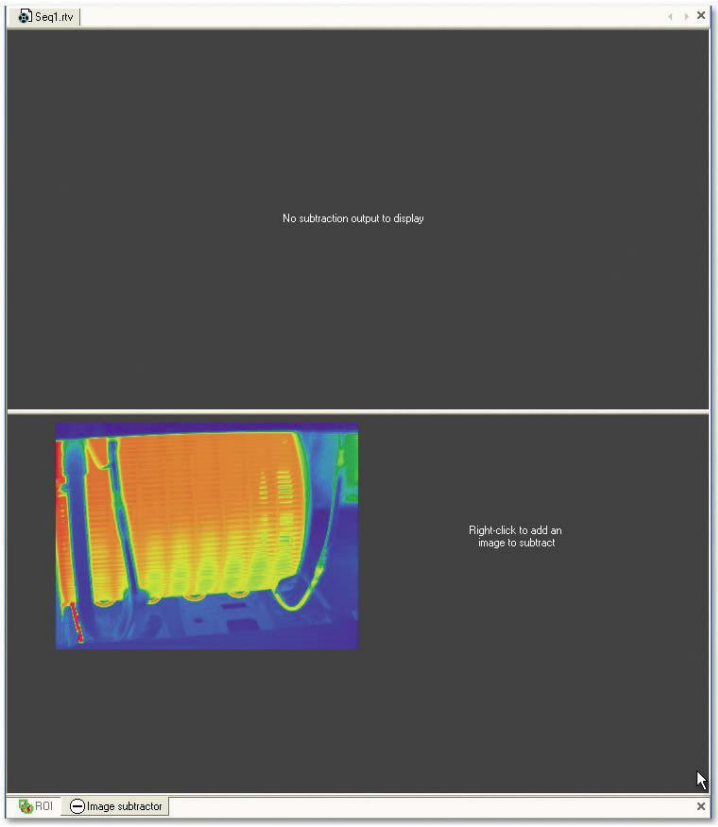
4.3.1 Using Image Subtractor

To subtract one image from another:

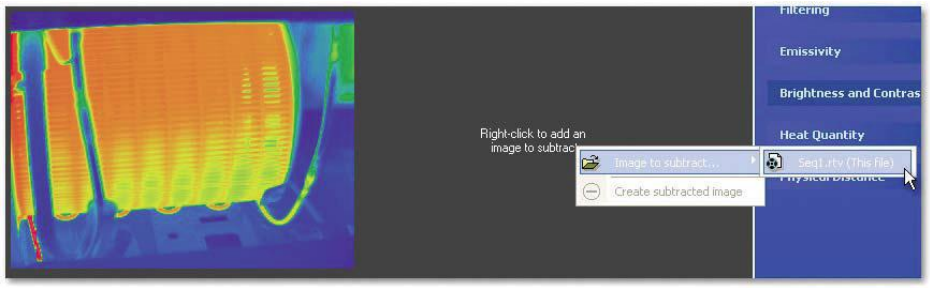




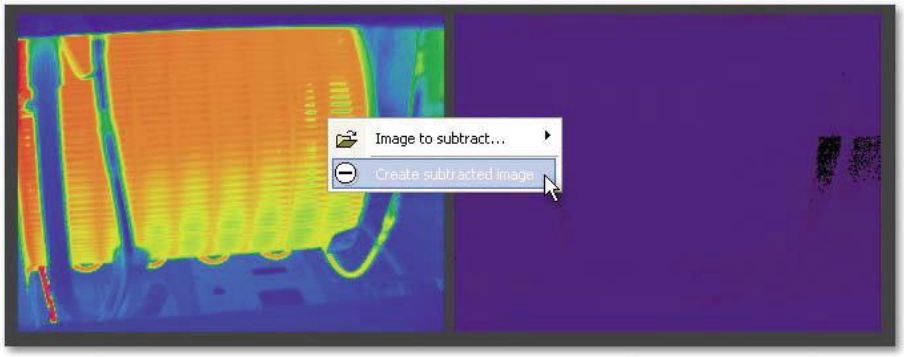
1. Open the image you will subtract from. In this case, an .RTV sequence file is opened, and the last frame is selected using the **Sequence Control Panel**.
2. Select Image **Subtractor under Image Manipulation** on the **View Pane** panel.
3. The first image will appear in the **Image Subtractor** in the **Active Tool Window**. The **Active Thermal Window** will eventually display the subtracted image, but for now displays the text **No subtraction output to display.**



4. Open the image you would like to subtract from the first image. In this case, the first frame (depicting ambient) of the current .RTV sequence file is selected using the **Sequence Control Panel**. To select a new frame in the sequence, click **ROI** under **Thermal** on the **View Pane**. This will allow you access to the sequence again outside the **Image Subtractor** view.
5. Once the second image is open (or the desired frame is achieved within the sequence), go back to the **Image Subtractor View** by clicking on Image **Subtractor** under **Image Manipulation**. You may also click on the **View Tabs** on the bottom of the user interface for easy navigation between views.
6. Right-click on the instructional text next to the first picture in the Image **Subtractor Active Tool Window**. Choose **Image to Subtract**, and then choose the file or sequence name from the list of open files shown.



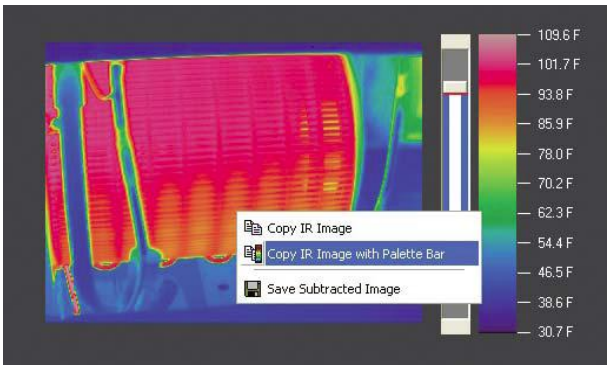
7. Right-click on either image in the **Active Tool Window,** and choose **Create Subtracted Image**.



8. The subtracted image appears in the **Active Thermal Window**. The temperature data contained and portrayed in this image is the true Delta T measured in the sequence. You may adjust the subtracted image's temperature palette bar as well.

To copy the subtracted image to the Windows™ clipboard:

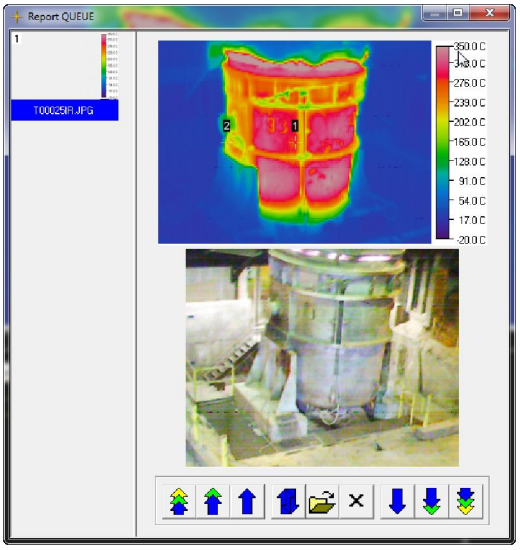
1. Right-click on the composite Mosaic image in the Active Thermal Window
2. Select **Copy Mosaic Image** or **Copy IR Image with Palette Bar**. You can also save the mosaic image as a new Thermal image file by selecting **Save Mosaic Image**.
3. When you have copied the image to your Windows™ clipboard, you may paste it into the program of your choice.



To ensure consistent document formatting, this page was intentionally left blank.

5 Using the Report Queue

The Report Queue is a temporary queue that acts as a bridge between LumaSpec™ Offline Analyzer and LumaSpec Offline Analyzer Report Writer. You may send images to the Report Queue and, within the Queue, edit the order of images.



After launching Report Writer from within LumaSpec Offline Analyzer, the queue can be used to quickly create a multi-page report using a general or customized Report Template. Report Queues may also be saved and loaded.

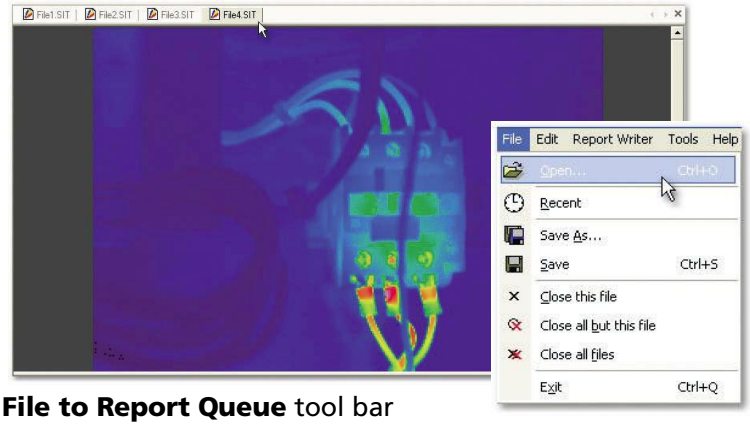
The Report Queue consists of two areas—a main viewing area showing the selected thermal image and a scrollable display along the left side showing each image that has been added to the Report Queue. Below the main display are buttons that allows you to edit the order and amount of thermal images within the Queue.

5.1 Adding Files to the Report Queue

When a file is added to the Report Queue, the thermal image is added, along with the corresponding visible image (if applicable). In addition, Histogram and 3D Profile information are generated, and a Line Profile is added if you have generated this data. ROI data is also automatically added, and ROIs are displayed on the main thermal image for each file. Other types of images created in LumaSpec Offline Analyzer, like Blended Images or Mosaics, must be added as separate "images" to the Report Queue, as these types of images have their own specific thermal data.

5.1.1 Adding a Thermal Image to the Report Queue

There are two ways to add images to the Report Queue. You may use the Text Menu or the Tool Bar.

