M-Loc MPM

GPS Measurement Platform Module for Mobile Products

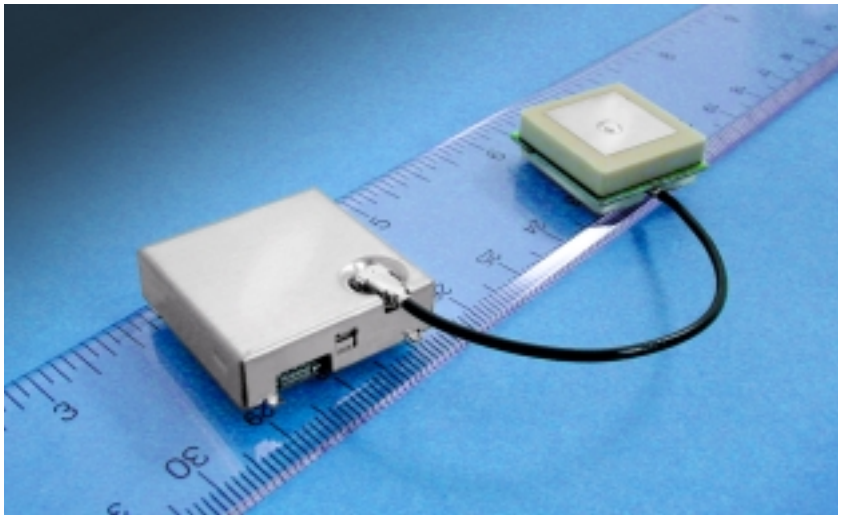
Key Features and Benefits

- **Lowest power usage available: 34.7 mW**
- **Very small size: 25 mm x 25 mm (1 in.²)**
- **Powerful GPS performance**
- **Efficient, host-based GPS libraries**

The M-Loc™ MPM™ module adds powerful GPS location technology to your mobile product in less space, for less power, and at less cost than previously possible.

Using Trimble's breakthrough FirstGPS® architecture, the module uses far less power and space than other modules, and requires less integration time and lower total cost than a basic chipset. With the M-Loc MPM module, you're faster to market with less risk and expense.

The M-Loc MPM module is designed for mobile, battery-powered applications such as cell phones, pagers, PDAs, digital cameras, automobile navigation systems, and many others.



Trimble M-Loc MPM module and optional antenna

FirstGPS Architecture

The FirstGPS architecture consists primarily of two integrated circuits and FirstGPS software. It provides a GPS measurement platform that performs the processor-intensive GPS tracking and processing tasks. It enables the host CPU–based software to calculate the actual position, velocity and time (PVT) solutions at its own pace, without burdening the other applications running on the device. The architechure is CPU- and OS-independent, and needs only 2 MIPs from the host CPU during steady-state tracking and 4 MIPs during acquisition.

Hardware

The M-Loc MPM module packages this architecture in a tiny form factor, approximately 25mm x 25mm (1 in²). It typically requires 34.7 mW of power. Total typical power usage, including the Trimble 3.3 VDC miniature antenna, is 68 mW.

The module is a miniature board containing a GPS hardware core based on Trimble's Colossus® RF ASIC and IO-S digital signal processor (DSP) ASIC. The board is enclosed in an RF shield to eliminate the risk of designing shielding into your product.

The module collects and processes the GPS signals and outputs data over its serial port to the host processor. The FirstGPS software then computes the PVT solution as required by the host application.

The module is compatible with active 3.3 VDC antennas. A Trimble miniature GPS antenna is available and recommended for use. This antenna is unpackaged, to enable easy integration into mobile applications.

Software

The FirstGPS software controls the operation of the M-Loc MPM module and the host-based navigation platform. The FirstGPS software is the only host-based architecture available today that allows flexible integration of GPS with other real-time software tasks.

FirstGPS software runs on the host CPU and provides access to GPS information via an Application Programming Interface (API). A simple call of an API function returns the requested GPS information. FirstGPS software takes care of all interfacing with the M-Loc MPM module.

The customer application always has priority and there are no time-critical interrupts from the GPS hardware. FirstGPS software can survive periods of up to 5 seconds where the customer application has total control of the CPU. The customer application can treat FirstGPS software as a simple extension to the operating system.

