Document : Datasheet
Date : 11-Apr-10

Model # : GPS - 1319

GPS Receiver with Antenna (5V TTL Serial)

- User Manual

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This is a high gain GPS Receiver (5V Serial) with 4-pin 2.54mm pitch Berg strip. Receiver is made with third generation POT (Patch Antenna On Top) GPS module. The built in 3V3 to 5V level convertor enable us to interface with normal 5V Microcontrollers. Its low pin count (4-Pin) will make it easy to interface and it is bread board friendly (2.54 mm connector). The 4 Pins are 5V, TX, RX, GND. Yes, there is no setting required, just plug in to the power (5V), your data (NMEA 0183) is ready at TX pin! This is a standalone 5V GPS Module and requires no external components. It has internal RTC Back up battery. It can be directly connected to Microcontroller's USART.

This GPS engine provides a solution with high position and speed accuracy performances as well as high sensitivity and tracking capabilities in urban conditions and it provides standard NMEA0183 strings in “raw” mode for any microcontroller. The module provides current time, date, latitude, longitude, speed, altitude and travel direction / heading among other data, and can be used in a host of applications, including navigation, tracking systems, fleet management, mapping and robotics.

The GPS chipsets inside the module are designed by MediaTek Inc.,which is the world's leading digital media solution provider and largest fab-less IC company in Taiwan. The module can support up to 51 channels. The GPS solution enables small form factor devices. They deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility. They are designed to simplify the embedded system integration process.

FEATURES

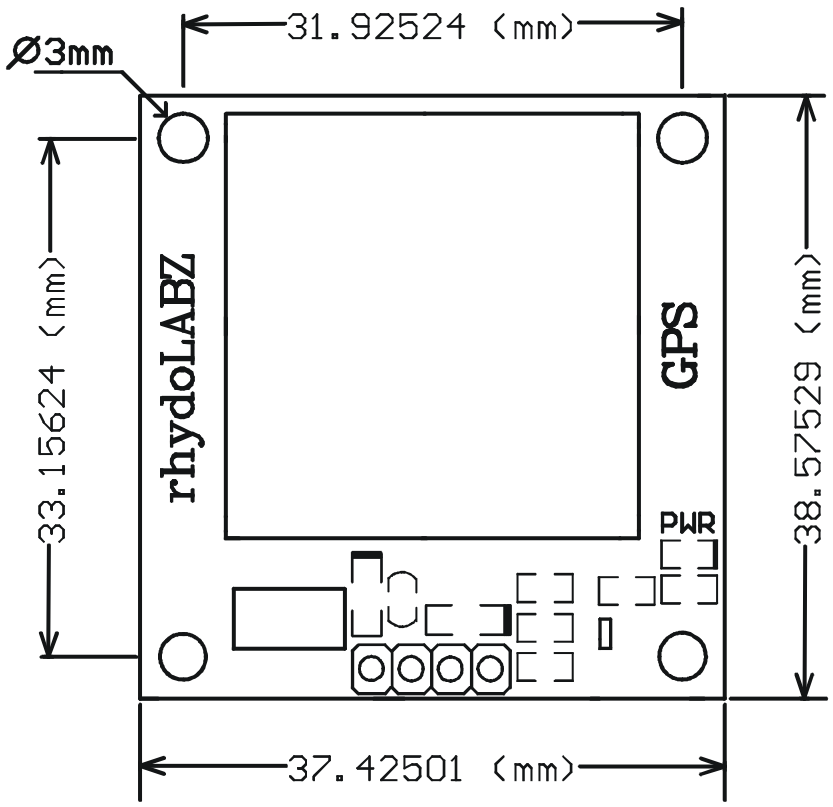
- Single 5V DC supply @ 60 mA (typical)
- TTL asynchronous serial interface
- Data output Baud rate: 9600 bps(Default)
- Standard NMEA0183 output format
- Standard 4-pin Berg strip interface (2.54mm Pitch).
- Module will be provided with two type berg strip (Normal & Right angled)
- Based on MediaTek Single Chip Architecture.
- Patch Antenna Size: 25mm x 25mm x 4mm
- Low Power Consumption: 50mA @ acquisition, 45mA @ tracking
- L1 Frequency, C/A code, 51-channel
- High Sensitivity: Up to -158 dBm tracking, superior urban performances
- Position Accuracy: < 3m CEP (50%) without SA (horizontal)
- Cold Start is Under 36 seconds (Typical)

