

# FLIR Camera Setup and Software Instructions

## Setup

Figure 1 below shows how the Camera should be set up with the Power over Ethernet (PoE) injector.

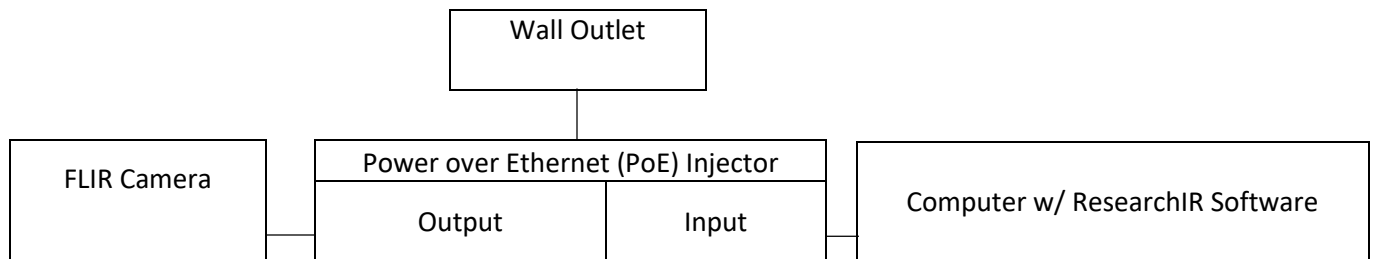


Figure 1: Set up of the FLIR Camera, PoE Injector, and Computer with ResearchIR Software

## Getting Started

- Open the “ResearchIR (64-bit)” application on the desktop
- Click on the AX5 Camera displayed under the “GigE (PureGEV)” connection type
  - o This should take you to the Home Screen of the application with a video feed displayed

## Home Screen

See Figure 2 for the Home Screen of the FLIR ResearchIR Software. The items labelled are as follows:

- 1) Image Toolbar that include (from left to right):
  - Statistics Viewer
    - o The user can also access plots by hovering the cursor that include:
      - Profile Plot
      - Temporal Plot
      - Histogram
      - Oscilloscope
  - Bad Pixel Picker
  - Capture
    - o Access different tools by hovering the cursor that include:
      - Pause Live Image
      - Record a Single Image

- Record a Movie
  - Edit Record Settings
- Arm Recording
- Export Bitmap
- Enable File Operation
- 2) Region of Interest (ROI) Toolbar that include (from top to bottom):
  - Edit ROIs
  - Add a box ROI
  - Add an ellipse ROI
  - Add a line ROI
  - Add a bendable line ROI
  - Add a polygon ROI
  - Add a freehand ROI
  - Add a cursor ROI (1 pixel)
  - Add a measurement cursor ROI (3x3 pixels)
  - Add/Remove a point
  - Rotate ROI
  - Select the next ROI
  - Delete the selected ROI
  - Delete all ROIs
  - Load ROIs
  - Load ROIs, keep existing ROIs
  - Save ROIs
  - Show ROIs
- 3) Video feed that shows the image of the camera target
- 4) Temperature Scale
  - The user can change the color palette of the temperatures by going to View -> Palette, then select a preset palette that would best suit your needs
- 5) Image Enhancement Toolbar
  - Used to reduce noise from the video feed by changing the thresholds of high and low temperatures

