PwrPak7D-E1

Compact Dual Antenna Enclosure
Delivers Leading SPAN GNSS+INS Technology by Hexagon | NovAtel

**Dual Antenna Input**
Multi-frequency, dual antenna input allows the PwrPak7D-E1 to harness the power of NovAtel RTK and ALIGN functionality. This makes the PwrPak7D-E1 ideal for ground, marine or aircraft based systems, providing industry-leading GNSS multi-constellation heading and position data in static and dynamic environments.

**World Leading GNSS+INS Technology**
SPAN GNSS+INS technology brings together two different but complementary technologies: Global Navigation Satellite System (GNSS) positioning and inertial navigation. The absolute accuracy of GNSS positioning and the stability of Inertial Measurement Unit (IMU) gyro and accelerometer measurements are deeply coupled to provide an exceptional 3D navigation solution that is stable and continuously available, even through periods when satellite signals are blocked.

**SPAN-Enabled MEMS Receiver**
The PwrPak7D-E1 contains an Epson G320N MEMS IMU to deliver world class SPAN technology in an integrated, single box solution. This product is commercially exportable and provides an excellent price/performance/size GNSS+INS solution.

**Future-Proofed Scalability**
Capable of tracking all present and upcoming GNSS constellations and satellite signals, the PwrPak7D-E1 is a robust, high precision receiver that is software upgradeable in the field to provide the custom performance required for your application demands. The PwrPak7D-E1 has a powerful OEM7 GNSS engine, integrated MEMS IMU, built in Wi-Fi, onboard NTRIP client and server support, and 16 GB of internal storage.

**Precise Thinking Makes It Possible**
Our GNSS products have set the standard in quality and performance for over 20 years. State-of-the-art, lean manufacturing facilities in our North American headquarters produce the industry’s most extensive line of OEM receivers, antennas and subsystems.

**Benefits**
- Small, low-power, all-in-one GNSS/INS enclosure
- Easy integration into space and weight constrained applications
- Commercially exportable system
- Rugged design ideal for challenging environments
- Enhanced connection options including serial, USB, CAN and Ethernet
- Future proof for upcoming GNSS signal support

**Features**
- Low noise commercial grade Gyros and Accelerometers
- Dedicated Wheel Sensor input
- TerraStar correction services supported over multi-channel L-Band and IP connections
- Advanced interference mitigation features
- SPAN GNSS+INS capability with configurable application profiles
- Dual antenna ALIGN heading
- 16 GB of internal storage
- Built-in Wi-Fi support
Performance

Signal Tracking

GPS  L1/CA, L1C, L2C, L2P, L5
GLONASS L1/C/A, L2/C/A, L2P, L3, L5
Galileo E1, E5 AltBOC, E5a, E5b
BeiDou B1I, B1C, B2I, B2a, B2b
QZSS L1 C/A, L1C, L2C, L5
NavIC (IRNSS) L5
SBAS5 L1, L5
L-Band\(^1\) up to 5 channels

Horizontal Position Accuracy (RMS)

- Single Point L1: 1.5 m
- Single Point L1/L2: 1.2 m
- SBAS\(^1\): 50 cm
- DGPS: 40 cm
- TerraStar-L\(^1\): 40 cm
- TerraStar-C PRO\(^2\): 2.5 cm
- TerraStar-X\(^1\): 2 cm
- RTK: 1 cm + 1 ppm

Initial time < 10 s
Initialization reliability > 99.9%

ALIGN Heading Accuracy

- Baseline: Accuracy (RMS)
  - 2 m: 0.08 deg
  - 4 m: 0.05 deg

Maximum Data Rate

- GNSS Measurements: up to 20 Hz
- GNSS Position: up to 20 Hz
- INS Solution: up to 200 Hz
- IMU Raw Data Rate: 125 Hz or 200 Hz

Time to First Fix

- Cold start\(^4\): < 39 s (typ)
- Hot start\(^4\): < 20 s (typ)

Time Accuracy\(^5\)

- 20 ns RMS

Velocity Limit\(^6\)

- 515 m/s

IMU Performance\(^7\)

- Gyroscope Performance
  - Input range: ±150 deg/s
  - Bias stability: 0.1 deg/hr
  - Angular random walk: 0.05 deg/s/√hr

- Accelerometer Performance
  - Range: ±15 g
  - Bias stability: 0.1 mg
  - Velocity random walk: 0.05 m/s/√hr

Communication Ports

- 1 RS-232 / RS-422 selectable
- 1 USB 2.0 (device) HS
- 1 RS-232
- 1 Quad Wheel Sensor input
- 1 Pulse Per Second output
- 1 Quadrature Wheel Sensor input
- 1 Event inputs
- 1 Event outputs
- 1 USB host Micro A/B
- 1 Ethernet RJ45
- 2 Antennas SMA
- 1 Data Logging Push button
- Power SAL M12, 5 pin, male

