GPS Receiver MT3318

Figure 1: GPS Receiver MT3318 top and bottom view

Introduction

GPS Receiver MT3318 is based on the MediaTek MTK MT3318 chipset. It has active patch antenna from Cirocomm. It can track 51 satellites simultaneously. This GPS receiver gives data output in standard NMEA format with update rate of 1 second at 9600 bps. Receiver has onboard battery for memory backup for quicker acquisition of GPS satellites. Receiver has 8 pin male berg connector with 2mm pitch. 8 pin female berg connector comes with this GPS module for external connections.

Note: You may also require general purpose PCB with 2mm pitch for mounting the receiver on the PCB.

Specifications

- Supply: 3.3V, 45mA
- Chipset: MTK MT3318
- Antenna: High gain GPS patch antenna from Cirocomm
- Data output: CMOS UART interface at 3.3V
- Protocol: NMEA-0183@9600bps (Default) at update rate of 1 second.
- Protocol message support: GGA, GSA, GSV,RMC, VTG
- No. of Satellite simultaneously tracked: 51
- Tracking Sensitivity: On-module antenna : -157 dBm
- Position Accuracy : <3 m
- Max. Update Rate：5Hz (Default: 1 Hz)
- Time to First Fix (Open sky and stationary position)
    - Obscuration recovery: 0.1 second average
    - Hot start: <1 seconds average
    - Warm start: <34 seconds average
    - Cold start: <36 seconds average
- Size: 26mm x 26mm x11.7mm

Kit Contains:

- GPS Receiver MT3318
- 8 pin Female berg connector with 2mm pitch
- Documentation CD with terminal software from the NEX Robotics and GPS Cockpit NMEA terminal software

Mechanical Dimension:

