



SPAN

**Tightly Coupled GNSS+INS Technology Performance for
Exceptional 3D, Continuous Position, Velocity & Attitude**

SPAN Technology

NOVATEL'S SPAN TECHNOLOGY PROVIDES CONTINUOUS 3D POSITIONING, VELOCITY AND ATTITUDE DETERMINATION EVEN WHEN SATELLITE RECEPTION MAY BE COMPROMISED FOR SHORT PERIODS OF TIME.

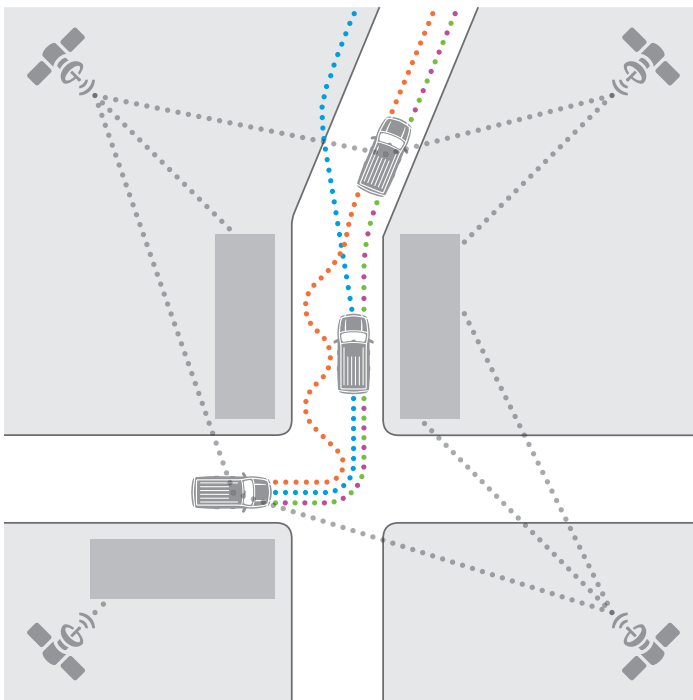
SPAN integrates our industry leading Global Navigation Satellite System (GNSS) technology with Inertial Measurement Units (IMUs) to create a tightly coupled GNSS+INS solution at data rates up to 200 Hz. A range of receiver, IMU and antenna options are available to meet accuracy and size requirements for nearly any application.

For comprehensive SPAN information, visit www.novatel.com/span

The accuracy of SPAN products can be optimized with best-in-class post-processing software from our Waypoint® Products Group.

For more information, go to www.novatel.com/waypoint.

How SPAN works



- **GNSS Solution**

With GNSS only positioning, navigating becomes unreliable or impossible when satellites are blocked by obstructions such as trees or buildings.

- **Drifting INS Solution**

In the absence of an external reference, the Inertial Navigation System (INS) solution will drift over time due to accumulated errors in the IMU data.

- **True Path**

- **SPAN solution**

Continuously available and following the true path

- **SATELLITE Line-of-Sight**

When combined, the two navigation techniques augment and enhance each other to create a powerful positioning system. The absolute position and velocity accuracy of the GNSS is used to compensate for the errors in the IMU measurements. The stable relative position of the INS can be used as a bridge to span times when the GNSS solution is degraded or unavailable. Data is available in real-time or can be post-processed for workflows requiring the most robust solution possible and additional quality control.

SPAN Enclosures



ProPak6™

- » Standalone metre-level to RTK centimetre-level positioning.
- » 4 GB onboard memory for data logging and easy storage and retrieval.

Dimensions: 190 x 185 x 75 mm

Weight: 1.79 kg

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ + SBAS + L-Band



FlexPak6™

- » Houses NovAtel's OEM628 GNSS receiver board.
- » Provides multiple communication options including Ethernet, USB and CAN bus.

Dimensions: 113 x 147 x 45 mm

Weight: 337 g

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ + SBAS + L-Band



FlexPak-S™

- » Houses NovAtel's OEM625S GNSS receiver board.
- » Provides SAASM RTK with civil RTK fall back.