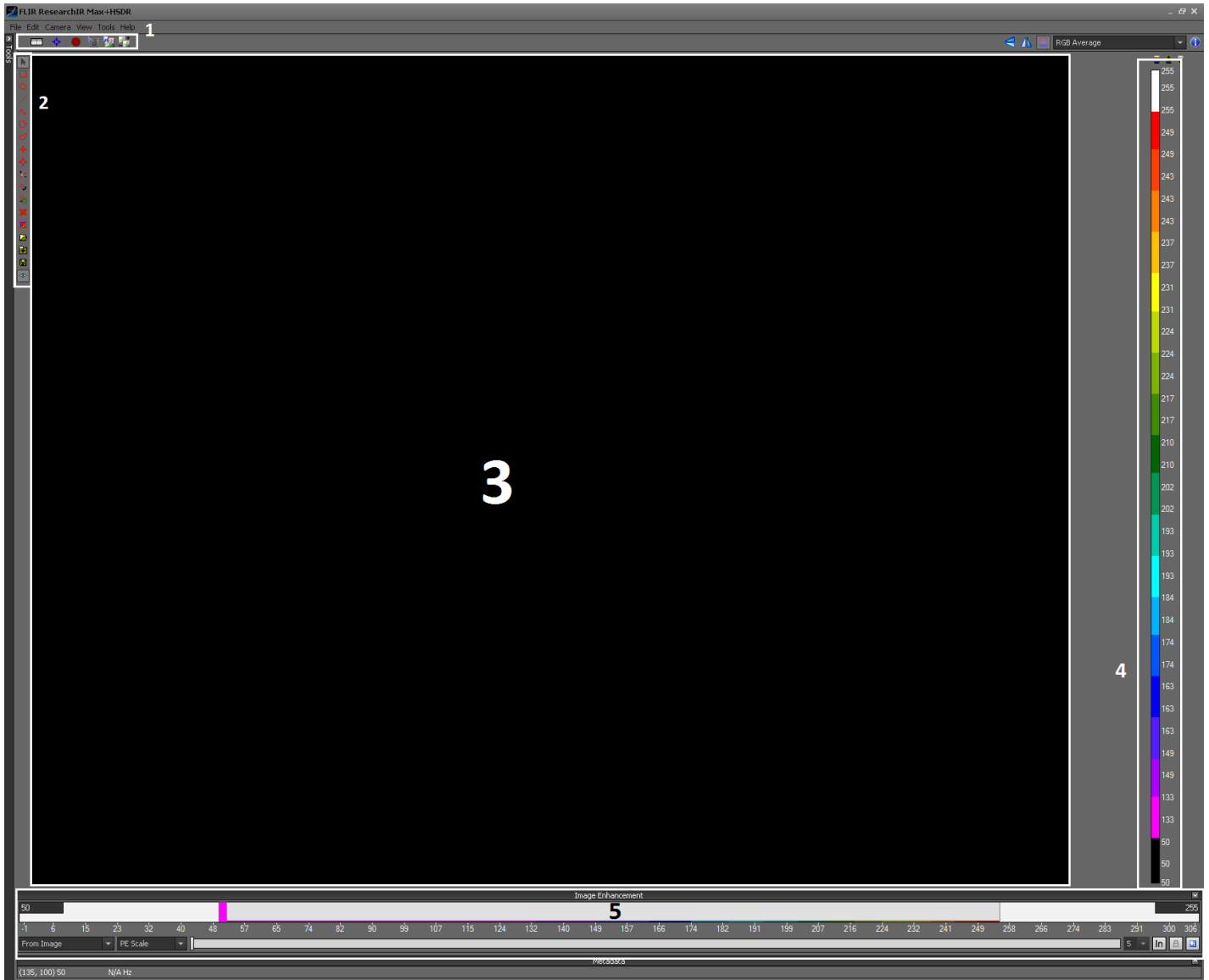


Figure 2: FLIR ResearchIR Software Home Screen. Each number is listed with an in-depth description.

## Statistics Viewer

As shown in Figure 3, the Statistics Viewer is split into two sides. The left side of the window shows the live statistics of a specific ROI that includes tools (from top to bottom) such as:

- Pause/ Resume statistics update
- Save statistics as a text file
- Show/Hide Image ROI
- Add an ROI subtraction entry

The right side of the window consists of functions. The right side contains tools (from left to right) such as:



- Enable a pretrigger
- Use a header field to start recording
- Use a measurement function to start recording
- Start and stop recording at a specified time and date
- File naming options

Once the settings have been configured, click 'OK', then hover over the capture tool button (3<sup>rd</sup> button from left) and select either the 'Record a single image' or 'Record a movie' button to capture the image.

