

# 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

**Performance<sup>1</sup>**

**Signal tracking<sup>2</sup>**

GPS	L1 C/A, L1C, L2C, L2P, L5
GLONASS <sup>3</sup>	L1 C/A, L2 C/A, L2P, L3, L5
Galileo <sup>4</sup>	E1, E5 AltBOC, E5a, E5b
BeiDou	B1I, B1C, B2I, B2a, B2b
QZSS	L1 C/A, L1C, L1S, L2C, L5
NavIC (IRNSS)	L5
SBAS <sup>5</sup>	L1, L5
L-Band <sup>5</sup>	up to 5 channels

**Horizontal position accuracy (RMS)**

Single point L1	1.5 m
Single point L1/L2	1.2 m
SBAS <sup>6</sup>	60 cm
DGPS	40 cm
TerraStar-L <sup>7</sup>	40 cm
TerraStar-C PRO <sup>7</sup>	2.5 cm
RTK	1cm + 1ppm
Initialization 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 <sup>8</sup>	< 39 s (typ)
Hot start <sup>9</sup>	< 20 s (typ)

**Time accuracy<sup>10</sup>** 20 ns RMS

**Velocity limit<sup>11</sup>** 515 m/s

**IMU performance<sup>12</sup>**

**Gyroscope performance**

Input range	±150 deg/s
Rate bias stability	3.5 deg/hr
Angular random walk	0.1 deg/√hr

**Accelerometer performance**

Input range	±5 g
Bias stability	0.1 mg
Velocity random walk	0.05 m/s/√hr

**Communication ports**

1 RS-232	up to 460,800 bps
2 RS-232/RS-422 selectable	up to 460,800 bps
1 USB 2.0 (device)	HS
1 USB 2.0 (host)	HS
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	
1 Quadrature wheel sensor input	

**Physical and electrical**

<b>Dimensions</b>	147 x 125 x 55 mm
<b>Weight</b>	510 g

**Power**

Input voltage	+9 to +36 VDC
Power consumption <sup>13</sup>	4.15 W

**2 Antenna LNA power outputs**

Output voltage	5 VDC ±5%
Maximum current	200 mA

**Connectors**

2 Antenna	SMA
USB device	Micro A/B
USB host	Micro A/B
Serial, CAN, Event I/O	DSUB HD26
Ethernet	RJ45
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, Procedure II (16 g)
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**Bump (operating)**

IEC 60068-2-27 (25g)
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**Shock (operating)**

MIL-STD-810H, Method 516.8, Procedure 1, 40 g 11 ms terminal sawtooth
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**Compliance**

FCC, ISED, CE and Global Type Approvals
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**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
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**Performance during GNSS outages<sup>1</sup>**

Outage Duration	Positioning Mode	Position Accuracy (m) RMS		Velocity Accuracy (m/s) RMS		Attitude Accuracy (Degrees) RMS		
		Horizontal	Vertical	Horizontal	Vertical	Roll	Pitch	Heading
0 s	RTK <sup>14</sup>	0.02	0.03					
	PPP	0.06	0.15	0.020	0.010	0.020	0.020	0.090
	SP	1.00	0.60					
	Post Processed <sup>15</sup>	0.01	0.02	0.010	0.010	0.009	0.009	0.044
10 s	RTK <sup>14</sup>	0.27	0.13					
	PPP	0.31	0.25	0.070	0.020	0.040	0.040	0.130
	SP	1.25	0.70					
	Post Processed <sup>15</sup>	0.02	0.02	0.020	0.010	0.009	0.009	0.044
60 s	RTK <sup>14</sup>	15.02	1.63					
	PPP	15.06	1.75	0.720	0.065	0.095	0.095	0.210
	SP	16.00	2.20					
	Post Processed <sup>15</sup>	0.35	0.10	0.030	0.011	0.014	0.014	0.048

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 L5. 4. E1bc and E6bc 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 OEM7 User Documentation for power supply considerations. 14. 1 ppm 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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