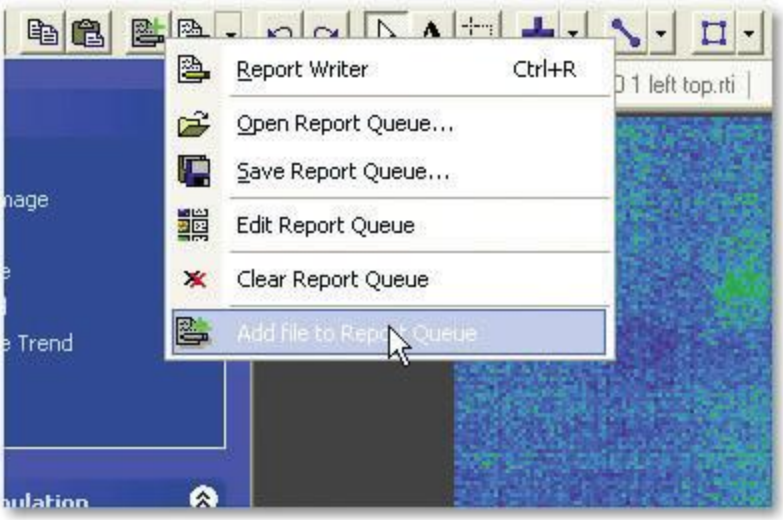


To add an image to the Report Queue:

1. Select the image you wish to add to the **Report Queue**. Open the file if it is not already active, or select the appropriate **File Tab** to reveal the image in the Active Thermal Window.
2. Easily add the image to the **Report Queue** by using the **Add File to Report Queue** tool bar button.

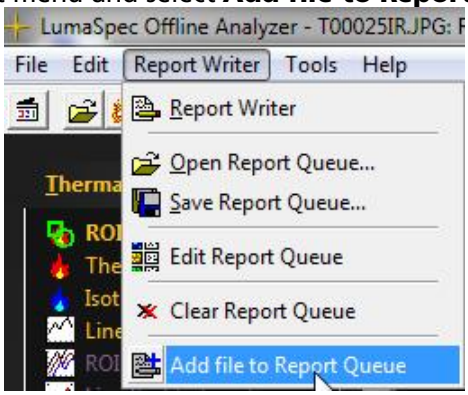
OR

Use the expandable **Report Writer** tool bar button and choose **Add file to Report Queue**.

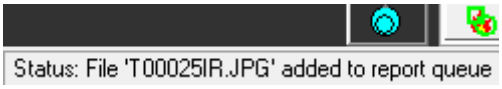


OR

Use the **Report Writer** text menu and select **Add file to Report Queue.**

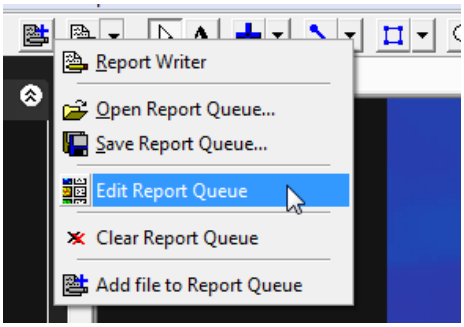


The Status Bar in the lower left of LumaSpec Offline Analyzer's user interface will display that the file has been added to the Report Queue.

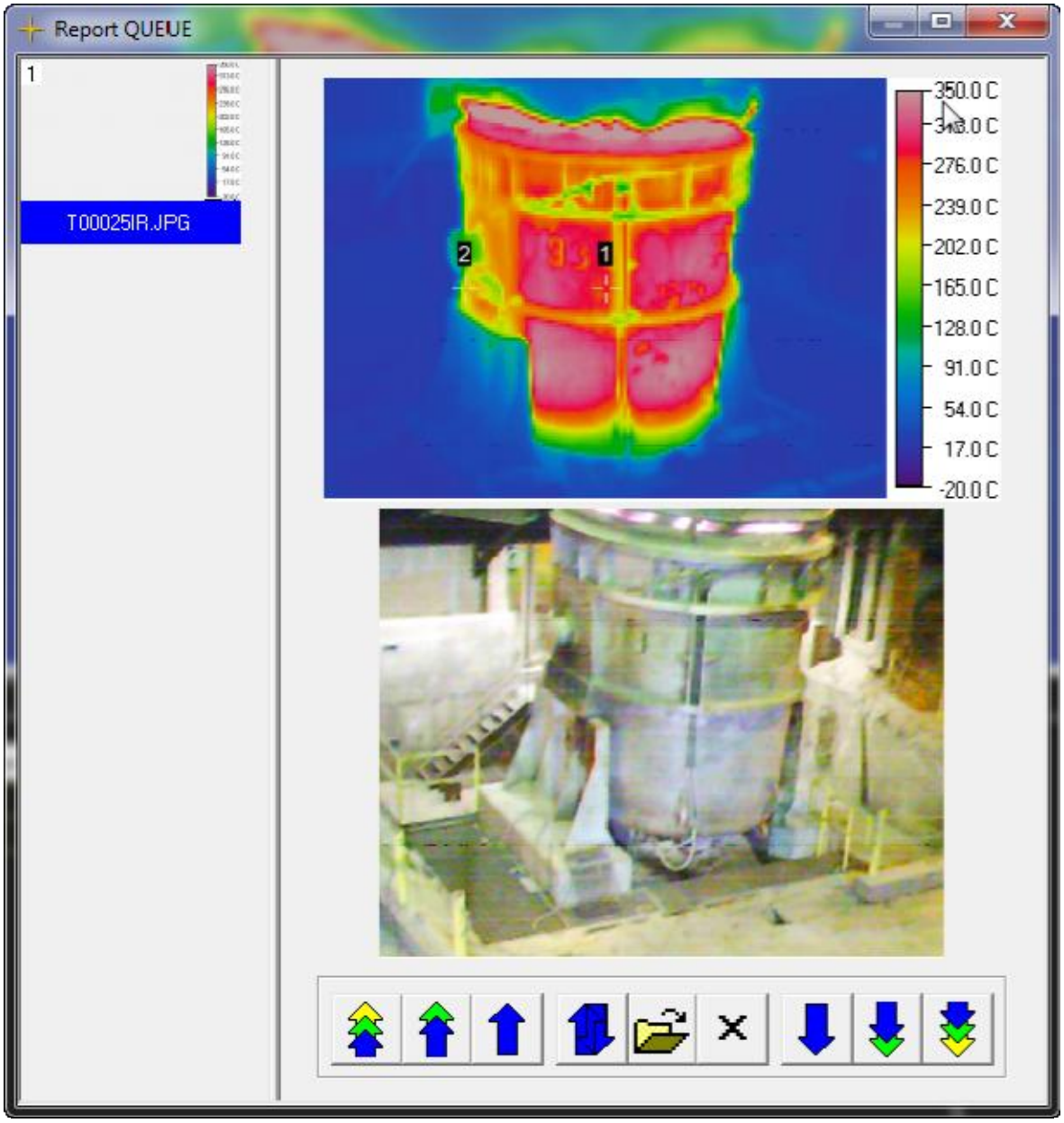


To view/edit the Report Queue:

1. Select the Report Writer tool bar button and choose **Edit Report Queue** (You can access the same expandable menu through the Report Writer text menu.)



2. The queue appears with the file added and ready to be edited.



5.2 Editing the Report Queue

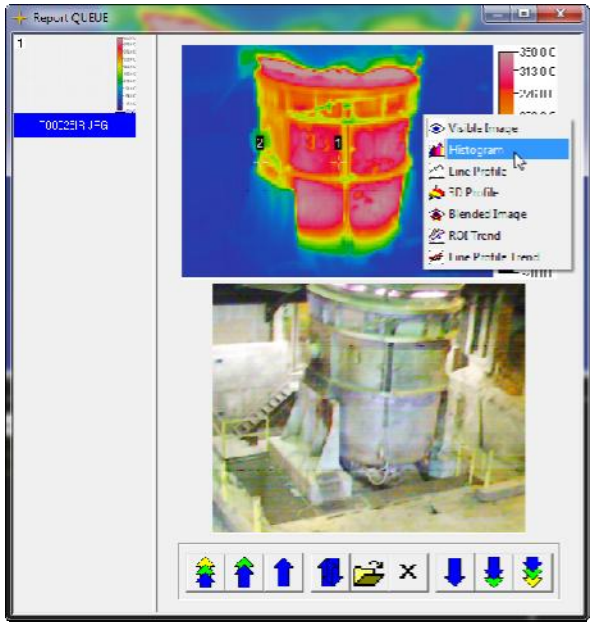
Within the Report Queue, you may change the type of data displayed below the thermal image, and you may also change the order of the images within the Queue.

5.2.1 Changing Data Displayed Below the Thermal Image

The corresponding visual image is the default display below the featured thermal image in the Report Queue. However, you may choose to display the thermal images Histogram, Line Profile, or 3D Profile instead. This change affects all the images in the Queue, but it is easy to switch between settings. The Report Queue remembers the last option chosen when the Queue is closed, and when it is re-opened, the same data is displayed below the main thermal image.

To change the data displayed below the thermal image:

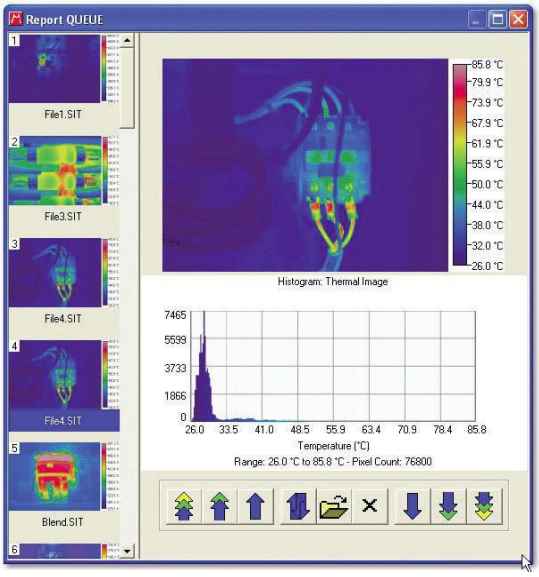
1. Right-click anywhere within the Report Queue.



2. You will see a menu with five choices: Visible, Histogram, Line Profile, 3D Profile, and Blended Image. (Histogram and 3D Profile are automatically generated, but Line Profile and Blended Image will need to have been created in order to appear in the Report Queue.) Select the appropriate item. For this example, we selected **Histogram**.

