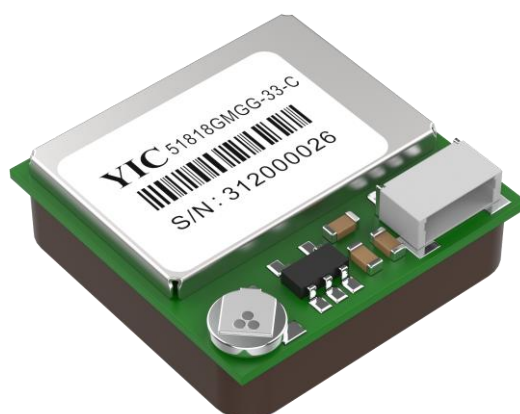




**YIC51818GMGG-33-C**

**Standard Precision GNSS Antenna Module**

**Datasheet**

### Revision History

| Date       | Reversion | Description                                                     |
|------------|-----------|-----------------------------------------------------------------|
| 2021/1/21  | 1.0       | First Draft, Based on YIC51818GMGG-33-C                         |
| 2024/12/26 | 2.0       | Description: Added Cable Assembly Link                          |
| 2025/4/16  | 3.0       | Description: Added Ordering Information 、 Cable Assembly Option |

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## 1. Product Information

### 1.1 Product Description

YIC51818GMGG-33-C is a compact, high performance and low power consumption, standalone multiple GPS/GNSS antenna module. The module can simultaneously acquire and track multiple satellite constellations that include GPS, QZSS, GLONASS, Galileo, BeiDou and SBAS. It features low power and small form factor.

### Applications

- Automotive navigation
- Personal positioning
- Fleet management
- Mobile phone navigation
- Marine navigation

### 1.2 Product Features

- High performance and low power consumption GPS chipset
- Very high sensitivity
- Extremely fast TTFF (Time To First Fix) at low signal level
- Two serial ports
- Built-in LNA
- Compact size suitable for space-sensitive application
- Support NMEA 0183 and MTK binary protocol
- Module connected to host through cable connector

## 1.3 Product Specifications

| GNSS Receiver           |                                                                                                 |                                                                                              |
|-------------------------|-------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------|
| Chip                    | MediaTek                                                                                        |                                                                                              |
| Frequency               | GPS, GALILEO, QZSS: L1 1575.42MHz, C/A code<br>GLONASS: L1 1598.0625MHz ~ 1605.375MHz, C/A code |                                                                                              |
| Channels                | Support 99 channels (33 Tracking, 99 Acquisition)                                               |                                                                                              |
| Update rate             | 1Hz default, up to 10Hz                                                                         |                                                                                              |
| Sensitivity             | Tracking                                                                                        | -161dBm, up to -165dBm (with external LNA)                                                   |
|                         | Cold start                                                                                      | -142.5dBm, up to -148dBm (with external LNA)                                                 |
| Acquisition Time        | Hot start (Open Sky)                                                                            | < 1s                                                                                         |
|                         | Cold Start (Open Sky)                                                                           | < 38s                                                                                        |
|                         |                                                                                                 | < 18s with AGPS                                                                              |
| Position Accuracy       | Autonomous                                                                                      | 5m (2D RMS).                                                                                 |
|                         | SBAS                                                                                            | 2.5m (depends on accuracy of correction data).                                               |
| Max. Altitude           | < 18,000 m, up to 50,000m by request                                                            |                                                                                              |
| Max. Velocity           | Velocity < 515 m/s                                                                              |                                                                                              |
| Protocol Support        | NMEA 0183                                                                                       | 9600 bps, 8 data bits, no parity, 1 stop bits<br>(default) 1Hz: GGA, GLL, GSA, GSV, RMC, VTG |
| Physical Characteristic |                                                                                                 |                                                                                              |
| Dimensions              | 18.5mm *18.5mm * 6.8mm ±0.2mm                                                                   |                                                                                              |