- Warm Start is Under 34 seconds (Typical)
- Hot Start is Under 1 second (Typical)
- Max. Update Rate : 5 Hz (Default: 1 Hz)

PIN DEFINITIONS

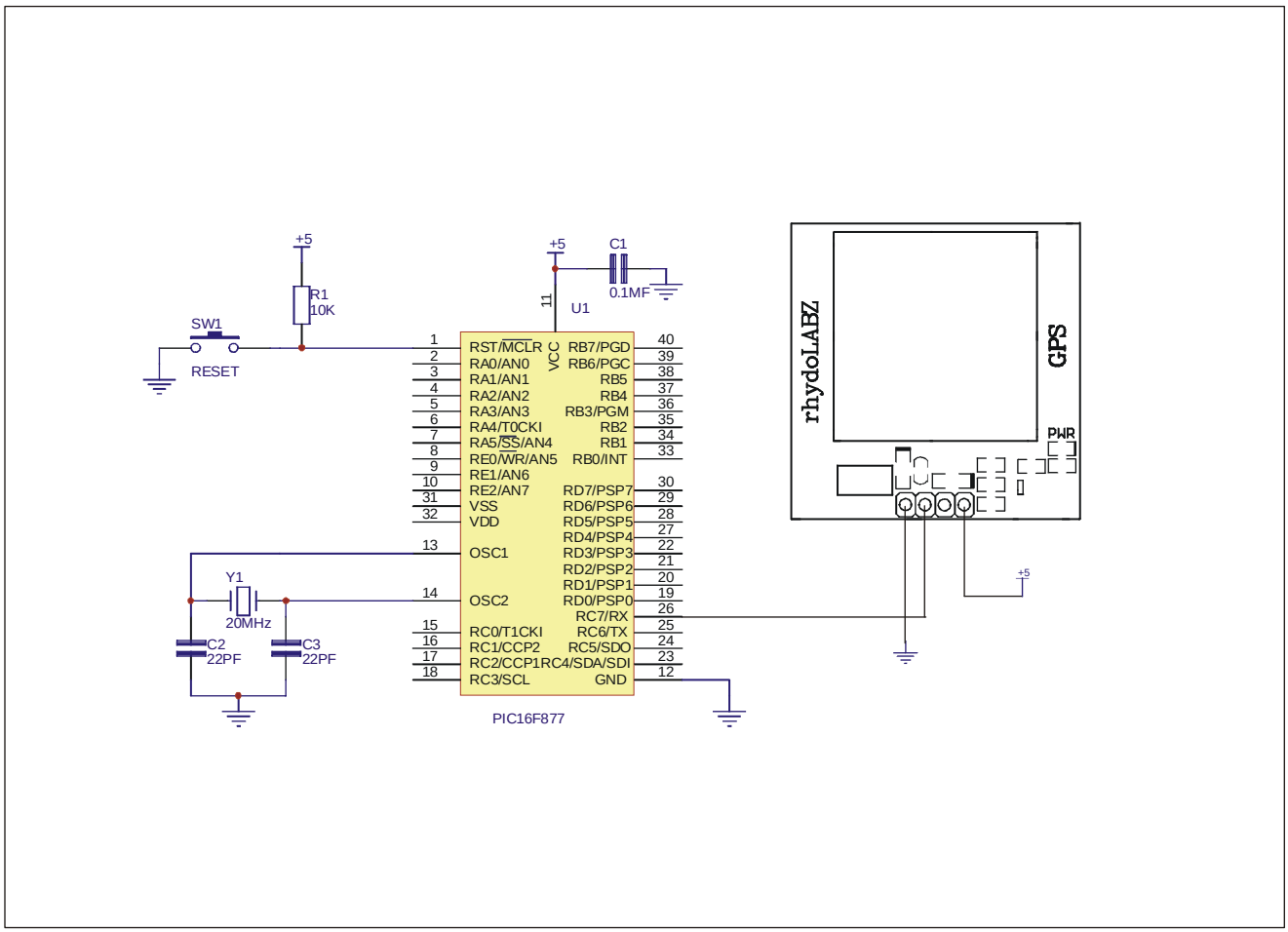
PIN	PIN NAME	DETAILS
5V	Power Supply	Power Supply Input (5V)
RXD	Receive	Pin for Data Reception
TXD	Transmit	Pin for Data Transmission
GND	Ground	Ground Level of Power supply

DIMENSIONS



INTERFACING WITH MICROCONTROLLER

- Below is an example of interfacing the GPS Module with PIC 16F877A microcontroller.



