GPS3260/ GPS3261

Extra Low Power

Smart Sensor xLP Series

Data Sheet

Related documents

- GPS3260/GPS3261 xLP Product brief LA000664
- Navman NMEA reference manual MN000315
- SiRF Binary Protocol reference manual

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1.0 Introduction

Navman's Extra Low Power Smart GPS Sensor is a tethered, fully integrated GPS antenna and high performance receiver that easily brings location capabilities to almost any platform. The GPS3260 xLP series includes a 20-channel ultra-high sensitivity receiver based on SiRFstar III technology, providing the fastest TTFF (Time to First Fix) possible in challenging environments such as urban canyons or dense foliage, and in all weather conditions.

2.0 Technical description

The 20-channel architecture with more than 200 000 effective correlators provides rapid TTFF under all start-up conditions. Acquisition is guaranteed under all conditions due to higher sensitivity.

2.1 Product applications

The Extra Low Power Smart GPS Sensor is especially suitable for applications where rapid TTFF and operation under low signal levels are primary requirements. The module offers high performance and maximum flexibility in a wide range of OEM configurations.

Supporting advanced power management modes, SBAS and a variety of user selectable Datums the GPS3260 xLP Series provides the perfect plug and play GPS solution for automotive, marine, scientific, industrial, commercial, leisure and battery powered applications requiring ultimate navigation.

2.2 Physical characteristics

The Smart GPS xLP Sensor is a complete GPS receiver within an enclosed housing that is waterproof to IPx7.

2.3 Mechanical specification

2.3.1 Physical dimensions and pin out assignments

Dimensions in mm:

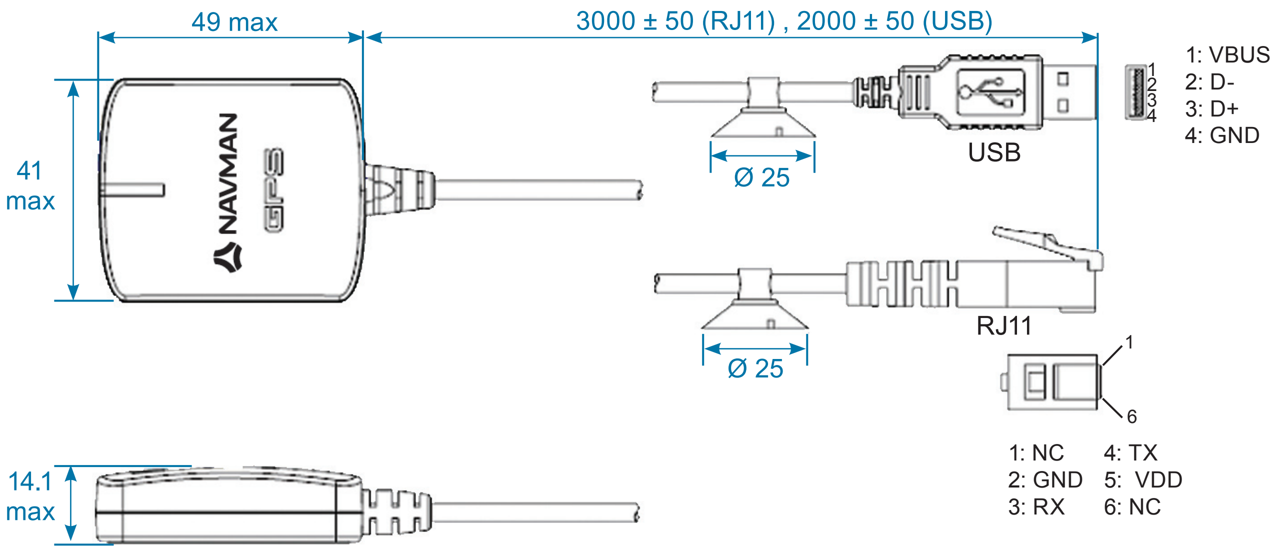


Figure 2-1: Physical dimensions

2.3.2 Weight

Total weight: 96 g max

2.4 External mounting

A magnet provides for external mounting on a car. The underside of the Smart GPS Sensor has a skid resistant pad. Cables are provided with a suction cup.