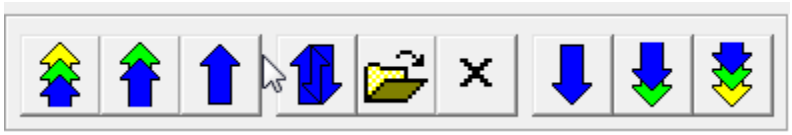
3. Now each thermal image is shown with its Histogram displayed below. The Queue will remember this setting (unless changes are made before it is saved), and when the Queue is re-opened, it will again display the thermal images with corresponding Histograms.

   If the image you select has not been created, the Report Queue will display only the centered thermal image and the sentence **No image available**.



5.2.2 Changing the Order of Images Within the Queue

The Report Queue allows you to change the order of the images within the Queue using the editing buttons at the bottom of the main Report Queue display.



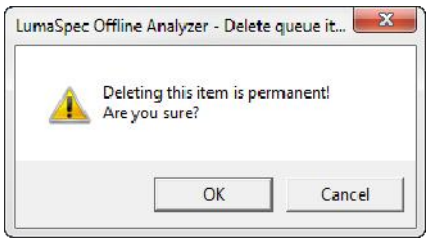
	**Move up 25 items**	Moves an image up 25 items in the Report Queue order.
	**Move up 5 items**	Moves an image up 5 items in the Report Queue order.
	**Move up 1 item**	Moves an image up 1 item in the Report Queue order.
	**Send selected item to...**	Brings up a window which allows you to type in the number corresponding to the placement they desire for the image.
	**Open Image**	Opens a Report Queue image in LumaSpec Offline Analyzer.
	**Delete Image**	Removes the thermal image from the Queue. You are asked to confirm, as this is permanent.
	**Move down 1 item**	Moves an image down 1 item in the Report Queue order.
	**Move down 5 items**	Moves an image down 5 items in the Report Queue order.
	**Move down 25 items**	Moves an image down 25 items in the Report Queue order.

5.2.3 Deleting Images Within the Queue

To remove an image from the Report Queue:

1. Select the image to remove from the scrollable list on the left of the **Report Queue Window**.
2. Click the **Delete Image** button (located between the Send Selected Item To and Move Down One Item buttons at the bottom of the main Report Queue display).
3. A warning will appear asking if you want to remove this image from the Report Queue.

   If you have selected the right image, click OK. The image disappears from the scrollable list at the left.



5.3 Saving a Report Queue

Once you have configured your Report Queue the way you want it, you have the option of saving it so that you can return to it later.

To save a Report Queue:

1. Either click on the Report Writer tool bar button or the Report Writer text menu and choose **Save Report Queue** or click on the Report Writer text menu and select **Save Report Queue**.

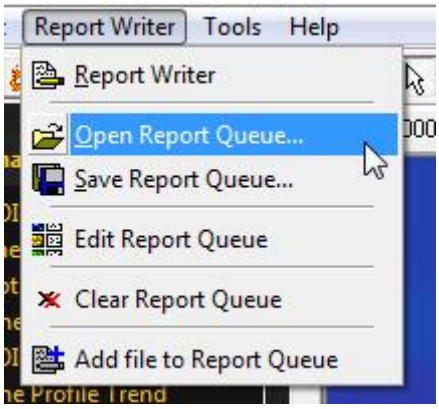
2. The "Save As" Windows™ dialog box appears.
3. Choose a name and location for your file; the .MSQ extension will be automatically added.
4. Click **Save**.

5.4 Opening a Saved Report Queue

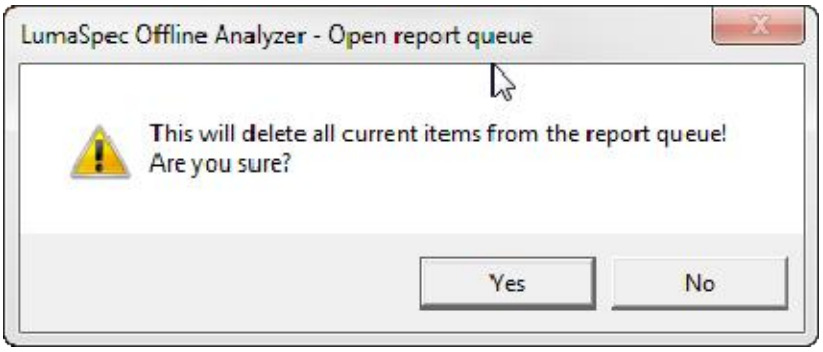
You can open a previously saved Report Queue to continue working on it or to modify it for other, similar projects.

To Open a Report Queue:

1. Either select the Report Writer tool bar button and choose **Open Report Queue** or click on the **Report Writer** text menu and select **Open Report Queue**.



2. If you already have items in your Report Queue, a dialog box will appear warning you that these items will be overwritten. If you do not wish to preserve your current Report Queue, click **Yes**. Otherwise, click No and save your current Report Queue using the steps described above.



3. A standard Windows™ dialog box appears.
4. Select the file you wish to open and click **Open**.

To see the newly loaded Report Queue, either select the Report Writer tool bar button and choose Edit Report Queue or click on the Report Writer text menu and select Edit Report Queue.

To ensure consistent document formatting, this page was intentionally left blank.

6 Using the Report Writer

The LumaSpec™ Offline Analyzer Report Writer is designed to provide you with a powerful, yet simple and user-friendly means for creating professional-quality reports based on data collected by your LumaSpec Offline Analyzer software. You can either run the Report Writer as a stand-alone word processing program or simultaneously with your LumaSpec Offline Analyzer software.

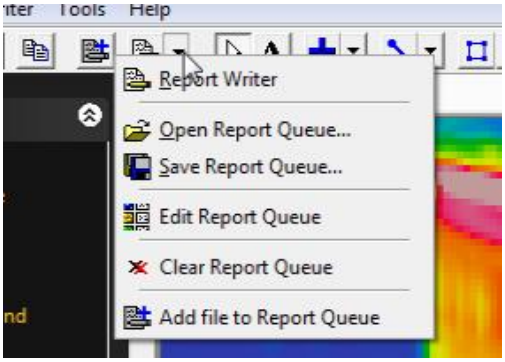
Note: The LumaSpec™ Offline Analyzer Report Writer is compatible with Microsoft Word (.doc format).

6.1 Accessing the Report Writer

1. Click on the **Report Writer** text menu and choose **Report Writer**. You may also use the corresponding toolbar button or the corresponding text command (Ctrl +R).

   OR

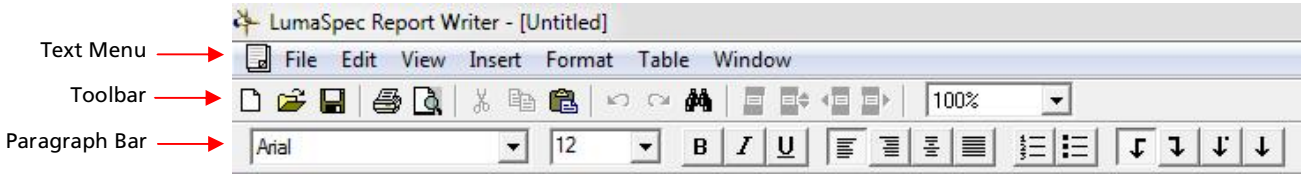
   To launch the Report Writer independently, simply go to the All Programs area of your Windows™ Start menu, and choose LumaSpec Offline Analyzer, then Report Writer.



Note: When you launch the Report Writer from within LumaSpec Offline Analyzer, the Report Writer software establishes links to the LumaSpec Offline Analyzer program to enables data input directly from the LumaSpec Offline Analyzer program. When you launch the Report Writer independently, it does not link to the LumaSpec Offline Analyzer program in this way, and the same data must be inserted again.

6.2 Using the Report Writer

When the Report Writer is opened, the software automatically opens a new blank document. The Report Writer features standard Windows™ text menus at the top of the user interface. A toolbar and paragraph bar are located under the text menus for quick access to the software's tools and editing features.



6.3 Text Menus

6.3.1 File

This program has a standard Windows™ File menu, with standard Windows™ document commands.

New (Ctrl + N)	Creates a new blank report
Open (Ctrl + O)	Opens an existing report
Close (Ctrl + F4)	Closes the current file
Save (Ctrl + S)	Saves the current file, overwriting any previously saved versions
Save As	Saves the current file with with the option to give it a new name
Page Setup (Ctrl + G)	Allows you to select page size, orientation, and margins for the current report document
Print (Ctrl + P)	Prints the current document
Print Preview	A new window opens showing the document as it will print on the page
Return to LumaSpec	Exits entire program
Exit	Exits entire program

6.3.2 Edit

Undo Input (Ctrl + Z)	Allows you to undo your last action in the program
Redo	Allows you to redo something just undone
Cut (Ctrl + X)	Removes selected text/image while copying it to the clipboard
Copy (Ctrl + C)	Copies an image or data to the clipboard
Paste (Ctrl + V)	Pastes an image or data from the clipboard
Delete (Del)	Deletes the selected item
Delete Page	Deletes the current page
Search (Ctrl + F)	Finds text within a report. Choose the search direction (within text) and you may also choose case-matching by checking the appropriate box.
Replace (Ctrl + H)	Finds and replaces text within a report. Replace words/phrases one at at a time, or choose to "Replace All" at once.
Select All (Ctrl + A)	Selects everything on the page for easy cutting/copying.

6.3.3 View

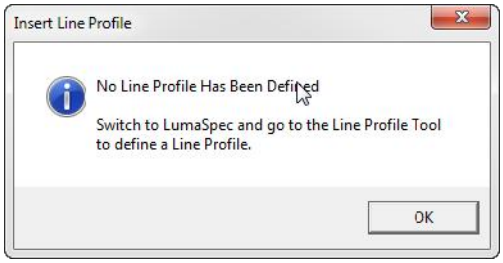
Normal Layout	The edges of the page extend to the edges of the Report Writer Window
Page Layout	Shows the page edges at the top and right side of the Report Writer Window
Centered Page Layout	Reveals all page edges, centering the page within the Report Writer Window
Headers and Footers	Allows you to create/edit headers and footers for the current report
Tool Bar	Shows/hides the Tool Bar at the top of the Report Writer interface
Paragraph Bar	Shows/hides the Paragraph text-editing fields/buttons
Ruler	Shows/hides the ruler at the top of the current page
Status Bar	Shows/hides the information at the bottom of the page (page number, line number, column number, zoom percentage, overwrite (on/off), caps lock (on/off), number lock (on/off)
Control Characters	Shows/hides invisible text formatting characters
Zoom	Choose from several zoom levels

6.3.4 Insert

Note: Reveal the Insert menu by right-clicking with your mouse anywhere in the Report Writer file. Edit an inserted object by right-clicking on a selected image, object, or a text selection.