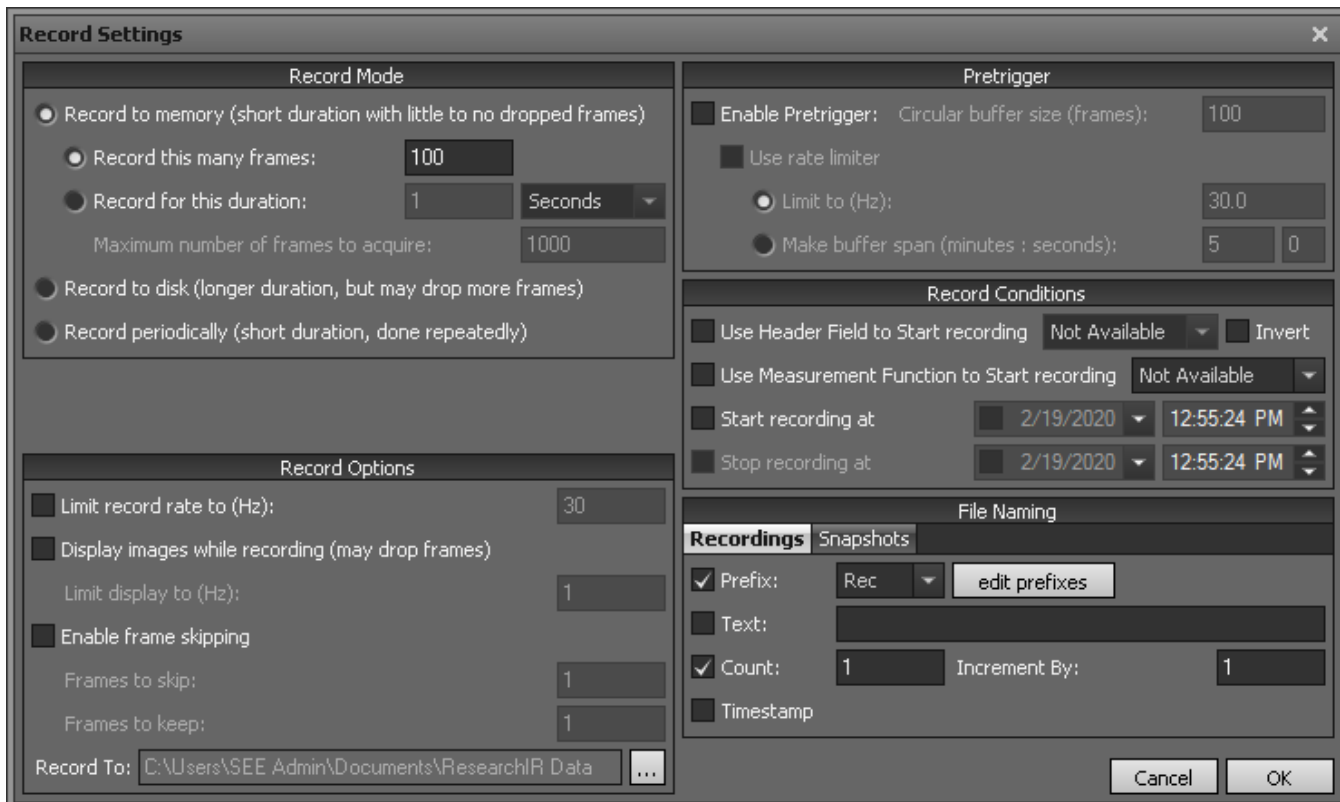


Figure 4: FLIR ResearchIR Software Recording Settings.

### Enhancing an Image

In some cases, the camera feed has a lot of low-temperature 'noise'. FLIR ResearchIR has an easy-to-use image enhancement tool to reduce noise in the feed. Figure 5 shows an image that has a lot of low-temperature noise.

