

# spectral camera **SWIR**

High-speed hyperspectral camera in the range 970-2500 nm that provides the accuracy required in today's most challenging near-infrared chemical imaging applications, from pharmaceutical quality assurance to food and agriculture analysis and Process Analytical Technologies.



**S**PECIM's Spectral Camera is an integrated combination of our ImSpector imaging spectrograph and an area monochrome camera. It works as a push-broom type line scan camera providing full, contiguous spectral data for each pixel.

The Spectral Camera SWIR consists of an ImSpector N25E imaging spectrograph for the wavelength region 970-2500nm and a cooled, temperature stabilized MCT detector. The transmission diffraction grating and lens optics used in the spectrograph provide a high quality, distortion free image which is designed to meet the unique requirements of the associated detector.

The rugged camera housing is designed for easy connectivity and operation. The camera

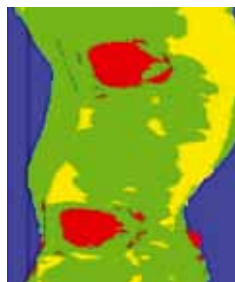
is delivered with separate power supply/temperature control unit, frame grabber and the necessary cables.

### UNIQUE DUAL COOLING SOLUTION

The MCT detector provides the highest sensitivity in the full SWIR spectral range. SPECIM's dual cooling solution keeps the detector chip in the required operating temperature of <200 K and stabilizes the total detector package temperature. It is designed to minimize the dark current and ensure high stability in the detector operations in a wide ambient temperature range. It makes the camera a real tool for process and outdoor uses.

## Applications

- Chemical Imaging for R&D
- Process Analytical Technologies
- Pharmaceutical manufacture
- Plastics sorting
- Mineral mapping
- Food and agriculture
- Moisture content distribution



Pork meat analysis



RGB image of capsules



Classified NIR image for identical and QA of the capsules

132 cm, 1050 pixels



40 cm, 320 pixels

### HIGH SPEED AND RESOLUTION

Spectral Camera SWIR images this set of drill cores samples in less than 11 seconds with 1.3 x 1.3 mm pixel resolution.

Drill core image processed by Finnish Geological Survey  
[www.adept.net.au](http://www.adept.net.au)

## Performance Specifications

SPECTRAL CAMERA SWIR			
<b>Optical characteristics</b>			
Spectrograph	ImSpector N25E		
Spectral range	970 - 2500 nm ±		
Spectral resolution	10 nm (30µm slit)		
Spectral sampling	6.3 nm		
Spatial resolution	rms spot radius < 15 µm		
Aberrations	Insignificant astigmatism, smile or keystone < 5 µm		
Numerical aperture	F/2.0		
Slit width options	30µm (50 or 80µm optional)		
Effective slit length	9.6mm		
Total efficiency (typical)	> 50%, independent of polarization		
Stray light	< 0.5% (halogen lamp, 1400 nm notch filter)		
<b>Electrical characteristics</b>			
Camera	MCT camera		
Pixels in full frame	320 (spatial) x 256 (spectral)		
Active pixels	320 (spatial) x 240 (spectral)		
Pixel size	30 x 30µm		
Cooling	4-stage Peltier for detector array, additional Peltier for active cooling of the detector package		
Camera output	14-bit LVDS		
Signal-to-noise ratio	800:1 (at max. signal level)		
Data cable	Length 5 meters		
Frame grabber	National Instruments PCL-1422		
Camera control	Serial port		
Frame rate	100 fps (maximum full frame)		
Exposure time range	0,1 - 20 ms		
Power consumption	< 200 W		
Input voltage	24 V		
<b>Mechanical characteristics</b>			
Size (L x W x H)	Sensor	Power supply	Control box
	392 x 170 x 151 mm	120 x 240 x 70 mm	260 x 260 x 95 mm
Weight	8,5 kg	1,9 kg	3,4 kg
	Anodized aluminium and painted steel with mounting screw holes		
Body	Standard C-mount		
Lens mount	None		
User adjustments	None		
<b>Environmental characteristics</b>			
Storage	- 20 ... +50 °C		
Operating	+ 5 ... +40 °C, non-condensing		

## ACCESSORIES

SPECIM can provide various accessories for the Spectral Cameras to broaden their applicability.

**Fore objective lenses**, specifically designed for optimized performance in 900-2500 nm.

Lens	Focal length	FOV
OLES 15	15 mm	36 degrees
OLES 22,5	22,5 mm	24 degrees
OLES 30	30 mm	18 degrees
OLES 56	56 mm	10 degrees
OLES Macro	1:1 imaging	

**Fiber optics** with collection lenses or SMA connectors: from 4 to 110 input channels in one spectrometer without a moving multiplexer.

**Various scanning systems:** mirror scanner on rotary stage for scanning static target and outdoor scenes, and X-stage sample mover for desktop and microscope applications.

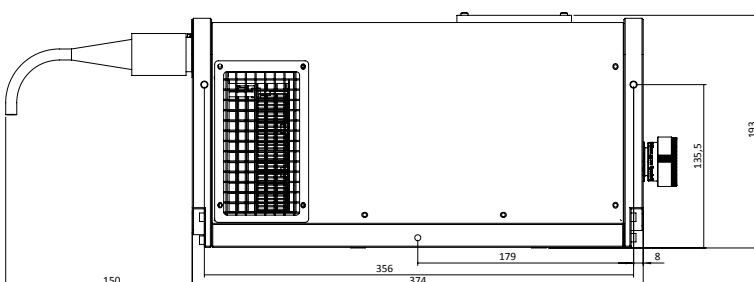
## SPECTRALDAQ SOFTWARE

SPECIM Spectral Camera SWIR is supported by SpectralDAQ software, which allows:

- data acquisition and saving data in the hard disk
- to set camera parameters
- image visualization in real time
- to control scanner systems

Datacubes are saved in ENVI compatible format that allows further image processing with several commercial software packages.

Side view



Bottom view

