SPECIFICATION

SPEC NO. : **PMB-948**

PART NO. : **PMB-948**

PRODUCT NAME : **GPS Module / PMB-948**

DESCRIPTION : **GPS Module**

REVISION STATUS

VERSION	DATE	PAGE	REVISION DESCRIPTION	PREPARED	DESIGNED	APPROVED
0.1	2008/04/14	all pages	New Issued	Ken Hung	Ken Hung	S. M. Wang
1.0	2008/10/12	7	Modification	Ken Hung	Ken Hung	S. M. Wang

Prepared By	Designed By	Approved By

INDEX

1.0 Cautions

GPS (Global Positioning System) is a satellite-based navigation system. In an unobstructed clear view of the sky, GPS works anywhere in the world, 24 hours a day.

GPS is developed and operated by the government of United States. Under the policy of the government, the degradation in accuracy shall occur without prior warnings, and sometimes satellites don't transmit signal due to adjustment, test, and orbital revision.

Also, please note:

1. products such as motors, computer, and RF devices, which emit high levels of magnetic field and interference that may cause the performance of the GPS unit to drop.
2. the optimal position during automobile applications is on the roof top of the vehicles. If the GPS unit is to be placed inside the car, be certain to avoid coverage by metal objects for optimal performance.

Please be aware that the performance of the GPS receiver module does not warrant against the above factors.

(Position Accuracy)
Position data and position accuracy are affected or degraded by the satellite geometry, electric magnetic interference, and multipath.

(Equipment)
The high frequency noise will interfere with signal receiving. The high frequency noise within the receiver frequency band, 1575Mhz ±10MHz, will affect the receiver quality. Also, because of the mixer and modulation, the low frequency noise will be increased by several times. If this increased frequency drops into the 1575MHz ±10MHz band, it will also affect the receiver quality.

(Warranty)
If the product fails within one year after the date of delivery while it has been used properly it will be replaced or repaired free of charge.

2.0 Features:

- **Skytraq high sensitivity GPS chip set.**
- **65-Channel GPS Receiver for fast acquisition and reacquisition.**
- **Surpport NMEA 0183**
- **Built-in patch antenna**
- **Small size 41x41x18 mm**

3.0 Normal Operating Conditions

Symbol	Parameter	Min	Typ	Max	Units
V_{CC}	**Power Supply Voltage**	**3.0**	**3.3**	**5.5**	**V**
Pw	**Power Consumption(*1)**	**—**	**85**	**—**	**mA**
Top	**Operating Temperature**	**-20**	**25**	**70**	**°C**
***1: Power Consumption: Typical: 55mA @5V**					

4.0 Specification

Chipset		Skytraq
Baud Rate		4800/9600/38400/115200 bps (Factory setting before shipping)
Satellite Tracking		65 Parallel channels
RF input	Center frequency	1575.42MHz L1 band, C/A code
	Signal sensitivity	-160 dBm or less
Positioning system	Default	WGS-84
Positioning accuracy	Position	2.5m CEP
	Velocity	0.1m/s Average
Altitude		18,000 meters(60,000 feet)max
Velocity		515 meters/second (1000 kmots)max
Navigation Update Rate		1second
Operation Temperature		－20℃ to 70℃
Storage Temperature		－30℃ to 85℃

5.0 Time To First Fix (TTFF)

Assumes listed navigation conditions and 8 satellites in view (average)

TTFF	Typ	Units
Hot Start (time, position, valid ephemeris, and valid almanac)	**2**	**seconds**
Cold Start (time, position, no ephemeris, and valid almanac)	**35**	**Seconds**

The G-mouse has to establish location fix before accurate time information can be provided.