2.5 Connectors

The GPS3260 xLP provides a 3 m cable with RJ11 connector and the GPS3261 xLP provides a 2 m cable with USB connector.

2.6 Environmental

Environmental operating conditions:

operating temperature (Topr): –30ºC to +60ºC
storage temperature (Tstg): –40ºC to +60ºC (25ºC typical)
humidity: up to 95% non-condensing or a wet bulb temperature of +35ºC
altitude: –304 m to 18 000 m
vibration: random vibration IEC 68-2-64
max. vehicle dynamics: 500 m/s
shock (non-operating): 50 G peak, 11 ms

2.7 Compliances

The Navman Smart GPS Sensors comply with the following:

- Directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment (RoHS)
- CISPR22 and FCC: Part 15, Class B for radiated emissions

3.0 Performance characteristics

3.1 TTFF (Time To First Fix)

TTFF is the actual time required by a GPS receiver to achieve a position solution. This specification will vary with the operating state of the receiver, the length of time since the last position fix, the location of the last fix, and the specific receiver design.

Aiding is a method of effectively reducing the TTFF by making every start Hot or Warm.

3.1.1 Hot start

A hot start results from a software reset after a period of continuous navigation, or a return from a short idle period (i.e. a few minutes) that was preceded by a period of continuous navigation. In this state, all of the critical data (position, velocity, time, and satellite ephemeris) is valid to the specified accuracy and available in SRAM. Battery backup of the SRAM and RTC during loss of power is required to achieve a hot start.

3.1.2 Warm start

A warm start typically results from user-supplied position and time initialisation data or continuous RTC operation with an accurate last known position available in memory. In this state, position and time data are present and valid but ephemeris data validity has expired.

3.1.3 Cold start

A cold start acquisition results when either position or time data is unknown. Almanac information is used to identify previously healthy satellites.

3.2 Acquisition times

Table 3-1 shows the corresponding TTFF times for each of the acquisition modes.

Mode	@ –125 dBm	@ –140 dBm
	Typ	Typ
hot start TTFF	< 1 s	< 1 s
warm start TTFF	32 s	38 s
cold start TTFF	38 s	50 s
re-acquisition (<10 s obstruction)	< 1 s	< 1 s

Table 3-1: Acquisition times at –125 dBm and –140 dBm

3.3 LED indicator

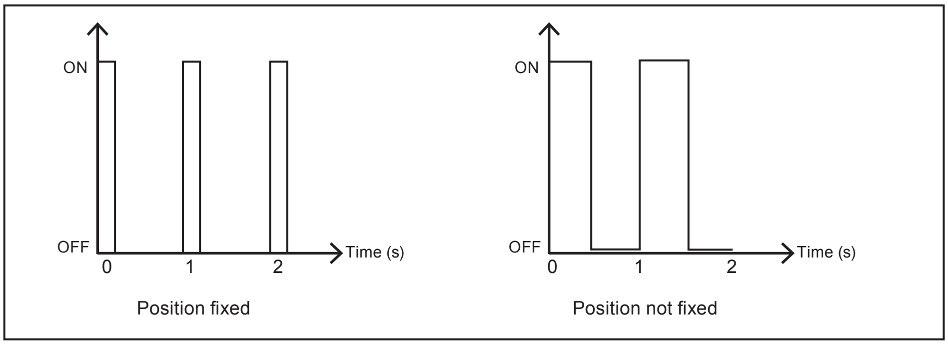


Figure 3-1: LED indicator duty cycle

The red LED indicates GPS positioning status. In continuous power mode, it flashes once per second when position is fixed. When first powered on and searching for a fix, the LED will flash at a 50% ON and 50% OFF ratio.

3.4 Power management

The Smart GPS Sensor offers Adaptive TricklePower, which can be set using NMEA or SiRF Binary messages.

3.4.1 Adaptive TricklePower

The Smart GPS Sensor can use the Adaptive TricklePower (ATP) feature, which reduces power consumption by intelligently switching between full power in tough GPS environments and low power in strong GPS signal areas.