To reduce noise, find the Image Enhancement tool at the bottom of the Home Screen (boxed in red), and you will see a profile of the temperatures along with a gray, opaque box highlighting

the profile. Find the left edge of the temperature span (boxed in yellow), click and drag the edge to the desired low-level threshold.

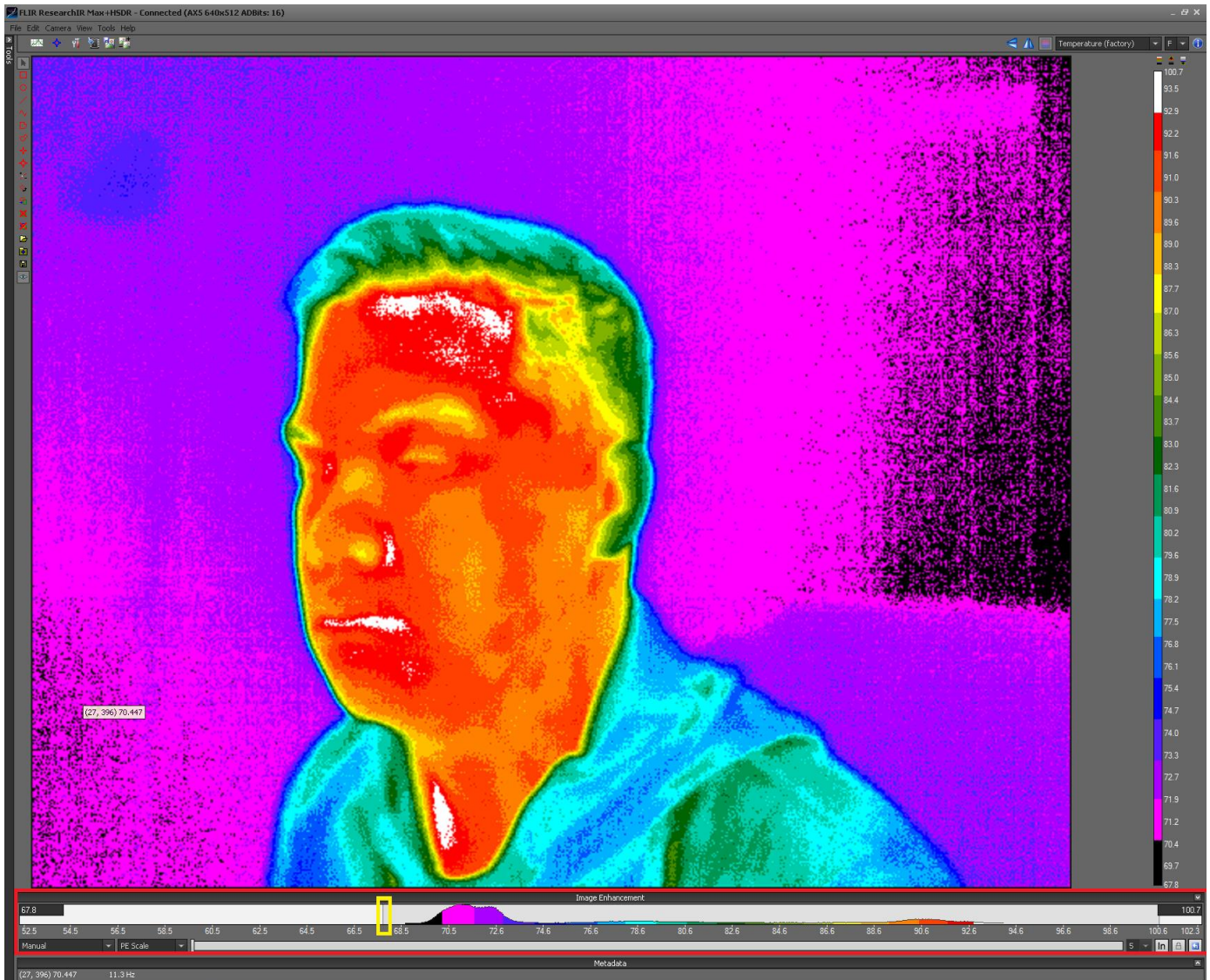


Figure 5: FLIR image with a lot of low-temperature 'noise'. Image Enhancement Tool is boxed in red. Left edge of temperature span is boxed in yellow.