LumaSpec

This submenu allows you to import many specific kinds of data directly from the LumaSpec Offline Analyzer program. You can import a Template, Thermal Image, Isotherm, Region of Interest (ROI) data, a Line Profile, a 3-D Profile, or a Histogram.



Note: This "LumaSpec Offline Analyzer" submenu is only available if you've launched Report Writer from within LumaSpec Offline Analyzer. See instructions for launching the Report Writer within LumaSpec Offline Analyzer, at the beginning of Section 4. You must generate data in LumaSpec Offline Analyzer before you can import it into the Report Writer. For example, if you select Insert > LumaSpec Offline Analyzer > Line Profile before you actually perform a line profile on a thermal image, the Report Writer software will display the prompt above. You must return to LumaSpec Offline Analyzer and generate the data. Then you will be able to import it.

Options for inserting images/data from LumaSpec Offline Analyzer are:

Template	Choose from two quick templates: ROI Template (portrait) and Line Profile and ROI Template (portrait)
Thermal Image	Choose to insert a Thermal Image Frame (thermal, visual, and sound file), or simply a Thermal Image (Thermal Image only).
Isotherm	Choose to insert an Isotherm Frame (Isotherm, sound file, and data), Isotherm Image (Image only), or only the Isotherm Data (data only).
ROIs	Choose to insert an ROI Frame, ROI Image, or simply ROI data.
Line Profile	Choose to insert a Line Profile Frame, Line Profile Image, Line Profile Graph, or simply Line Profile Data.
3D Profile	Choose to insert a 3D Profile Frame or simply the 3D Profile Image.
Histogram	Insert a histogram, with temperature data, minimum, and maximum.
Sound File	Insert an embedded sound file at the cursor's point.
Visible Image	Inserts a visible image
Company Information	Inserts the company information that was specified in the Tools > Options > Company Information tab.

Image Information — Choose to insert Date, Time, Min. Temperature, Max. Temperature, Comment, Memo, Equipment ID, Equipment Location, and User Fields (Choose 1-10). All these will come from pre-entered information in LumaSpec Offline Analyzer. **If the specific information chosen has not been pre-defined in LumaSpec Offline Analyzer, Report Writer will alert you (as shown in the example with the Line Profile). Once entered in LumaSpec Offline Analyzer, the data can be inserted in the Report Writer.**

Template Fields

Use this menu to add text labels to an image.

Infrared Image (F2) — Insert a field for an infrared image

Visible Light Image (F3) — Insert a field for a visible light image

Sound File (Shift + F2) — Insert a field for a sound file

Image Information — Insert a field for Name, Title, Date (Ctrl + F2), Time (Shift + Ctrl + F2), Emissivity, Background, Memo, Comment, Min. Temperature, Max. Temperature, and Temperature Unit

Equipment ID — Insert a field for equipment ID information

Equipment Location — Insert a field for Equipment location information

User Fields — Insert user fields, 1-10

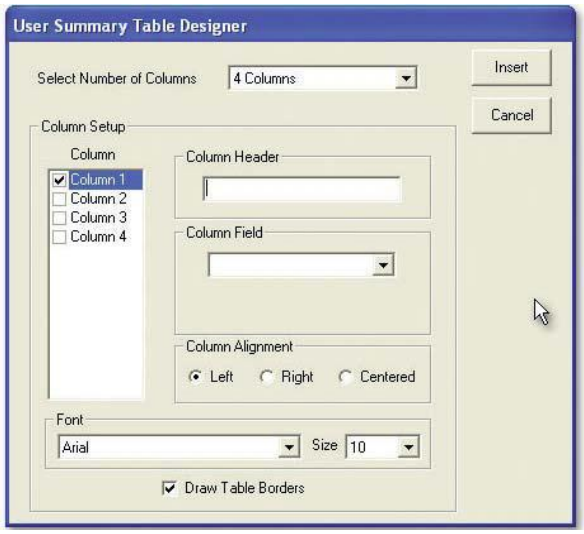
Company Information — Insert fields for Company Name, Address 1, Address 2, City, State, Zip Code, and Phone Number

System Date (Ctrl + D) — Insert a field for System Date

System Time (Ctrl + E) — Insert a field for System Time

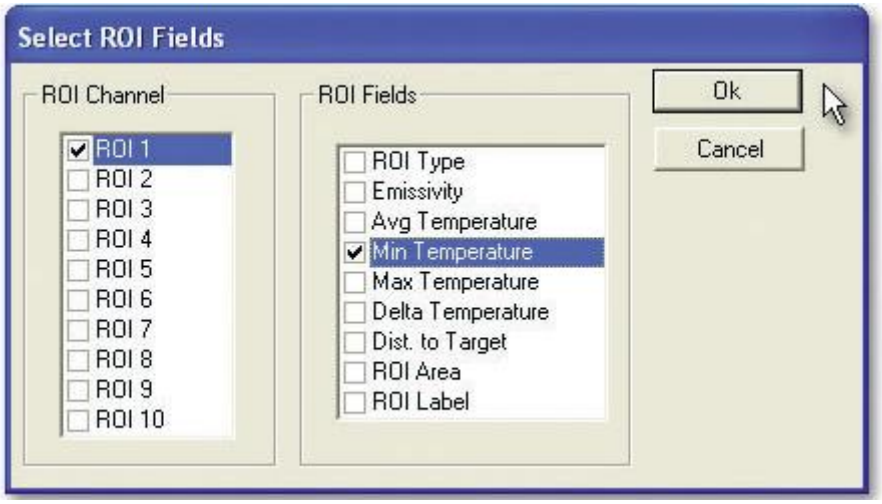
Report Title — Insert a field for a Report Title

Report Summary Table — Insert a field for an Image Summary, Equipment ID Summary, Equipment ID and Image Summary, or User Field Summary. When User Field Summary is chosen, this window appears, allowing you to design the table:



3D Profile (F4) — Insert a field for a 3D Profile

Histogram (F5)	Insert a field for a Histogram
Isotherm Image (F6)	Insert a field for an Isotherm Image
Isotherm Data (Shift + F6)	Insert a field for Isotherm Data
ROI Image (F7)	Insert a field for an ROI Image
ROI Line Profile (Shift + F7)	Insert a field for an ROI Line Profile
ROI Data Table (F8)	Insert a field for an ROI Data Table
ROI Fields	Insert a field for an ROI Reference Temperature, an ROI Reference Emissivity field, or a customer ROI Data Field. If you choose ROI Data Field, this window appears:



Choose an ROI Channel and Field to specify the kind of information your template field will hold.

Page Number (Shift + F1)	Insert a page number field
Test Template (F1)	This choice allows you to test your custom template. A Template Preview window appears (similar to a Print Preview window), and you can zoom, or close the Template Preview and resume editing.

Note: LumaSpec Offline Analyzer contains embedded sample data, which appears in the appropriate fields to help you test your custom template.

Text - Insert text files (.txt or .rtf) into LumaSpec Offline Analyzer Report Writer.

Image - Choose to insert an image (.bmp, .gif, tif, .jpg, and .wmf files) at cursor position, or as a fixed object within the Report. Inserting at the cursor position integrates the image into the flow of the text, which enables the software to automatically move the image with the text if you insert or delete lines. Inserting as a fixed object places the object separate from the text, and the text flows around it. Refer to Format > Image for information on how to format an imported image.

Object - Choose to insert a wide variety of OLE-2 compliant documents directly into the active Report Writer document. You may insert at cursor position, or as a fixed object within the Report. You may embed many types of objects, like spreadsheets, Adobe Acrobat .pdf files, or sound files.

You may insert an existing document, or a new document. If you inset a new document, the Report Writer adds a new document window to the active report document and launches a version of the software type that you specified in the Insert Object Window.

Note: Use Insert > Object when you would like an embedded object to launch another application inside LumaSpec Offline Analyzer Report Writer. For example, if you insert an Adobe Acrobat .pdf as an object, an Acrobat .pdf icon is inserted. Adobe Acrobat is launched within Report Writer, so you may view the .pdf file. This way you avoid time-consuming conversion procedures. Remember to consider the software your final report audience has available to them.

Edit - This command is accessible by using your mouse to right-click the object or text you would like to edit. Right-clicking reveals the choices of Cut, Copy, Paste and Delete.

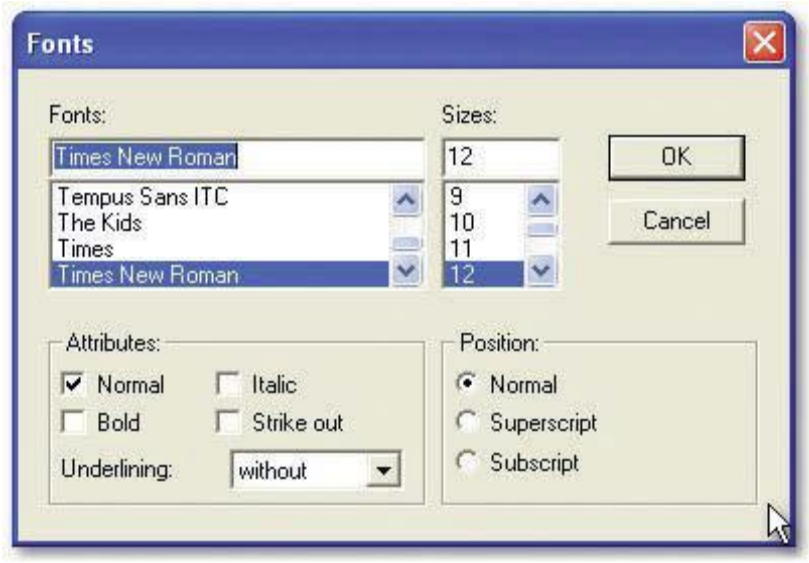
Page Break - Force content to the next page by inserting a Page Break.