CHIPSET SPECIFICATION

GENERAL	
Chipset	MTK MT3318
Frequency	L1, 1575.42MHz
C/A Code	1.023 MHz
Channels	51 channels
DGPS	RTCM protocol WAAS, EGNOS, MSAS
Datum	WGS84(Default), Tokyo-M, Tokyo-A, User Define
CPU	ARM7TDMI
DIMENSIONS	
Length/Width/Height	26mm x26mm x 11.7mm
Weight	12.5g
PERFORMANCE CHARACTERISTICS	
Position Accuracy	Without aid：3.0m 2D-RMS
	< 3m CEP (50%) without SA (horizontal)
	DGPS (RTCM, SBAS (WAAS, EGNOS, MSAS))：2.5m
Velocity Accuracy	Without aid：0.1 m/s
	DGPS (RTCM, SBAS (WAAS, EGNOS, MSAS))：0.05m/s
Acceleration	Without aid：< 4g
	DGPS (RTCM, SBAS (WAAS, EGNOS, MSAS))：< 4g
Timing Accuracy	100 ns RMS
Sensitivity[1]	Acquisition：-146dBm (Cold Start)
	Reacquisition：-156dBm
	Tracking：-158dBm
Max. Update Rate	5Hz **(Default: 1 Hz)**

ACQUISITION (OPEN SKY, STATIONARY)	
Reacquisition Time[1]	Less than 1 second
Hot start[1]	1 second (Typical)
Warm start[1]	34seconds (Typical)
Cold start[1]	36 seconds (Typical)
DYNAMIC	
Altitude	Maximum 18,000m
Velocity	Maximum 515m/s
Acceleration	Maximum 4g
INPUT/OUTPUT	
Signal Output	8 data bits, no parity, 1 stop bit
Available Baud Rates	**9600 bps(Default),**4800/9600/14400/19200/38400/57600/ 115200 is also available
Protocols	NMEA 0183 v3.01, MTK NMEA Command
DATA OUTPUT INTERFACE	
Protocol messages	9600 bps/8/N/1 (Default)
Output format (Default)	GGA(1sec),GSA(1sec),RMC(1sec),VTG(1sec),GSV(5sec)
ENVIRONMENT	
Operating Temperature	-40℃ to 85 ℃ (without coin battery) -20℃ to 60 ℃ (with coin battery)
Storage Temperature	-50℃ to 90 ℃(without coin battery) -20℃ to 60 ℃ (with coin battery)
Operating Humidity	5% to 95% (no condensing)

[1] Reference to GPS chipset specification

DC CHARACTERISTICS

Parameter	Condition	Specification			Unit
		Min.	Typ.	Max.	
Supply Voltage	Vcc	4.5	5.0	5.8	V
Power Consumption @ 5V	Acquisition	50	60	80	mA
	Tracking	45	60	85	mA

NMEA OUTPUT SENTENCE

Table-1 lists each of the NMEA output sentences specifically developed and defined by MTK for use within MTK products

NMEA Output Sentence	Table-1
Option	**Description**
GGA	Time, position and fix type data.
GSA	GPS receiver operating mode, active satellites used in the position solution, and DOP values.
GSV	The number of GPS satellites in view satellite ID numbers, elevation, azimuth, and SNR values.
RMC	Time, date, position, course and speed data. Recommended Minimum Navigation Information.
VTG	Course and speed information relative to the ground.