When signal levels drop, the receiver returns to full power so that message output rates remain constant. This results in variable power savings but much more reliable performance for a fixed output rate. Applications using ATP should give performance very similar to full power, but with significant power savings in strong signal conditions.

ATP is best suited for applications that require solutions at a fixed rate as well as low power consumption and still maintain the ability to track weak signals.

With ATP at a 1 second update, a power saving of 50% can easily be achieved with minimal degradation in navigation performance.

For further information refer to the Navman Low Power Operating Modes application note (LA000513), Navman NMEA reference manual (MN000315) and the SiRF Binary Protocol reference manual.

3.5 Differential aiding

3.5.1 Satellite Based Augmentation Systems (SBAS)

The Smart GPS Sensor is capable of receiving SBAS differential corrections including WAAS and EGNOS. SBAS improves horizontal position accuracy by correcting GPS signal errors caused by ionospheric disturbances, timing and satellite orbit errors.

3.7 Sensitivity

Sensitivity of the Smart GPS Sensor is measured assuming a system noise value of 3 dB. The sensitivity values are as follows:

Parameter	Signal strength	C/N_0
acquisition – cold start	–140 dBm	20 dBHz
acquisition – hot start	–150 dBm	15 dBHz
navigation	N/A	N/A
tracking	–159 dBm	10 dBHz

Table 3-2: Sensitivity

3.8 Dynamic constraints

The Smart GPS Sensor receiver is programmed to deliberately lose track if any of the following limits is exceeded:

velocity: 500 m/s max

acceleration: 4 G (39.2 m/s2) max

vehicle jerk: 5 m/s3 max

altitude: 18 000 m max (referenced to MSL)

3.9 Position and velocity accuracy

Position and velocity accuracy are shown in Table 3-3, assuming full accuracy C/A code. These values are the same in normal operation and when Adaptive TricklePower is active.

Parameter	Value
horizontal CEP*	TBA
horizontal (2 dRMS) - autonomous	< 10 m
horizontal (2 dRMS) - SBAS	< 5 m
vertical VEP*	< 25 m
velocity 2D (2 sigma)	< 10 m/s
**position error 50%*	

Table 3-3: Position and velocity accuracy

4.0 Electrical requirements

4.1 Power consumption

See Table 5-1 for GPS3260 xLP and GPS3261 xLP continuous mode power consumption details.

Parameter	Symbol	Product	Min	Typ	Max
input voltage	VCC	GPS3260	4.75 V	5 V	5.25 V
		GPS3261	4.75 V	5 V	6 V
input current	Icc	GPS3260		34 mA*	
		GPS3261		35 mA*	
**measured when position fix is available and input voltage is 5 V*					

Table 4-1: Power consumption (continuous mode)

5.0 Software interface

Protocols supported are selected NMEA (National Marine Electronics Association) -0183 and SiRF Binary messages: latitude, longitude, elevation, velocity, heading, time, satellite tracking status, command/control messages.

The default serial modes are as follows:

NMEA, 9600 bps, 8 data bits, no parity, 1 stop bit

SiRF Binary, 38400 bps, 8 data bits, no parity, 1 stop bit

5.1 NMEA output messages

NMEA is a standard protocol used by GPS receivers to transmit data. The output NMEA (0183 v2.2) messages for the Smart GPS Sensors are listed in Table 6-1. A complete description of each NMEA message is contained in the Navman NMEA reference manual (MN000315).

Message ID and description	Refresh rate
GGA – global positioning system fix data	1 s
GSA – DOP and active satellites	1 s
GSV – satellites in view	1 s
RMC – recommended minimum specific GPS data	1 s
VTG – course over ground and ground speed	1 s
GLL – geographic position - latitude, longitude	1 s

Table 5-1: Default NMEA messages

5.1.1 Proprietary NMEA messages

Table 6-1 shows the proprietary message parameters.

Start sequence	Payload	Checksum	End sequence
$PSRF<MID>[1]	Data[2]	CKSUM[3]	<CR><LF>[4]

1. Message Identifier consisting of three numeric characters. Input messages begin at MID 100.
2. Message specific data. Refer to a specific message section for <data>…<data> definition.
3. CKSUM is a two-hex character checksum as defined in the NMEA specification, NMEA-0183Standard For Interfacing Marine Electronic Devices. Use of checksums is required on all input messages.
4. Each message is terminated using Carriage Return (CR) Line Feed (LF) which is \r\n which is hex 0D0A. Because \r\n are not printable ASCII characters, they are omitted from the example strings, but must be sent to terminate the message and cause the receiver to process that input message.