6.3.5 Format

The Format pull-down menu provides access to the various Report Writer format commands. Each format submenu has its own window, providing various options for formatting.

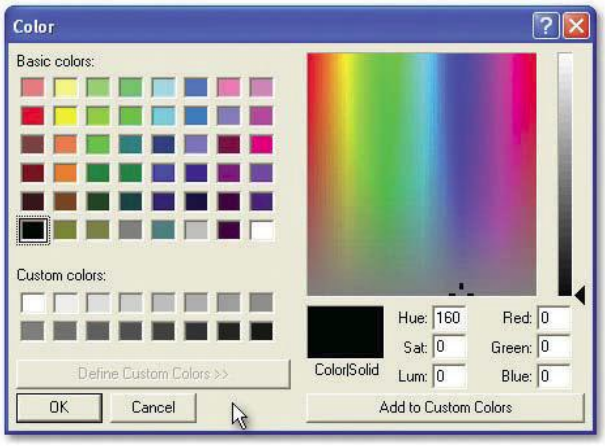
Character

Opens a window showing font choices and formatting options:



Text Color

A window appears showing color choices for text. You may enter your own RGB mix, or use the mouse to select a color. When you have selected the color you desire, click **Add to Custom Colors** for easier reference next time.

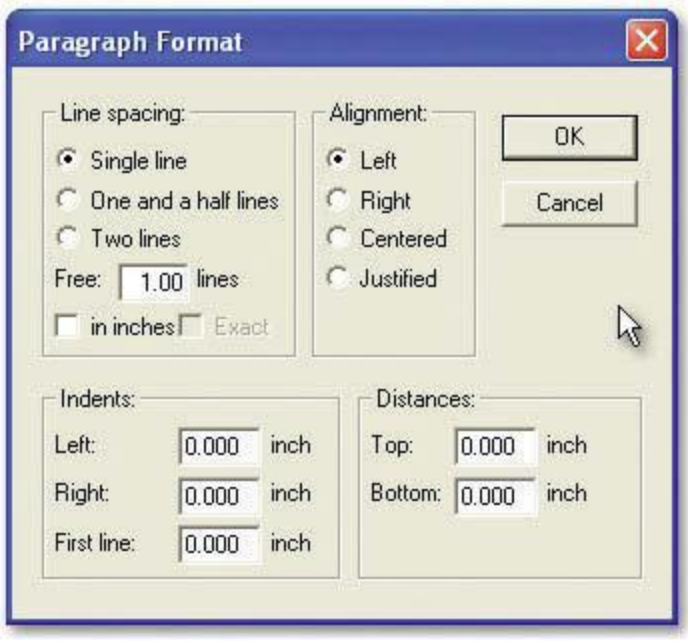


Background Color

The same color menu appears but for background text color. This color appears to "highlight"the text, appearing in bars behind it.

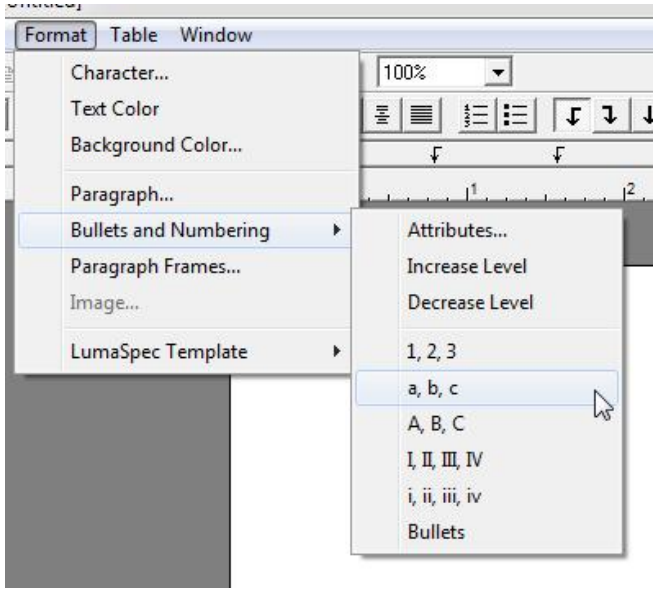
Paragraph

Opens a Paragraph Format window, with Line Spacing and Alignment options, Indent settings and settable Distances. See below:



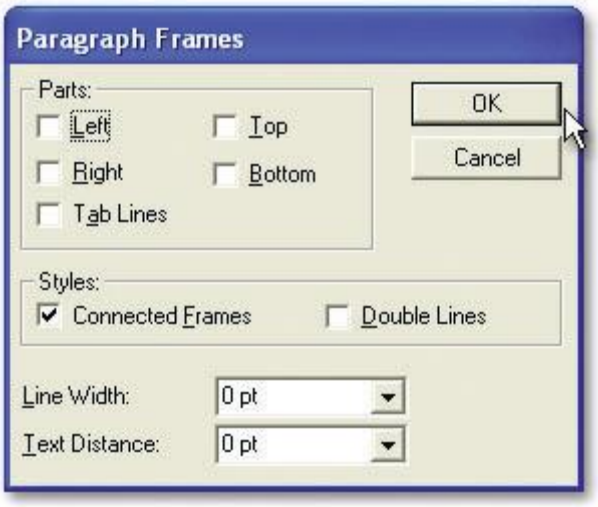
Bullets and Numbering

This submenu controls various outline formats like numbering and lettering, Roman numerals, and bullets. A window appears with options for these various formats:



Paragraph Frames

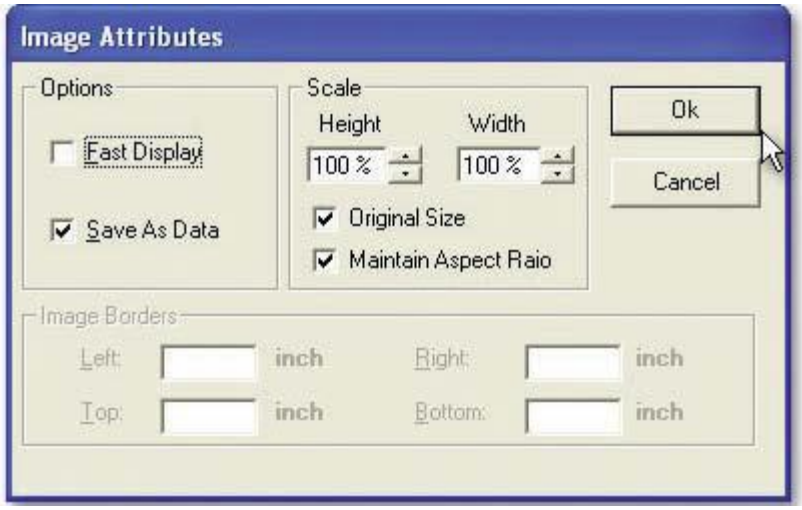
Opens a Paragraph Frames options window. You may define the size, type, and location of frames around the current paragraph. Choose the orientation of Frame Parts, and choose Frame Styles. Enter Line Width and Text Distance.



Image

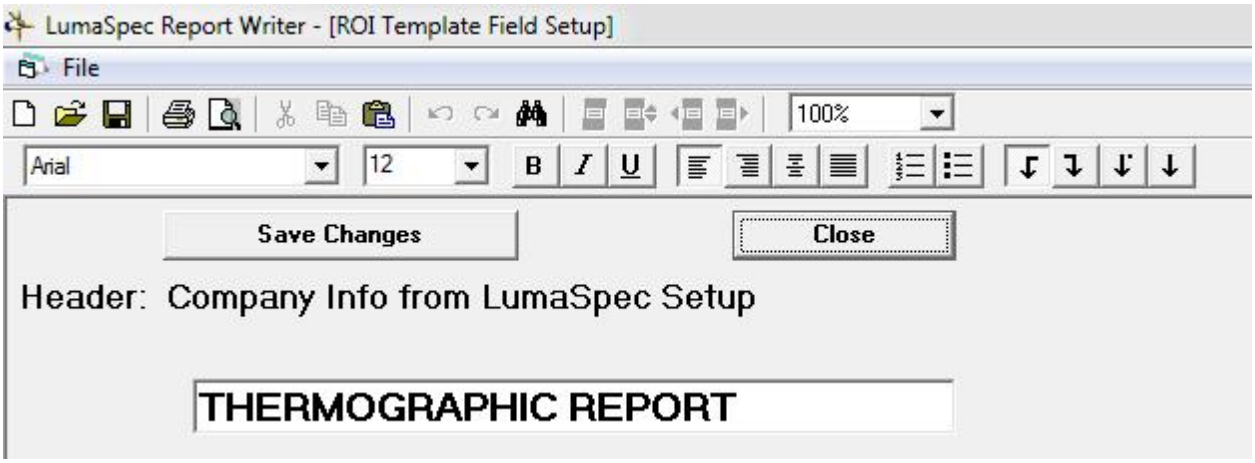
This option opens an Image Attributes window, which allows you to check various Image Options, as well as manually scale the image.

The Fast Display option allows the software to display the current page without using extra memory to display the image. With Fast Display checked, the software displays the image as a gray box. The Save As Data option embeds image data in the report. If you do not select Save As Data, the software links to the location of original image file outside of the report document.



LumaSpec Offline Analyzer Template

The Template Setup/Formatting submenu allows formatting of the standard ROI Template and ROI/Line Profile Templates. A new screen opens, as shown below, allowing field changes. You must click the Save Changes button to save any changes made in the Template Setup screen. (Clicking the Close button before saving will cause you to lose your changes.)



6.3.6 Table

Insert

Table	This submenu allows you to insert a table at the cursor position in the document. When you select Table > Insert > Table, the Table Attributes window appears, and prompts you to specify the number of rows and columns for the table. Either select values from the pull-down menus provided or manually input values into the Rows and Columns fields. You may format the table using Table > Properties.
Column to the Left	Inserts a column to the left of the cursor location in the current table.
Column to the Right	Inserts a column to the right of the cursor location in the current table.
Row Above	Inserts a row above the cursor location in the current table.
Row Below	Inserts a row below the cursor location in the current table.