GGA—Global Positioning System Fixed Data. Time, Position and fix related data for a GPS receiver

Table-2 contains the values for the following example：

$GPGGA,035238.000,2307.1219,N,12016.4423,E,1,9,0.89,23.6,M,17.8,M,,*69

GGA Data Format			**Table-2**
Name	**Example**	**Units**	**Description**
Message ID	$GPGGA		GGA protocol header
UTC Time	035238.000		hhmmss.sss
Latitude	2307.1219		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4424		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Satellites Used	9		Range 0 to 14
HDOP	0.89		Horizontal Dilution of Precision
MSL Altitude	17.3	meters	Antenna Altitude above/below mean-sea-level
Units	M	meters	Units of antenna altitude
Geoidal Separation	17.8	meters	
Units	M	meters	Units of geoidal separation
Age of Diff. Corr.		second	Null fields when DGPS is not used
Checksum	*69		
<CR> <LF>			End of message termination

GSA—GNSS DOP and Active Satellites

Table-3 contains the values for the following example：

$GPGSA,A,3,29,21,09,18,10,26,12,24,15,,,,1.20,0.89,0.80*04

GSA Data Format			**Table-3**
Name	**Example**	**Units**	**Description**
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See **Table-4**
Mode 2	3		See **Table-5**
Satellite Used	29		SV on Channel 1
Satellite Used	21		SV on Channel 2
....	….	….	....
Satellite Used			SV on Channel 12
PDOP	1.20		Position Dilution of Precision
HDOP	0.89		Horizontal Dilution of Precision
VDOP	0.80		Vertical Dilution of Precision
Checksum	*04		
<CR> <LF>			End of message termination

Mode 1	**Table-4**
Value	**Description**
M	Manual—forced to operate in 2D or 3D mode
A	2D Automatic—allowed to automatically switch 2D/3D

Mode 2	**Table-5**
Value	**Description**
1	Fix not available
2	2D (**<** 4 SVs used)
3	3D (≧4 SVs used)

GSV—GNSS Satellites in View

Table-7 contains the values for the following example：

$GPGSV,3,1,10,24,76,195,48,09,62,173,48,21,50,308,48,15,45,021,48*73

$GPGSV,3,2,10,26,33,031,46,18,29,319,46,10,21,092,45,29,18,221,44*7D

$GPGSV,3,3,10,12,05,167,24,05,03,181,*76

GSV Data Format			**Table-6**
Name	**Example**	**Units**	**Description**
Message ID	$GPGSV		GSV protocol header
Number of Messages	3		Range 1 to 3 *(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)*
Message Number1	1		Range 1 to 3
Satellites in View	10		
Satellite ID	24		Channel 1 (Range 1 to 32)
Elevation	76	degrees	Channel 1 (Maximum 90)
Azimuth	195	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	48	dBHz	Range 0 to 99, (null when not tracking)
....	….	….	....
Satellite ID	15		Channel 4 (Range 1 to 32)
Elevation	45	degrees	Channel 4 (Maximum 90)
Azimuth	021	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	48	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*73		
<CR> <LF>			End of message termination

RMC—Recommended Minimum Navigation Information

Table-7 contains the values for the following example：

$GPRMC,035242.000,A,2307.1220,N,12016.4420,E,0.06,0.00,140508,,,A*63

RMC Data Format			**Table-7**
Name	**Example**	**Units**	**Description**
Message ID	$GPRMC		RMC protocol header
UTC Time	035242.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307. 1220		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4420		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.06	knots	
Course Over Ground	0.00	degrees	True
Date	140508		ddmmyy
Magnetic Variation		degrees	E=east or W=west *(MTK does support magnetic declination)*
Mode	A		A= Autonomous mode D= Differential mode
			E= Estimated mode
Checksum	*63		
<CR> <LF>			End of message termination

VTG — Course and speed information relative to the ground.

Table-8 contains the values for the following example：

$GPVTG,0.00,T,,M,0.06,N,0.11,K,A*3B

VTG Data Format			**Table-8**
Name	**Example**	**Units**	**Description**
Message ID	$GPVTG		VTG protocol header
Course	0.00	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic *(MTK does not support magnetic declination.)*
Speed	0.06	knots	Measured horizontal speed
Units	N		Knots
Speed	0.11	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*3B		
<CR> <LF>			End of message termination

MTK NMEA Command Protocol

Packet Type：

103 PMTK_CMD_COLD_START

Packet Meaning：

Cold Start：Don’t use Time, Position, Almanacs and Ephemeris data at re-start.

Example：$PMTK103*30<CR><LF>

GETTING STARTED

Connect the GPS

Connect the GPS board as per the circuit diagram given.

Power Supply

Connect the power Supply (5V DC) to the power supply input pins.

Led Indication

When the module is successfully powered-up, the Green LED (PWR) will be ON.

