Hyperspectral Imaging Solutions

- High-Precision
- Completely Integrated Systems
- Affordable
- Excellent Support

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Hyperspectral Imaging Cameras

Visible + Near Infrared (VNIR) 400 – 1,000 nm

Pika L
Lightweight, compact, ideal for airborne remote sensing applications.

Pika XC2
High-performance VNIR hyperspectral imager with high resolution and superior image quality.

Near Infrared (NIR) 900 – 1,700 nm

Pika NIR-320
Hyperspectral imaging camera covering the near infrared spectral range.

Pika NIR-640
High-precision infrared hyperspectral imaging camera. High spectral and spatial resolutions.
# Hyperspectral Cameras Specifications

<table>
<thead>
<tr>
<th></th>
<th>Pika L</th>
<th>Pika XC2</th>
<th>Pika NIR-320</th>
<th>Pika NIR-640</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spectral range (nm)</strong></td>
<td>400 - 1000</td>
<td>400 - 1000</td>
<td>900 - 1700</td>
<td>900 - 1700</td>
</tr>
<tr>
<td><strong>Spatial channels</strong></td>
<td>900</td>
<td>1600</td>
<td>320</td>
<td>640</td>
</tr>
<tr>
<td><strong>Spectral channels</strong></td>
<td>281</td>
<td>447</td>
<td>164</td>
<td>328</td>
</tr>
<tr>
<td><strong>Spectral resolution FWHM (nm)</strong></td>
<td>3.7</td>
<td>2.3</td>
<td>9.7</td>
<td>5.3</td>
</tr>
<tr>
<td><strong>Sampling resolution (nm)</strong></td>
<td>2.1</td>
<td>1.3</td>
<td>4.9</td>
<td>2.5</td>
</tr>
<tr>
<td><strong>Max frame rate (fps)</strong></td>
<td>249</td>
<td>165</td>
<td>520</td>
<td>249</td>
</tr>
<tr>
<td><strong>Interface</strong></td>
<td>USB 3.0</td>
<td>USB 3.0</td>
<td>GigE</td>
<td>GigE</td>
</tr>
<tr>
<td><strong>Weight, w/lens (kg)</strong></td>
<td>0.75</td>
<td>2.57</td>
<td>3.21</td>
<td>3.21</td>
</tr>
<tr>
<td><strong>Dimensions (cm)</strong></td>
<td>12.4 x 10.5 x 6.7</td>
<td>27.0 x 10.5 x 7.6</td>
<td>27.0 x 11.4 x 8.9</td>
<td>27.0 x 11.4 x 8.9</td>
</tr>
</tbody>
</table>
Objective Lenses

Objective lenses determine the field-of-view for each hyperspectral camera.

Field of View (FOV)
The Field of View defines the long dimension of the line “seen” by the imaging spectrometer in units of degrees. The user can change the FOV by changing the objective lens. See the table below to identify the lens that provides the optimal FOV for each application.

Instantaneous Field of View (IFOV)
The Instantaneous Field of View defines the narrow dimension of the line “seen” by the imaging spectrometer, reported in units of milli-radians.
Objective Lenses

Objective lenses determine the field-of-view for each hyperspectral camera.