Dimensions: 113 x 147 x 45 mm

Weight: <400 g

GPS L1/L2/L2C + GLONASS L1/L2 + SBAS

SPAN OEM Receiver Boards



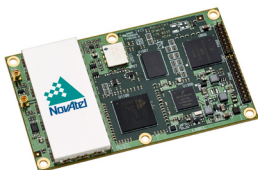
OEM615™ & OEM617™

- » Smaller than the size of a business card, the OEM615 and OEM617 feature high performance GNSS positioning with low power consumption.

Dimensions: 46 x 71 x 11 mm

Weight: 24 g

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ (OEM617 only) + SBAS



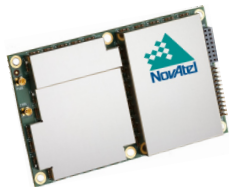
OEM628™

- » High performance GNSS positioning with low power consumption.
- » Drop in replacement for NovAtel's OEMV-2 GNSS receiver.

Dimensions: 60 x 100 x 9 mm

Weight: 37 g

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ + SBAS + L-Band



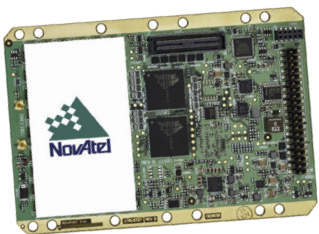
OEM625S™

- » High performance SAASM and civil GNSS positioning with low power consumption.
- » Provides SAASM RTK with civil RTK fall back.

Dimensions: 60 x 100 x 15 mm

Weight: 56 g

GPS L1/L2/L2C + GLONASS L1/L2 + SBAS



OEM638™

- » The most advanced GNSS receiver within the OEM6 series of products.
- » 4 GB onboard memory for data logging and easy storage and retrieval.

Dimensions: 85 x 125 x 14.3 mm

Weight: 84 g

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ + SBAS + L-Band

Power Consumption	Operating Temperature
3.5 W ²	-40°C to +75°C
1.8 W ³	-40°C to +75°C
4.9 W ⁴	-40°C to +65°C
<1.0 W ⁵	-40°C to +85°C
1.3 W ⁶	-40°C to +85°C
2.2 W ⁴	-40°C to +85°C
2.8 W ⁶	-40°C to +85°C

1. Requires OEM6.400 firmware or higher
2. Model and/or configuration dependent.

3. Typical, GPS L1/L2 at 6 VDC with Ethernet disabled.
4. Typical, GPS Civil + GGLONASS + SAASM

5. Typical, GPS L1/L2.
6. Typical, GPS L1/L2 with Ethernet disabled.

SPAN Combined GNSS+INS Systems



SPAN-CPT™

- » Features NovAtel's OEM628 GNSS receiver, fiber optic gyros and Micro Electromechanical Systems (MEMS) accelerometers in one enclosure.
- » This product is not ITAR controlled, reducing cross border difficulties when operating in multiple countries.

Dimensions: 152 x 168 x 89 mm

Weight: 2.28 kg

Operating Temperature: -40°C to +65°C

GPS L1/L2/L2C + GLONASS L1/L2 + BeiDou¹ + SBAS + L-Band



SPAN-IGM-S1

- » Features the OEM615 receiver and STIM300 IMU.
- » The STIM300 is a tactical grade IMU with MEMS gyros and accelerometers.
- » This product is not ITAR controlled, reducing cross border difficulties when operating in multiple countries.
- » Stacks with a FlexPak6 receiver to create a compact ALIGN® heading system.

Dimensions: 152 x 142 x 51 mm

Weight: 540 g

Operating Temperature: -40°C to +65°C

GPS L1/L2/L2C + GLONASS L1/L2 + SBAS

SPAN-IGM-A1

- » Features the OEM615 receiver and ADIS-16488 IMU.
- » The ADIS-16488 is a cost effective IMU with MEMS gyros and accelerometers.
- » This product is not ITAR controlled, reducing cross border difficulties when operating in multiple countries.
- » Stacks with a FlexPak6 receiver to create a compact ALIGN® heading system.

