Sensors Unlimited Mini-SWIR™ Camera

Mil-Rugged, High-Sensitivity InGaAs SWIR Camera

The compact 640HSX is a Mil-Rugged InGaAs digital video camera featuring high-sensitivity and wide operating temperature range. It provides real-time daylight to low-light imaging in the Short Wave Infrared (SWIR) wavelength spectrum for persistent surveillance, laser detection, and penetration through dust, and smoke. In addition, the camera employs on-board Automatic Gain Control (AGC), proprietary dynamic-range enhancement technology, and built-in non-uniformity corrections (NUCs), allowing it to address the challenges of urban night imaging without blooming. Simultaneous RS170 analog and Camera Link® digital output provide a means for plug-and-play video and high quality 12-bit images for transmission and image processing. The lightweight, compact size, and low power consumption enables easy integration into surveillance systems, whether hand-held, mobile, or aerial. Optional NIR/SWIR technology is available to extend the sensitivity of Sensors Unlimited cameras to below 0.7 µm, offering the advantage of both Near Infrared (NIR) and Short Wave Infrared wavelength response.

APPLICATIONS

- Low-light level imaging
- Covert surveillance with passive 24 hr./7 day operation
- Driver Vision Enhancement (DVE)
- Imaging through atmospheric obscurants
- OEM version for easy integration into Unmanned Aerial Systems, handheld, or robotic systems
- Laser spotting and tracking
- EVS applications

FEATURES

- Highest sensitivity available in 0.9 to 1.7 µm spectrum; NIR/SWIR, from 0.7 to 1.7 µm
- Images from partial starlight to direct sun illumination
- 640 x 512 pixel format, 25 µm pitch
- Compact OEM module size < 4.0 in^3
- Enclosed module size < 10.7 in^3
- Low power < 3.6 W at 40°C
- All solid-state InGaAs imager
- No moving parts
- On-board non-uniformity corrections
- Simultaneous digital & analog outputs
- Advanced Automatic Gain Control (AGC)
- Selectable contrast enhancement modes
- Free-form or user defined Region of Interest (ROI) windowing mode
- FCC, MIL-STD-461F, and CE certified
- Tested to MIL-STD-810G for functional shock, vibration, thermal shock, storage temperature, altitude, and humidity
- Operation from -40°C to 70°C
- Environmental Stress Screening

UTC Aerospace Systems

Model No: 640HSX

MECHANICAL SPECIFICATIONS		
	Enclosed	OEM
Module dimensions	2.05 x 2.05 x 2.55 inches	1.64 x 1.50 x 1.63 inches
Width x Height x Depth	52.1 x 52.1 x 64.7 mm (with I/O connectors, no lens or mount)	41.5 x 38.1 x 41.4 mm
Weight (no lens)	≤ 270 g	≤ 90 g
Lens Mount	M42x1 mount; C-mount adapter; more available	M42x1 mount bracket
Included Lens	f/1.4, 50 mm, 18° FOV width, M42x1-mount	None
Camera Link Connector	SDR standard connector	None
I/O Connector	3M SDR14 Connector	None
Interface Connectors	Not applicable	Samtec QSH-030-01-L-D-A Harwin Datamate M80-5020805
Pixel Pitch	25 µm	25 µm
Focal Plane Array Format	640 x 512 pixels	640 x 512 pixels
Active Area	16 mm x 12.8 mm x 20.5 mm diagonal	16 mm x 12.8 mm x 20.5 mm diagonal

ENVIRONMENTAL & POWER SPECIFICATIONS	
Operating Case Temperature	-40°C to 70°C
Storage Temperature	-54°C to 85°C
Humidity	100% noncondensing
Power Requirements: **AC Adapter Supplied** **DC Voltage** **Typical Power**	 100-240 VAC, 47-63 Hz +9-16 V ≤ 3.8 W at 20°C ambient, ≤ 3.6 W @ 40°C ambient
Functional Shock, Thermal Shock, Random Vibration, Storage Temperature, Temperature/Altitude Combine, Humidity, Transportability	MIL-STD-810G compliant
Conducted & Radiated Emissions	FCC Part 15, MIL-STD-461F CE102 and RE102
CE compliance	EN 61326-1:2006, Class A, EN 61000-3-3:2006, and EN 61000-3-3:1995 A1:2001, A2:2005
Mean Time Between Failure	≥ 10,000 hours, MIL-HDBK-217F N2
Fungus-Inert Material	MIL-HDBK-454B

ELECTRICAL SPECIFICATIONS	
Optical Fill Factor	100%
Spectral Response	Standard, 0.9 µm to 1.7 µm NIR/SWIR, < 0.7 µm to 1.7 µm
Quantum Efficiency	Standard, ≥ 65% from 1 µm to 1.6 µm NIR/SWIR, ≥ 65% from 0.9 µm to 1.6 µm
Mean Detectivity, D* (Typical) [1]	4.2 x 10^{13} cm√Hz/W
Noise Equivalent Irradiance (Typical)[1]	2.1 x 10^{8} photons/cm^2×s
Noise (RMS, Typical) [1]	35 electrons
Full Well (Typical) In OPR0	12 x 10^{6} electrons
Dynamic Range (Typical)[4]	4000:1
Operability [2]	≥ 99%
Exposure Times [3]	60 µs to 33 ms
Image Correction	2-point (offset and gain) pixel by pixel, user selectable
Digital Output Format	12 bit Camera Link® (SDR connector for enclosed version, ribbon for OEM version)
Analog Output Format	Buffered EIA170 compatible video, 30 fps (both versions)
Digital Output Frame Rate	30 fps (faster frame rates in windowed operation)
Scan Mode	Continuous, or 4 externally triggered modes, or ROI windowing mode

[1] λ = 1.55 µm, exposure time = 33.2 ms, Highest Sensitivity OPR setting, no lens, x1 digital gain with enhancement, AGC, and correction off.

[2] The fraction of pixels with responsivity deviation between +/- 35% from the mean.

[3] The pre-configured exposure times include factory stored non-uniformity corrections. Additional shorter, longer and custom exposure times are programmable via RS-232 commands.

[4] In high dynamic range OPR settings. Able to achieve 1000:1 in high sensitivity OPR settings.

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