## 1.4 DC Electrical Characteristics

| Parameter                    | Symbol           | Conditions                                               | Min. | Typ.                           | Max.               | Units                |
|------------------------------|------------------|----------------------------------------------------------|------|--------------------------------|--------------------|----------------------|
| Input Voltage                | VCC              |                                                          | 3.0  | 3.3                            | 5.5                | V                    |
| Input Backup Battery Voltage | V_BCKP           |                                                          | 2.0  |                                | 4.3                | V                    |
| Supply Current               | I <sub>ss</sub>  | VCC = 3.3V<br>Peak<br>Acquisition<br>Tracking<br>Standby |      | 31<br>24 <sup>(2)</sup><br>600 | 150 <sup>(1)</sup> | mA<br>mA<br>mA<br>uA |
| Backup Battery Current       | I <sub>bat</sub> | VCC = 0V                                                 |      | 7                              |                    | uA                   |
| High Level Input Voltage     | V <sub>IH</sub>  |                                                          | 2.0  |                                | 3.6                | V                    |
| Low Level Input Voltage      | V <sub>IL</sub>  |                                                          | -0.3 |                                | 0.8                | V                    |
| High Level Input Current     | I <sub>IH</sub>  | no pull-up or down                                       | -1   |                                | 1                  | uA                   |
| Low Level Input Current      | I <sub>IL</sub>  | no pull-up or down                                       | -1   |                                | 1                  | uA                   |
| High Level Output Voltage    | V <sub>OH</sub>  |                                                          | 2.4  |                                | 3.3                | V                    |
| Low Level Output Voltage     | V <sub>OL</sub>  |                                                          |      |                                | 0.4                | V                    |
| High Level Output Current    | I <sub>OH</sub>  |                                                          |      | 2                              |                    | mA                   |
| Low Level Output Current     | I <sub>OL</sub>  |                                                          |      | 2                              |                    | mA                   |

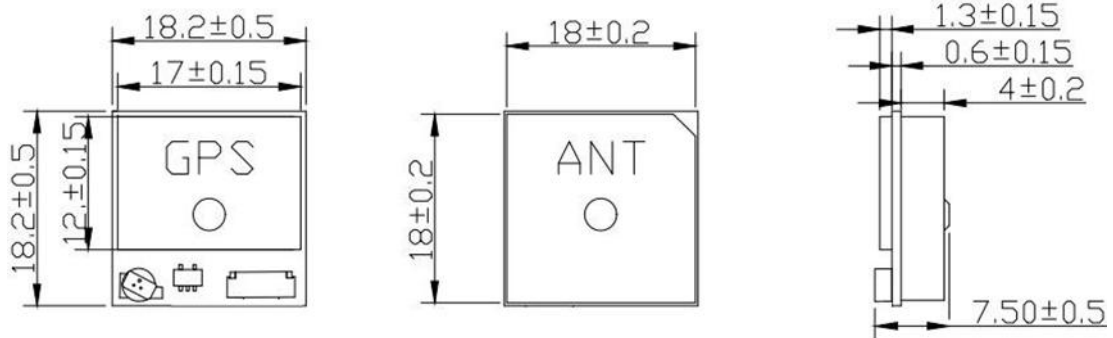
**Note 1:** This happens when downloading AGPS data to Module.

**Note 2:** Measured when position fix (1Hz) is available, input voltage is 3.3V and the function of self-generated ephemeris prediction is inactive.

## Temperature characteristics

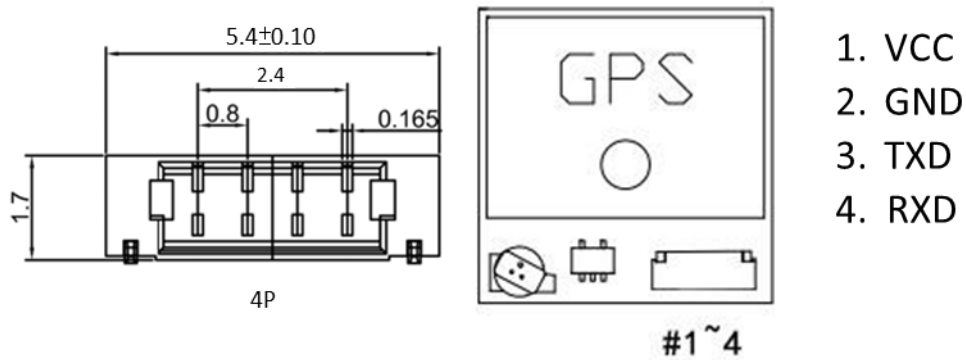
| Parameter             | Symbol           | Min. | Typ. | Max. | Units |
|-----------------------|------------------|------|------|------|-------|
| Operating Temperature | T <sub>opr</sub> | -40  | 25   | 85   | °C    |
| Storage Temperature   | T <sub>stg</sub> | -40  | 25   | 85   | °C    |