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PERFORMANCE SPECIFICATIONS

General: L1 Frequency, C/A Code, 12-channel, continuous tracking receiver

Update rate: 1 Hz (assuming enough processor time)

Accuracy

- **Horizontal position:** Better than 7 meters CEP 95%
- **Altitude position:** Better than 10 meters CEP 95%
- **Velocity:** 0.1 m/sec

Acquisition for Pentium/Windows Environment

- **Reacquisition:** less than 2 seconds for outages of up to 15 seconds
- **Hot start:** 16 seconds 90% of the time; 12 seconds on average
- **Warm start:** 45 seconds 90% of the time; 39 seconds on average
- **Cold start:** 130 seconds 90% of the time; 90 seconds on average

Actual performance numbers are host environment dependent and may vary with different CPU/RTOS combinations.

ENVIRONMENTAL SPECIFICATIONS

Operating temperature: –40° C to +85° C

Storage temperature: –55° C to +105° C

Vibration:

0.008 g^2/Hz	5 Hz to 20 Hz
0.05 g^2/Hz	20 Hz to 100 Hz
–3dB/octave	100 Hz to 900 Hz

Operating humidity: 5% to 95% RH, non-condensing, +60° C

ELECTRICAL CHARACTERISTICS

Prime power: 3.3 VDC ±0.3V

Power Consumption

M-Loc MPM module only[1]:

- **Power:** 34.7 mW typical, 43 mW maximum @ 3.3V
- **Voltage:** 3.3 to 3.6 VDC
- **Current:** 10.5 mA typical, 13 mA maximum

M-Loc MPM module plus GPS active antenna:

- **Power:** 68 mW typical, 86 mW maximum @ 3.3V
- **Voltage:** 3.3 to 3.6 VDC
- **Current:** 20.5 mA typical, 26 mA maximum
- **Ripple noise[2]:** Max 100 mV, peak to peak from 1Hz to 1MHz

INTERFACE CHARACTERISTICS

Connectors

- **RF:** H.FL-R-SMT (10), 50 Ohm
- **I/O:** FC1-05-02-T, Single 5-pin socket

Serial ports/ 1 PPS: 1 serial port (transmit/receive)
CMOS compatible TTL level pulse
PPS, once per second with the rising edge of the pulse synchronized with UTC

Protocols: FirstGPS Software Library provides GPS information in C data structure format. Sample GPS application provided with the development tools can be used to output NMEA messages.

PHYSICAL CHARACTERISTICS

Dimensions: 25.4 mm W x 25.4 mm H x 6.9 mm L

Weight: 5.7 gr (0.2 ounce) including the shield

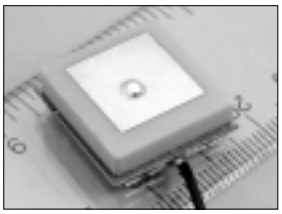
HOST ENVIRONMENT

M-Loc requirements from the host environment

- **CPU:** 2-4 MIPs
- **RAM:** 90K-110 Kbytes for Release
  Up to 512 Kbytes for Development
- **ROM/Flash:** 220K-256 Kbytes for Release
  280 Kbytes for Development

Host Processor	Host Operating System
ARM7	Nucleus
StrongArm	Windows CE
SH3	VxWorks
Pentium	Windows (95,98, 2000, or NT)

ACCESSORIES



Embedded GPS antenna:
Compact, 27±4 dB, 3.3V active miniature unpackaged GPS antenna with 80 mm cable
(20.1 mm W x 20 mm L x 8 mm H)

Antenna power:
3.3V at 13mA maximum

ORDERING INFORMATION

Module

M-Loc MPM module, RF shielded

Antenna (optional)

Unpackaged 3.3V miniature antenna, 80 mm cable

FirstGPS Starter Kit, includes:

Hardware

- IO-S Measurement Platform Module
- Interface Motherboard
- DB-9, RS-232 interface cable
- AC/DC converter
- Miniature 3.3V magnetic mount antenna

Software and Documentation (one CD)

- FirstGPS Monitor Program
- Sample Application Source Code
- FirstGPS Starter Kit User Guide (includes FirstGPS Standard API)

[1] This assumes that no antenna is attached to the module.
[2] Coupled with the prime power for a full performance specification of M-Loc.

Please visit our website for current information, part numbers, and ordering information at:

www.trimble.com/mlocmpm

Specifications and descriptions are subject to change without notice.

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