<table>
<thead>
<tr>
<th>Model</th>
<th>Notes</th>
<th>FOV (deg)</th>
<th>IFOV (mrads)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pika L</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 mm</td>
<td></td>
<td>4.3</td>
<td>0.17</td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>6.0</td>
<td>0.24</td>
</tr>
<tr>
<td>23 mm</td>
<td>standard on benchtop and outdoor systems</td>
<td>13.1</td>
<td>0.52</td>
</tr>
<tr>
<td>17 mm</td>
<td>standard on airborne systems</td>
<td>17.6</td>
<td>0.71</td>
</tr>
<tr>
<td>12 mm</td>
<td></td>
<td>24.8</td>
<td>1.00</td>
</tr>
<tr>
<td>8 mm</td>
<td></td>
<td>36.5</td>
<td>1.50</td>
</tr>
<tr>
<td>6 mm</td>
<td></td>
<td>47.4</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Pika XC2</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70 mm</td>
<td></td>
<td>7.7</td>
<td>0.17</td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>10.7</td>
<td>0.24</td>
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<td>23.1</td>
<td>0.52</td>
</tr>
<tr>
<td>17 mm</td>
<td>standard on airborne systems</td>
<td>30.8</td>
<td>0.71</td>
</tr>
<tr>
<td>12 mm</td>
<td></td>
<td>42.7</td>
<td>1.00</td>
</tr>
<tr>
<td>8 mm</td>
<td></td>
<td>60.8</td>
<td>1.50</td>
</tr>
<tr>
<td>6 mm</td>
<td></td>
<td>76.0</td>
<td>2.00</td>
</tr>
<tr>
<td><strong>Pika NIR-320</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 mm</td>
<td></td>
<td>5.5</td>
<td>0.30</td>
</tr>
<tr>
<td>75 mm</td>
<td></td>
<td>7.3</td>
<td>0.40</td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>11.0</td>
<td>0.60</td>
</tr>
<tr>
<td>25 mm</td>
<td>standard on all systems</td>
<td>21.7</td>
<td>1.20</td>
</tr>
<tr>
<td>6.0 mm</td>
<td></td>
<td>77.3</td>
<td>5.00</td>
</tr>
<tr>
<td><strong>Pika NIR-640</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 mm</td>
<td></td>
<td>5.5</td>
<td>0.15</td>
</tr>
<tr>
<td>75 mm</td>
<td></td>
<td>7.3</td>
<td>0.20</td>
</tr>
<tr>
<td>50 mm</td>
<td></td>
<td>11.0</td>
<td>0.30</td>
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<tr>
<td>25 mm</td>
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<td>0.60</td>
</tr>
<tr>
<td>6.0 mm</td>
<td></td>
<td>77.3</td>
<td>2.50</td>
</tr>
</tbody>
</table>
Airborne Systems

Complete hyperspectral imaging systems for remote sensing.
Includes all hardware and software necessary to deliver georegistered hyperspectral data.

**Standard kit components:**
- Hyperspectral Imaging Camera
- Objective Lens (17mm standard)
- Data Acquisition Unit
- GPS/IMU & Georectification Software
- Post-Processing & Analytical Software
- System Mounts for UAV’s and Piloted Aircraft
- Radiometric Calibration
- Calibration Target
- Protective Travel Case

**Options:**
- Downwelling Irradiance Sensor
- High-precision GPS/IMU (dual antenna)
- Training Services

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**Complete System Weights (kg)**

<table>
<thead>
<tr>
<th></th>
<th>kit only, no imager</th>
<th>Pika L</th>
<th>Pika XC2</th>
<th>Pika NIR-320</th>
<th>Pika NIR-640</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Standard GPS/IMU</strong></td>
<td>0.80</td>
<td>1.55</td>
<td>3.37</td>
<td>4.31</td>
<td>4.31</td>
</tr>
<tr>
<td><strong>High-Precision GPS/IMU</strong></td>
<td>0.93</td>
<td>1.68</td>
<td>3.50</td>
<td>4.44</td>
<td>4.44</td>
</tr>
</tbody>
</table>
Airborne System Options

GPS/IMU Options
The standard system includes a single-antenna GPS/IMU.
The High-Precision Option uses two antennas for increased accuracy.

<table>
<thead>
<tr>
<th></th>
<th>Standard GPS/IMU</th>
<th>High-Precision GPS/IMU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Accuracy, SBAS (m)</td>
<td>0.6</td>
<td>0.6</td>
</tr>
<tr>
<td>Accuracy, Pitch (deg)</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Accuracy, Roll (deg)</td>
<td>0.2</td>
<td>0.1</td>
</tr>
<tr>
<td>Accuracy, Heading (deg)</td>
<td>1</td>
<td>0.2</td>
</tr>
<tr>
<td>Weight (kg)</td>
<td>0.05</td>
<td>0.18</td>
</tr>
</tbody>
</table>

Downwelling Sensors
A downwelling irradiance sensor is a point spectrometer that flies with the system and measures solar illumination during flight.

