

## Lassen SQ GPS Module

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

### Key Features and Benefits

- 100 mW @ 3.3 V
- 26 mm x 26 mm x 6 mm
- TSIP 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™ 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® 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 two most popular standard protocols: TSIP (Trimble Standard 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.

### Hardware

The Lassen SQ module packages this architecture in a tiny form



*Lassen SQ GPS receiver with metal shield*

factor, (approximately 26 mm x 26 mm, including the metal shield). It typically requires only 100 mW of power (at 3.3 VDC). Total typical power usage, including the Trimble 3.3 VDC miniature antenna, is  $\leq 133$  mW.

The highly integrated module is a miniature board containing a GPS hardware core based on Trimble's Colossus® RF ASIC and IO-S 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 compatible 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: 100 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 & 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
<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%) Hot Start: <14 sec (50%), <18 sec (90%) Warm Start: <38 sec (50%), <45 sec (90%) Cold Start: <90 sec (50%), <170 sec (90%) Cold start requires no initialization. Warm start implies last position, time and almanac are saved by backup power. Hot start implies 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 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 GGA, VTG, GLL, ZDA, GSA, GSV and RMC
<b>NMEA Messages:</b>	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: 100 mW @ 3.3 V w/embedded ant.: 133.3 mW @ 3.3 V
<b>Backup Power:</b>	+2.5 VDC to +3.6VDC
<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

**Module**  
Lassen SQ module, in metal enclosure with solder mounting tabs

**Lassen SQ Starter Kit**  
Includes Lassen SQ module mounted on interface board in metal enclosure, Compact magnetic-mount antenna, AC/DC power adapter, Serial interface cable, Reference manual and GPS toolkit software supplied on a CD-ROM

**Transition cable:**  
RF cable for connecting antennas with MCX connector to on-module RF connector. Cable length: 10 cm

### Ultra-Compact Embedded Antenna:



3.3 V 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:



3 V 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 with optional RF transition cable to on-module RF connector

### Compact Magnetic-Mount Antenna:



3 V 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")  
Connector: MCX, mates through the optional RF transition cable to the module RF connector

*Specifications subject to change without notice*



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