6.0 Interface

I/O connector (Power supply, serial data I/0) pitch 1.25mm 6pin Molex Male

7.0 Communication Specification

Communication method	Start-stop synchronization
Transfer rate input/output	4800/9600/38400/115200 bps
Logic levels	LVTTL/RS-232
I/O code	ASCII
Communication format	NMEA 0183

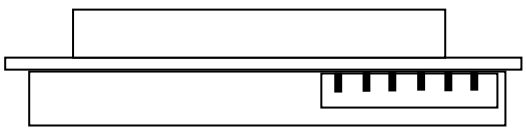
8.0 LED Indicate function

status	Description	LED ON / OFF TIME
1	**The GPS is fixed status**	**Flashing (ON and OFF both for 1 second)**
2	**The GPS is Not-fix status**	**Flashing (ON for 1 second and OFF for 2 second)**
3	**The GPS is out of power**	**Always OFF**

9.0 Module I/O Connector Pins

Pin Configuration

Pin No.	Symbol	I/O	Description
1	**TTL TX**	**O**	**TTL TX (Navigation data output).**
2	**TTL RX**	**I**	**TTL RX (Command Input).**
3	**VCC**	**I**	**Power supply input.**
4	**GND**	**G**	**Power & Data ground.**
5	**RS-232 TX**	**O**	**RS-232 TX (Navigation data output).**
6	**RS-232 RX**	**I**	**RS-232 RX (Command Input)**



Pin 1 **pin6**

10.0 NMEA command

- *GGA - Global Positioning System Fix Data*

Structure:
$GPGGA,hhmmss.sss,ddmm.mmmm,a,dddmm.mmmm,a,x,xx,x.x,x.x,M,,,,xxxx*hh<CR><LF>
Example:
$GPGGA,111636.932,2447.0949,N,12100.5223,E,1,11,0.8,118.2,M,,,,0000*02<CR><LF>

Field	Name	Example	Description
1	UTC Time	111636.932	UTC of position in hhmmss.sss format, (000000.000 ~ 235959.999)
2	Latitude	2447.0949	Latitude in ddmm.mmmm format Leading zeros transmitted
3	N/S Indicator	N	Latitude hemisphere indicator, ‘N’ = North, ‘S’ = South
4	Longitude	12100.5223	Longitude in dddmm.mmmm format Leading zeros transmitted
5	E/W Indicator	E	Longitude hemisphere indicator, 'E' = East, 'W' = West
6	GPS quality indicator	1	GPS quality indicator 0: position fix unavailable 1: valid position fix, SPS mode 2: valid position fix, differential GPS mode 3: GPS PPS Mode, fix valid 4: Real Time Kinematic. System used in RTK mode with fixed integers 5: Float RTK. Satellite system used in RTK mode. Floating integers 6: Estimated (dead reckoning) Mode 7: Manual Input Mode 8: Simulator Mode
7	Satellites Used	11	Number of satellites in use, (00 ~ 12)
8	HDOP	0.8	Horizontal dilution of precision, (00.0 ~ 99.9)
9	Altitude	108.2	mean sea level (geoid), (-9999.9 ~ 17999.9)
10	DGPS Station ID	0000	Differential reference station ID, 0000 ~ 1023 NULL when DGPS not used
11	Checksum	02	

- *GSA – GNSS DOP and Active Satellites*

Structure: $GPGSA,A,x,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,xx,x.x,x.x,x.x*hh<CR><LF>
Example: $GPGSA,A,3,05,12,21,22,30,09,18,06,14,01,31,,1.2,0.8,0.9*36<CR><LF>

Field	Name	Example	Description
1	Mode	A	Mode ‘M’ = Manual, forced to operate in 2D or 3D mode ‘A’ = Automatic, allowed to automatically switch 2D/3D
2	Mode	3	Fix type 1 = Fix not available 2 = 2D 3 = 3D
3	Satellite used 1~12	05,12,21,22,30 ,09,18,06,14,0 1,31,,	Satellite ID number, 01 to 32, of satellite used in solution, up to 12 transmitted
4	PDOP	1.2	Position dilution of precision (00.0 to 99.9)
5	HDOP	0.8	Horizontal dilution of precision (00.0 to 99.9)
6	VDOP	0.9	Vertical dilution of precision (00.0 to 99.9)
7	Checksum	36	

- *GSV – GNSS Satellites in View*

Structure: $GPGSV,x,x,xx,xx,xx,xxx,xx,...,xx,xx,xxx,xx *hh<CR><LF>
Example:
$GPGSV,3,1,12,05,54,069,45,12,44,061,44,21,07,184,46,22,78,289,47*72<CR><LF>
$GPGSV,3,2,12,30,65,118,45,09,12,047,37,18,62,157,47,06,08,144,45*7C<CR><LF>
$GPGSV,3,3,12,14,39,330,42,01,06,299,38,31,30,256,44,32,36,320,47*7B<CR><LF>