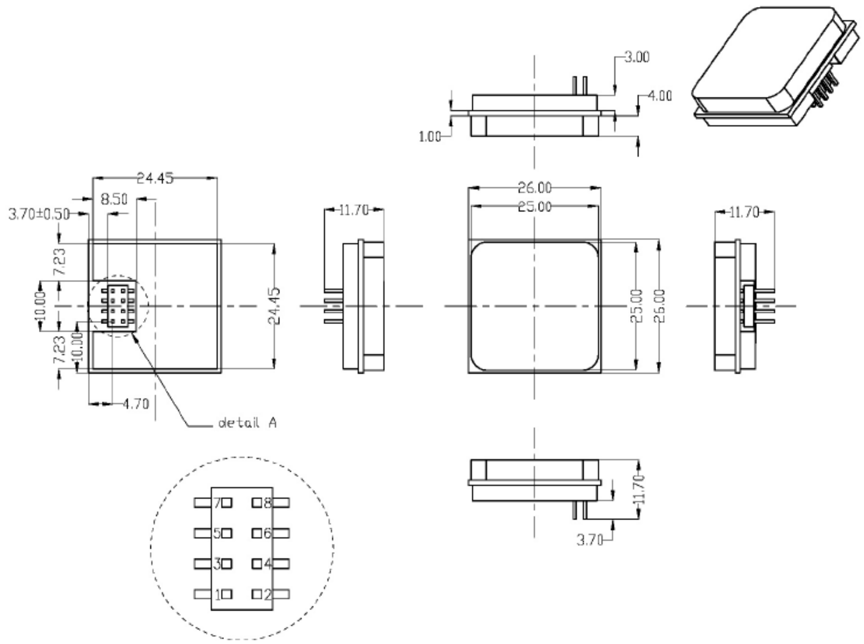

Figure 2: Mechanical Dimensions

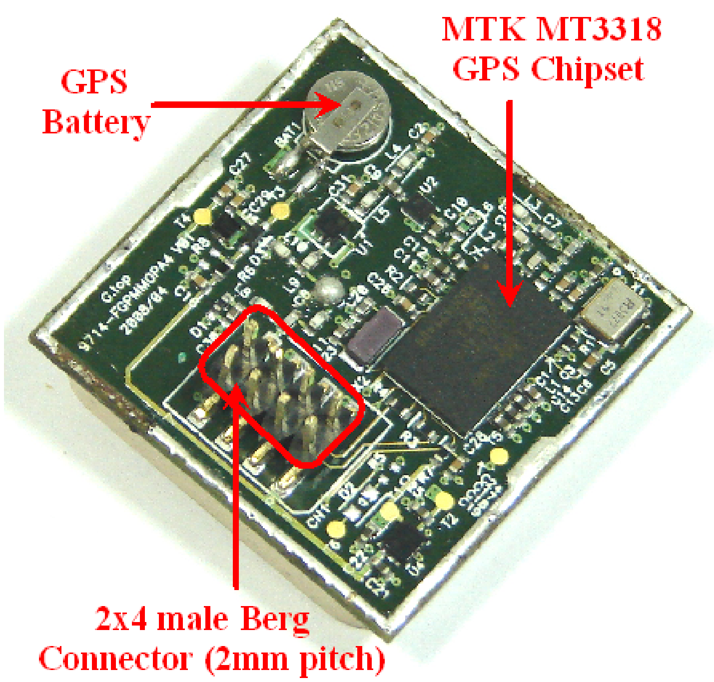

Figure 3: Inside view of the GPS receiver

GPS Receiver MT3318 is also available in the following form factors

GPS Receiver MT3318 Module
GPS Receiver is soldered on the PCB with 3.3V low drop voltage regulator, 5V to 3.3V logic level converter, LEDs for TX, RX and Power.

GPS Receiver MT3318 USB Module
By using this you can be directly interfaced GPS with the PC via USB port. GPS Receiver is soldered on the PCB with 3.3V low drop voltage regulator, 5V to 3.3V logic level converter, LEDs for TX, RX and Power has onboard USB module

Connections

GPS receiver has 8pin male berg connector with 2mm pitch for the connections. Table 1 shows the pin connections.

VCC (Pin1)	3.3V DC Supply voltage
GND (Pin2)	Ground
RX (Pin3)	Receiver pin (on this pin give data from external circuit)
TX (Pin4)	Transmitter pin (on this pin get data from satellite)
V-ANT (Pin5)	3.3V DC Supply for external antenna
GND(Pin6)	Ground
RESET(Pin7)	Please keep no connection (N/C) it remain high when power is on
EXANT(Pin8)	External Antenna input pin

Table 1: GPS Receiver MT3318 pin connections

You can use 8 pin female berg connector with 2mm pitch for connections which comes with the GPS receiver.

Interfacing Microcontroller which is working on 3.3V with the GPS receiver:
Microcontroller interfacing at 3.3V is fairly strait forward process. All you have to do connect TXD of the uC to RXD of the GPS and RXD of the uC to TXD of the GPS receiver. And give common ground.

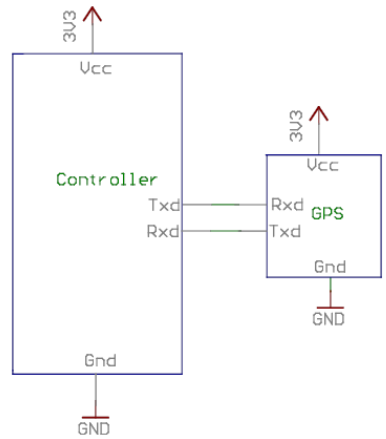

Figure 4: GPS interfacing with the microcontroller at 3.3V logic level

Interfacing Microcontroller which is working on 5V with the GPS receiver:

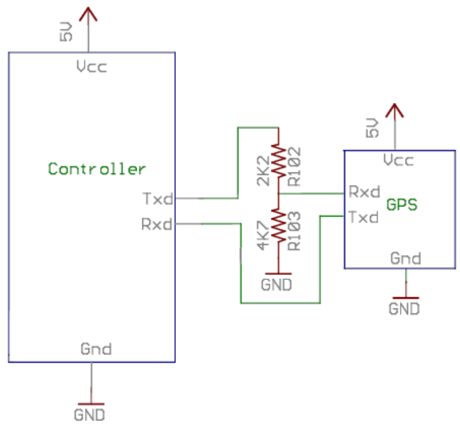

Figure 5: GPS interfacing with the microcontroller at 5V logic level

In this case microcontroller is working at 5V while GPS receiver is operating at 3.3V. TXD pin of the microcontroller will have 5V logic level while RXD pin of the GPS will be operating at 3.3V. We need to use voltage divider network of the resistors to scale down voltage level of TXD pin of the microcontroller to less than 3.3V.Figure 5 shows voltage divider network consist of 2.2K ohm and 4.7K ohm resistors which scales down 5V approximately by the factor of 2/3

TXD pin of the GPS receiver can be directly connected to the microcontroller's RXD pin.

