

# Lassen SQ GPS Module

*Low-power, micro-sized GPS solution for mobile products*

## Key Features and Benefits

- **110 mW @ 3.3V**
- **26 mm x 26 mm x 6 mm**
- **TSIP, TAIP and NMEA 0183 protocols**
- **Flash memory**
- **Small companion antenna: 20.1 mm x 20 mm x 8 mm**
- **Antenna short-circuit detection and protection**

Trimble's new Lassen<sup>®</sup> SQ module adds complete GPS functionality to your mobile product in a postage-stamp-sized footprint with ultra-low power consumption. The module is designed for portable handheld, battery-powered applications such as cell phones, pagers, PDAs, digital cameras, and many others.

Using Trimble's breakthrough FirstGPS<sup>™</sup> architecture, the module delivers complete position, velocity and time (PVT) solutions for use in the host application. The Lassen SQ module uses minimal power and space and delivers a robust, reliable PVT solution.

The Lassen SQ module is the only stamp-sized GPS product with the three most popular standard protocols: TSIP (Trimble Standard Interface Protocol), TAIP (Trimble ASCII Interface Protocol) and NMEA 0183. The module is enclosed within a metal shield for ease of handling. The shield acts as a protective case.

## FirstGPS Architecture

The FirstGPS architecture consists primarily of two integrated circuits and FirstGPS firmware. This technology enables the Lassen SQ to achieve the unique combination of both ultra-low power usage and micro-size in the same unit.



*Lassen SQ GPS receiver with metal shield*

## Hardware

The Lassen SQ module packages this architecture in a tiny form factor, (approximately 26 mm x 26 mm, including the metal shield). It typically requires only 110 mW of power (at 3.3 VDC). Total typical power usage, including the Trimble 3.3 VDC miniature antenna, is  $\leq 143$  mW.

The highly integrated module is a miniature board containing a GPS hardware core based on Trimble's Colossus<sup>™</sup> RF ASIC and IO-TS digital signal processor (DSP) design and a 32-bit RISC CPU. The module offers onboard data storage in flash memory for complete processing capability.

## Antennas

The Lassen SQ module is com-

patible with active, 3.3 VDC antennas. Three such antennas are available from Trimble and are recommended for use according to your application:

- An ultra-compact embedded antenna, approximately the same size as the module itself. This antenna is unpackaged, for easy integration into mobile applications.
- A compact, unpackaged antenna slightly larger than the ultra-compact model above.
- A compact, packaged antenna with magnetic mount for flexible, movable installation.

## Starter Kit

The Lassen SQ Starter Kit provides everything you need to get started integrating state-of-the-art GPS capability into your application.

# Lassen SQ GPS Module

Low-power, micro-size GPS solution for mobile products

## KEY FEATURES

- Ultra-low power consumption: 110 mW @ 3.3 V
- Small, thin-model design: 26 mm W x 26 mm L x 6 mm H (1.02" x 1.02" x 0.24")
- TSIP, TAIP & NMEA protocols
- Flash memory
- Small companion antennas
- Antenna short-circuit detection and protection

## PERFORMANCE SPECIFICATIONS

<b>General:</b>	L1 (1575.42 MHz) frequency, C/A code, 8-channel, continuous tracking receiver, 32 correlators
<b>Update Rate:</b>	TSIP @ 1 Hz; NMEA @ 1 HZ, TAIP @ 1 HZ
<b>Accuracy:</b>	Horizontal: <6 meters (50%), <9 meters (90%) Altitude: <11 meters (50%), <18 meters (90%) Velocity: 0.06 m/sec PPS: ±95 nanoseconds
<b>Acquisition:</b>	Reacquisition: <2 sec. (90%)
<b>Hot Start:</b>	<14 sec (50%), <18 sec (90%)
<b>Warm Start:</b>	<38 sec (50%), <45 sec (90%)
<b>Cold Start:</b>	<90 sec (50%), <170 sec (90%) Cold start requires no initialization. Warm start requires last position, time and almanac are saved in battery back-up memory. Hot start requires that the ephemeris also saved.
<b>Dynamics:</b>	Acceleration: 4g (39.2 m/sec <sup>2</sup> ) Motional jerk: 20 m/sec <sup>3</sup>
<b>Operational Limits:</b>	Altitude <18000m or velocity <515m/s (COCOM limit) Either limit may be exceeded but not both