Dimensions: 152 x 142 x 51 mm

Weight: 515 g

Operating Temperature: -40°C to +65°C

GPS L1/L2/L2C + GLONASS L1/L2 + SBAS

1. Requires OEM6.400 firmware or higher

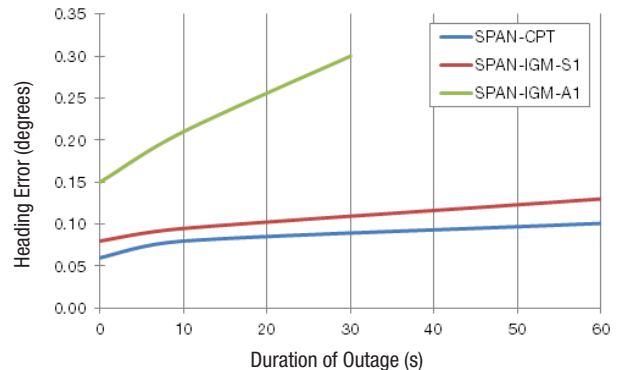
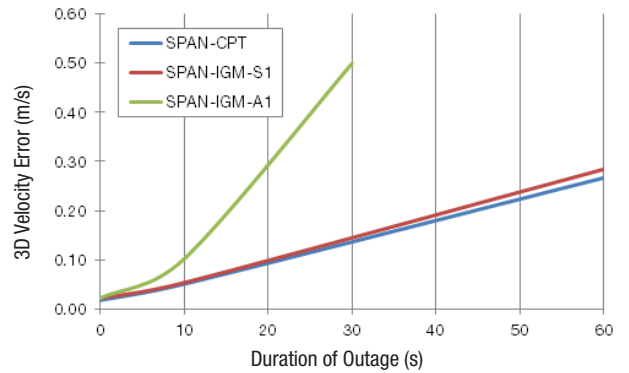
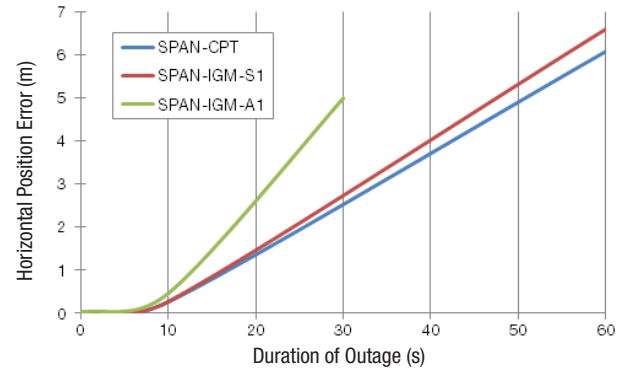
IMU SPECS

Power Consumption	Export Control	Data Rate	Gyro Bias Stability	Turn On Bias	Gyro Technology
16 W (max)	Commercial	100 Hz	1.0 deg/hr ⁵	20.0 deg/hr	FOG
6 W ⁴	Commercial	125 Hz	0.5 deg/hr ⁵	250.0 deg/hr	MEMS
4 W ⁴	Commercial	200 Hz	5.0 deg/hr ⁵	720.0 deg/hr	MEMS

SPAN SYSTEM ATTITUDE ACCURACY (DEGREES)¹ RMS

RTK ²			Post Processed ³		
Roll	Pitch	Heading	Roll	Pitch	Heading
0.020	0.020	0.060	0.015	0.015	0.030
0.015	0.015	0.080	0.015	0.015	0.080
0.035	0.035	0.150	0.035	0.035	0.150

SPAN PERFORMANCE



1. When SPAN is in RTK mode. Based on 0 seconds outage duration.
2. 0 seconds outage on land vehicle application.
3. RMS, incremental error growth from steady state accuracy. Computed with GPS, RTK trajectory.
4. Typical, GPS + GLONASS only, 12 V, 25 °C.
5. Values are in-run bias stability figures.

SPAN Inertial Measurement Units (IMUs)

High Performance IMUs



ISA-100C

A near navigation grade IMU from Northrop-Grumman Litef GMBH. The low noise and stable biases of the accelerometer and gyro sensors mean the ISA-100C is well suited for ground or airborne survey applications. The ISA-100C is a commercially exportable IMU that offers the highest level of performance in our IMU portfolio.