Delete

Table (Ctrl + T)	Deletes selected table.
Column (Ctrl + M)	Deletes selected column(s), or column where cursor is located.
Row (Ctrl + R)	Deletes selected row(s), or row where cursor is located.

Select

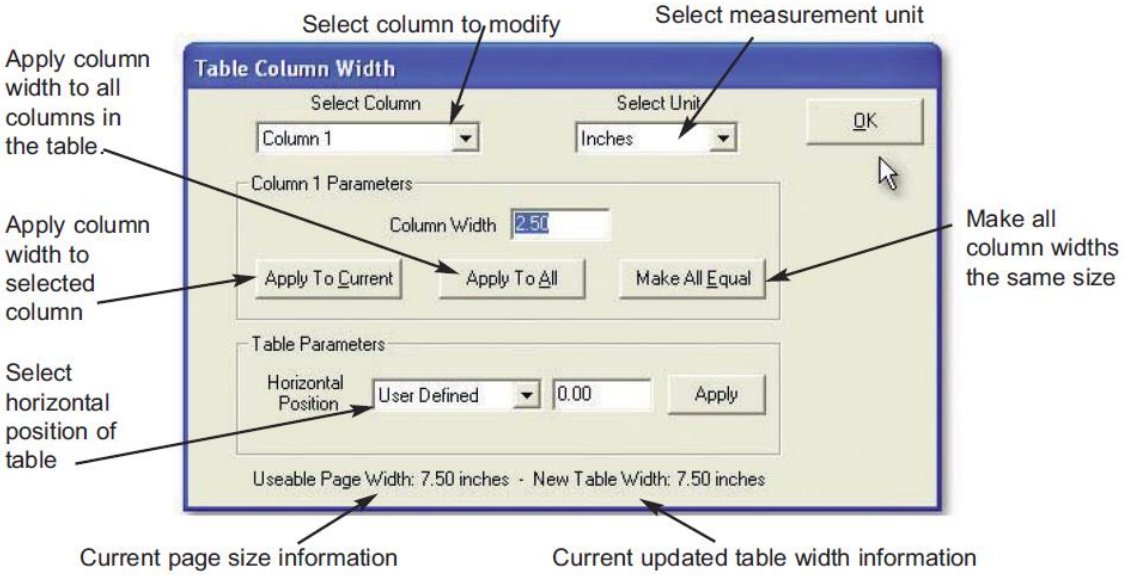
Table	Selects entire table in which cursor is located.
Row	Selects row in which cursor is located.
Cell	Selects cell in which cursor is located.

Grid Lines

Check this item on the Table menu to see Table Row/Column borders (grid lines). These light gray lines do not print, however. Uncheck this item to hide the grid lines.

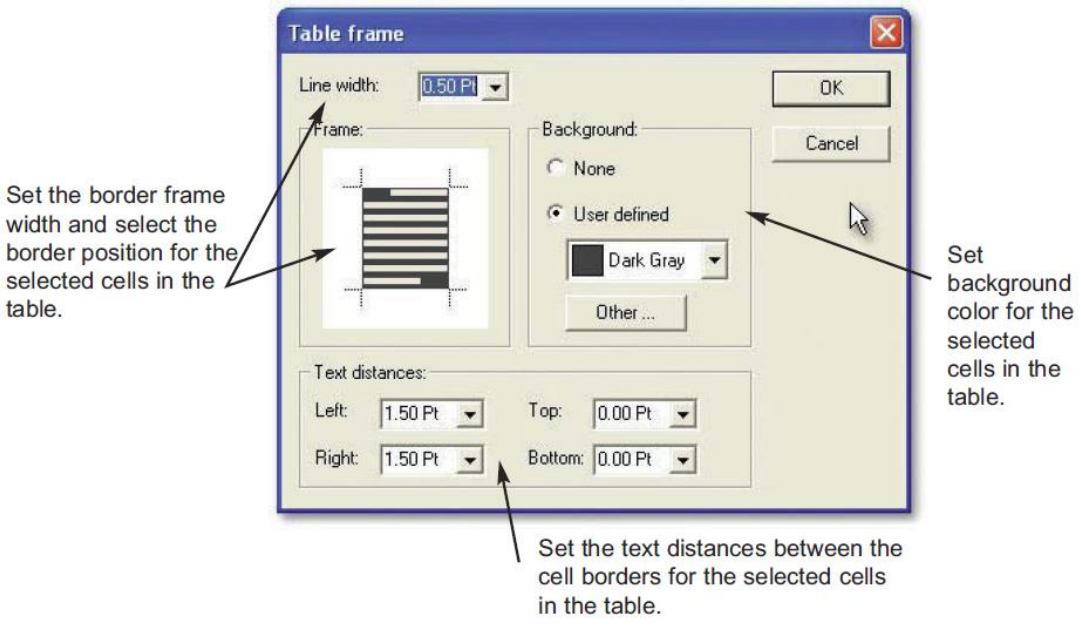
Column Width

The Column Width window appears, in which you can set the column width of the cells of the current table. The Table Column Width window also enables you to set the horizontal position of the current table. The horizontal position can be Left, Right, Centered or User Defined. To adjust the column widths in a table, click in any cell of an existing table, then select the Table > Column Width menu item.



Properties

Opens the Table Frame window (below) in which you can set the various attributes that create and control the frames around the cells of the current table. The Table Frame window also lets you assign fill colors to the table, and control the text position within the cells.



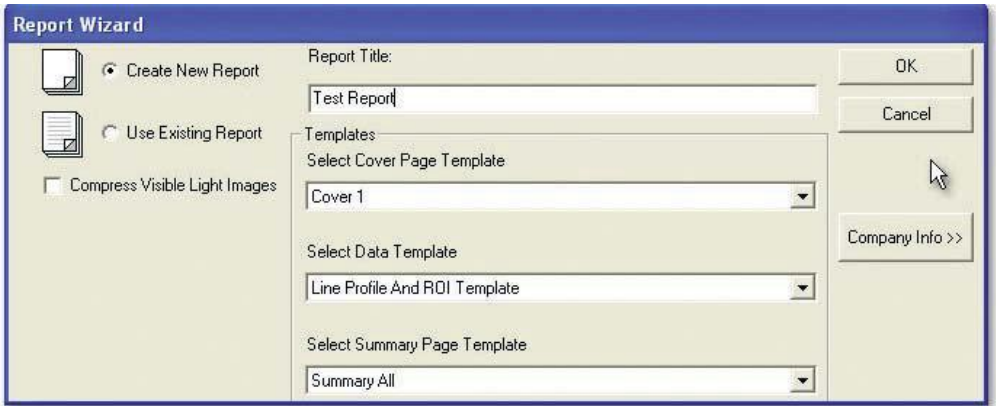
6.3.7 Window

The Window pull-down menu enables you to arrange your open report document windows.

Cascade	Staggers windows so you can see the upper left corner and name of each.
Tile Horizontal	Divides the screen horizontally, giving each window equal area.
Tile Vertical	Divides the screen vertically, giving each window equal area.
Arrange Icons	Organizes all minimized files in the lower left corner of the Report Writer.

6.4 Report Wizard

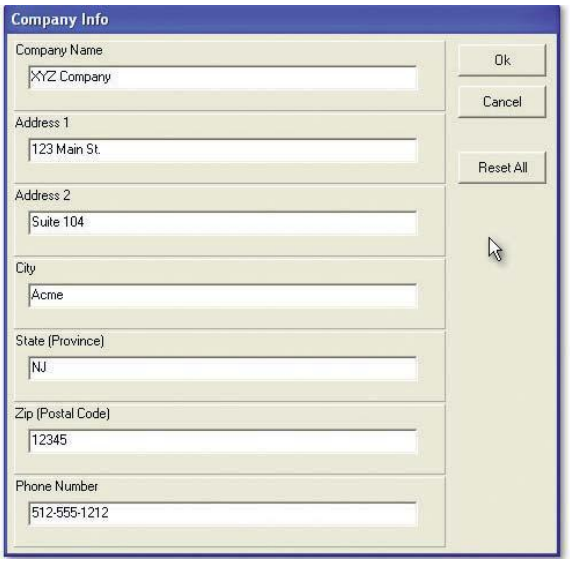
The Report Writer Wizard reads the data from the LumaSpec Offline Analyzer Report Queue (see Chapter 5 of this manual.) The Report Writer Wizard dialog box (shown below) allows you to create a new Report or append to an existing report. This dialog box automatically appears when you launch Report Writer from LumaSpec Offline Analyzer and have added information to the Report Queue.