### 2.Dimensions



### 3. Pin Assignment

#### 3.1 JST Connector



| Pin NO. | Pin Name | I/O | Remark                      | Description                  |
|---------|----------|-----|-----------------------------|------------------------------|
| 1.      | VCC      | I   | Module Power Supply         | 4 Pole 0.8mm Pitch Connector |
| 2.      | GND      | G   | Ground                      |                              |
| 3.      | TXD      | O   | UART/TTL Serial Data Output |                              |
| 4.      | RXD      | I   | UART/TTL Serial Data Input  |                              |

## 4. Cable Assembly Option

The YIC51818GMGG-33-C can be optionally equipped with the [J0408-A32-J0408-35](#) cable assembly to facilitate UART communication and power supply interfacing with the host system. Both cable length and connector pinout can be customized upon request to accommodate specific system integration requirements.

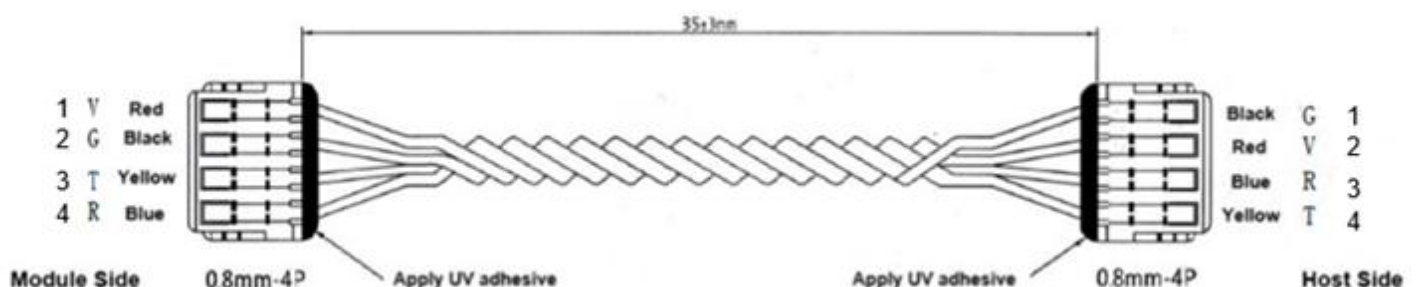


### 4.1 Cable Assembly Specification

|                | Specification            |
|----------------|--------------------------|
| Connector Type | JST 0.8mm pitch 4-pin    |
| Cable Length   | 35 ± 3 mm                |
| Wire Type      | Twisted pair             |
| Fixing Method  | UV adhesive on both ends |

### 4.2 Pin Definitions for Module Side and Host Side

| Pin Name | Module Side |            | Host Side |            |
|----------|-------------|------------|-----------|------------|
|          | Pin NO.     | Wire Color | Pin NO.   | Wire Color |
| VCC      | 1           | Red        | 2         | Red        |
| GND      | 2           | Black      | 1         | Black      |
| TXD      | 3           | Yellow     | 4         | Yellow     |
| RXD      | 4           | Blue       | 3         | Blue       |



### 5. Ordering Information

| Ordering Number    | Description                                         |
|--------------------|-----------------------------------------------------|
| YIC51818GMGG-33-C  | GNSS module only                                    |
| YIC51818GMGG-33-C1 | GNSS module with pre-installed cable assembly       |
| YIC51818GMGG-33-C2 | GNSS module with cable assembly supplied separately |



YIC51818GMGG-33-C1



YIC51818GMGG-33-C2

## 6. Installation Guidelines

### Introduction

Proper placement and installation of a GNSS antenna module significantly affects signal reception performance. This application note outlines key recommendations for integrating GNSS modules (especially those with built-in antennas) into a final product enclosure to ensure optimal positioning, minimum interference, and stable operation.

### 6-1 Prioritize Top or Upper Surface Placement

The GNSS antenna should face the sky directly, typically meaning the top side of the device enclosure. Avoid or minimize any obstruction above the antenna to ensure a clear line of sight to satellites.

### 6-2 Keep Away from Metal Parts

Avoid placing the GNSS antenna near internal metal components such as brackets, shielding covers, metal frames, battery packs, large metal housings, or bundled cables. Maintain a minimum distance of 1–2 cm from such structures; the farther, the better.