Dimensions: 180 x 150 x 137 mm

Weight: 5.0 kg



LN200

The low noise, tactical grade LN200 is a proven sensor for airborne survey and mobile mapping applications. The LN200 features closed-loop fiber optic gyros and solid state accelerometers.

The LN200 is available in the Universal IMU Enclosure (shown) or the SPAN IMU Enclosure.

Universal IMU Enclosure

Dimensions: 168 x 195 x 146 mm

Weight: 4.5 kg

SPAN IMU Enclosure

Dimensions: 135 x 153 x 130 mm

Weight: 3.0 kg



HG1700 AG58

The HG1700 AG58 is a tactical grade IMU from Honeywell containing ring-laser gyros and servo accelerometers. With a Gyro Bias of 1 degree per hour, the economical HG1700 AG58 offers excellent performance.

The HG1700 AG58 is available in the Universal IMU Enclosure (shown) or the SPAN HG Enclosure.

Universal IMU Enclosure

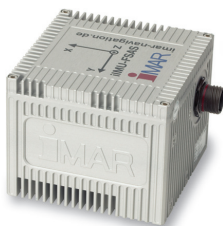
Dimensions: 168 x 195 x 146 mm

Weight: 4.5 kg

SPAN HG Enclosure

Dimensions: 167 x 193 x 100 mm

Weight: 3.4 kg



IMU-FSAS

Small, tactical grade IMU consisting of three closed-loop fiber optic gyros and three servo accelerometers. Manufactured in Germany, the IMU-FSAS is a good option for customers looking for a product without International Traffic in Arms Regulations (ITAR) restrictions.

Dimensions: 128 x 128 x 104 mm

Weight: 2.1 kg

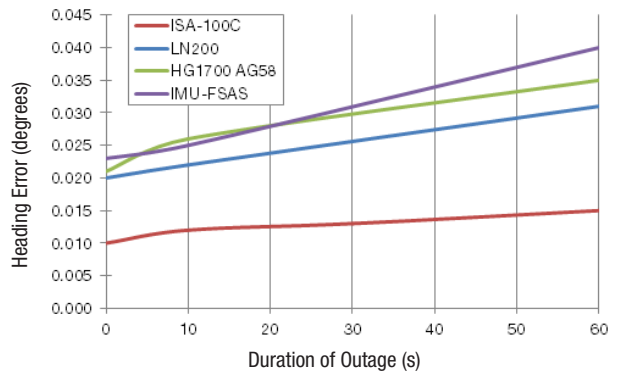
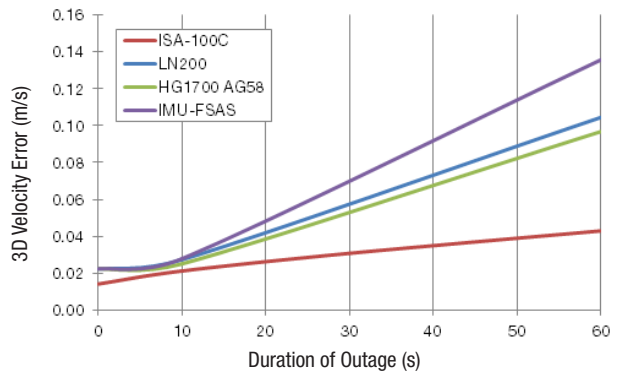
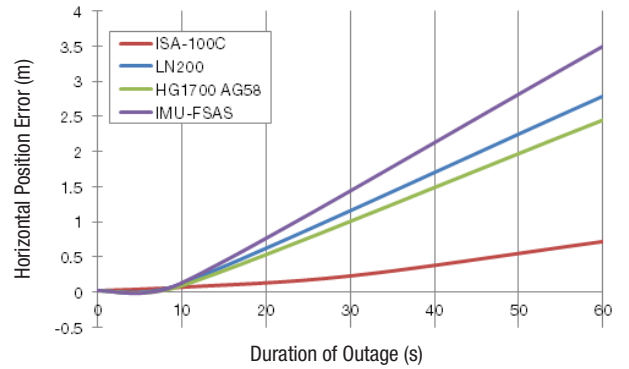
IMU SPECS