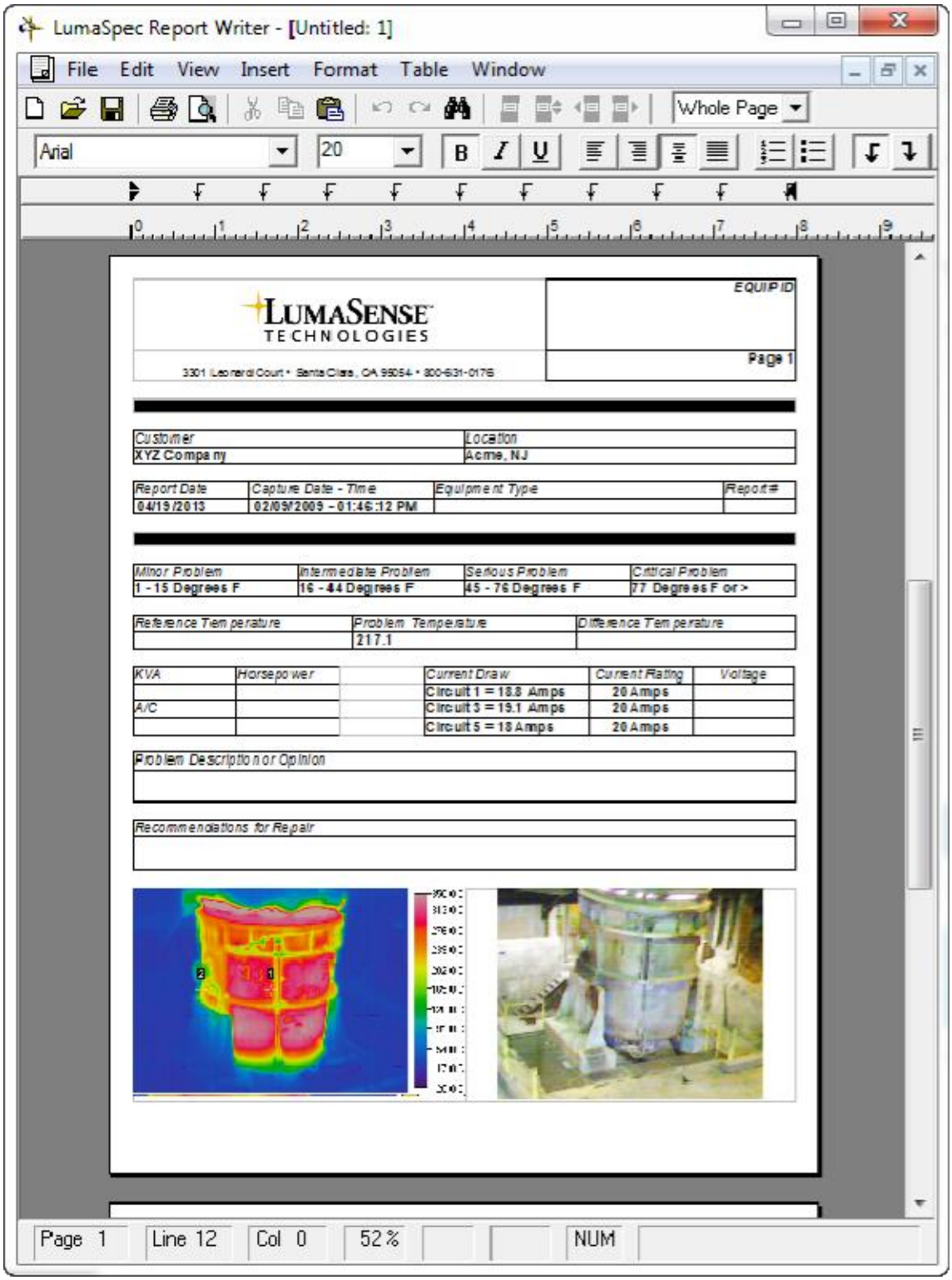
Enter the Report Title. Select the Cover Page, Data Page, and Summary Page templates to use and click OK. The Report Writer will apply all of the data from the LumaSpec Offline Analyzer Queue to the template selected. If the user defined template is one page and three infrared images are sent to the Queue, then the Wizard will generate a three-page report. If the user defined template is two pages and three infrared images are sent to the Queue, the wizard will generate a six-page report.

When using all three templates (Cover, Data, and Summary) a complete report will be generated. To reduce the file size of the report, check the **Compress Visible Light Images** checkbox. The Report Writer will shrink the visible light images to 320 x 240 pixels.

If the user defined data template uses company information fields (see Section 6.3.4 for description of template fields,) then click on the **Company Info** button. The **Company Info** window appears (shown right.) Fill in the desired information.



A report generated using the Electric 1 template in the report wizard would look like this:



7 Using Report Writer Templates

The section provides more information on how to create custom report layouts using the Report Writer Template Creator/Editor. The Report Writer allows you to create custom templates and edit pre-made templates.

7.1 Loading Templates

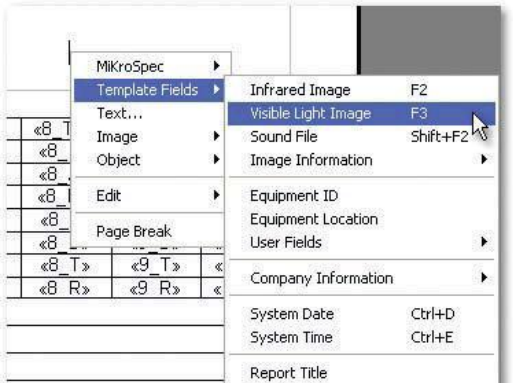
To load a user template:

1. Launch the Report Writer from LumaSpec Offline Analyzer or from the Windows Start Menu.
2. In the Report Writer menu, click on **File** > **Open**.
3. An Open File dialog box will appear.
4. Select the **LumaSpec Offline Analyzer\Templates folder** on your hard drive.
5. Select the **Cover, Data, or Summary folder**.
6. In the **Files of Type** list at the bottom of the Open File window, select **LumaSpec Offline Analyzer Report Template** (*.mrt)
7. Select the Template to load and click on the **Open** button (See window below).
8. The selected template will now be loaded into the Report Writer for editing.

7.2 Inserting Template Fields

7.2.1 Normal Template Fields

To insert template fields:



1. Place the cursor in the document where the fields will be inserted.
2. Right-click at the cursor's point to bring up the **Insert Menu.**
3. Select **Template Fields** from the **Insert Menu**.
4. Select the field to be inserted.
5. A Field tag will be inserted into the document. In this case, «VIS» is displayed when "Visible Light Image" is selected.

   All Template Fields begin with « and end with ».
6. The fields can be placed anywhere in the template document, including templates.

   You can format the tag to have any text color, font, or type size. For example, if you insert the System Date Field and then format the tag to be blue, Arial, Bold, 12 pt. size, the tag looks like this: **«SYSD».** When the template is executed, the tag would be replaced with the System Date and would look like: **3/29/07.** Any attribute you assign to the tag will be applied to the data that replaces the tag when the template is executed.

7.2.2 Special Template Fields

There are two special types of fields that can be inserted into templates.

ROI Data Tables

The first kind of special template field is the ROI Data Table. This field is a complete ROI table that will automatically adjust the number of columns to the number of ROIs defined in the Report Queue information. If there is no Distance to Target information defined, then the ROI Data Table will also remove the Distance and Area Rows. The figure below shows a sample of the ROI Data table fields. The second figure shows the results of the ROI Data table with the 5 ROIs defined.

«ROIB»	«1_TP»	«2_TP»	«3_TP»	«4_TP»	«5_TP»	«6_TP»	«7_TP»	«8_TP»	«9_TP»	«10_TP»
Emiss.	«1_E»	«2_E»	«3_E»	«4_E»	«5_E»	«6_E»	«7_E»	«8_E»	«9_E»	«10_E»
Avg	«1_A»	«2_A»	«3_A»	«4_A»	«5_A»	«6_A»	«7_A»	«8_A»	«9_A»	«10_A»
Min	«1_M»	«2_M»	«3_M»	«4_M»	«5_M»	«6_M»	«7_M»	«8_M»	«9_M»	«10_M»
Max	«1_X»	«2_X»	«3_X»	«4_X»	«5_X»	«6_X»	«7_X»	«8_X»	«9_X»	«10_X»
Delta	«1_D»	«2_D»	«3_D»	«4_D»	«5_D»	«6_D»	«7_D»	«8_D»	«9_D»	«10_D»
Dist.	«1_T»	«2_T»	«3_T»	«4_T»	«5_T»	«6_T»	«7_T»	«8_T»	«9_T»	«10_T»
Area	«1_R»	«2_R»	«3_R»	«4_R»	«5_R»	«6_R»	«7_R»	«8_R»	«9_R»	«10_R»

	Ref.	Rect2	Rect3	Circle4	Line5
Emiss.	1.0	1.0	1.0	1.0	1.0
Avg		108.5 °F	107.1 °F	107.6 °F	112.4 °F
Min		96.7 °F	101.6 °F	93.6 °F	109.7 °F
Max	101.6 °F	147.5 °F	130.6 °F	115.9 °F	114.7 °F
Delta		45.9 °F	29.0 °F	14.3 °F	13.1 °F

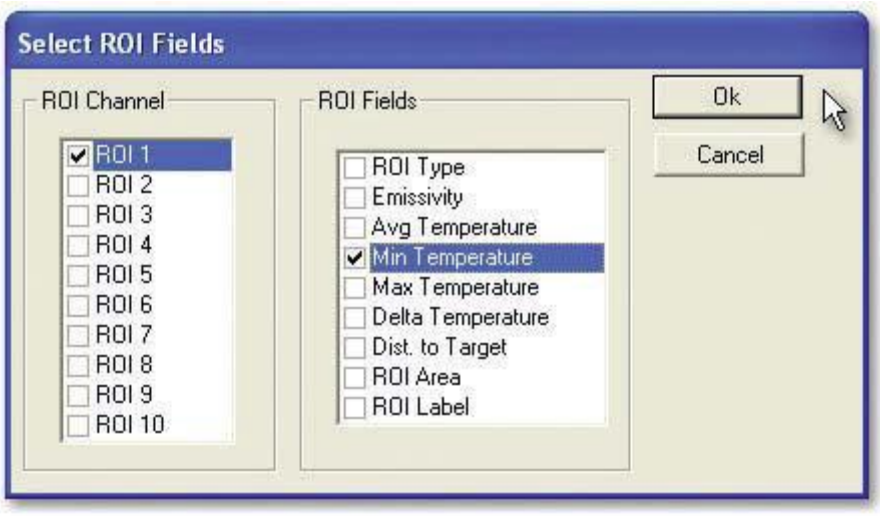
Individual ROI Fields

The second special type of fields that can be inserted are the individual ROI fields. The Reference Temperature and Emissivity, or any ROI value, can be inserted into the template.

To insert ROI fields:

1. Place the cursor in the document where the fields will be inserted and right-click to bring up the **Insert** menu.
2. Select **Template Fields** from the **Insert** menu.
3. Select **ROI Fields** from the **Template Fields** menu.
4. Select the fields to insert.

If you choose ROI Data, the figure below shows the Select ROI Fields dialog box appears. Select the ROI Channel and Field, then click on **OK**.



7.3 Inserting Summary Template Tables

There are four special types of summary tables that can be inserted into a template. Image Summary, Equipment ID Summary, Equipment ID and Image Summary, and User Field Summary.

7.3.1 Image Summary, Equipment ID Summary, and Equipment ID and Image Summary

The first three summary tables have fixed fields. The User Field Summary table is user definable up to 10 columns. Rows will be automatically added for each image record by the Report Wizard.

To insert a summary table:

1. Right mouse-click to bring up the **Insert Menu**.
2. Select **Template Fields**, and then **Report Summary Table**.
3. Select the Summary Table to be inserted.