Also connect common ground between both of the devices.

Acquiring the GPS data:

GPS data can be received by the microcontroller or on the PC using any terminal software. Following example shows the GPS data acquisition on the PC using terminal software from the NEX Robotics.

If you are using Serial terminal from NEX Robotics then follow bellow steps

Step1: Install the terminal software from NEX Robotic on the PC which is located in the documentation CD.
Step 2: Select COM Port in serial terminal setting column.
Step 3: Set Baud rate to 9600
Step 4: Set parity to none, Data bits to 8 and stop bits to one.
Step 5: click on connect button for connection

Connecting GPS module with the PC:

Connect GPS module with the PC using Serial port via MAX232 or equivalent TTL to RS232 converter or using any USB to Serial Converter.

Note: If you are using USB to Serial Converters from NEX Robotics then for installing drivers, refer to the respective product manuals.

GPS data accusation on the PC:

When GPS module inside the room:

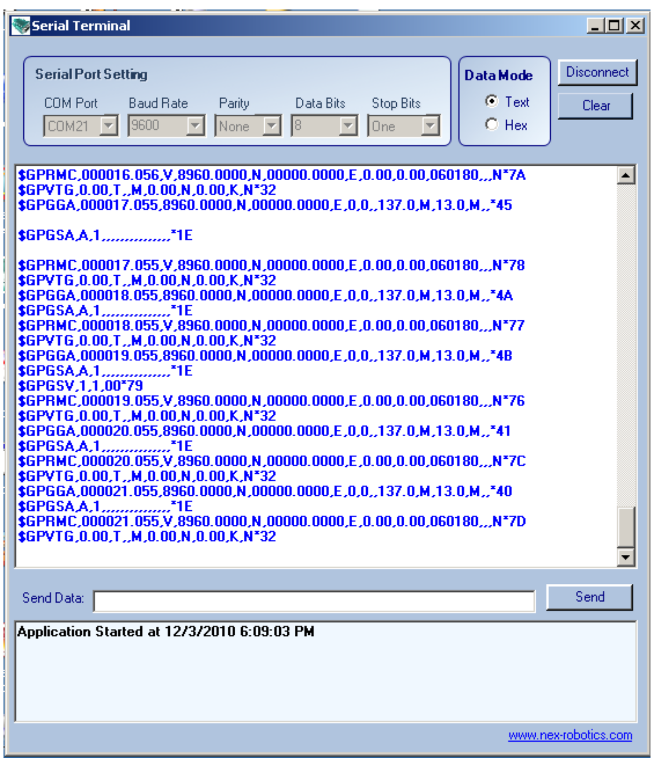

Figure 6

Figure 6 shows data when GPS module inside the room. You will not get any data also it will not detect any satellite inside the room.

When GPS module outside the room:

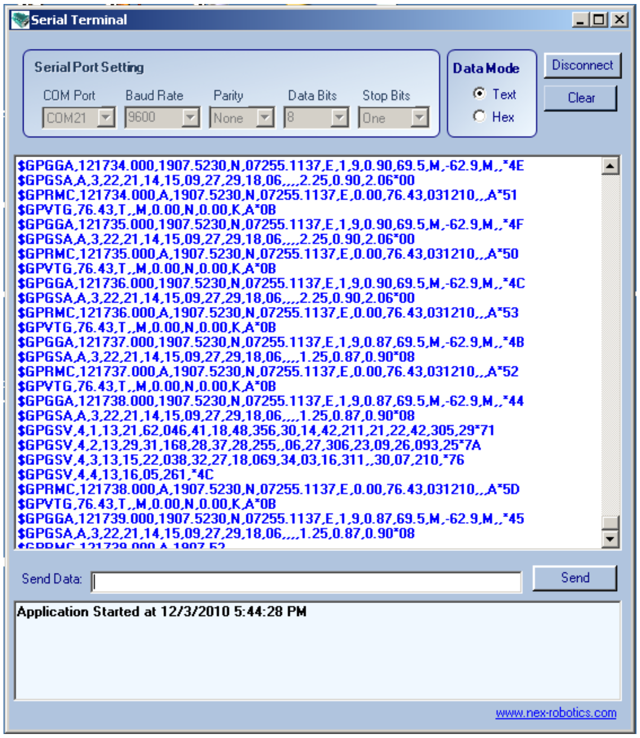

Figure 7

Figure 7shows data when GPS module outside the room. You will get perfect data in NMEA-0183 format at 9600bps.