If done correctly, the image noise will be viewed as black, and only the main object in the camera will be measured. Figure 6 shows the new image with the noise reduced. The left edge of the temperature span (boxed in yellow) is moved past the low-temperature noise peak and the image becomes more refined.

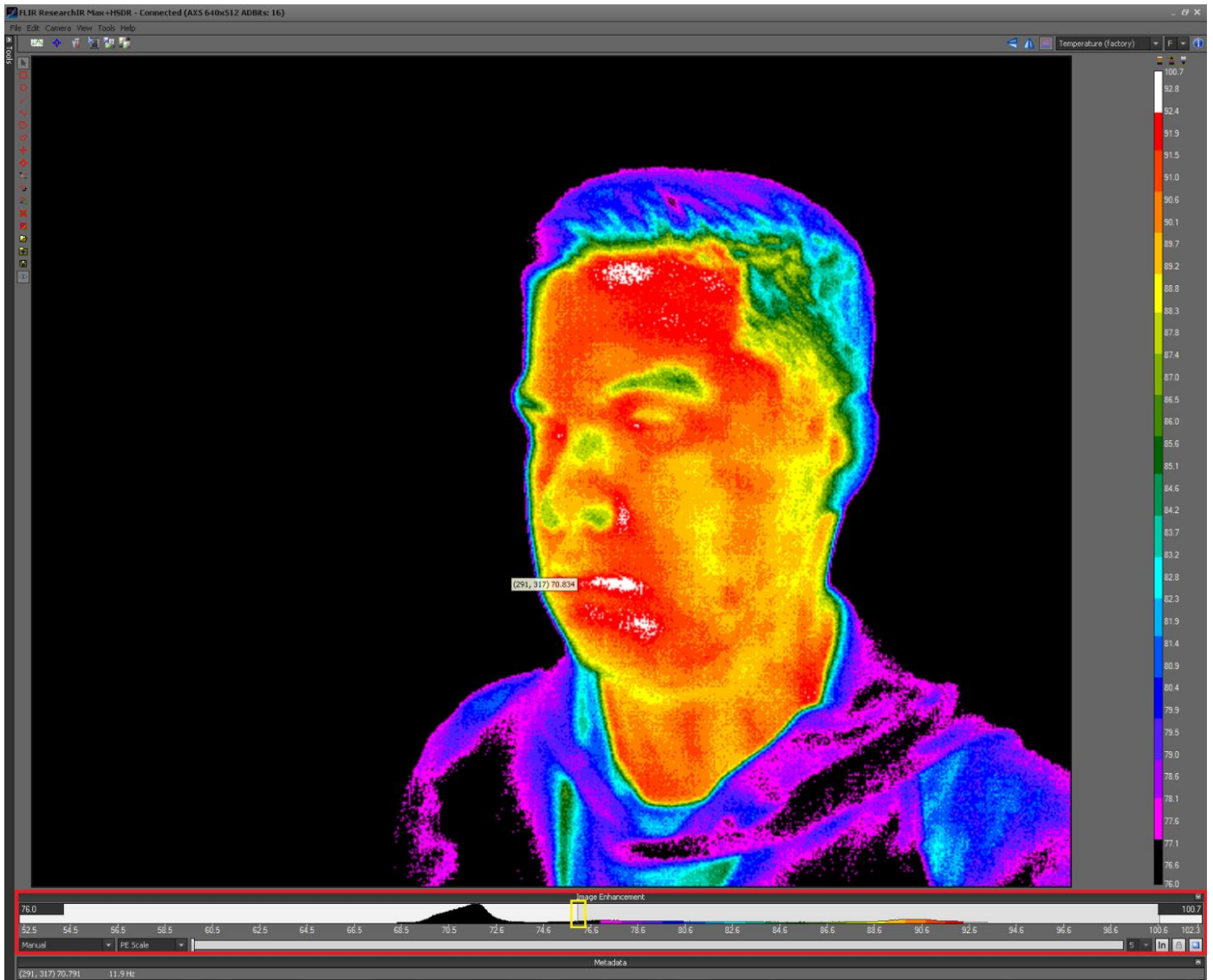


Figure 6: FLIR image with the low-temperature noise reduced. The left side of the temperature span (boxed in yellow) is moved past the low-temperature noise peak shown to the left of it.

## Hardware Specifications

The next pages contain hardware specifications on the FLIR A65 13mm camera.



### 13.24 FLIR A65 f=13 mm




P/N: 73413-0101

Rev.: 35207

General description	
<p>The FLIR A65 has features and functions that make it the natural choice for anyone who uses PC software to solve problems and for whom 640 x 512 pixel resolution is sufficient.</p> <p>Among its main features are GigE Vision and GenICam compliance, which makes it plug-and-play when used with software packages such as IMAQ Vision and Halcon.</p>	
Key features:	