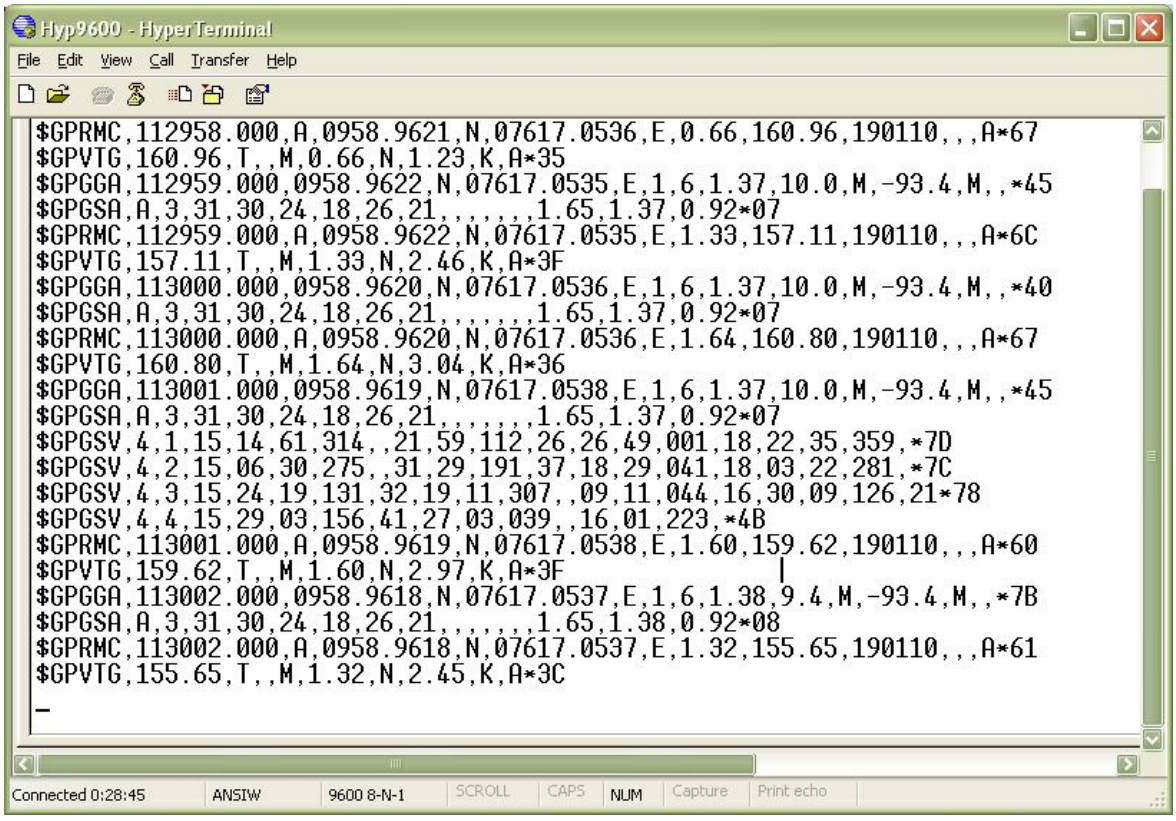
Baud rate

The default Baud rate supported by the GPS is 9600. Make sure the host system is set to the supported baud rate.