You can also use GPS Cockpit software to see GPS Data on PC

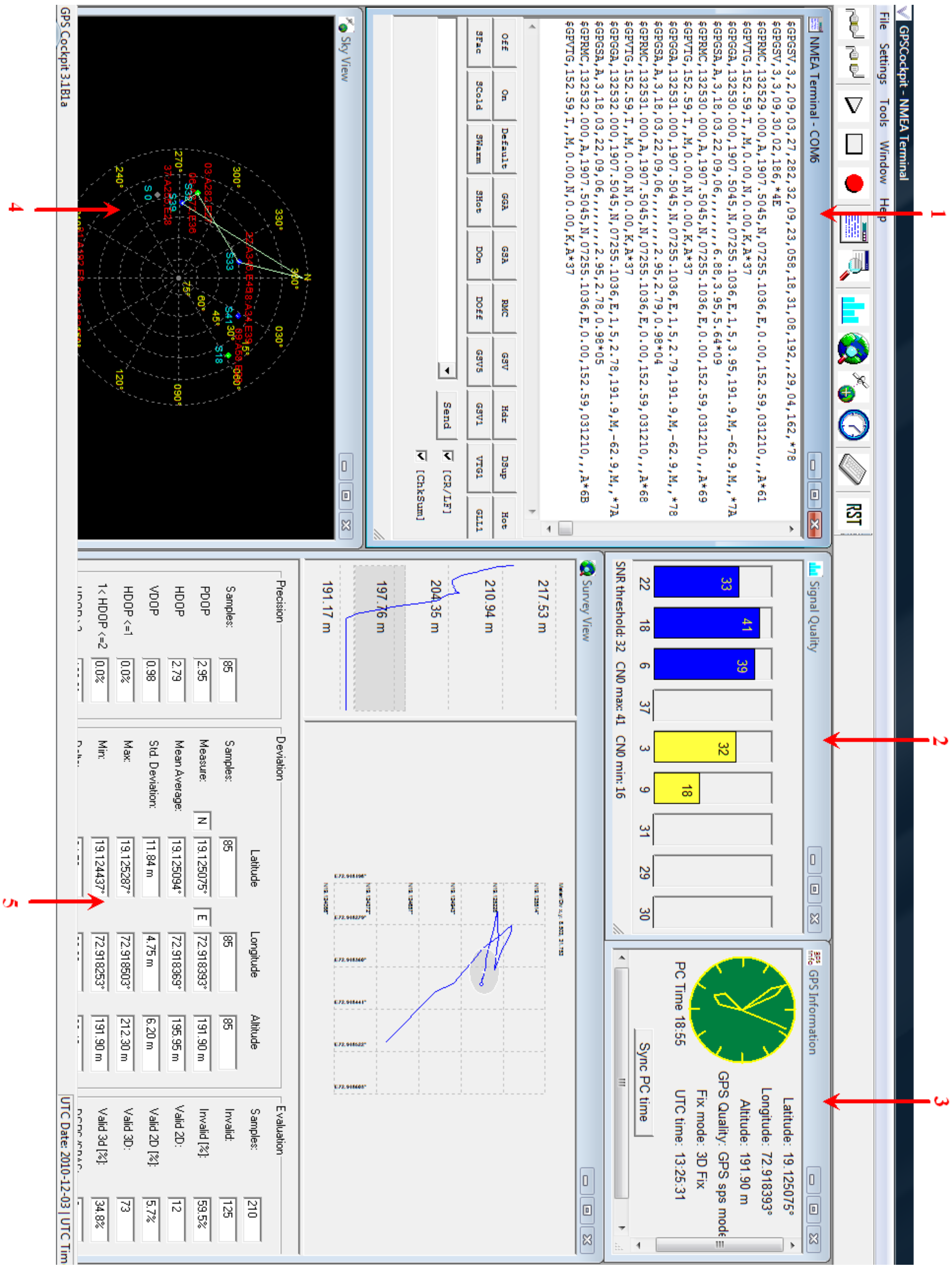

Figure 8

GPS Cockpit software is very easy software for GPS data study. It shows GPS data in different windows. Like you can directly get latitude and longitude on GPS information window, you can also find out distance between two points in survey window. In signal quality window displays the signal to noise ratio or carrier to noise. You can also see satellite position in sky view window.All other important GPS data you can see it on NMEA terminal window.

