



PM-1211-A1 (RS232 Interface) Fast Acquisition Low-Cost 12 Channel GPS Sensor Module Product Datasheet

Document Revision: 1.0A

Document Release: August 30, 2005

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Revision History

Revision	Description	Date
1.0A	➤ PM-1211-A1 Product Datasheet – Formal Release	August 30, 2005

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1.0 Features

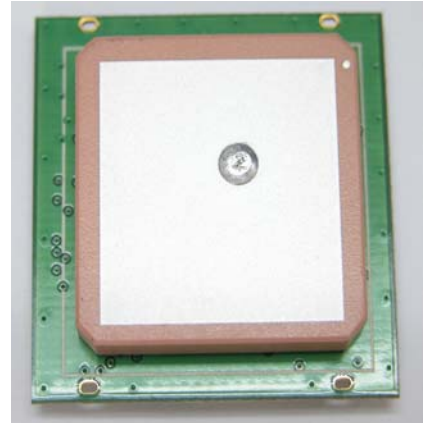
The PM-1211-A1 is a compact all-in-one GPS module solution intended for a broad range of Original Equipment Manufacturer (OEM) products, where fast and easy system integration and minimal development risk is required.

The receiver continuously tracks all satellites in view and provides accurate satellite positioning data. The PM-1211-A1 is optimized for applications requiring good performance, low cost, and maximum flexibility; suitable for a wide range of OEM configurations including handhelds, sensors, asset tracking, PDA-centric personal navigation system, and vehicle navigation products.

Its 12 parallel channels and 4000 search bins provide fast satellite signal acquisition and short startup time. Acquisition sensitivity of -140dBm and tracking sensitivity of -152dBm offers good navigation performance even in urban canyons having limited sky view.

Satellite-based augmentation systems, such as WAAS and EGNOS, are supported to yield improved accuracy.

Both the LVTTTL-level and RS232-level serial interface are provided on the interface connector. Supply voltage of $3.8\text{V}\sim 12\text{V}$ is supported.



Features

- 12 parallel channel GPS receiver
- 4000 simultaneous time-frequency search bins
- SBAS (WAAS, EGNOS) support
- -140dBm acquisition sensitivity
- -152dBm tracking sensitivity
- < 5 second hot start
- 35 second warm start
- 45 second cold start
- 5m CEP accuracy

2.0 Technical Specifications

Table 2-1 Technical Specifications

Receiver Type	12 parallel channel, L1 C/A code
Accuracy:	Position 5m CEP
	Velocity 0.1m/sec
	1PPS Timing +/-1us
Startup Time	< 10sec hot start
	35sec warm start
	45sec cold start
Reacquisition	1s
Sensitivity	-140dBm acquisition
	-152dBm tracking
Update Rate	1Hz
Dynamics	4G (39.2m/sec ²)
Operational Limits	Altitude < 18,000m or velocity < 515m/s (COCOM limit, either may be exceeded but not both)
Serial Interface	LVTTL Level
	RS-232 Level
Protocol	NMEA-0183 V3.01
	GPGGA, GPGLL, GPGSA, GPGSV, GPRMC, GPVTG, GPZDA
	4800,9600,19200,38400 baud (default 4800), 8, N, 1
Datum	WGS-84
Interface Connector	1.0mm pitch WTB S/R wafer 87213 SMT R/A type connector
Input Voltage	3.8V ~ 12.0V
Current Consumption	40~45mA
Dimension	32mm (L) x 32mm (W) x 8.5mm (H)
Weight	15g
Operating Temperature	-40oC ~ +85oC(not include battery)
Humidity	5% ~ 95%

3.0 Lateral View

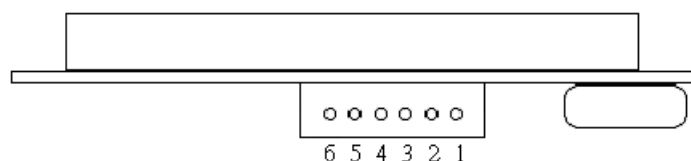


Figure 3-1 Lateral View

4.0 Pin Assignment Description

Table 4-1 Pin Assignment Descriptions

Pin Number	Signal Name	Description
1	TxD0	TTL Transmitting signal
2	RxD0	TTL receiving signal
3	Tx0	RS-232 Transmitting signal
4	Rx0	RS-232 receiving signal
5	Vcc	DC power 3.8~12V
6	GND	Power and signal ground

5.0 NMEA Messages

The serial interface protocol is based on the National Marine Electronics Association's NMEA 0183 ASCII interface specification. This standard is fully define in "NMEA 0183, Version 3.01" The standard may be obtained from NMEA, www.nmea.org

5.1 GGA – GPS Fix Data

Time, position and position-fix related data (number of satellites in use, HDOP, etc.).

