

M1



High Sensitivity Shortwave Infrared Camera
Powered by Cardinal 640

HIGH PERFORMANCE VIS-SWIR EXTENDED RANGE CAMERA

The M1 camera, powered by SCD Cardinal sensor platform, is a high-sensitivity VIS-SWIR camera with extended spectral range from 0.6 μ m to 1.7 μ m.

The camera uses a 640 x 512 format InGaAs detector with a 15 μ m pixel pitch and integral anti-blooming. On-chip correlated double sampling delivers a dynamic range in excess of 70dB with readout noise of less than 40 rms electrons making it ideal for light-starved applications (total noise including dark current is typically 60 rms electrons).

Available with both 16 bit Camera Link[®] and analog NTSC output, the M1 will run from 30 FPS to 60 FPS depending on factory configuration. Automatic gain and exposure control are available to optimize image quality over a large range of imaging conditions, and a proprietary, adaptive 3-point non-uniformity correction provides high quality imagery over -40° to +70° C operating conditions.

The M1 camera both images in NIR/SWIR and delivers Asynchronous Laser Pulse Detection (ALPD) capability. In ALPD mode, the sensor serves as a two dimensional detector capable of capturing laser pulses and providing the x-y coordinates of those pulses in both daytime and night-time conditions. The camera optionally provides the ability to detect, track and decode multiple laser spots in the camera field of view making the M1 ideal for see-spot operations.

Noise and image stability is optimized using proprietary thermal stabilization techniques and system performance is assured through 100% testing of each production unit. Full characterization data sets including mean-variance and noise equivalent irradiance plots are provided with each camera delivered.



M1

BENEFITS

ALPD mode

Allows for See Spot operations in all lighting conditions with multiple, asynchronous laser sources.

Low Power

With configurable cooling set-point to optimize power/performance.

Low Image Lag

Eliminates image persistence issues.

Extended Spectral Range

Increases sensitivity and allows shorter wavelength illuminators.

Compact Size

Standard camera fits small space claims.

APPLICATIONS

- UAV sensors
- Semiconductor Inspection
- Airborne reconnaissance (Haze penetration)
- Laser spot detection (See Spot)
- Bio Applications

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SYSTEM FEATURES

- 640 x 512 resolution, 30fps as default setting (29.97 fps in NTSC mode)
- 15-bit digitization for video
- Low read noise of <math><55e\text{-rms}</math>
- Imaging and ALPD mode
- Extended spectral response from 0.6 μm to 1.7 μm
- Snapshot image capture (to avoid rolling shutter artifact)
- Programmable operation (NUC, AGC, Trigger)
- Camera Link and NTSC
- Mil-spec environment
- Internal "free running" mode or external trigger configurable
- Custom housings and configurations available

M1

PARAMETER	VALUE	COMMENTS
Sensor Type	InGaAs	
Sensor Readout	Full-frame	Snapshot Mode
Image Format	640 x 512	
Pixel Size	15 μm x 15 μm	
Active Area	100% fill factor	
Spectral Response	0.6 μm to 1.7 μm	See QE plot
Read Noise	<math><40e\text{-rms}</math>	Typical
Total Noise	<math><60e\text{-rms}</math>	20°C sensor temperature
Frame Rate	30Hz up to 60Hz	
Dynamic Range	70dB	Typical
Power Dissipation	5 Watts	Typical at 30° case

MECHANICAL

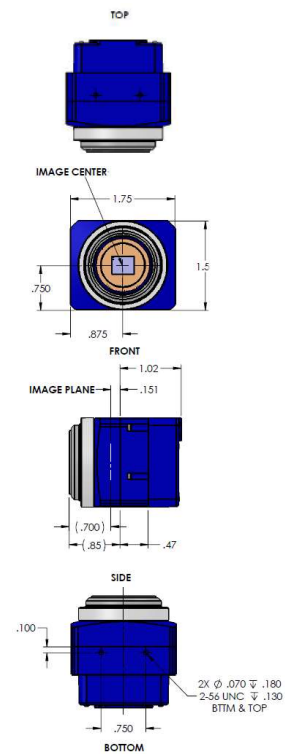
Housing Material	Aluminum	
Lens Mount	C-mount/M42	Other mounts available
Weight	<math><4\text{oz}</math>	
Dimensions	1.75" x 1.5" x 1.8"	See drawing

POWER AND SIGNAL INTERFACE

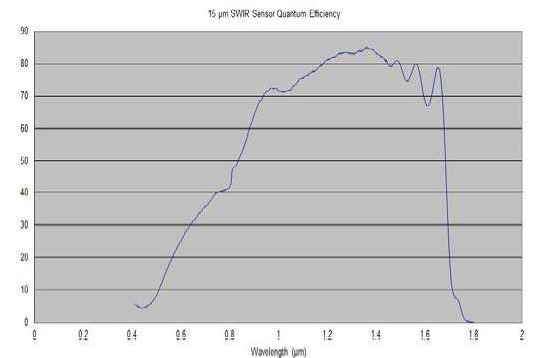
Power Input	+12VDC	Omnetics A22045-001
Data	Base Camera Link®	NTSC also available
Trigger/Sync		Samtec MCX and Camera Link® CC1
Mode Control	Serial port	Via Camera Link®

ENVIRONMENTAL

Operating Temp	-30°C to +60°C	Full Performance
	-40°C to +70°C	Degraded performance (random noise)
Storage Temp	-50°C to +85°C	
Humidity	Up to 90%	Non-condensing



Typical Spectral Response



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