Training Services
Training services include two days instruction. Location can be at Resonon or customer’s facility.

Topics include:
• Installation
• Parameter Estimation
• System Setup
• Data Processing
• Georectification
• Data Analysis
Benchtop System
Reflectance Configuration

Hyperspectral system designed for laboratory measurements. Contains all hardware and software to acquire and analyze hyperspectral data.

The linear translation stage holds the sample and translates across the field of view. Used for small samples that are easy to move.

System Components:
- Hyperspectral Imaging Camera
- Objective Lens (23mm standard)
- Linear Translation Stage
- High Intensity Stabilized Broadband Line Light
- Mounting Tower and Baseplate
- Data Acquisition Computer & Software
- Calibration Tile

Custom stage and lighting configurations are available.
Benchtop System
Transmission Configuration

Hyperspectral system designed for laboratory measurements. Contains all hardware and software to acquire and analyze hyperspectral data.

Backlighting with a clear stage platform, for transmission measurements. Often used to scan biological and mineralogical samples.

System Components:
- Hyperspectral Imaging Camera
- Objective Lens (23mm standard)
- Linear Translation Stage with Clear Tray
- Stabilized Broadband Backlight
- Mounting Tower and Baseplate
- Data Acquisition Computer & Software

Custom stage and lighting configurations are available.
Benchtop System
Combined Reflectance/Transmission Configuration

Hyperspectral system designed for laboratory measurements.
Contains all hardware and software to acquire and analyze hyperspectral data.

Clear stage with top and bottom lighting. Allows for both reflectance and transmission measurements.

System Components:
- Hyperspectral Imaging Camera
- Objective Lens (23mm standard)
- Linear Translation Stage with Clear Tray
- High Intensity Stabilized Broadband Lighting Assembly
- Stabilized Broadband Backlight
- Mounting Tower and Baseplate
- Data Acquisition Computer & Software
- Calibration Tile

Custom stage and lighting configurations are available.
Benchtop System
Reflectance of Large Samples

Hyperspectral system designed for large stationary samples.
Contains all hardware and software to acquire and analyze hyperspectral data.

The imager and lighting assembly are mounted to a long stage, and the stage is mounted to the tower or towers. Vertical and horizontal orientations are possible. Used to scan large stationary objects.

System Components:
- Hyperspectral Imaging Camera
- Objective Lens (23mm standard)
- Linear Translation Stage, 89 cm
- High Intensity Stabilized Broadband Lighting Assembly
- Mounting Towers and Baseplates
- Data Acquisition Computer & Software
- Radiometric Calibration
- Calibration Standard

Custom stage and lighting configurations are available.
Outdoor System

Hyperspectral system designed for outdoor measurements. Contain all hardware and software to acquire and analyze hyperspectral data.

The imager is mounted to a rotation stage on a tripod, and rotates to scan the scene of interest. The tripod is fitted with a tray to hold a laptop computer.

Standard kit components:

- Hyperspectral Imaging Camera
- Objective Lens (23mm standard)
- Rotational Scanning Stage & Tripod
- Ruggedized Laptop & Data Acquisition Software
- Radiometric Calibration
- Calibration Target
- Power Supply
- Protective Travel Case

![Image of hardware components: Hyperspectral camera, Rotational scanning stage, High-strength tripod with laptop tray, SpectrononPro software.}
Spectronon software is used to control Resonon’s benchtop and outdoor hyperspectral imaging systems. Many data processing, analysis, and visualization tools are included, and user-written plugins are also supported.

Spectronon comes standard with the Benchtop and Outdoor Systems.

A free version of Spectronon is available for download at our website. This version contains all the analysis and visualization features of the full version but does not include controls for the hyperspectral cameras and stages.

Spectronon runs on Windows 7 and 10 operating systems.

Software Development Kit (SDK)

A C++ SDK is available for direct control of Resonon’s hyperspectral imaging cameras. The SDK allows a user to integrate a Resonon hyperspectral camera directly into their custom system.

The SDK runs on Windows 7 and 10 operating systems.