Format:

\$GPGGA,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,M,<10>,M,<11>,<12>,*<13><CR><LF>

Example:

\$GPGGA,104549.04,2447.2038,N,12100.4990,E,1,06,01.7,00078.8,M,0016.3,M,,*5C<CR><LF>

Table 5-1 GGA – GPS Fix Data

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	2447.2038	Latitude in ddmm.mmmm format Leading zeros transmitted
3	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
4	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	1	Position fix quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode
7	06	Number of satellites in use, 00 ~ 12
8	01.7	Horizontal dilution of precision, 00.0 ~ 99.9
9	00078.8	Antenna height above/below mean sea level, -9999.9 ~ 17999.9
10	0016.3	Geoidal height, -999.9 ~ 9999.9
11		Age of DGPS data since last valid RTCM transmission in xxx format (seconds) NULL when DGPS not used
12		Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
13	5C	Checksum

Note: The checksum field starts with a '*' and consists of 2 characters representing a hex number. The checksum is the exclusive OR of all characters between '\$' and '*'.

5.2 GLL – Latitude and Longitude with Time of Position Fix and Status

Latitude and longitude of current position, time, and status.

Format:

\$GPGLL,<1>,<2>,<3>,<4>,<5>,<6>,<7>*<8><CR><LF>

Example:

\$GPGLL,2447.2073,N,12100.5022,E,104548.04,A,A*65<CR><LF>

Table 10-2 GLL – Latitude and Longitude with Time of Position Fix and Status

Field	Example	Description
1	2447.2073	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
3	12100.5022	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
5	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
6	A	Status, 'A' = valid position, 'V' = navigation receiver warning
7	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
8	65	Checksum

5.3 GSA – GPS DOP and Active Satellites

GPS receiver operating mode, satellites used for navigation, and DOP values.

Format:

\$GPGSA,<1>,<2>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

\$GPGSA,A,3,26,21,,,09,17,,,,,10.8,02.1,10.6*07<CR><LF>

Table 10-3 GSA – GPS DOP and Active Satellites

Field	Example	Description
1	A	Mode, 'M' = Manual, 'A' = Automatic
2	3	Fix type, 1 = not available, 2 = 2D fix, 3 = 3D fix
3	26,21,,,09,17,,,,,	PRN number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	10.8	Position dilution of precision, 00.0 to 99.9
5	02.1	Horizontal dilution of precision, 00.0 to 99.9
6	10.6	Vertical dilution of precision, 00.0 to 99.9
7	07	Checksum

5.4 GSV – GPS Satellite in View

Number of satellites in view, PRN number, elevation angle, azimuth angle, and C/No. Only up to four satellite details are transmitted per message. Additional satellite in view information is sent in subsequent GSV messages.

Format:

\$GPGSV,<1>,<2>,<3>,<4>,<5>,<6>,<7>,...,<4>,<5>,<6>,<7> *<8><CR><LF>

Example:

\$GPGSV,2,1,08,26,50,016,40,09,50,173,39,21,43,316,38,17,41,144,42*7C<CR><LF>

\$GPGSV,2,2,08,29,38,029,37,10,27,082,32,18,22,309,24,24,09,145,*7B<CR><LF>

Table 10-4 GSV – GPS Satellite in View

Field	Example	Description
1	2	Total number of GSV messages to be transmitted
2	1	Number of current GSV message
3	08	Total number of satellites in view, 00 ~ 12
4	26	Satellite PRN number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	50	Satellite elevation number, 00 ~ 90 degrees
6	016	Satellite azimuth angle, 000 ~ 359 degrees
7	40	C/No, 00 ~ 99 dB Null when not tracking
8	7C	Checksum

5.5 RMC – Recommended Minimum Specific GPS/Transit Data

Time, date, position, course and speed data.

