

Velodyne Lidar®

# Security Solutions

POWERFUL MONITORING AND PROTECTION IN A RANGE OF PHYSICAL ENVIRONMENTS



By providing reliable object detection and tracking day or night, Velodyne's sensors decrease the number of false positive and false negative readings to facilitate effective threat response. In security applications, lidar also preserves privacy while improving the efficiency of system implementation and performance. Velodyne's sensors deliver powerful monitoring and protection in a range of physical environments, including:

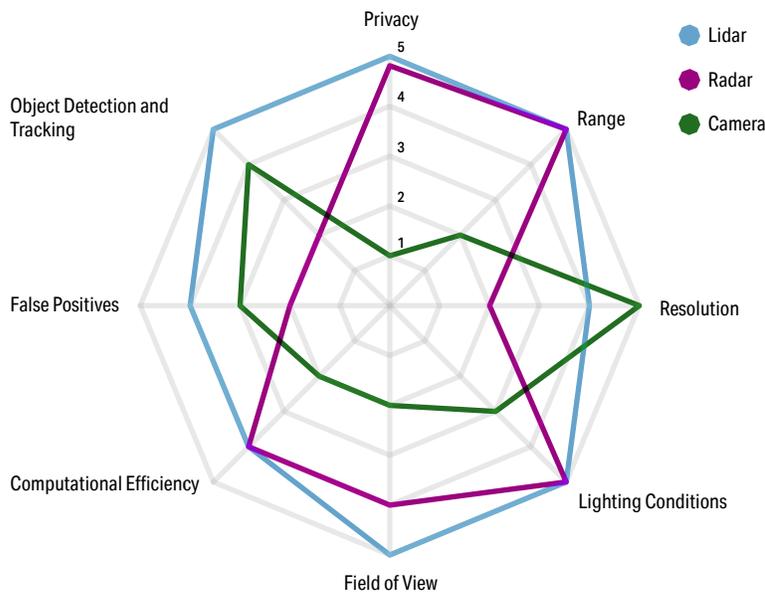
- Airports
- Energy facilities
- Industrial plants
- Institutions
- Commercial and private property
- Transportation infrastructure



## ADVANTAGES OF LIDAR-BASED SECURITY

- Real-time distance measurements (3D perception)
- Object detection and tracking in all light conditions
- Increased signal-processing and automated detection efficiency
- Decreased false positive/negative readings
- Superior perception coverage for simplified and less expensive installation
- Privacy protection