Below are samples of the first three fixed summary tables:

Image Summary

Image	Image Date • Time	Page
IPLE0001.SIT	06/06/2008 03:27:07 PM	1
IPLE0002.SIT	06/09/2008 05:55:03 PM	2
IPLE0003.SIT	04/08/2008 11:12:14 AM	3
IPLE0004.SIT	02/02/2008 06:39:57 AM	4

Equipment ID Summary

Equipment ID	Equipment Location	Page
Fuse 023	MCC 113	1
Fuse 112	MCC 127	2
Fuse 031	MCC 139	3
Fuse 102	MCC 134	4

Equipment ID and Image Summary

Image	Image Date • Time	Equipment ID	Equipment Location	Page
IPLE0001.SIT	06/06/08 03:27:07 PM	Fuse 023	MCC 113	1
IPLE0002.SIT	06/09/08 05:55:03 PM	Fuse 112	MCC 127	2
IPLE0003.SIT	04/08/08 11:12:14 AM	Fuse 031	MCC 139	3
IPLE0004.SIT	02/02/08 06:39:57 AM	Fuse 102	MCC 134	4

7.3.2 The User Field Summary Table

The User Field Summary Table is user configurable up to 10 columns.

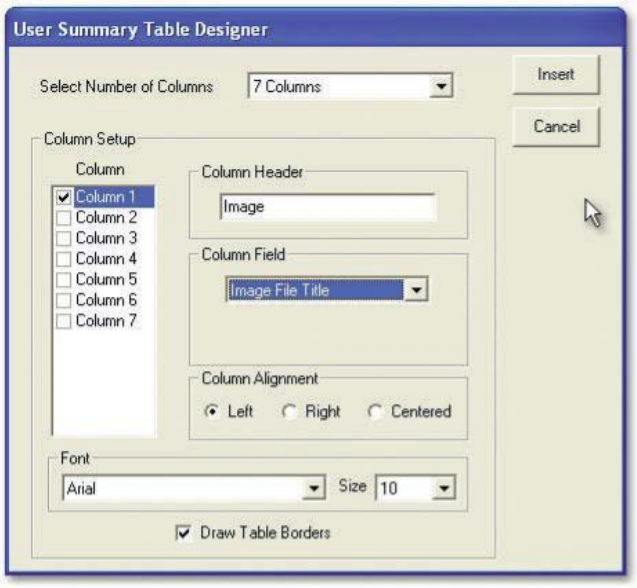
Below is a sample of the User Field Summary configured to display results for inspecting 3-phase equipment.

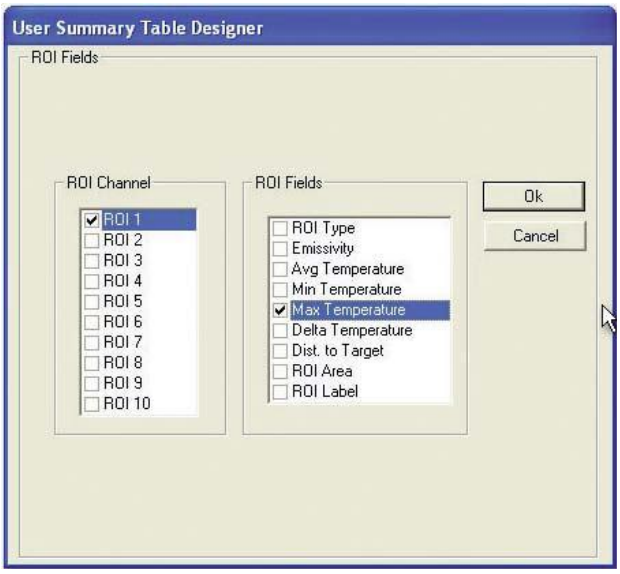
User Field Summary

Image	Unit	Phase 1	Phase 2	Phase 3	Ambient	Page
IPLE0001.SIT	F	87.6	192.7	157.1	178.5	1
IPLE0002.SIT	F	101.3	211.1	169.3	191.6	2
IPLE0003.SIT	F	65.2	182.4	145.6	123.5	3
IPLE0004.SIT	F	99.3	212.5	171.3	188.6	4

To insert a user field table:

1. Right-click to bring up the **Insert Menu**.
2. Select the **Template Fields** menu item.
3. Select **Report Summary Table** menu item.
4. Select the **User Field Summary** menu item.
5. Select 7 Columns in the Select Number of Columns drop down list. The dialog box will display only this option (number of columns) until you enter a number.
6. Type Image in the Column Header field.
7. Select Image File Title from the Column Field drop down list.
8. Click on Column 2 in the Column field.
9. Type Unit in the Column Header field.
10. Select ROI Temperature Unit from the Column Field drop down list.
11. Click on Centered in the Column Alignment frame.
12. Click on Column 3 in the Column field.
13. Type Phase 1 in the Column Header field.
14. Select ROI Fields from the Column Field drop down list. The ROI Fields window opens, allowing you to choose which ROI you want and which data will be displayed for that ROI.
15. Select ROI 1 and Max Temperature from the ROI Fields and Click Ok.
16. Click on Centered in the Column Alignment frame.
17. Click on Column 4 in the Column field.
18. Type Phase 2 in the Column Header field.





19. Select ROI Fields from the Column Field drop down list.
20. Select ROI 2 and Max Temperature from the ROI Fields and Click Ok.
21. Click on Centered in the Column Alignment frame.
22. Click on Column 5 in the Column field.
23. Type Phase 3 in the Column Header field.
24. Select ROI Fields from the Column Field drop down list.
25. Select ROI 3 and Max Temperature from the ROI Fields and Click Ok.
26. Click on Centered in the Column Alignment frame.
27. Click on Column 6 in the Column field.
28. Type Ambient in the Column Header field.
29. Select ROI Fields from the Column Field drop down list.
30. Select ROI 4 and Max Temperature from the ROI Fields and Click Ok.
31. Click on Centered in the Column Alignment frame.
32. Click on Column 7 in the Column field.
33. Type Page in the Column Header field.
34. Select Image Page Number from the Column Field drop down list.
35. Click on Centered in the Column Alignment frame.
36. Click on Insert to insert the User Field Summary Table.
37. Use Table Properties and Table Column Width to adjust the inserted table.

    The resulting template should look like this:

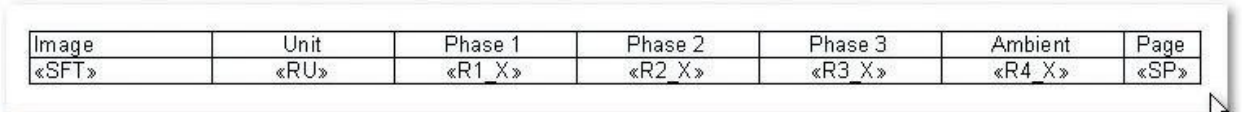


Image	Unit	Phase 1	Phase 2	Phase 3	Ambient	Page
«SFT»	«RU»	«R1_X»	«R2_X»	«R3_X»	«R4_X»	«SP»

7.4 Testing a Template

The LumaSpec Offline Analyzer Report Writer has built-in sample data to test your user-defined template without exiting Report Writer. To test a template, simply press F1 on your keyboard. Your Template will now be populated with the Report wrier's test data and a Template Preview Window will be displayed. This window is read-only and is intended to give you a visual preview of your template. To return to your template, click on the Close button in the upper left corner of the screen.

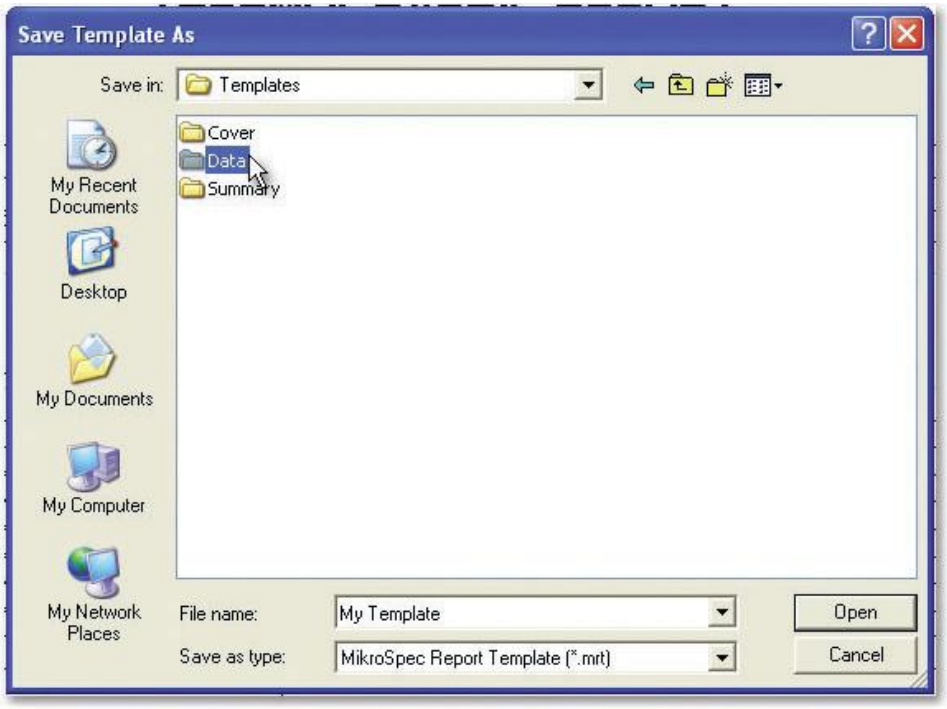
7.5 Saving a Template

To save a template:

1. Click on **File** > **Save** in the **Report Writer** text menus. A **Save Template As** dialog box will appear.
2. In the filename field, type the name that you wish to call this template (i.e. "My Template"). Report Writer will automatically append the MRT extension to the filename. Before saving, verify that the folder in the Save In field is Templates\Cover, Templates\Data, or

Templates\Summary. The Report Wizard will only look in the Templates folder for user-defined templates.

3. After you have entered the filename for the template, click on **Save.** The user-defined template will now be saved. See the example of the **Save Template As** dialog box below:



Index