### 6-3 Avoid any High-Frequency Noise

Do not place the antenna close to noise-generating components, especially:

- Wi-Fi/Bluetooth modules
- Cellular transceivers (especially during transmission)
- High-speed digital circuits (e.g., CPUs, GPUs, data buses)
- Switching power supplies
- Motor drivers
- Display backlight drivers

These components emit electromagnetic interference that can overwhelm the weak GNSS signals.

### 6-4 Avoid Metal-Coated Plastic Enclosures

Some enclosures use metal spraying or electroplating for aesthetics or EMC reasons. These coatings may block satellite signals. Ensure the area directly above and around the antenna (at a certain radiation angle) is made of non-metallic materials such as pure plastic or glass.

### 6-5 Minimize Obstructions Around the Antenna

Avoid placing tall or dense components (e.g., battery packs, camera modules, speakers, or large connectors) directly above or around the antenna within a vertical angle of 5°–10°. These parts can block signal reception at low elevation angles.

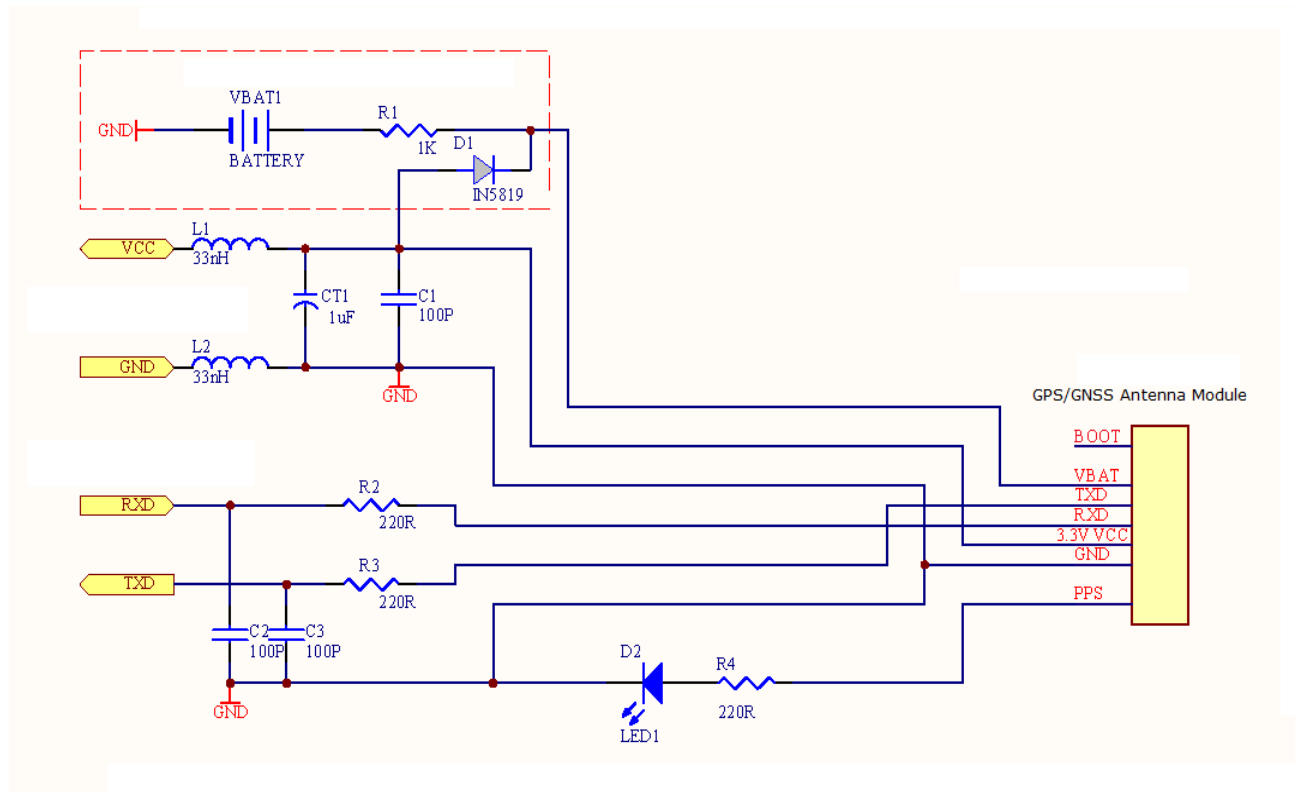
### 6-6 Ensure Clean and Stable Power Supply

Provide the module with a power source that has low ripple and stable voltage. It is recommended to use an LDO or a low-noise DC-DC converter, and place sufficient decoupling capacitors close to the module's power pins (as specified in the module datasheet).

