

# G12 Sensor

**12-channel GPS Receiver for High-Accuracy,  
Low-Multipath Operation**



## Unmatched Performance

The G12™ GPS receiver sets the standard for superior performance in a wide assortment of high-accuracy marine, avionics and land navigation applications. Available in a sensor format, this powerful 12-channel receiver is the first of its kind to offer a 20Hz update rate for real-time guidance, position and raw data output. The G12 offers differential accuracy better than 40cm and position latency less than 50ms.

The G12 incorporates all-in-view tracking to track up to 12 satellites with a “loss of lock” re-acquisition time of less than 2 seconds, and delivers unsurpassed position accuracies of better than 40cm achieved immediately following satellite acquisition. Revolutionary Strobe Correlator™ technology provides unmatched multipath mitigation for code, providing the best possible position accuracy.

The G12 offers distinct timing options for precise timing and frequency, or time-tagging of positions, including 1PPS time pulse, variable frequency output, an event marker to tag time a position, and a programmable measurement

strobe that generates a pulse at a programmable interval in advance of measurements.

The G12 also offers compatibility with all other Ashtech GPS sensors, using the same DB25 connector that the Ashtech GG24™ Sensor and Z12™ Sensor use.

## All-in-view Base Station

The U.S. Coast Guard uses Ashtech Reference Stations at all their differential reference station sites. Now you can provide similar performance from the G12 base station at a significantly lower price.

The G12 is an ideal differential base station because its 12 parallel channels track all satellites in view and it also generates RTCM SC-104 message types 1,2,3,6,9,16.

## Multipath Mitigation

Multipath is the single largest cause of differential GPS position errors. The Strobe Correlator™ (patent pending) is a digital signal processing technique implemented in the hardware and software of the G12 receiver that removes multi-

path errors almost entirely for reflected signals with delays of 37m or more. This represents the best DGPS multipath mitigation available today in GPS receivers — and it is available standard with the G12. This means improved accuracy and greater reliability.

## Windows Evaluation Software

Evaluate™ software is available with the G12 and provides visual displays of satellite information (e.g., SNR), receiver position and velocity, as well as data logging and analysis. It also allows direct communication with the receiver. Compatible with all receivers, the software runs on Windows® version 3.x, Windows 95®/98® and Windows NT® platforms.

## Take It for a Test-drive

The G12 Development Kit, which includes the G12 and all necessary components, enables you to perform a comprehensive test-drive. The kit contains a G12 GPS receiver, the Evaluate software, power supply, ready-made interface cables, antenna, and manuals.

# G12 Sensor Specifications

## Real-Time Position Accuracy<sup>1</sup>

**Autonomous<sup>2</sup>**  
3.0 m (CEP)

**Differential**  
40.0 cm (CEP)

## Velocity Accuracy<sup>1</sup> (knots)

0.1 (95%)

## Time to First Fix<sup>1</sup>

	Min	Avg	Max
Re-acquisition	1 sec	2 sec	3 sec
Hot start	8 sec	11 sec	15 sec
Warm start	26 sec	35 sec	45 sec
Cold start	39 sec	45 sec	300 sec

## Standard Features

- 12 Channels GPS code and carrier
- Strobe Correlator™ multipath mitigation
- Standard NMEA-0183 V2.01 output
- Position latency output
- Geoid and Magnetic Variation models
- Raw data output (code and carrier)
- 1PPS (5V TTL)
  - Precision: 45 ns (differential)
  - 340 ns (stand alone)
- Programmable Measurement Strobe
- Variable Frequency Output from <1Hz to 8.25 MHz

## G12 Remote Standard Features

### All G12 Standard Features and:

- Differential remote RTCM V2.2, message types 1,2,3,6,9,16
- 20Gs tracking capability
- Position and raw data update rates selectable up to 10Hz
- Event marker

## G12 Base Station Standard Features

### All G12 Standard Features and:

- Differential reference station RTCM Message Types 1,2,3,6,9,16
- Position and raw data update rates selectable up to 2Hz

## Optional Features

- Software toolkit
- 20Hz position updates<sup>3</sup>
- 20Hz raw data (code & carrier)

## Communications

- 2 bi-directional RS-232 serial ports, up to 115,000 bps
- External LED drivers

## Environmental and Physical

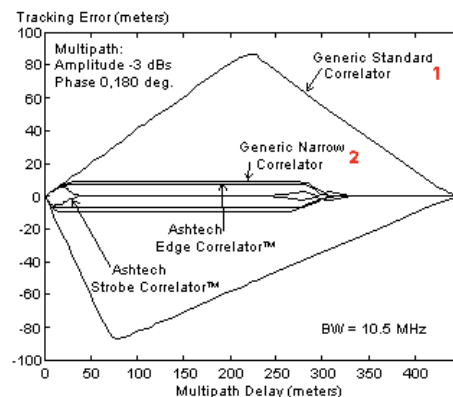
- Operating Temp: -30°C to +60°C
- Storage Temp: -40°C to +85°C
- Power Consumption: 2.2 W (Receiver)  
0.3 W (Antenna)
- Input Voltage: 9-36 VDC
- Size: 95mm x 42mm x 168mm
- Connector: DB25 (pin-compatible with the GG24™ Sensor, and the Z12™β Sensor)
- Weight: 19 ounces
- Acceleration: 20 Gs
- Humidity: 95% non-condensing
- Speed (Max): 1,000 knots
- Altitude (Max): 60,000 ft

Higher altitude and velocities up to 9km/s are available under validated export license.

## G12 Development Kit

The G12 Development Kits includes a G12 GPS receiver, antenna, power supply, cables, manuals and the Evaluate™ and Mission Planning™ software. The kit is loaded with all the firmware options available.

## Multipath Error Envelope



1. Generic Standard Correlator Spacing, 1 chip
2. Generic Narrow Correlator Spacing, 0.1 chip

This figure shows the errors induced by a multipath signal half the strength of the direct signal. The horizontal axis of the plot shows the multipath delay, this is the extra distance that the reflected signal travels compared to the direct signal. The vertical axis shows the induced range error caused by a multipath signal with the indicated delay.

From this plot you can see that typical narrow correlator performance and Edge Correlator performance is similar, while Strobe Correlator performance is much better, almost totally cancelling any multipath with a delay of more than 37m.

<sup>1</sup> Accuracy and TTFF specs. based on tests conducted in California. Differential tests performed using Ashtech Z-Sensor™ base station with Geodetic antenna and G12 Sensor remote with Geodetic antenna (Marine IV antenna for TTFF). Antenna benchmark locations determined using CORS sites Point Blunt (PBL1) and Pigeon Point (PPT1). Tests at different locations under different conditions may produce different results.

Position accuracy specifications are for horizontal positioning. Vertical error is typically <2 times horizontal error.

<sup>2</sup> Real-time position accuracies obtained with SA off. With SA on, accuracy of autonomous positioning may degrade up to 100 meters (95%) as specified by the U.S. Department of Defense.

<sup>3</sup> When 20 Hz positions are generated the maximum number of satellites used is 8, the receiver still tracks up to 12 satellites and raw data is still available for up to 12 satellites. When positions are generated at 10 Hz, or lower, the receiver tracks and uses up to 12 satellites.

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Specifications are subject to change without notice.

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