Field	Name	Example	Description
1	Number of message	3	Total number of GSV messages to be transmitted (1-3)
2	Sequence number	1	Sequence number of current GSV message
3	Satellites in view	12	Total number of satellites in view (00 ~ 12)
4	Satellite ID	05	Satellite ID number, GPS: 01 ~ 32, SBAS: 33 ~ 64 (33 = PRN120)
5	Elevation	54	Satellite elevation in degrees, (00 ~ 90)
6	Azimuth	069	Satellite azimuth angle in degrees, (000 ~ 359)
7	SNR	45	C/No in dB (00 ~ 99) Null when not tracking
8	Checksum	72	

- *RMC – Recommended Minimum Specific GNSS Data*

Structure:
$GPRMC,hhmmss.sss,A,dddmm.mmmm,a,dddmm.mmmm,a,x.x,x.x,ddmmyy,,,a*hh<CR><LF>
Example:
$GPRMC,111636.932,A,2447.0949,N,12100.5223,E,000.0,000.0,030407,,,A*61<CR><LF>

Field	Name	Example	Description
1	UTC time	0111636.932	UTC time in hhmmss.sss format (000000.00 ~ 235959.999)
2	Status	A	Status ‘V’ = Navigation receiver warning ‘A’ = Data Valid
3	Latitude	2447.0949	Latitude in dddmm.mmmm format Leading zeros transmitted
4	N/S indicator	N	Latitude hemisphere indicator ‘N’ = North ‘S’ = South
5	Longitude	12100.5223	Longitude in dddmm.mmmm format Leading zeros transmitted
6	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
7	Speed over ground	000.0	Speed over ground in knots (000.0 ~ 999.9)
8	Course over ground	000.0	Course over ground in degrees (000.0 ~ 359.9)
9	UTC Date	030407	UTC date of position fix, ddmmyy format
10	Mode indicator	A	Mode indicator ‘N’ = Data not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
11	checksum	61	

- *VTG – Course Over Ground and Ground Speed*

Structure: GPVTG,x.x,T,,M,x.x,N,x.x,K,a*hh<CR><LF>
Example: $GPVTG, 000.0,T,,M,000.0,N,0000.0,K,A*3D<CR><LF>

Field	Name	Example	Description
1	Course	000.0	True course over ground in degrees (000.0 ~ 359.9)
2	Speed	000.0	Speed over ground in knots (000.0 ~ 999.9)
3	Speed	0000.0	Speed over ground in kilometers per hour (0000.0 ~ 1800.0)
4	Mode	A	Mode indicator ‘N’ = not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
5	Checksum	3D	

- *GLL – Latitude/Longitude*

Structure: $GPGLL,ddmm.mmmm,a,dddmm.mmmm,a,hhmmss.sss,A,a*hh<CR><LF>
Example: $GPGLL,2447.0944,N,12100.5213,E,112609.932,A,A*57<CR><LF>

Field	Name	Example	Description
1	Latitude	2447.0944	Latitude in ddmm.mmmm format Leading zeros transmitted
2	N/S Indicator	N	Latitude hemisphere indicator ‘N’ = North ‘S’ = South
3	Longitude	12100.5213	Longitude in dddmm.mmmm format Leading zeros transmitted
4	E/W Indicator	E	Longitude hemisphere indicator 'E' = East 'W' = West
5	UTC Time	112609.932	UTC time in hhmmss.sss format (000000.000 ~ 235959.999)
6	Status	A	Status, ‘A’ = Data valid, ‘V’ = Data not valid
7	Mode Indicator	A	Mode indicator ‘N’ = Data not valid ‘A’ = Autonomous mode ‘D’ = Differential mode ‘E’ = Estimated (dead reckoning) mode ‘M’ = Manual input mode ‘S’ = Simulator mode
8	Checksum	57	

Appendix A. GPS Module-PC Board Dimension