

PwrPak7-E2

OEM7 enclosure with SPAN GNSS+INS technology from Hexagon | NovAtel provides improved performance and higher data rates

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.

PwrPak7-E2 advantages

The PwrPak7-E2 contains an Epson G370N MEMS IMU to deliver world-class SPAN technology in an integrated, single-box solution. Built on top of the reputable PwrPak7 family with a higher performance Epson IMU, the PwrPak7-E2 provides seamless positioning, quick alignment and leading performance. This product is commercially exportable and provides an excellent midrange price/performance/size GNSS+INS solution.

Future-proofed scalability

Capable of tracking all present and upcoming GNSS constellations and satellite signals, the PwrPak7-E2 is a robust, high-precision receiver that is software upgradeable in the field to provide the custom performance required for your application demands.

The PwrPak7-E2 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. It also has enhanced connection options including serial, USB, CAN and Ethernet.

Precise thinking makes it possible

Our GNSS products are developed for efficient and rapid integration and 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. Our products are backed by a team of highly-skilled design and customer support engineers ready to answer your integration questions.



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

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
- 16 GB of internal storage
- Built-in Wi-Fi support

Performance¹

Signal tracking

GPS L1 C/A, L1C, L2C, L2P, L5
 GLONASS² L1 C/A, L2 C/A, L2P, L3, L5
 Galileo³ E1, E5 AltBOC, E5a, E5b, E6
 BeiDou B1I, B1C, B2I, B2a, B2b, B3I
 QZSS L1 C/A, L1C, L1S, L2C, L5, L6
 NavIC (IRNSS) L5
 SBAS L1, L5
 L-Band up to 5 channels

Horizontal position accuracy (RMS)

Single point L1 1.5 m
 Single point L1/L2 1.2 m
 SBAS⁴ 60 cm
 DGPS 40 cm
 TerraStar-L⁵ 40 cm
 TerraStar-C PRO⁵ 2.5 cm
 TerraStar-X⁵ 2 cm
 RTK 1 cm + 1 ppm
 Initialization time < 10 s
 Initialization reliability > 99.9%

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 200 Hz

Time to first fix

Cold start⁶ < 39 s (typ)
 Hot start⁷ < 20 s (typ)

Time accuracy⁸

20 ns RMS

Velocity limit⁹

515 m/s

IMU performance¹⁰

Gyroscope performance

Input range ±450 deg/s
 Rate bias stability 0.8 deg/hr
 Angular random walk 0.06 deg/√hr

Accelerometer performance

Input range ±10 g
 Bias stability 0.01 mg
 Velocity random walk 0.025 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

Dimensions 147 x 125 x 55 mm

Weight 560 g

Power

Input voltage +9 to +36 VDC
 Power consumption¹¹ 3.4 W

Antenna LNA power output

Output voltage 5 VDC ±5%
 Maximum current 200 mA

Connectors

Antenna TNC
 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
 Profiles:
 • Rail CAT 11 – 0.5 g RMS
 • Composite Wheeled Vehicle CAT 4 – 2.24 g RMS
 • Aircraft Propeller CAT 13 – 4.5 g RMS

Acceleration (operating)

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

Bump (operating)

IEC 60068-2-27 (25 g)

Shock (operating)¹²

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

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

PwrPak7Q-E2 no Wi-Fi

Performance during GNSS outages¹

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 ¹⁵	0.02	0.03	0.015	0.010	0.013	0.013	0.070
	PPP	0.06	0.15					
	SP	1.00	0.60					
	Post Processed ¹⁶	0.01	0.02					
10 s	RTK ¹⁵	0.17	0.13	0.040	0.020	0.022	0.022	0.085
	PPP	0.21	0.25					
	SP	1.15	0.70					
	Post Processed ¹⁶	0.02	0.02					
60 s	RTK ¹⁵	5.02	1.03	0.220	0.035	0.035	0.035	0.120
	PPP	5.06	1.15					
	SP	6.00	1.60					
	Post Processed ¹⁶	0.17	0.06					

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. Hardware ready for L5. 3. E1b and E6bc support only. 4. GPS-only. 5. Requires a subscription to a TerraStar data service. Subscriptions available from NovAtel. 6. Typical value. No almanac or ephemerides and no approximate position or time. 7. Typical value. Almanac and recent ephemerides saved and approximate position and time entered. 8. Time accuracy does not include biases due to RF or antenna delay. 9. Export licensing restricts operation to a maximum of 515 meters per second, message output impacted above 500 m/s. 10. Supplied by IMU manufacturer. 11. Typical values using serial port communication without interference mitigation. Consult the OEM7 User Documentation for power supply considerations. 12. GNSS only. IMU measurements may not be valid. 13. 1 ppm should be added to all position values to account for additional error due to baseline length. 14. Post-processing results using Inertial Explorer software. The survey data used to generate these statistics had frequent changes in azimuth.

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