Install the GPS Cockpit software on the PC which is located in the documentation CD.
First Set com port and baud rate 9600 in sitting option. Then click *Play NMEA file* option

Figure 8 shows NMEA cock pit terminal window it having
1:- NMEA Terminal window
2:- Signal quality window
3:- GPS information window
4:- Sky view window
5:- Survey view window

For more information about Cockpit software you can Refer GPS Cockpit user manual located in the documentation CD.

NMEA protocol explanation:

1: GPGGA - Global Positioning System Fix Data
2: GPGSA - GPS DOP and active satellites
3: GPGSV - GPS Satellites in view
4: GPRMC: Recommended minimum specific GPS/Transit data
5: GPVTG: Track Made Good and Ground Speed.

GPGGA: Global Positioning System Fix Data

Name	Example Data	Description
Sentence Identifier	$GPGGA	Global Positioning System Fix Data
Time	170834	17:08:34 Z
Latitude	4124.8963, N	41d 24.8963' N or 41d 24' 54" N
Longitude	08151.6838, W	81d 51.6838' W or 81d 51' 41" W
Fix Quality: - 0 = Invalid - 1 = GPS fix - 2 = DGPS fix	1	Data is from a GPS fix
Number of Satellites	05	5 Satellites are in view
Horizontal Dilution of Precision (HDOP)	1.5	Relative accuracy of horizontal position
Altitude	280.2, M	280.2 meters above mean sea level
Height of geoid above WGS84 ellipsoid	-34.0, M	-34.0 meters
Time since last DGPS update	blank	No last update
DGPS reference station id	blank	No station id
Checksum	*75	Used by program to check for transmission errors

Courtesy of Brian McClure, N8PQI.

Global Positioning System Fix Data. Time, position and fix related data for a GPS receiver.

eg2. $--GGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx

hhmmss.ss = UTC of position
llll.ll = latitude of position
a = N or S
yyyyy.yy = Longitude of position
a = E or W
x = GPS Quality indicator (0=no fix, 1=GPS fix, 2=Dif. GPS fix)
xx = number of satellites in use
x.x = horizontal dilution of precision
x.x = Antenna altitude above mean-sea-level

M = units of antenna altitude, meters
x.x = Geoidal separation
M = units of geoidal separation, meters
x.x = Age of Differential GPS data (seconds)
xxxx = Differential reference station ID

eg3. $GPGGA,hhmmss.ss,llll.ll,a,yyyyy.yy,a,x,xx,x.x,x.x,M,x.x,M,x.x,xxxx*hh
1 = UTC of Position
2 = Latitude
3 = N or S
4 = Longitude
5 = E or W
6 = GPS quality indicator (0=invalid; 1=GPS fix; 2=Diff. GPS fix)
7 = Number of satellites in use [not those in view]
8 = Horizontal dilution of position
9 = Antenna altitude above/below mean sea level (geoid)
10 = Meters (Antenna height unit)
11 = Geoidal separation (Diff. between WGS-84 earth ellipsoid and
mean sea level. -=geoid is below WGS-84 ellipsoid)
12 = Meters (Units of geoidal separation)
13 = Age in seconds since last update from diff. reference station
14 = Diff. reference station ID#
15 = Checksum

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GPGSA: GPS DOP and active satellites

eg1. $GPGSA,A,3,,,,,,16,18,,22,24,,,3.6,2.1,2.2*3C
eg2. $GPGSA,A,3,19,28,14,18,27,22,31,39,,,,,1.7,1.0,1.3*35

1 = Mode:
M=Manual, forced to operate in 2D or 3D
A=Automatic, 3D/2D
2 = Mode:
1=Fix not available
2=2D
3=3D
3-14 = IDs of SVs used in position fix (null for unused fields)
15 = PDOP
16 = HDOP
17 = VDOP