Note: All fields in all proprietary NMEA messages are required, none are optional. All NMEA messages are comma delimited.

5.1.2 Proprietary NMEA input messages

Table 6-1 shows the proprietary input message descriptions.

Message	MID*	Description
SetSerialPort	100	Set PORT A parameters and protocol
NavigationInitialization	101	Parameters required for start using X/Y/Z**
SetDGPSPort	102	***
Query/Rate Control	103	Query standard NMEA message and/or set output rate
LLANavigationInitialization	104	Parameters required for start using Lat/Lon/Alt**
Development Data On/Off	105	***
Select Datum	106	Selection of datum to be used for coordinate transformations

*Message Identification (MID)
**Input coordinates must be WGS84
***This feature is not available for Smart GPS Sensor

6.0 Product handling

6.1 Packaging and delivery

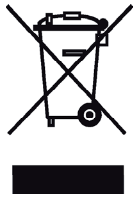
Units are delivered individually bubble wrapped within a carton.

The MOQ (Minimum Order Quantity) for shipping is 50 units (1 carton).

6.4 Safety

Improper handling and use of the Jupiter GPS receiver can cause permanent damage to the receiver and may even result in personal injury.

6.5 Disposal



This product should not be treated as household waste. For more detailed information about recycling of this product, please contact your local waste management authority or the reseller from whom you purchased the product.

7.0 Ordering information

The part numbers of the Smart GPS Sensor variants are shown in Table 11-1.

Part Number	Description
AA003260-G	Extra Low Power Smart GPS Sensor with 3 m cable and RJ11 connector
AA003261-G	Extra Low Power Smart GPS Sensor with 2 m cable and USB connector

Table 7-1: Ordering information

8.0 Glossary and acronyms

2dRMS: twice-distance Root Mean Square
A horizontal measure of accuracy representing the radius of a circle within which the true value lies at least 95% of the time.

Almanac
A set of orbital parameters that allows calculation of approximate GPS satellite positions and velocities. The almanac is used by a GPS receiver to determine satellite visibility and as an aid during acquisition of GPS satellite signals. The almanac is a subset of satellite ephemeris data and is updated weekly by GPS Control.

C/A code: Course Acquisition code
A spread spectrum direct sequence code that is used primarily by commercial GPS receivers to determine the range to the transmitting GPS satellite.

C/N_0: Carrier to Noise ratio

GDOP: Geometric Dilution of Precision
A factor used to describe the effect of the satellite geometry on the position and time accuracy of the GPS receiver solution. The lower the value of the GDOP parameter, the less the error in the position solution. Related indicators include PDOP, HDOP, TDOP and VDOP.

EGNOS: European Geostationary Navigation Overlay Service
The system of geostationary satellites and ground stations developed in Europe to improve the position and time calculation performed by the GPS receiver.

Ephemeris
A set of satellite orbital parameters that is used by a GPS receiver to calculate precise GPS satellite positions and velocities. The ephemeris is used to determine the navigation solution and is updated frequently to maintain the accuracy of GPS receivers.

GPS: Global Positioning System
A space-based radio positioning system that provides accurate position, velocity, and time data.

OEM: Original Equipment Manufacturer

Re-acquisition
The time taken for a position to be obtained after all satellites have been made invisible to the receiver.

NAVMAN WIRELESS

SBAS: Satellite Based Augmentation System
Any system that uses a network of geostationary satellites and ground stations to improve the performance of a Global Navigation Satellite System (GNSS). Current examples are EGNOS and WAAS.

SRAM: Static Random Access Memory

SAW filter: Surface Acoustic Wave filter

WAAS: Wide Area Augmentation System
The system of satellites and ground stations developed by the FAA (Federal Aviation Administration) that provides GPS signal corrections. WAAS satellite coverage is currently only available in North America.