Status LEDs

- Power
- GNSS
- INS
- Data Logging USB

Environmental

- Temperature
  - Operating: -40°C to +75°C
  - Storage: -40°C to +85°C

- Humidity
  - 95% non-condensing

- Ingress Protection Rating
  - IP67

Vibration (operating)

- Random: MIL-STD-810H, Method 514.8 (Cat 24, 20 g RMS)
- Sinusoidal: IEC 60068-2-6

- Acceleration (operating)
  - MIL-STD-810H, Method 513.8 (Cat 14, 5 g RMS)
  - 515 m/s
  - 0.075 W
  - ±5 g
  - 0.1 deg/hr
  - 3.5 deg/hr

- Shock (operating)
  - MIL-STD-810H, Method 516.8, Procedure II (16 g)
  - 0.60 g
  - 0.1 deg/√hr

- Bump (operating)
  - IEC 60068-2-27 (25g)
  - 0.15 g

Compliance

- FCC, ISED, CE and Global Type Approvals

Included Accessories

- Power cable
- USB cable
- DSUB HD26 to DB9 RS-232 cable

Optional Accessories

- Full breakout cable for DSUB HD26 connector
- DSUB HD26 to M12 IMU cable
- RJ45 Ethernet cable
- VEXXIS GNSS-500 and GNSS-800 series antennas
- Compact GNSS antennas
- GrafNav/GrafNet
- Inertial Explorer
- NovAtel Application Suite

Hardware Options

- PwrPak7DM-E1 no Wi-Fi, no 16 GB internal storage

Performance During GNSS Outages\(^1\)

<table>
<thead>
<tr>
<th>Outage Duration</th>
<th>Positioning Mode</th>
<th>Position Accuracy (M) RMS</th>
<th>Velocity Accuracy (M/S) RMS</th>
<th>Attitude Accuracy (Degrees) RMS</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 s</td>
<td>RTK(^6)</td>
<td>0.02</td>
<td>0.03</td>
<td>0.020</td>
</tr>
<tr>
<td></td>
<td>PPP</td>
<td>0.06</td>
<td>0.15</td>
<td>0.010</td>
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<tr>
<td></td>
<td>SP</td>
<td>1.00</td>
<td>0.60</td>
<td>0.009</td>
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<tr>
<td></td>
<td>Post Processed(^6)</td>
<td>0.01</td>
<td>0.02</td>
<td>0.009</td>
</tr>
<tr>
<td>10 s</td>
<td>RTK(^6)</td>
<td>0.27</td>
<td>0.13</td>
<td>0.070</td>
</tr>
<tr>
<td></td>
<td>PPP</td>
<td>0.31</td>
<td>0.25</td>
<td>0.020</td>
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<tr>
<td></td>
<td>SP</td>
<td>1.25</td>
<td>0.70</td>
<td>0.040</td>
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<tr>
<td></td>
<td>Post Processed(^6)</td>
<td>0.02</td>
<td>0.02</td>
<td>0.009</td>
</tr>
<tr>
<td>60 s</td>
<td>RTK(^6)</td>
<td>15.02</td>
<td>1.63</td>
<td>0.720</td>
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<tr>
<td></td>
<td>PPP</td>
<td>15.06</td>
<td>1.75</td>
<td>0.065</td>
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<tr>
<td></td>
<td>SP</td>
<td>16.00</td>
<td>2.20</td>
<td>0.095</td>
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<tr>
<td></td>
<td>Post Processed(^6)</td>
<td>0.35</td>
<td>0.10</td>
<td>0.030</td>
</tr>
</tbody>
</table>

1. Typical values. Performance specifications subject to GNSS system characteristics, Signal-in-Space (SIS) operational degradation, ionospheric and tropospheric conditions, satellite geometry, baseline length, multipath effects and the presence of intentional or unintentional interference. 2. Model-configurable to track L5/E5a (all / Galileo) through L2 (GPS) or L3/E5b/B2 (GLONASS / Galileo / BeiDou) through L2 (GLONASS). See manual for details. 3. Hardware ready for L3 and L5. 4. Ebit and Ebits support only. 5. L-Band and SBAS reception on primary antenna only. 6. GPS only. 7. Requires a subscription to a TerraStar data service. Subscriptions available from NovAtel. 8. Typical value. No almanac or ephemerides and no approximate position or time. 9. Typical value. Almanac and recent ephemerides saved and approximate position and time entered. 10. Time accuracy does not include biases due to RF or antenna delay. 11. Export licensing restricts operation to a maximum of 515 meters per second, message output impacted above 500 m/s. 12. Supplied by IMU manufacturer. 13. Typical values using serial port communication without interference mitigation. Consult the DEM/UD User Documentation for power supply considerations. 14. Typically should be added to all position values to account for additional error due to baseline length. 15. Post-processing results using Inertial Explorer software. The survey data used to generate these statistics had frequent changes in azimuth.

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For the most recent details of this product: novatel.com

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