Testing with a PC

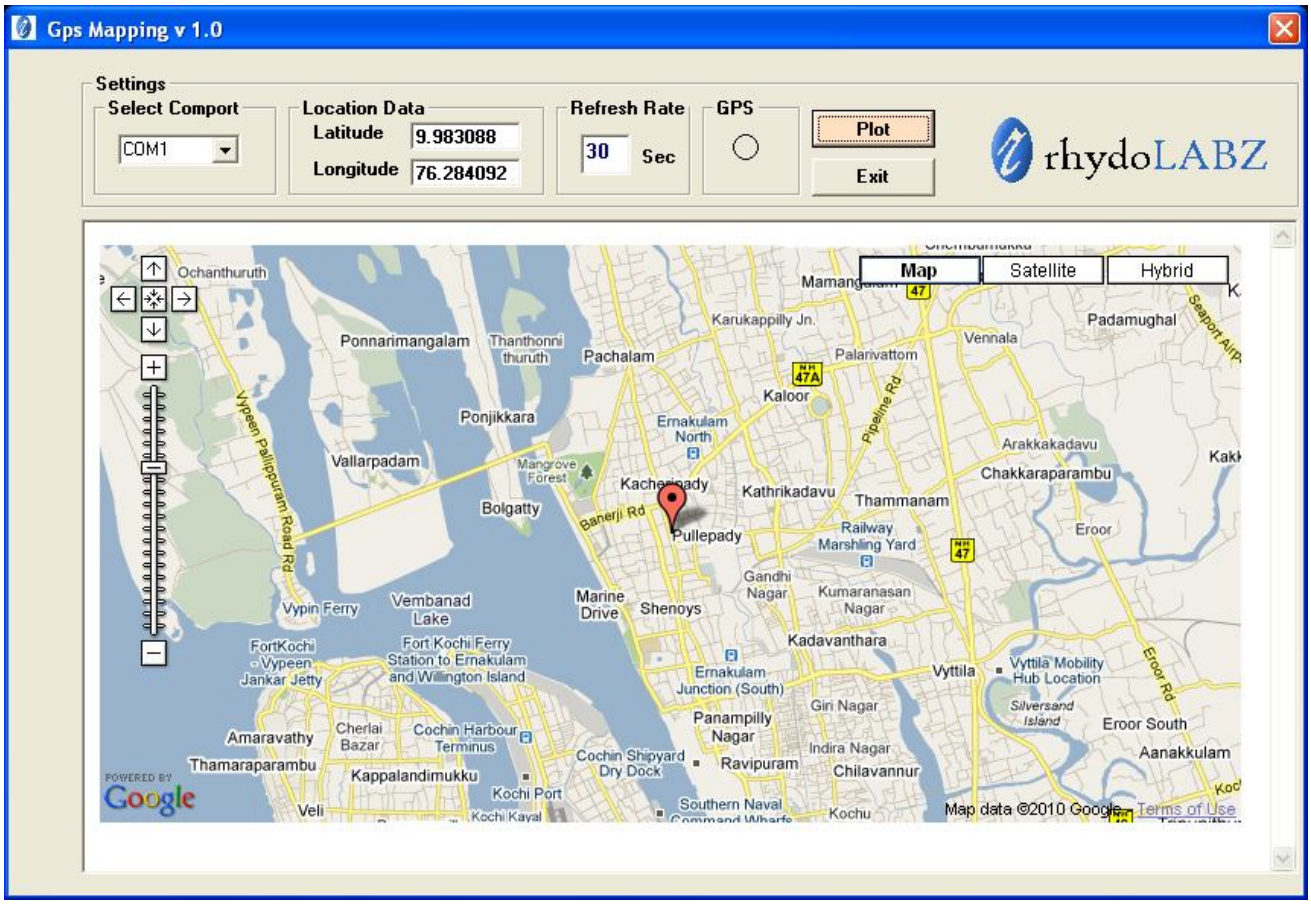
1. Connect the GPS Module to a PC Com port using a MAX-232 level conversion circuit or TTL-RS-232/TTL-USB convertor and Power it Up.
2. Create a HyperTerminal (Windows tool for serial port communications) window with Baudrate 9600 and connect it to the ComPort to which the Gps is connected.
3. You could see the GPS data in the hyper terminal window.

Terminal Window on PC where GPS is connected



PC INTERFACE SOFTWARE FOR GPS

- Download setup file from www.rhydolabz.com/documents/gps_gsm/gps_mapping_software.zip
- Install the setup file in your PC. Once the installation is completed, open the application from StartMenu-Programs-Rhydolabz-GpsMapping
- Connect the Gps to a PC Com port using a MAX-232 circuit or TTL-RS-232/TTL-USB and Power it Up.
- Select the Comport* (in the application software) to which Gps is connected and select the refresh rate in seconds (Between 10 and 65).Press the "**Plot**" button.
- If GPS data is received through serial port, the circle in the GPS Frame in software will start blinking (Green).
- The software displays the current Latitude and Longitude and plots the position in Google Maps.



** If the comport number does not appear in the software, re-assign the Comport to an available one.(Can be done in Device Manager- Comport-Properties)*

TECHNICAL SUPPORT

If you are experiencing a problem that is not described in this manual, please contact us. Our phone lines are open from 9:00 AM – 5.00 PM (*Indian Standard Time*) Monday through Saturday excluding holidays. Email can be sent to *support@rhydolabz.com*

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DISCLAIMER

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