Power Consumption	Export Control	Data Rate	Gyro Bias	Gyro Technology	Available as OEM
18 W	Commercial	200 Hz	0.5 deg/hr	FOG	
16 W	ITAR	200 Hz	1.0 deg/hr	FOG	+
8 W	ITAR	100 Hz	1.0 deg/hr	RLG	+
16 W	Varies	200 Hz	<0.75 deg/hr	FOG	

SPAN SYSTEM ATTITUDE ACCURACY (DEGREES)¹ RMS

RTK ²			Post Processed ³		
Roll	Pitch	Heading	Roll	Pitch	Heading
0.007	0.007	0.010	0.007	0.007	0.010
0.010	0.010	0.020	0.005	0.005	0.008
0.010	0.010	0.021	0.007	0.007	0.010
0.008	0.008	0.023	0.008	0.008	0.012

SPAN PERFORMANCE



1. When SPAN is in RTK mode.
2. 0 seconds outage on land vehicle application.
3. RMS, incremental error growth from steady state accuracy. Computed with respect to full GPS, RTK trajectory.

SPAN Inertial Measurement Units (IMUs)

Mid Performance IMUs



OEM-HG1900

The HG1900 is a MEMS gyro based IMU manufactured by Honeywell. Economical, robust and small in size, the low power HG1900 provides high end tactical grade performance for commercial and military guidance and navigation applications.

The OEM-HG1900 requires a NovAtel MEMS Interface Card (MIC) to integrate with NovAtel GNSS receivers.

Dimensions: 92.7 mm dia max x 79.1 mm h

Weight: <460 g



KVH-1750

The IMU-KVH1750 offers tactical grade performance in a compact and rugged package with minimal power consumption. It contains Fiber Optic gyros (FOG) and MEMS accelerometers.

Dimensions: 88.9 mm dia max x 73.7 mm h

Weight: <700 g



HG1700 AG62

The HG1700 AG62 is a tactical grade IMU from Honeywell containing ring-laser gyros and servo accelerometers. With a Gyro Bias of 5 degrees per hour, the economical HG1700 AG62 offers good performance.

The HG1700 AG62 is available in the Universal IMU Enclosure (shown) or the SPAN HG Enclosure.

Universal IMU Enclosure

Dimensions: 168 x 195 x 146 mm

Weight: 4.5 kg

SPAN IMU Enclosure

Dimensions: 167 x 193 x 100 mm

Weight: 3.4 kg

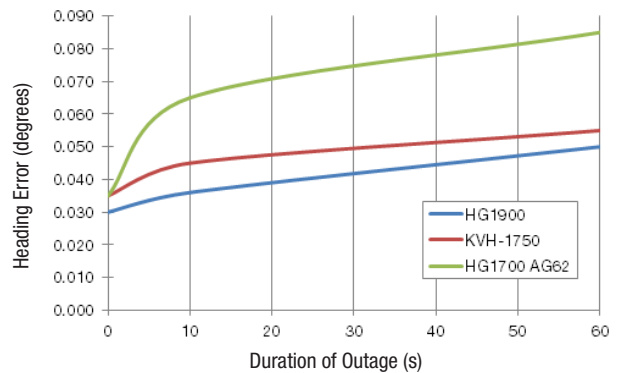
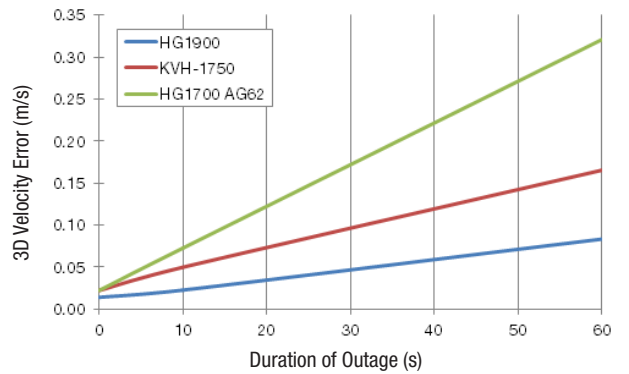
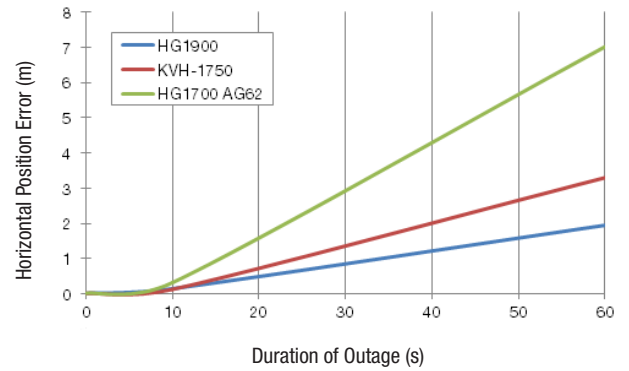
IMU SPECS

