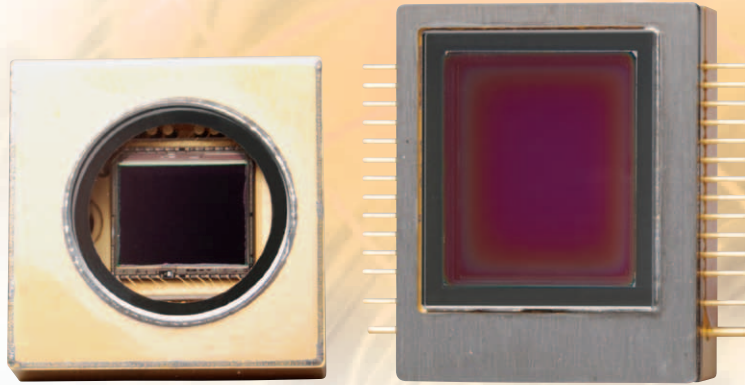


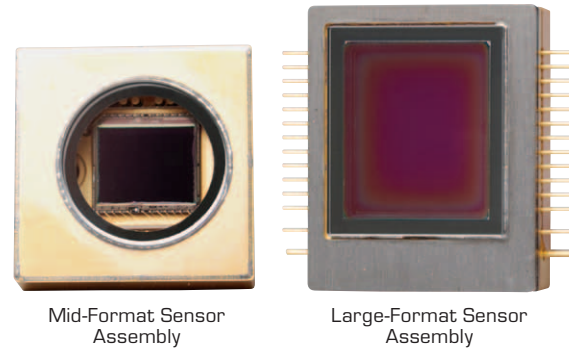
# Short-Wave IR Components

Focal Plane Arrays and Sensor Assemblies



## Short-Wave IR Components

- Proven Performance and Reliability for Research, Industrial and Military Applications
- High-Sensitivity Indium Gallium Arsenide Detectors
- Mid- and Large-Formats with Common Electrical Interfaces
- User-Configurable, Optimized for Low Background Applications
- Industry Standard Devices



Mid-Format Sensor Assembly

Large-Format Sensor Assembly

### Focal Plane Arrays

FLIR Systems, the world's premier supplier of infrared products, presents the "Core by Indigo" line of Indium Gallium Arsenide (InGaAs) components. FLIR's InGaAs detectors and advanced readout integrated circuit technologies form the basis of these commercial off-the-shelf staring focal plane arrays (FPAs) and sensor assemblies.

FLIR makes "Core by Indigo" FPAs and sensor assemblies in mid- and large-format configurations, including 320 x 256 and 640 x 512 pixel arrays. Short-wave InGaAs FPAs cover the 0.9 to 1.7  $\mu\text{m}$  spectral range. FLIR delivers these FPAs as encapsulated sensor assemblies.

These arrays use a capacitive transimpedance amplifier circuit design, optimized for a wide range of applications, including those with low signal levels. All designs include two modes of operation — a simplified default mode and a user configurable command mode — providing the flexibility necessary to support a wide range of applications. From terrestrial applications that use a single channel video rate output, to high-speed scientific laser testing that use multiple outputs and dynamic windowing — FLIR focal plane arrays surpass all expectations. The windowing feature allows read-out of two-dimensional sub-arrays at frame rates of up to 38,000 frames per second for small window sizes. Other advanced on-chip

features of the ROIC include integration capacitor selection, variable gain, multiple output channels, snapshot integration with variable integration time settings, signal skimming, non-destructive readout, and dynamic image transposition. The detector bias setting and overall power control for the chip are also user-adjustable.

### Sensor Assemblies

Sensor assembly packaging is available for both mid- and large-format InGaAs FPAs. These assemblies consist of one FPA mounted on a thermoelectric cooler (TEC), integrated into a dewar designed by FLIR, and powered through pins on the rear side of the assembly. The higher level system optical path sets the sensor f-number. The front window of the dewar is BK7A glass and transmits radiation in the 0.9 to 1.7  $\mu\text{m}$  range; it is canted and coated to minimize reflections. The window and package opening are sized so as not to vignette the FPA when used with f/1.4 or slower optics. The average window transmittance (at 1.0  $\mu\text{m}$ ) is greater than 99%, with less than 0.1% reflectance at 1.55  $\mu\text{m}$ .

The back of the mid-format ISC9809 package supplies the 41-pin electrical interface to the assembly; on the large format ISCO002 assembly the electrical interface is 28 pins on two sides of the package. FLIR provides an interface description document for this interface as part of the standard delivery.