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GPGSV :GPS Satellites in view

eg. $GPGSV,3,1,11,03,03,111,00,04,15,270,00,06,01,010,00,13,06,292,00*74
$GPGSV,3,2,11,14,25,170,00,16,57,208,39,18,67,296,40,19,40,246,00*74
$GPGSV,3,3,11,22,42,067,42,24,14,311,43,27,05,244,00,,,,*4D
$GPGSV,1,1,13,02,02,213,,03,-3,000,,11,00,121,,14,13,172,05*67

1 = Total number of messages of this type in this cycle
2 = Message number
3 = Total number of SVs in view
4 = SV PRN number
5 = Elevation in degrees, 90 maximum
6 = Azimuth, degrees from true north, 000 to 359
7 = SNR, 00-99 dB (null when not tracking)
8-11 = Information about second SV, same as field 4-7
12-15= Information about third SV, same as field 4-7
16-19= Information about fourth SV, same as field 4-7

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GPRMC: Recommended minimum specific GPS/Transit data

eg1. $GPRMC,081836,A,3751.65,S,14507.36,E,000.0,360.0,130998,011.3,E*62
eg2. $GPRMC,225446,A,4916.45,N,12311.12,W,000.5,054.7,191194,020.3,E*68

225446 Time of fix 22:54:46 UTC
A Navigation receiver warning A = OK, V = warning
4916.45,N Latitude 49 deg. 16.45 min North
12311.12,W Longitude 123 deg. 11.12 min West
000.5 Speed over ground, Knots
054.7 Course Made Good, True
191194 Date of fix 19 November 1994
020.3,E Magnetic variation 20.3 deg East
*68 mandatory checksum

eg3. $GPRMC,220516,A,5133.82,N,00042.24,W,173.8,231.8,130694,004.2,W*70
1 2 3 4 5 6 7 8 9 10 11 12

1 220516 Time Stamp
2 A validity - A-ok, V-invalid
3 5133.82 current Latitude
4 N North/South
5 00042.24 current Longitude
6 W East/West
7 173.8 Speed in knots
8 231.8 True course
9 130694 Date Stamp
10 004.2 Variation
11 W East/West
12 *70 checksum

eg4. $GPRMC,hhmmss.ss,A,llll.ll,a,yyyyy.yy,a,x.x,x.x,ddmmyy,x.x,a*hh
1 = UTC of position fix
2 = Data status (V=navigation receiver warning)
3 = Latitude of fix
4 = N or S
5 = Longitude of fix

6 = E or W
7 = Speed over ground in knots
8 = Track made good in degrees True
9 = UT date
10 = Magnetic variation degrees (Easterly var. subtracts from true course)
11 = E or W
12 = Checksum

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GPVTG: Track Made Good and Ground Speed.

eg1. $GPVTG,360.0,T,348.7,M,000.0,N,000.0,K*43
eg2. $GPVTG,054.7,T,034.4,M,005.5,N,010.2,K

054.7,T True track made good
034.4,M Magnetic track made good
005.5,N Ground speed, knots
010.2,K Ground speed, Kilometers per hour

eg3. $GPVTG,t,T,,,s.ss,N,s.ss,K*hh
1 = Track made good
2 = Fixed text 'T' indicates that track made good is relative to true north
3 = not used
4 = not used
5 = Speed over ground in knots
6 = Fixed text 'N' indicates that speed over ground in in knots
7 = Speed over ground in kilometers/hour
8 = Fixed text 'K' indicates that speed over ground is in kilometers/hour
9 = Checksum

The actual track made good and speed relative to the ground.

$--VTG,x.x,T,x.x,M,x.x,N,x.x,K
x.x,T = Track, degrees True
x.x,M = Track, degrees Magnetic
x.x,N = Speed, knots
x.x,K = Speed, Km/hr

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- ⚠ **Product's electronics is static sensitive. Use the product in static free environment.**
- ⚠ **Read the user manuals completely before start using this product**

Recycling:
Almost all the part of this product are recyclable. Please send this product to the recycling plant after its operational life. By recycling we can contribute to cleaner and healthier environment for the future generations.