Format:

\$GPRMC,<1>,<2>,<3>,<4>,<5>,<6>,<7>,<8>,<9>,<10>,<11>,<12>*<13><CR><LF>

Example:

\$GPRMC,104549.04,A,2447.2038,N,12100.4990,E,016.0,221.0,250304,003.3,W,A*22<CR><LF>

Table 10-5 RMC – Recommended Minimum Specific GPS/Transit Data

Field	Example	Description
1	104549.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	A	Status, 'V' = navigation receiver warning, 'A' = valid position
3	2447.2038	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N	Latitude hemisphere indicator, 'N' = North, 'S' = South
5	12100.4990	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
7	016.0	Speed over ground, 000.0 ~ 999.9 knots
8	221.0	Course over ground, 000.0 ~ 359.9 degrees
9	250304	UTC date of position fix, ddmm yy format
10	003.3	Magnetic variation, 000.0 ~ 180.0 degrees
11	W	Magnetic variation direction, 'E' = East, 'W' = West

Field	Example	Description
12	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
13	22	Checksum

5.6 VTG – Course over Ground and Ground Speed

Velocity is given as course over ground (COG) and speed over ground (SOG).

Format:

GPVTG,<1>,T,<2>,M,<3>,N,<4>,K,<5>*<6><CR><LF>

Example:

\$GPVTG,221.0,T,224.3,M,016.0,N,0029.6,K,A*1F<CR><LF>

Table 10-6 VTG – Course over Ground and Ground Speed

Field	Example	Description
1	221.0	True course over ground, 000.0 ~ 359.9 degrees
2	224.3	Magnetic course over ground, 000.0 ~ 359.9 degrees
3	016.0	Speed over ground, 000.0 ~ 999.9 knots
4	0029.6	Speed over ground, 0000.0 ~ 1800.0 kilometers per hour
5	A	Mode indicator 'N' = Data invalid 'A' = Autonomous 'D' = Differential 'E' = Estimated
6	1F	Checksum

5.7 ZDA Time and Date

Format:

\$GPZDA,<1>,<2>,<3>,<4>,<5>,<6>*<7><CR><LF>

Example:

\$GPZDA,104548.04,25,03,2004,,*6C<CR><LF>

Table 10-6 ZDA Time and Date

Field	Example	Description
1	104548.04	UTC time in hhmmss.ss format, 000000.00 ~ 235959.99
2	25	UTC time: day (01 ... 31)
3	03	UTC time: month (01 ... 12)
4	2004	UTC time: year (4 digit year)
5		Local zone hour Not being output by the receiver (NULL)
6		Local zone minutes Not being output by the receiver (NULL)
7	6C	Checksum

6.0 Mechanical Characteristics

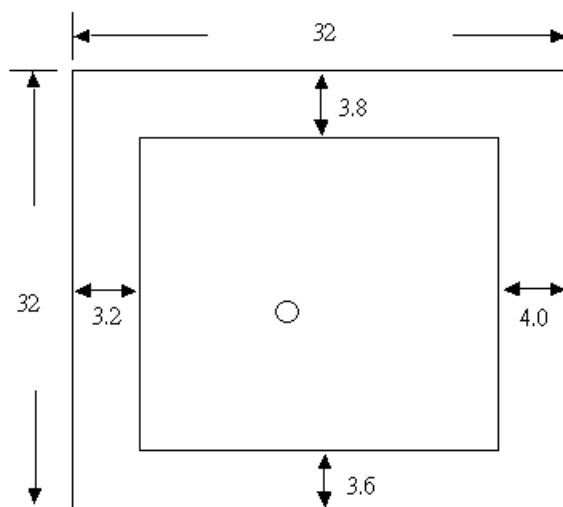


Figure 6-1 Top View

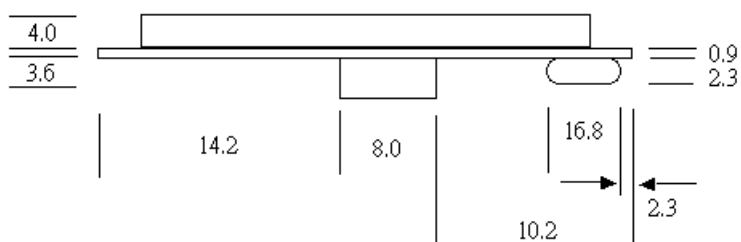


Figure 6-2 Side View