SPAN® SPAN CPT7

COMPACT DUAL ANTENNA SPAN ENCLOSURE DELIVERS 3D POSITION, VELOCITY AND ATTITUDE

SPAN: WORLD-LEADING GNSS+INS TECHNOLOGY

Synchronous Position, Attitude and Navigation (SPAN) 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 tightly coupled to provide an exceptional 3D navigation solution that is stable and continuously available, even through periods when satellite signals are blocked.

SPAN CPT7 OVERVIEW

The SPAN CPT7 is a compact, single enclosure GNSS+INS receiver, powered by NovAtel's world class OEM7® technology. Capable of delivering up to centimetre-level accuracy, customers can choose from a variety of positioning modes to ensure they have the optimal level of accuracy for their application.

The SPAN CPT7 contains a high performing and highly reliable Honeywell HG4930 Micro Electromechanical System (MEMS) IMU to deliver leading-edge NovAtel SPAN technology 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 SPAN CPT7 is a small, lightweight and low power solution with multiple communication interfaces for easy integration on multiple platforms.

SPAN CPT7 ADVANTAGES

The tight coupling of the GNSS and IMU measurements delivers the most satellite observations and the most accurate, continuous solution possible. Further, SPAN CPT7 is comprised entirely of commercial components, simplifying export restrictions involved with traditional GNSS+INS systems.

IMPROVE SPAN CPT7 ACCURACY

Take advantage of NovAtel CORRECT® to receive your choice of accuracy and performance, from decimetre to RTK-level positioning. For more demanding applications, Inertial Explorer® post-processing software can be used to post-process SPAN data to provide the system's highest level of accuracy.

BENEFITS

+ Continuous, stable positioning
+ Easy integration into space and weight constrained applications
+ Future proof for upcoming GNSS signal support
+ Multiple communication interfaces
+ Commercially exportable system (non-ITAR)
+ Small, low power, all-in-one GNSS/INS enclosure

FEATURES

+ MEMS gyros and accelerometers
+ Increased satellite availability with 555 channel capability
+ SPAN Land Vehicle technology
+ Optional SPAN Profiles support
+ Advanced interference mitigation features
+ Dual antenna ALIGN® heading

SPAN CPT7

SPAN SYSTEM PERFORMANCE[1]

Channel Count
555 Channels

Signal Tracking[2 3]

GPS	L1 C/A, L1C, L2C, L2P, L5
GLONASS[4]	L1 C/A, L2 C/A, L2P, L3, L5
BeiDou[5]	B1I, B1C, B2I, B2a
Galileo	E1, E5 AltBOC, E5a, E5b
NavIC (IRNSS)	L5
SBAS	L1, L5
QZSS	L1 C/A, L1C, L2C, L5
L-Band (Primary RF only)	up to 5 channels

Horizontal Position Accuracy (RMS)

Single Point L1	1.5 m
Single Point L1/L2	1.2 m
SBAS[6]	60 cm
DGPS	40 cm
TerraStar-L[7]	40 cm
TerraStar-C PRO[7]	2.5 cm
RTK	1 cm + 1 ppm
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 Position/Attitude	up to 200 Hz

Time to First Fix

Cold start[8, 20]	< 40 s (typ)
Hot start[9, 20]	< 19 s (typ)

Signal Reacquisition

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

Time Accuracy[10] 20 ns RMS

Velocity Accuracy < 0.03 m/s RMS

Velocity Limit[11] 515 m/s

IMU PERFORMANCE[12]

Gyroscope Performance

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

Accelerometer Performance

Technology	MEMS
Range	±20 g

IMU Raw Data Rate 100 Hz

PHYSICAL AND ELECTRICAL

Dimensions[13] 90 x 60 x 60 mm

Weight 500 g

Power

Power consumption[14]	7 W (typ)
Input voltage	+9 to +32 VDC

Antenna LNA Power Output

Output voltage	5 VDC ±5%
Maximum current	200 mA

Input/Output Connectors

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

COMMUNICATION PORTS

RS-422	1
RS-232 (230400 bps max)	1
USB Device	1
Ethernet	1
CAN Bus	1
Event Input	2
Event Output	2

ENVIRONMENTAL

Temperature

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

Humidity 95% non-condensing

Environment

Submerion	2 m for 12 hours (IEC 60529 IP68)
Water	MIL-STD-810G(Ch1), Method 512.6
Dust	MIL-STD-810G(Ch1), Method 510.6

Vibration (operating)

Random	MIL-STD-810G(Ch1), Method 514.7, Category 24, 7.7 g RMS
Sinusoidal	IEC 60068-2-6

Acceleration (operating) MIL-STD-810G(Ch1), Method 513.7, Procedure II (G Loading - 15 g)

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

Shock (operating) MIL-STD-810G(Ch1), Method 516.7, Procedure 1, 40 g, 11 ms terminal sawtooth

Compliance[19] FCC, ISED, CE, RoHS, WEEE

FIRMWARE SOLUTIONS

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

OPTIONAL ACCESSORIES

- Power and I/O cable
- Mounting Plate
- VEXXIS series antennas
- ANT series antennas
- NovAtel Connect™
- GrafNav/GrafNet®
- Inertial Explorer®

PERFORMANCE DURING GNSS OUTAGES[17, 18]

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	0.05	0.015	0.010	0.010	0.010	0.030
	SP	1.20	0.60	0.015	0.010	0.010	0.010	0.030
	PP[16]	0.01	0.02	0.015	0.010	0.005	0.005	0.010
10 s	RTK[15]	0.12	0.10	0.040	0.020	0.020	0.020	0.040
	SP	1.30	0.65	0.040	0.020	0.020	0.020	0.040
	PP[16]	0.01	0.02	0.020	0.010	0.005	0.005	0.010
60 s	RTK[15]	3.82	0.75	0.165	0.035	0.030	0.030	0.055
	SP	5.10	1.30	0.165	0.035	0.030	0.030	0.055
	PP[16]	0.15	0.05	0.020	0.010	0.007	0.007	0.012

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 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 The secondary antenna input does not support L-Band or SBAS signals.
4 Hardware ready for L3 and L5.
5 Designed for BeiDou Phase 2 and 3, B1and B2 compatibility (where applicable).
6 GPS-only.
7 Requires subscription to 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 metres per second, message output impacted above 500 m/s.
12 Supplied by IMU manufacturer.
13 Dimensions do not inlude mounting feet.
14 Typical values using serial port communication without interference mitigation. Consult the OEM7 Installation & Operation User Manual for power supply considerations
15 1 ppm should be added to all postition values to account for additional error due to baseline length.
16 Post-processing results using Intertial Explorer.
17 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.
18 Outage performance achieved with one antenna.
19 Pending.
20. Available in Q2 2019

Version 3 Specifications subject to change without notice.

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