

LWIR 8 – 12 μm HYPERSPECTRAL CAMERAS

Middleton Research offers three long-wave infrared hyperspectral cameras covering the range 8-12 μm from Specim Ltd. These cameras are used in various applications including security, camouflage detection, and geological mapping. The three models optimize different parameters, such as sensitivity and resolution.

High Sensitivity HS Model

The LWIR hyperspectral camera has an uncooled bolometer FPA camera with a wavelength range of 8-12 μm , a moderate spectral resolution of 200 nm, and 30 spectral bands. It is a compact model that is appropriate for many industry applications.

LWIR-HS / LWIR-HR



LWIR Camera Specifications

Optical Characteristics	LWIR HS	LWIR HR	LWIR C
Range	8-12 μm	8-12 μm	8-12 μm
Resolution (spatial x spectral)	384 x 42	384 x 119	384 x 84
Spectral Resolution	400 nm	100 nm diffraction limited	100 nm diffraction limited
Spectral Sampling	145 nm / band	50 nm / band	48 nm / band
Spatial Sampling	0.0564 degrees	0.0564 degrees	0.063 degrees
Aberrations	Insignificant astigmatism, smile or keystone < 0.1 pixels	Insignificant astigmatism, smile or keystone < 0.1 pixels	Insignificant astigmatism, smile or keystone < 0.1 pixels
Optics temperature	Uncooled	Uncooled	Stabilized
Numerical Aperture	F/1.0	F/1.0	F/2.0
Field of View	With fore lens L62: 21 degrees	With fore lens L62: 21 degrees	With fore lens L43: 24 degrees

Electrical Characteristics

Sensor	LWIR uncooled microbolometer	LWIR uncooled microbolometer	MCT
Camera Output	14-bit LVDS	14-bit LVDS	14-bit LVDS
Frame rate (full / binning)	60 Hz	60 Hz	100 Hz
Cooling	Uncooled	Uncooled	Stirling-cycle cooler
Frame Grabber	NI-PCI 1422 or 1424s National Instruments	NI-PCI 1422 or 1424 National Instruments	NI-PCI 1422 or 1424 National Instruments
Pixel Size	25 x 25 μm (pizel size)	25 x 25 μm (pizel size)	24 x 24 μm (pizel size)
Power Consumption	3.5 W	3.5 W	< 200 W
Signal-to-noise ratio	Target 400 K, 8 μm : 240, 10 μm : 210, 12 μm : 180 *	Target 800 K, 8 μm : 530, 10 μm : 402, 12 μm : 150 *	Target 300 K, 8 μm : 450, 10 μm : 580, 12 μm : 230 *
NESR (mW / m2sr μm)	8 μm : 171, 10 μm : 161, 12 μm : 139 *	8 μm : 2130, 10 μm : 1540, 12 μm : 2470 *	8 μm : 21, 10 μm : 18, 12 μm : 40 *
NETD / spectral pixel			0.2 K *

Environmental Characteristics

Storage	-20 to 50 C	-20 to 50 C	-20 to 50 C
Operating	5 to 40 C, non-condensing	5 to 40 C, non-condensing	5 to 40 C, non-condensing

Mechanical Characteristics

Size (LxWxH)	100 x 143 x 185 mm	100 x 143 x 185 mm	175 x 285 x 200 mm
Weight	3.5 kg	3.5 kg	13.1 kg
Body	Anodized Al and painted steel	Anodized Al and painted steel	Anodized Al and painted steel
Shutter	Yes (shutter / internal calibration)	Yes (shutter / internal calibration)	Yes (shutter / internal calibration)

* x2 software binning

Please note: Specifications are subject to change without notice.

High Resolution HR Model

The LWIR HR model has a wavelength range of 8-12 μm and a high spectral resolution of 70 nm and 85 bands, ideal for applications where the targets are at temperatures higher than ambient or where an IR source is used to illuminate the sample. The HR model is based on an uncooled bolometer FPA camera. Similar to the HS model, the HR model is compact and useful in many applications including gas emissions analysis and IR chemical imaging.

Cooled C Model

The LWIR C model has a wavelength range of 8-12 μm and is an integration of a state-of-the-art temperature-stabilized imaging spectrograph and a cooled, highly sensitive MCT FPA detector. With a spectral resolution of 48 nm, 84 spectral bands, and an image rate of up to 100 Hz, the LWIR hyperspectral camera C model is ideal for the most challenging ground-based applications including remote sensing and security.

Applications

- Geological mapping
- Mineral classification
- Volcanology
- Water temperature
- Camouflage detection
- Gas detection
- Flame analysis
- Land cover type recognition



LWIR-C

LWIR Camera Package

- Fore objective
- Control unit including power supply
- Control cable
- LVDS frame grabber
- LVDS data cable
- Power cord set
- Software CD
- Transport case

LWIR Camera Comparative Performance

SNR Table

Spectral Camera	300K	400K	800K	NESR
LWIRHS	63	210	1250	160 mW/(m ² srμm)
LWIRC	630	1600	-	16 mW/(m ² srμm)
LWIRHR	17	67	402	1600 mW/(m ² srμm)

LWIR Cased Camera Ordering Information

Part Number	Description	Product Name
MRC-303-007-01	LWIR hyperspectral camera - high sensitivity model	LWIRHS-LVDS-60-L120P
MRC-303-007-02	LWIR hyperspectral camera - high resolution model	LWIRHR-LVDS-60-L140M
MRC-303-007-03	LWIR hyperspectral camera - cooled model	LWIRC-LVDS-100-L120M