## INTERFACE CHARACTERISTICS

<b>Connectors:</b>	I/O: 8-pin (2x4) male header, micro terminal strip ASP 69533-01 or similar RF: Low-profile coaxial connector H.FL-R-SMT (10), 50 Ohm
<b>Serial Port:</b>	1 serial port (transmit/receive)
<b>PPS:</b>	3.3 V CMOS-compatible, TTL-level pulse Once per second with the rising edge of the pulse synchronized with UTC
<b>Protocols:</b>	TSIP @ 9600 baud, 8 Bits NMEA 0183 v3.0, selectable baud rate, 8 Bits TAIP @ selectable baud rate, 8 Bits
<b>NMEA Messages:</b>	GGA, VTG, GLL, ZDA, GSA, GSV and RMC Messages selectable by TSIP command; selection stored in flash memory

## ELECTRICAL CHARACTERISTICS

<b>Prime Power:</b>	+3.0 VDC to +3.6 VDC (3.3 V typ.)
<b>Power Consumption:</b>	GPS board only: 110 mW @ 3.3 V w/embedded ant.: 143.3 mW @ 3.3 V
<b>Backup Power:</b>	+2.5 VDC to +3.6 VDC
<b>Ripple Noise:</b>	Max 60 mV, peak-to-peak from 1 Hz to 1 MHz
<b>Antenna Fault Protection:</b>	Short-circuit detection and protection

## ENVIRONMENTAL SPECIFICATIONS

<b>Operating Temperature:</b>	-40°C to +85°C
<b>Storage Temperature:</b>	-55°C to +105°C

<b>Vibration</b>	0.008 g <sup>2</sup> /Hz	5 Hz to 20 Hz
	0.05 g <sup>2</sup> /Hz	20 Hz to 100 Hz
	-3 dB/octave	100 Hz to 900 Hz
<b>Operating Humidity</b>	5% to 95% R.H. non-condensing @ +60°C	

## PHYSICAL CHARACTERISTICS

<b>Enclosure:</b>	Metal enclosure with solder mounting tabs
<b>Outside Dimensions:</b>	26 mm W x 26 mm L x 6 mm H (1.02" x 1.02" x 0.24")
<b>Weight:</b>	Approximately 5.7 grams (0.2 ounce) including the shield

## ORDERING INFORMATION & ACCESSORIES

<b>Module</b>	Lassen SQ module, in metal enclosure with solder mounting tabs
<b>Starter Kit</b>	Includes Lassen SQ module mounted on interface motherboard in a durable metal enclosure, AC/DC power converter, compact magnetic-mount GPS antenna, ultra-compact embedded antenna, serial interface cable, cigarette lighter adapter, TSIP, NMEA and TAIP protocols, software toolkit for TSIP and manual on CD-ROM.
<b>Antenna Transition Cable, MCX:</b>	RF cable for connecting antennas with MCX connector to on-module H.FL-RF connector. Cable length: 10 cm.
<b>Antenna Transition Cable, SMA:</b>	RF cable for connecting antennas with SMA connector to on-module H.FL-RF connector. Cable length: 12.9 cm.

### Ultra-Compact Embedded Antenna:



3.3V active miniature unpackaged antenna  
Cable length: 8 cm  
Dim: 22 mm W x 21 mm L x 8 mm H (0.866" x 0.827" x 0.315")  
Connector: HFL; mates directly to on-module RF connector



**Compact Unpackaged Antenna:**  
3V active micropatch unpackaged antenna  
Cable length: 11 cm  
Dim: 34.6 mm W x 29 mm L x 9 mm H (1.362" x 1.141" x 0.354")  
Connector: MCX; mates through the optional RF transition cable to on-module RF connector



**Compact Magnetic-Mount Antenna, MCX or SMA:**  
3V active micropatch antenna with magnetic mount  
Cable length: 5 m  
Dim: 42 mm W x 50.5 mm L x 13.8 mm H (1.65" x 1.99" x 0.55")  
Connectors: MCX or SMA, mates through the optional RF transition cable to the module RF connector

Specifications subject to change without notice

Trimble has relied on representation made by its suppliers in certifying this product as RoHS compliant.



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Trimble Navigation Limited  
Corporate Headquarters  
935 Stewart Drive  
Sunnyvale, CA 94085  
1-800-787-4225  
1-408-481-7741

Trimble Navigation Europe  
Phone: +49-6142-2100-161

Trimble Export Ltd, Korea  
Phone: 82-2-5555-361  
korea\_sales@trimble.com

Trimble Navigation Ltd,  
China  
Phone: 86-21-6391-7814

