CPT7700

Compact enclosure with SPAN GNSS+INS technology delivers 3D position, velocity and attitude

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 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.

CPT7700 overview

The CPT7700 is a compact, single enclosure GNSS+INS receiver powered by world class OEM7 technology from Hexagon | NovAtel. Capable of delivering up to centimeter-level accuracy, customers can choose from a variety of positioning modes to ensure they have the optimal level of accuracy for their application.

The CPT7700 contains a high performing and highly reliable Honeywell HG4930 Micro Electromechanical System (MEMS) IMU to deliver leading-edge SPAN technology from NovAtel in an integrated, single enclosure solution. It provides tactical grade performance for unmanned vehicles, mobile mapping and other commercial and/or military guidance applications. The CPT7700 is a small, lightweight and low-power solution with multiple communication interfaces for easy integration on multiple platforms.

CPT7700 advantages

The deep coupling of the GNSS and IMU measurements delivers the most satellite observations and the most accurate, continuous solution possible. Further, the CPT7700 is comprised entirely of commercial components, simplifying export restrictions involved with traditional GNSS+INS systems.

Improve CPT7700 accuracy

CPT7700 provides your choice of accuracy and performance, from decimeter to RTK-level positioning. For more demanding applications, Inertial Explorer post-processing software can be used to post-process the real-time SPAN GNSS+INS solution to provide the system's highest level of accuracy.

Benefits

- High performance SPAN GNSS+INS solution
- 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

- MEMS gyros and accelerometers
- Small size, rugged and lightweight
- 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
- 16 GB of internal storage
- Four receiver status LEDs

SPAN system performance[1]

Signal tracking

GPS	L1 C/A, L1C, L2C, L2P, L5
GLONASS[2]	L1 C/A, L2 C/A, L2P, L3, L5
Galileo[3]	E1, E5 AltBOC, E5a, E5b, E6
BeiDou[4]	B1I, B1C, B2I, B2a, B2b, B3
QZSS	L1 C/A, L1C, 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
SBAS[5]	60 cm
DGPS	40 cm
TerraStar-L[6]	40 cm
TerraStar-C PRO[6]	2.5 cm
TerraStar-X[6]	2.0 cm
RTK	1 cm + 1 ppm
Initialization time	< 10 s
Initialization reliability	> 99.9%

Heave performance[7]

Instantaneous Heave	5 cm or 5%
Delayed Heave	3.5 cm or 3.5%
Post-Processed Heave[8]	2.5 cm or 2.5%

Maximum data rate

IMU raw data rate	100 Hz or 400 Hz[9]
INS solution	Up to 200 Hz

Time to first fix

Cold start[10]	< 39 s (typ)
Hot start[11]	< 20 s (typ)

Signal reacquisition

L1	< 0.5 s (typ)
L2/L5	< 1.0 s (typ)

Time accuracy[12] 20 ns RMS

Velocity accuracy < 0.03 m/s RMS

Velocity limit[13] 515 m/s

IMU performance[14]

Gyroscope performance

Technology	MEMS
Input rate (max)	±200°/s

Accelerometer performance

Technology	MEMS
Range	±20 g

Physical and Electrical

Dimensions[15] 90 x 60 x 60 mm

Weight 500 g

Power

Power consumption[16]	9 W (typ)
Input voltage	+9 to +32 VDC

Antenna LNA power output

Output voltage	5 VDC ±5%
Maximum current	200 mA

Input/Output connectors

Antenna	1 x SMA
Power and I/O	2 x Fischer Core 16 pin DPBU 104 A086 140G/240G

Status LEDs

- Power
- Position
- INS
- Logging

Communication ports

RS-422	1
RS-232	1
USB Device	1
Ethernet	1
CAN Bus	1
Event Input	3
Event Output	3
Wheel Sensor Input	1

Environmental

Temperature

Operating	-40°C to +71°C
Storage	-40°C to +85°C

Humidity 95% non-condensing

Submersion 2 m for 12 hours (IEC 60529 IP68)

Water MIL-STD-810H, Method 512.6

Dust MIL-STD-810H, Method 510.7

Vibration (operating)

Random MIL-STD-810H, Method 514.8, Category 24, 7.7 g RMS

Sinusoidal IEC 60068-2-6

Acceleration (operating) MIL-STD-810H, Method 513.8, Procedure II (G Loading - 15 g)

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

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

Compliance

FCC, ISED, CE[17]

Firmware solutions

- Field upgradeable firmware and software models
- Configurable PPS output
- SPAN Enhanced Profiles
- ALIGN
- TerraStar PPP
- RTK
- RTK ASSIST
- API

Optional Accessories

- Power and I/O cable
- Mounting Plate
- VEXXIS series antennas
- Compact GNSS antennas
- NovAtel Application Suite
- GrafNav/GrafNet
- Inertial Explorer

Performance During GNSS Outages[19],

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[18]	0.02	0.03					
	PPP	0.06	0.15	0.015	0.010	0.010	0.010	0.030
	SP	1.00	0.60					
	Post-Processed[8]	0.01	0.02	0.015	0.010	0.003	0.003	0.010
10 s	RTK[18]	0.12	0.08					
	PPP	0.16	0.20	0.035	0.020	0.018	0.018	0.040
	SP	1.10	0.65					
	Post-Processed[8]	0.01	0.02	0.015	0.010	0.003	0.003	0.010
60 s	RTK[18]	3.82	0.73					
	PPP	3.86	0.85	0.165	0.030	0.030	0.030	0.055
	SP	4.80	1.30					
	Post-Processed[8]	0.11	0.05	0.017	0.010	0.004	0.004	0.014

1. Typical SPAN system performance values when using this IMU. 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 L3 and L5. 3. E1bc support only. 4. Requires an MFD model receiver. 5. GPS-only. 6. Requires subscription to TerraStar data service. Subscriptions available from NovAtel. 7. Requires SPAN Marine Profile. 8. Post-processing results using Waypoint Inertial Explorer. 9. Configurable with appropriate model. 10. Typical value. No almanac or ephemerides and no approximate position or time. 11. Typical value. Almanac and recent ephemerides saved and approximate position and time entered. 12. Time accuracy does not include biases due to RF or antenna delay. 13. Export licensing restricts operation to a maximum of 515 meters per second, message output impacted above 500 m/s. 14. Supplied by IMU manufacturer. 15. Dimensions do not include mounting feet. 16. Typical values using serial port communication without interference mitigation. Consult the OEM7 Installation & Operation User Manual for power supply considerations. 17. Pending 18. 1 ppm should be added to all position values to account for additional error due to baseline length. 19. Outage statistics were calculated by taking the RMS of the maximum errors over a minimum of 30 complete GNSS outages. Each outage was followed by 120 seconds of full GNSS availability before the next outage was applied. High accuracy GPS updates (fixed ambiguities) were available immediately before and after each outage. The survey data used to generate these statistics had frequent changes in azimuth.

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