Raytheon
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# Sensors Unlimited: 640CSX camera

## Mil-rugged, high-sensitivity, small-SWaP, InGaAs SWIR camera

The compact Sensors Unlimited Micro-SWIR™ 640CSX is the next-generation SWIR video camera, designed for applications requiring small size, weight and power (SWaP), and available without ITAR restrictions.

### BENEFITS

- 640 x 512 pixel format, 12.5 µm pitch
- 30 or 60 frames per second full frame rate
- 1.5 W power consumption (@ +20°C)
- High-sensitivity 0.9 to 1.7 µm spectrum response imager; NIR/SWIR from 0.7 to 1.7 µm
- Low-light to daytime imaging
- Compact size
- All solid-state InGaAs imager
- Snapshot exposure
- On-board, real-time non-uniformity corrections
- Digital 12-bit Camera Link® base output
- Automatic gain control (AGC)
- C-mount compatible; adapters available
- User-defined region of interest (ROI) windowing mode
- Tested to MIL-STD-810G for functional shock, vibration, thermal shock, storage temperature and humidity
- Operates from -40°C to +70°C case temperature

The Sensors Unlimited Micro-SWIR 640CSX features a 640 x 512 pixel, high-sensitivity, stabilized InGaAs snapshot imager and uses our advanced image enhancement algorithms to produce the highest-quality imagery in all lighting conditions.

The camera provides real-time daylight to low-light imaging in the short wave infrared (SWIR) wavelength spectrum for a range of applications that include industrial process monitoring, enhanced vision and persistent surveillance. On-board automatic gain control (AGC) optimizes the camera's dynamic response throughout day and night imaging scenarios. Camera Link® digital output provides for plug-and-play video with 12-bit images for digital image output.

The light weight, compact size and low power draw are ideally suited for integration into commercial systems and industrial process monitoring applications. Optional NIR/SWIR technology is available to extend the sensitivity of the 640CSX below 0.9 µm, offering the advantage of both near infrared (NIR) and short wave infrared wavelength response.

### Applications

- Low-light level imaging
- Covert surveillance
- Multi-laser spotting and tracking
- Imaging through atmospheric obscurants
- Small size facilitates integration into unmanned aerial vehicles (UAVs), handheld and soldier-mounted systems
- Industrial processing monitoring
- Enhanced Vision Systems (EVS)
- Silicon wafer or integrated circuit microscopy

# Sensors Unlimited: 640CSX camera

| Mechanical specifications | |
|---|---|
| **Model** | SU640CSX-12.5B-ENC housed series<br>SU640CSX-12.5B-OEM |
| **Dimensions (width x height x depth) (includes connectors, excludes lens mm)** | Enclosed: 1.25"W x 1.25"H x 1.21"D<br>31.8 x 31.8 x 30.7 mm<br>OEM: 1.25"W x 1.25"H x 1.21"D<br>31.8 x 31.8 x 30.7 mm |
| **Weight** | ENC Series: ≤45 grams<br>OEM Series: ≤41 grams |
| **Lens mount** | C-mount |
| **Camera link connector** | 26-pin SDR standard connector<br>Board-to-board connector option for OEM model |
| **Power input connector** | 14-pin SDR standard connector |
| **Pixel pitch** | 12.5 µm |
| **Focal plane array format** | 640 x 512 pixels |
| **Active area** | 8.0 mm x 6.4 mm x 10.2 mm diagonal |

| Environmental and power specifications | |
|---|---|
| **Operating case temperature** | -40˚C to +70˚C |
| **Storage temperature** | -54°C to +85°C |
| **Humidity** | 95% relative humidity – non-condensing |
| **Power requirements: AC adapter supplied DC voltage power** | DC voltage: +4.5-16V<br>Power: 1.5 W at +20°C case temperature, maximum <4.25 W |
| **Functional shock, random vibration, and thermal shock** | Tested to MIL-STD-81OG for functional shock, vibration, thermal shock, storage temperature and humidity |

Specifications subject to change without notice.


| Electrical specifications | 30 fps | 60 fps |
|---|---|---|
| **Optical fill factor** | 100 % | 100 % |
| **Spectral response** | Standard, 0.9 µm to 1.7 µm<br>NIR/SWIR, 0.7 µm to 1.7 µm | Standard, 0.9 µm to 1.7 µm<br>NIR/SWIR, 0.7 µm to 1.7 µm |
| **Quantum efficiency** | Standard, > 65% from 1 µm to 1.6 µm<br>NIR/SWIR, > 65% from 0.9 µm to 1.6 µm | Standard, > 65% from 1 µm to 1.6 µm<br>NIR/SWIR, > 65% from 0.9 µm to 1.6 µm |
| **Mean detectivity, D*** [1] | > 2.5 x $10^{13}$ cm√Hz/W (typical) | > 2.8 x $10^{13}$ cm√Hz/W (typical) |
| **Noise equivalent irradiance** [1] | < 9.7 x $10^{8}$ photons/$cm^2$/s (typical) | < 1.2 x $10^{9}$ photons/$cm^2$/s (typical) |
| **Noise (RMS)** [1] | < 35 electrons (typical) | < 25 electrons (typical) |
| **Dynamic range** [1] | > 2500:1 at low gain<br>> 800:1 at high gain | > 2500:1 at low gain<br>> 1100:1 at high gain |
| **Operability** [2] | > 99 % | > 99 % |
| **Exposure times, preconfigured** | 200 µs to 32 ms | 200 µs to 32 ms |
| **Image correction** | Two point (offset and gain) pixel by pixel, user selectable | Two point (offset and gain) pixel by pixel, user selectable |
| **Output format** | 12-bit base Camera Link® | 12-bit base Camera Link® |
| **Digital output frame rate** | 30 fps | 60 fps |
| **Scan mode** | Continuous | Continuous |

[1] Typical, λ =1550 nm, exposure time = 33 ms (30FPS) / 16.67 ms (60FPS), case temperature = 20°C, highest sensitivity gain setting, no lens, corrections off, 1x digital gain, with AGC, enhancement and correction off.
[2] The percentage of pixels with responsivity deviation less than 35% from the mean.

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