<ul style="list-style-type: none"> <li>• Very affordable.</li> <li>• Compact (40 mm x 43 mm x 106 mm).</li> <li>• GigE Vision and GenICam compliant.</li> <li>• GigE Vision lockable connector.</li> <li>• PoE (power over Ethernet).</li> <li>• 8-bit 640 x 512 pixel images streamed at 30 Hz, signal linear</li> <li>• 14-bit 640 x 512 pixel images streamed at 30 Hz, signal and temperature linear</li> <li>• Synchronization between cameras possible.</li> <li>• 1x+1x GPIO.</li> <li>• Compliant with any software that supports GenICam, including National Instruments IMAQ Vision, Stemmers Common Vision Blox, and COGNEX Vision Pro.</li> </ul>	
Typical applications:	
<ul style="list-style-type: none"> <li>• Automation and thermal machine vision.</li> <li>• Entry level "high-speed" R&amp;D.</li> </ul>	
Imaging and optical data	
IR resolution	640 x 512 pixels
Thermal sensitivity/NETD	< 0.05°C @ +30°C (+86°F) / 50 mK
Field of view (FOV)	45° x 37°
Focal length	13 mm (0.5 in.)
Spatial resolution (IFOV)	1.31 mrad
F-number	1.25
Image frequency	30 Hz
Focus	Fixed
Detector data	
Detector type	Focal plane array (FPA), uncooled VOX microbolometer
Spectral range	7.5–13 μm
Detector pitch	17 μm
Detector time constant	Typical 12 ms
Measurement	
Object temperature range	<ul style="list-style-type: none"> <li>• -25 to +135°C (-13 to 275°F)</li> <li>• -40 to +550°C (-40 to +1022°F)</li> </ul>
Accuracy	±5°C (±9°F) or ±5% of reading