### FPA Specifications (at 293 K operating temperature)

Parameter	Mid-Format (ISC9809)	Large-Format (ISCO002)
Spectral Range	0.9 to 1.7 $\mu\text{m}$	0.9 to 1.7 $\mu\text{m}$
Resolution	320 x 256 pixels	640 x 512 pixels
Pixel Pitch	30 $\mu\text{m}$	25 $\mu\text{m}$
Integration Time	> 0.5 $\mu\text{s}$ to full frame	3 $\mu\text{s}$ to full frame
Well Capacity (min-max gain)	3.5 x 10 <sup>6</sup> e <sup>-</sup> 170 x 10 <sup>9</sup> e <sup>-</sup>	2.5 x 10 <sup>6</sup> e <sup>-</sup> .093 x 10 <sup>9</sup> e <sup>-</sup>
Operability	> 99%, > 99.5% typical	> 99%, > 99.5% typical
Power Dissipation*	< 150 mW	< 250 mW
NEI **	1.5 x 10 <sup>-7</sup> W/cm <sup>2</sup> low gain (1.1 x 10 <sup>12</sup> ph cm <sup>2</sup> /s low gain) 3.0 x 10 <sup>-10</sup> W/cm <sup>2</sup> high gain (2.2 x 10 <sup>9</sup> ph cm <sup>2</sup> /s low gain)	1.5 x 10 <sup>-9</sup> W/cm <sup>2</sup> low gain (1.1 x 10 <sup>10</sup> ph cm <sup>2</sup> /s low gain) 4.0 x 10 <sup>-10</sup> W/cm <sup>2</sup> high gain (2.9 x 10 <sup>9</sup> ph cm <sup>2</sup> /s high gain)
QE-Fill Factor	≥ 65% (over 1.0 to 1.6 $\mu\text{m}$ range)	≥ 65% (over 1.0 to 1.6 $\mu\text{m}$ range)
Dark Current ***	< 1% of full well	< 1% of full well
Uncorrected Uniformity	< 10.0%	< 10.0%
Output Range	2.7 V	2.5 V
Outputs	1, 2, or 4 selectable	1, 2 or 4 selectable
Max Frame Rate (1, 2, and 4 outputs)	110, 200, 346 Hz	30, 58, 107 Hz
Pixel Rate	10 MHz	10 MHz
Input Biases	VDETCOM 4.5 to 5.5 V VPOS_CORE 5.5 V VPOS 5.5 V VPOSOUT 5.5 V VPD 5.5 V VOUTREF 3.0 V VNEG 0.0 V VNEGOUT 0.0 V VND 0.0 V TEC + 5.0 V TEC - 0.0 V GETTER + NC GETTER - NC VBLM NC VCAS NC	VDETCOM 3.1 to 5.5 V VPOS_CORE 5.5 V VPOS 5.5 V VPOSOUT 5.5 V VPD 5.5 V VREF 2.6 to 3.1 V VOUTREV 1.6 V VNEG_CORE 0.0 V VNEG 0.0 V VNEGOUT 0.0 V VND 0.0 V TEC + 5.0 V TEC - 0.0 V GETTER + NC GETTER - NC
Input Clocks	CLK VPD to VND LSYNC VPD to VND FSYNC VPD to VND DATA VPD to VND	CLK VPD to VND LSYNC VPD to VND FSYNC VPD to VND DATA VPD to VND FIELD VPD to VND RESET_B VPD to VND
Misc Signals	IMSTR_ADJ 0.0 to 5.5 V TEMP 0.0 to 5.5 V GAIN 0.0 to 5.5 V BWL 0.0 to 5.5 V VOS 0.0 to 5.5 V TESTOUT 0.0 to 5.5 V VTESTIN 1.5 to 4.5 V	IMSTR_ADJ 0.0 to 5.5 V TEMP 0.0 to 5.5 V GAIN 0.0 to 5.5 V BWL 0.0 to 5.5 V VOS 1.6 to 5.5 V TESTOUT 0.0 to 5.5 V VTESTIN 0.0 to 5.5 V

\* Default conditions, single output mode

\*\* Measured at 293 K, spectral band 1.28-1.60  $\mu\text{m}$ , low gain  $T_{\text{int}} = 0.2\text{ms}$ , high gain  $T_{\text{int}} = 16\text{ms}$

\*\*\* Array average, at 273 K,  $T_{\text{int}} = 16\text{ms}$ , low gain mode

Specifications are subject to change without notice.

## Sensor Assembly Specifications

Parameter	Mid-Format Sensor Assembly (supports ISC9809 FPAs)	Large-Format Sensor Assembly (supports ISCO002 FPAs)
Size (L x W x H)	See ICD 500-0076-41	See ICD 500-0096-41
Weight	20.5 grams	30.6 grams
Mounting	See ICD 500-0076-41	See ICD 500-0096-41
Temperature/Altitude Range, Operational *	-20°C to +71°C 0 to 40,000 feet	-20°C to +71°C 0 to 40,000 feet
Temperature/Altitude Range, Non-Operational *	-50°C to +80°C 0 to 40,000 feet	-50°C to +80°C 0 to 40,000 feet
Shock	20 g, 11 ms half sine pulse	20 g, 11 ms half sine pulse
Vibration	6.7 g rms random vibrate, all 3 axes	6.7 g rms random vibrate, all 3 axes
Humidity	< 95% relative humidity	< 95% relative humidity
TEC Power	< 5.0 volts, max 1.0 amp < 5 watts max	Typical 4.0 to 5.0 volts, 1.5 to 1.7 amp < 8 watts max
TEC Stabilization Range	≤ 40°C temperature differential, FPA to ambient, 80°C hot side, single stage	≤ 60°C temperature differential, FPA to ambient, 80°C hot side, two stage
Dewar F#	Set by system level optics	Set by system level optics
Dewar Window Spectral Range	0.3 to 1.7 μm	0.3 to 1.7 μm

\*Requires customer supplied thermal management  
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### SANTA BARBARA CVS World Headquarters

FLIR Systems, Inc.  
70 Castilian Drive,  
Goleta, CA 93117  
USA  
PH: +1 805.964.9797  
FX: +1 805.685.2711

[www.flir.com](http://www.flir.com)