Power Consumption	Export Control	Data Rate	Gyro Bias	Gyro Technology	Available as OEM
<3 W	ITAR	100 Hz	5.0 deg/hr	MEMS	+
8 W	Commercial	200 Hz	2.0 deg/hr	FOG	
8 W	ITAR	100 Hz	5.0 deg/hr	RLG	+

SPAN SYSTEM ATTITUDE ACCURACY (DEGREES)¹ RMS

RTK ²			Post Processed ³		
Roll	Pitch	Heading	Roll	Pitch	Heading
0.010	0.010	0.030	0.008	0.008	0.020
0.015	0.015	0.035	0.015	0.015	0.035
0.012	0.012	0.035	0.012	0.012	0.030

SPAN PERFORMANCE



1. When SPAN is in RTK mode.
 2. 0 seconds outage on land vehicle application.
 3. RMS, incremental error growth from steady state accuracy. Computed with respect to full GPS, RTK trajectory.

SPAN Inertial Measurement Units (IMUs)

Entry Level Performance IMUs



IMU-CPT

Stand alone IMU with the same form factor as our SPAN-CPT containing fiber optic gyros and MEMS accelerometers.

Made entirely of commercially available components, the IMU-CPT reduces cross border difficulties when operating in multiple countries.

Dimensions: 152 x 168 x 89 mm **Weight:** 2.29 kg



IMU-IGM

Incorporating a MEMS inertial sensor, the IMU-IGM delivers the smallest and lightest IMU enclosure in our SPAN product portfolio. There are two IMU-IGM models available:

IMU-IGM-A1 contains an ADIS-16488 IMU to provide our most cost effective IMU enclosure.

IMU-IGM-S1 contains a STIM300 IMU to deliver our smallest tactical grade IMU enclosure.

Dimensions: 152 x 137 x 51 mm **Weight:** 475 g (A1), 500 g (S1)



OEM-STIM300

MEMS IMU from Sensor. Features low noise gyros and accelerometers in a small, light weight, environmentally sealed enclosure. It enables precision measurements for applications that require low cost, high performance and rugged durability in a small form factor. When integrated with NovAtel's SPAN technology, this IMU is ideal for airborne and ground applications that require accurate 3D position, velocity and attitude (roll, pitch and azimuth) data.

The OEM-STIM300 requires a NovAtel MEMS Interface Card (MIC) to integrate with NovAtel GNSS receivers.

Dimensions: 39 x 45 x 22 mm **Weight:** 55 g



OEM-HG1930

Small, economical MEMS IMU manufactured by Honeywell. Provides tactical grade performance for unmanned vehicles and other commercial and/or military guidance applications.

The OEM-HG1930 requires a NovAtel MEMS Interface Card (MIC) to integrate with NovAtel GNSS receivers.

Dimensions: 64.8 mm dia max x 35.7 mm h max **Weight:** 200 g



OEM-ADIS-16488

MEMS IMU from Analog Devices. Features low noise gyros and accelerometers in a small, light weight and rugged, environmentally sealed enclosure. Enables precision measurements for applications that require low cost, high performance and rugged durability in a very small form factor.

The OEM-ADIS-16488 requires a NovAtel MEMS Interface Card (MIC) to integrate with NovAtel GNSS receivers.

Dimensions: 47 x 44 x 14 mm **Weight:** 48 g

Contact Information



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Version 13 Specifications subject to change without notice.

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Refer to www.novatel.com for the latest specifications.

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