<b>Measurement analysis</b>	
Atmospheric transmission correction	Automatic, based on inputs for distance, atmospheric temperature and relative humidity
Optics transmission correction	Automatic, based on signals from internal sensors
Emissivity correction	Variable from 0.5 to 1.0
Reflected apparent temperature correction	Automatic, based on input of reflected temperature
External optics/windows correction	Automatic, based on input of optics/window transmission and temperature
Measurement corrections	Global object parameters
<b>Ethernet</b>	
Ethernet	Control and image
Ethernet, type	Gigabit Ethernet
Ethernet, standard	IEEE 802.3
Ethernet, connector type	RJ-45
Ethernet, communication	GigE Vision ver. 1.2 Client API GenICam compliant
Ethernet, image streaming	8-bit monochrome @ 30 Hz <ul style="list-style-type: none"> <li>• Signal linear/ DDE</li> <li>• Automatic/ Manual</li> <li>• Flip H&amp;V</li> </ul> 14-bit 640 x 512 pixels @ 30 Hz <ul style="list-style-type: none"> <li>• Signal linear/ DDE</li> <li>• Temperature linear</li> </ul> GigE Vision and GenICam compatible
Ethernet, power	Power over Ethernet, PoE IEEE 802.3af class 0 Power
Ethernet, protocols	TCP, UDP, ICMP, IGMP, DHCP, GigEVision
<b>Digital input/output</b>	
Digital input, purpose	General purpose
Digital input	1x opto-isolated, "0" <1.2 VDC, "1" = 2–25 VDC.
Digital output, purpose	General purpose output to ext. device (programmatically set)
Digital output	1x opto-isolated, 2–40 VDC, max. 185 mA
Digital I/O, isolation voltage	500 VRMS
Digital I/O, supply voltage	2–40 VDC, max. 200 mA
Digital I/O, connector type	12-pole M12 connector (shared with Digital synchronization and External power)
Synchronization in, purpose	Frame synchronization in to control camera
Synchronization in	1x, non-isolated
Synchronization in, type	LVC Buffer @3.3V, "0" <0.8 V, "1">2.0 V.
Synchronization out, purpose	Frame synchronization out to control another FLIR Ax5 camera
Synchronization out	1x, non-isolated

<b>Digital input/output</b>			
Synchronization out, type	LVC Buffer @ 3.3V, "0"=24 MA max, "1"= -24 mA max.		
Digital synchronization, connector type	12-pole M12 connector (shared with Digital I/O and External power)		
<b>Power system</b>			
External power operation	12/24 VDC, < 3.5 W nominal < 6.0 W absolute max.		
External power, connector type	12-pole M12 connector (shared with Digital I/O and Digital Synchronization )		
Voltage	Allowed range 10–30 VDC		
<b>Environmental data</b>			
Operating temperature range	-15°C to +50°C (+5°F to +122°F)		
	<table border="1"> <tr> <td> <b>NOTE</b></td> </tr> <tr> <td>The operating temperature range assumes that the camera is mounted on the base support (included in the package) or a similar type of heatsink.</td> </tr> </table>	 <b>NOTE</b>	The operating temperature range assumes that the camera is mounted on the base support (included in the package) or a similar type of heatsink.
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The operating temperature range assumes that the camera is mounted on the base support (included in the package) or a similar type of heatsink.			
Storage temperature range	-40°C to +70°C (-40°F to +158°F)		
Humidity (operating and storage)	IEC 60068-2-30/24 h 95% relative humidity +25°C to +40°C (+77°F to +104°F)		
EMC	<ul style="list-style-type: none"> <li>• EN 61000-6-2 (Immunity)</li> <li>• EN 61000-6-3 (Emission)</li> <li>• FCC 47 CFR Part 15 Class B (Emission)</li> </ul>		
Encapsulation	IP 40 (IEC 60529) with base support mounted		
Shock	25 g (IEC 60068-2-27)		
Vibration	2 g (IEC 60068-2-6)		
<b>Physical data</b>			
Weight	0.200 kg (0.44 lb.)		
Camera size (L x W x H)	106 x 40 x 43 mm (4.2 x 1.6 x 1.7 in.)		
Tripod mounting	UNC ¼"-20 (on three sides)		
Base mounting	4 x M3 thread mounting holes (bottom)		
Housing material	Magnesium and aluminum		
<b>Shipping information</b>			
Packaging, type	Cardboard box		
List of contents	<ul style="list-style-type: none"> <li>• Infrared camera with lens</li> <li>• Base support</li> <li>• Focus adjustment tool</li> <li>• Printed documentation</li> </ul>		
Packaging, weight			
Packaging, size	295 x 200 x 105 mm (11.6 x 7.9 x 4.1 in.)		
EAN-13	7332558010594		
UPC-12	845188011260		
Country of origin	Estonia		