## SENSOR PERFORMANCE COMPARISON FOR SECURITY





Ultra Puck™



Puck™

**Specifications<sup>1</sup>**

*(Subject to change)*

**Specifications:**

<p><b>Sensor</b></p>	<ul style="list-style-type: none"> <li>• Channels: 32</li> <li>• Measurement Range: 200 m</li> <li>• Range Accuracy: Up to ±3 cm (Typical)<sup>2</sup></li> <li>• Horizontal Field of View: 360°</li> <li>• Vertical Field of View: 40° (-25° to +15°)</li> <li>• Minimum Angular Resolution (Vertical): 0.33° (non-linear distribution)</li> <li>• Angular Resolution (Horizontal/Azimuth): 0.1° to 0.4°</li> <li>• Frame Rate: 5 Hz to 20 Hz</li> <li>• Integrated Web Server for Easy Monitoring and Configuration</li> </ul>	<ul style="list-style-type: none"> <li>• 16 Channels</li> <li>• Measurement Range: 100 m</li> <li>• Range Accuracy: Up to ±3 cm (Typical)<sup>1</sup></li> <li>• Field of View (Vertical): +15.0° to -15.0° (30°)</li> <li>• Angular Resolution (Vertical): 2.0°</li> <li>• Field of View (Horizontal): 360°</li> <li>• Angular Resolution (Horizontal/Azimuth): 0.1° – 0.4°</li> <li>• Rotation Rate: 5 Hz – 20 Hz</li> <li>• Integrated Web Server for Easy Monitoring and Configuration</li> </ul>
<p><b>Laser</b></p>	<ul style="list-style-type: none"> <li>• Laser Product Classification: Class 1 – Eye-safe per IEC60825-1:2014</li> <li>• Wavelength: ~903 nm</li> </ul>	<ul style="list-style-type: none"> <li>• Laser Product Classification: Class 1 Eye-safe per IEC 60825-1:2007 &amp; 2014</li> <li>• Wavelength: 903 nm</li> </ul>
<p><b>Mechanical/ Electrical/ Operational</b></p>	<ul style="list-style-type: none"> <li>• Power Consumption: 10 W (Typical)<sup>3</sup></li> <li>• Operating Voltage: 10.5 V – 18 V (with interface box and regulated power supply)</li> <li>• Weight: ~925 g (typical, without cabling and interface box)</li> <li>• Dimensions: See diagram on previous page</li> <li>• Environmental Protection: IP67</li> <li>• Operating Temperature: -20°C to +60°C<sup>4</sup></li> <li>• Storage Temperature: -40°C to +85°C</li> </ul>	<ul style="list-style-type: none"> <li>• Power Consumption: 8 W (Typical)<sup>2</sup></li> <li>• Operating Voltage: 9 V – 18 V (with Interface Box and Regulated Power Supply)</li> <li>• Weight: ~830 g (without Cabling and Interface Box)</li> <li>• Dimensions: See diagram on previous page</li> <li>• Environmental Protection: IP67</li> <li>• Operating Temperature: -10°C to +60°C<sup>3</sup></li> <li>• Storage Temperature: -40°C to +105°C</li> </ul>
<p><b>Output</b></p>	<ul style="list-style-type: none"> <li>• 3D Lidar Data Points Generated:                         <ul style="list-style-type: none"> <li>- Single Return Mode: ~600,000 points per second</li> <li>- Dual Return Mode: ~1,200,000 points per second</li> </ul> </li> <li>• 100 Mbps Ethernet Connection</li> <li>• UDP Packets Contain:                         <ul style="list-style-type: none"> <li>- Time of Flight Distance Measurement</li> <li>- Calibrated Reflectivity Measurement</li> <li>- Rotation Angles</li> <li>- Synchronized Time Stamps (µs resolution)</li> </ul> </li> <li>• GPS: \$GPRMC and \$GPGGA NMEA Sentences from GPS Receiver (GPS not included)</li> </ul>	<ul style="list-style-type: none"> <li>• 3D Lidar Data Points Generated:                         <ul style="list-style-type: none"> <li>- Single Return Mode: ~300,000 points per second</li> <li>- Dual Return Mode: ~600,000 points per second</li> </ul> </li> <li>• 100 Mbps Ethernet Connection</li> <li>• UDP Packets Contain:                         <ul style="list-style-type: none"> <li>- Time of Flight Distance Measurement</li> <li>- Calibrated Reflectivity Measurement</li> <li>- Rotation Angles</li> <li>- Synchronized Time Stamps (µs resolution)</li> </ul> </li> <li>• GPS: \$GPRMC and \$GPGGA NMEA Sentences from GPS Receiver (GPS not included)</li> </ul>

XX-XXXX Rev-A

**For more details and ordering information, contact Velodyne Sales ([sales@velodyne.com](mailto:sales@velodyne.com))**

1. These are projected specifications for final production parts. The specifications for any sample, prototype, or other non-final or pre-production parts may be different from the specifications in this document. For more information, please contact Velodyne Sales.
2. Typical accuracy refers to ambient wall test performance across most channels and may vary based on factors including but not limited to range, temperature and target reflectivity.
3. Operating power may be affected by factors including but not limited to range, reflectivity and environmental conditions.
4. Operating temperature may be affected by factors including but not limited to air flow and sun load.



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14 Odem ST. P.O.B. 7042 Petach Tikva 4917001, ISRAEL | Office: +972-3-924-3352  
 Fax: +972-3-9243385 | [sales@hypertech.co.il](mailto:sales@hypertech.co.il) | [www.hypertech.co.il](http://www.hypertech.co.il)

[www.velodynelidar.com/security](http://www.velodynelidar.com/security)