# EnMAP HSI Instrument Specification

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spectral range:</td>
<td>420 nm - 2450 nm</td>
</tr>
<tr>
<td>Spectral sampling distance:</td>
<td>6.5 nm (420 nm - 1000 nm; VNIR) 10 nm (900 nm - 2450 nm; SWIR)</td>
</tr>
<tr>
<td>Spectral accuracy:</td>
<td>0.5 nm (VNIR) / 1.0 nm (SWIR)</td>
</tr>
<tr>
<td>Signal-to-Noise ratio:</td>
<td>500 (at 495 nm; VNIR) 150 (at 2200 nm; SWIR)</td>
</tr>
<tr>
<td>Smile and keystone:</td>
<td>0.2 pixel</td>
</tr>
<tr>
<td>Polarization sensitivity:</td>
<td>5%</td>
</tr>
<tr>
<td>Radiometric resolution:</td>
<td>14 bits</td>
</tr>
<tr>
<td>Radiometric accuracy:</td>
<td>5%</td>
</tr>
<tr>
<td>On-board calibration:</td>
<td>Full aperture diffuser&lt;br&gt;Integrated sphere with various calibration lamps&lt;br&gt;Shutter for dark measurements</td>
</tr>
<tr>
<td>Telescope:</td>
<td>Three-mirror anastigmat&lt;br&gt;Focal length: 522.4 mm&lt;br&gt;Aperture: 174 mm in diameter&lt;br&gt;F-number: 3.0</td>
</tr>
<tr>
<td>Geometric resolution:</td>
<td>30 m x 30 m (swath width: 30 km)&lt;br&gt;(IFOV 9.5 arcsec x integration time 4.4 ms (FOV 2.63 deg))&lt;br&gt;swath length of 5000 km per day with 512 Gbit on-board mass memory</td>
</tr>
<tr>
<td>Modular Transfer Function:</td>
<td>&gt; 0.25 @ 60m across track&lt;br&gt;0.16 @ 60m along track&lt;br&gt;0.64 @ 240m across track&lt;br&gt;0.62 @ 240m along track</td>
</tr>
<tr>
<td>Geometric co-registration:</td>
<td>0.2 pixel</td>
</tr>
<tr>
<td>Pointing:</td>
<td>Accuracy: 500 m&lt;br&gt;Knowledge: 100 m&lt;br&gt;Stability: 1.5 m in 4 ms&lt;br&gt;Agility: 30° in 5 min with pointing stabilization</td>
</tr>
</tbody>
</table>
### EnMAP Orbit and Communication Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Orbit altitude:</td>
<td>652 km (7020.4 km semi-major axis)</td>
</tr>
<tr>
<td>Repeat cycle:</td>
<td>27 days, 398 revolutions</td>
</tr>
<tr>
<td>Inclination angle:</td>
<td>97.98° (polar, sun-synchronous)</td>
</tr>
<tr>
<td>Orbital period:</td>
<td>5854 s</td>
</tr>
<tr>
<td>Local time descending node:</td>
<td>11:00 h ± 18 min.</td>
</tr>
<tr>
<td>Revisit:</td>
<td>4 days (±30° off-nadir tilt)</td>
</tr>
<tr>
<td></td>
<td>27 days (±5° off-nadir tilt)</td>
</tr>
<tr>
<td>Communication:</td>
<td>4 Kbit/s (S-band uplink)</td>
</tr>
<tr>
<td></td>
<td>32 Kbit/s (S-band downlink)</td>
</tr>
<tr>
<td></td>
<td>320 Mbit/s (X-band downlink)</td>
</tr>
</tbody>
</table>

### EnMAP Platform and Launcher Specifications

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size of satellite:</td>
<td>3.1 m × 2.0 m × 1.7 m</td>
</tr>
<tr>
<td>Launch mass of satellite:</td>
<td>936 kg (including 55 kg hydrazine)</td>
</tr>
<tr>
<td>Launcher:</td>
<td>Indian PSLV (Polar Satellite Launch Vehicle) rocket</td>
</tr>
<tr>
<td>Launch site:</td>
<td>Sriharikota, India</td>
</tr>
<tr>
<td>Launch date:</td>
<td>2018</td>
</tr>
<tr>
<td>Operational lifetime:</td>
<td>&gt; 5 years</td>
</tr>
<tr>
<td>Power of satellite:</td>
<td>nominal 32 V</td>
</tr>
<tr>
<td></td>
<td>6.1 m² solar panels providing 970 W (EOL)</td>
</tr>
<tr>
<td></td>
<td>Li-Ion cells with 2 modules and 87 Ah (EOL)</td>
</tr>
<tr>
<td>Attitude control of satellite:</td>
<td>3-axis stabilized</td>
</tr>
<tr>
<td></td>
<td>Sensors: Star Sensors, Sun Presence Sensors, Magnetometer, Gyroscope</td>
</tr>
<tr>
<td></td>
<td>Navigation: GPS</td>
</tr>
<tr>
<td></td>
<td>Actuators: Reaction Wheels, Magnetic Torquers</td>
</tr>
<tr>
<td>Orbit control of satellite:</td>
<td>2 thrusters with 1 N each</td>
</tr>
</tbody>
</table>