PwrPak7D-E1

Compact dual-antenna enclosure delivers leading SPAN GNSS+INS technology from 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 System (INS). The absolute accuracy of GNSS positioning with the stability of inertial measurement unit (IMU) gyro and accelerometer measurements generate a 3D navigation solution that is stable and continuously available. Deeply coupling the GNSS and inertial measurements through SPAN technology enables better bridging through GNSS interruptions and rapid reacquisition of signals.

PwrPak7D-E1 advantages
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
- Spoofing detection, interference detection and mitigation provided by GNSS Resilience and Integrity Technology (GRIT)
- SPAN GNSS+INS capability with configurable application profiles
- Dual-antenna ALIGN heading
- 16 GB of internal storage
- Built-in Wi-Fi support
- Supports Precision Time Protocol (PTP)
- Hardware variants available without Wi-Fi or internal storage
### Performance

#### Signal tracking

- **GPS**: L1/C/A, L1C, L2C, L2P, L5
- **GLONASS**: L1 C/A, L2 C/A, L2P, L3, L5
- **Galileo**
  - E1, E5a, E5b, E6b
- **BeiDou**
  - B1I, B1C, B2I, B2a, B2b
- **QZSS**: L1 C/A, L1C, L1S, L2C, L5
- **GNV/C (IRNSS)**
  - L5
- **SBAS**: L1, L5
- **L-Band**: up to 5 channels

#### Horizontal position accuracy (RMS)

- Single point L1/L2: 1.2 m
- **TerraStar-L**
  - 40 cm
- **TerraStar-C PRO**
  - 2.5 cm
- **RTK**: 1 cm + 1 ppm

#### ALIGN heading accuracy

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

#### 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**: < 34 s (typ)
- **Hot start**: < 20 s (typ)

#### Time accuracy

- < 5 ns RMS

#### Velocity limit

- **Horizontal**: 600 m/s

### IMU performance

#### Gyroscope performance

- **Technology**: MEMS
- **Dynamic range**: 150 °/s
- **Bias instability**: 3.5 °/hr
- **Angular random walk**: 0.1 °/hr

#### Accelerometer performance

- **Technology**: MEMS
- **Dynamic range**: 5 g
- **Bias instability**: 0.1 mg
- **Velocity random walk**: 0.05 m/s/hr

#### 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
- **Sinusoidal**: IEC 60068-2-6

### Shock (operating)

- **MIL-STD-810H, Method 513.8, Procedure II (25g)**

### Bump (operating)

- **MIL-STD-810H, Method 513.8, Procedure I (16 g)**

### Compliance

- **FCC, ISED, CE and Global Type Approvals**

### Performance during GNSS outages

<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>
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<tbody>
<tr>
<td></td>
<td></td>
<td>Horizontal</td>
<td>Vertical</td>
<td>Horizontal</td>
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<tr>
<td>0 s</td>
<td>RTK</td>
<td>0.02</td>
<td>0.03</td>
<td>0.020</td>
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<td>0.05</td>
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<td>Single point</td>
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<td>0.60</td>
<td>0.720</td>
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<tr>
<td>10 s</td>
<td>RTK</td>
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<td>0.13</td>
<td>0.070</td>
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<tr>
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<td>TerraStar-C PRO PPP</td>
<td>0.27</td>
<td>0.15</td>
<td>0.020</td>
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<tr>
<td></td>
<td>Single point</td>
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<td>0.70</td>
<td>0.220</td>
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<tr>
<td>60 s</td>
<td>RTK</td>
<td>15.00</td>
<td>1.63</td>
<td>0.720</td>
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<tr>
<td></td>
<td>TerraStar-C PRO PPP</td>
<td>15.00</td>
<td>1.65</td>
<td>0.720</td>
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<tr>
<td></td>
<td>Single point</td>
<td>16.00</td>
<td>2.20</td>
<td>0.220</td>
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<tr>
<td>0 s</td>
<td>Post Processed using Inertial Explorer</td>
<td>3.50</td>
<td>0.80</td>
<td>0.220</td>
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<tr>
<td>10 s</td>
<td></td>
<td>3.50</td>
<td>0.80</td>
<td>0.220</td>
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<tr>
<td>60 s</td>
<td></td>
<td>3.50</td>
<td>0.80</td>
<td>0.220</td>
</tr>
</tbody>
</table>

1. Typical values under ideal, open sky conditions.
2. Signal availability based on model configuration. See manual for details.
3. The secondary antenna input does not support L-Band or SBAS signals.
5. E1b support only.
6. GPS only.
7. Requires a subscription to TerraStar correction service.
8. Cold start: no almanac or apheresis and no approximate position or time.
9. Time accuracy does not include bias due to RF or antenna delay.
10. Export licensing restricts operation to a maximum of 600 m/s, and message output impacted above 585 m/s.
11. Performance may be impacted in conditions with unmitigated vibration or significant temperature variations. May vary from part to part.
12. Performance with one antenna, no DMI, and no SPAN profile unless otherwise specified.
13. Typical. Based on mixed urban road vehicle dynamics and benign GNSS conditions.
14. 1 ppm should be added to all position values. For additional error due to baseline length.

### Physical and electrical

- **Dimensions**: 147 x 125 x 55 mm
- **Weight**: 510 g
- **Power**: Input voltage +9 to +36 VDC, 4.15 W
- **2 Antenna LNA power outputs**: 5 VDC ±5%, 200 mA
- **Connectors**:
  - 2 Antenna Sockets: Micro A/B
  - USB host: Micro A/B
  - Serial, CAN, Event I/O: DSUB HD26
  - RJ45: Power
  - SAL M12, 5 pin, male
- **Status LEDs**: Power, GNSS, INS, Data logging, USB
- **Communication ports**:
  - 1 RS-232: up to 460,800 bps
  - 2 RS-232/422 selectable: up to 460,800 bps
  - 1 USB 2.0 (device): up to 480 Mbps
  - 1 USB 2.0 (host): up to 480 Mbps
  - 1 Ethernet: 10/100 Mbps
  - 1 CAN Bus: 1 Mbps
  - 1 Wi-Fi: 3 Event inputs
  - 3 Event outputs
  - 1 Pulse Per Second (PPS) output

### Included accessories

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

### Optional accessories

- Full breakout cable for DSUB HD26
- DSUB HD26 to M12 IMU cable

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Contact Hexagon | NovAtel
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