### 6-7 Product Placement Recommendations

During the mechanical design of a product, the GNSS antenna module's placement should be pre-defined. Typically, a plastic cavity or grid structure is reserved in the enclosure to securely fit the module. The structure should be dimensioned to tightly hold the module in place. If additional fixation is needed, apply a small amount of adhesive to the backside of the module to ensure it stays firmly in position.

## 7. Application Circuit : (Example)



### 8. Software Protocol

Table 4.1 NMEA output message

| NMEA | Description                              |
|------|------------------------------------------|
| GGA  | Global positioning system fixed data     |
| GLL  | Geographic position - latitude/longitude |
| GSA  | GNSS DOP and active satellites           |
| GSV  | GNSS satellites in view                  |
| RMC  | Recommended minimum specific GNSS data   |
| VTG  | Course over ground and ground speed      |

## 9. Protocol

### 9.1 GGA--- Global Positioning System Fixed Data

Table 4.2 contains the values for the following example:

\$GPGGA,060406.000,2503.7148,N,12138.7451,E,2,17,0.71,116.7,M,15.3,M,0000,0000\*6D

Table4. 2 GGA Data Format

| Name                   | Example    | Units  | Description                       |
|------------------------|------------|--------|-----------------------------------|
| Message ID             | \$GPGGA    |        | GGA protocol header               |
| UTC Time               | 060406.000 |        | hhmmss.sss                        |
| Latitude               | 2503.7148  |        | ddmm.mmmm                         |
| N/S indicator          | N          |        | N=north or S=south                |
| Longitude              | 12138.7451 |        | dddmm.mmmm                        |
| E/W Indicator          | E          |        | E=east or W=west                  |
| Position Fix Indicator | 2          |        | See Table 3.3                     |
| Satellites Used        | 17         |        | Range 0 to 33                     |
| HDOP                   | 0.71       |        | Horizontal Dilution of Precision  |
| MSL Altitude           | 116.7      | mters  |                                   |
| Units                  | M          | mters  |                                   |
| Geoid Separation       | 15.3       | mters  |                                   |
| Units                  | M          | mters  |                                   |
| Age of Diff. Corr.     | 0000       | second | Null fields when DGPS is not used |
| Diff. Ref. Station ID  | 0000       |        |                                   |
| Checksum               | *6D        |        |                                   |
| <CR> <LF>              |            |        | End of message termination        |

Table4.3 Position Fix Indicators

| Value | Description                           |
|-------|---------------------------------------|
| 0     | Fix not available or invalid          |
| 1     | GPS SPS Mode, fix valid               |
| 2     | Differential GPS, SPS Mode, fix valid |
| 3-5   | Not supported                         |
| 6     | Dead Reckoning Mode, fix valid        |

## 9.2 GLL--- Geographic Position – Latitude/Longitude

Table4.4 contains the values for the following example:

\$GNGLL,2503.7148,N,12138.7451,E,060406.000,A,D\*46

Table3.4 GLL Data Format

| Name          | Example    | Units | Description                                                                                                                                                                |
|---------------|------------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message ID    | \$GNGLL    |       | GLL protocol header (GPGLL or GNGLL; GP indicates the device receives GPS satellites signal only and GN indicates the position is calculated with BEIDOU satellite signal) |
| Latitude      | 2503.7148  |       | ddmm.mmmm                                                                                                                                                                  |
| N/S indicator | N          |       | N=north or S=south                                                                                                                                                         |
| Longitude     | 12138.7451 |       | dddmm.mmmm                                                                                                                                                                 |
| E/W indicator | E          |       | E=east or W=west                                                                                                                                                           |
| UTC Time      | 060406.000 |       | hhmmss.sss                                                                                                                                                                 |
| Status        | A          |       | A=data valid or V=data not valid                                                                                                                                           |
| Mode          | D          |       | A=autonomous, D=DGPS, E=DR, N=Data not valid, R=Coarse Position, S=Simulator                                                                                               |
| Checksum      | *46        |       |                                                                                                                                                                            |
| <CR> <LF>     |            |       | End of message termination                                                                                                                                                 |

## 9.3 GSA---GNSS DOP and Active Satellites

Table 4.5 contains the values for the following example:

\$GNGSA,A,3,205,207,210,202,201,203,209,208,,,,,1.18,0.71,0.95\*1C

| Table3. 5 GSA Data<br>FormatName | Example | Units | Description                                                                                                                                                                                                                                                                                  |
|----------------------------------|---------|-------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message ID                       | \$GNGSA |       | GSA protocol header (GNGSA or GPGSA; GP indicates the device receives GPS satellites signal only and GN indicates the position is calculated with BEIDOU satellite signal).First row of GSA message contains GPS & QZSS satellites and second row of GSA message contains BEIDOU satellites. |
| Mode 1                           | A       |       | See Table 4.6                                                                                                                                                                                                                                                                                |
| Mode 2                           | 3       |       | See Table 4.7                                                                                                                                                                                                                                                                                |
| ID of satellite used             | 22      |       | Sv on Channel 1                                                                                                                                                                                                                                                                              |
| ID of satellite used             | 21      |       | Sv on Channel 2                                                                                                                                                                                                                                                                              |
| ....                             |         |       | ....                                                                                                                                                                                                                                                                                         |
| ID of satellite used             |         |       | Sv on Channel 12                                                                                                                                                                                                                                                                             |
| PDOP                             | 1.18    |       | Position Dilution of Precision                                                                                                                                                                                                                                                               |
| HDOP                             | 0.71    |       | Horizontal Dilution of Precision                                                                                                                                                                                                                                                             |
| VDOP                             | 0.95    |       | Vertical Dilution of Precision                                                                                                                                                                                                                                                               |
| Checksum                         | *2C     |       |                                                                                                                                                                                                                                                                                              |
| <CR> <LF>                        |         |       | End of message termination                                                                                                                                                                                                                                                                   |

Table 4.6 Mode 1

| Value | Description                                     |
|-------|-------------------------------------------------|
| M     | Manual- forced to operate in 2D or 3D mode      |
| A     | Automatic-allowed to automatically switch 2D/3D |

Table 4.7 Mode 2

| Value | Description       |
|-------|-------------------|
| 1     | Fix not available |
| 2     | 2D                |
| 3     | 3D                |

## 9.4 GSV---GNSS Satellites in View

Table 4.8 contains the values for the following example:

\$GPGSV,6,2,21,203,58,205,39,25,56,138,39,201,55,141,34,206,50,168,\*45

\$GPGSV,6,3,21,210,49,282,34,12,48,076,39,204,39,118,,14,38,322,37\*77

\$GPGSV,6,4,21,193,37,180,34,202,36,246,29,24,23,041,34,31,21,244,\*71

\$GPGSV,6,5,21,21,17,198,33,205,16,258,28,15,12,092,33,208,09,169,30\*7B

\$GPGSV,6,6,21,51,,,\*7E

Table 4.8 GSV Data Format

| Name                      | Example | Units   | Description                                                                                                                                      |
|---------------------------|---------|---------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| Message ID                | \$GPGSV |         | GSV protocol header                                                                                                                              |
| Total number of messages1 | 6       |         | Range 1 to 6                                                                                                                                     |
| Message number1           | 1       |         | Range 1 to 6                                                                                                                                     |
| Satellites in view        | 21      |         |                                                                                                                                                  |
| Satellite ID              | 18      |         | Channel 1 (Range 01 to 237), GPS Satellites ID : 01~32, SBAS Satellites ID : 33~64, QZSS Satellites ID:193~196, &BEIDOU Satellites ID : 201~214  |
| Elevation                 | 78      | degrees | Channel 1 (Range 00 to 90)                                                                                                                       |
| Azimuth                   | 169     | degrees | Channel 1 (Range 000 to 359)                                                                                                                     |
| SNR (C/No)                | 36      | dB-Hz   | Channel 1 (Range 00 to 99, null when not tracking)                                                                                               |
| Satellite ID              | 207     |         | Channel 4 (Range 01 to 237) , GPS Satellites ID : 01~32, SBAS Satellites ID : 33~64, QZSS Satellites ID:193~196, &BEIDOU Satellites ID : 201~214 |
| Elevation                 | 63      | degrees | Channel 4 (Range 00 to 90)                                                                                                                       |
| Azimuth                   | 328     | degrees | Channel 4 (Range 000 to 359)                                                                                                                     |
| SNR (C/No)                | 38      | dB-Hz   | Channel 4 (Range 00 to 99, null when not tracking)                                                                                               |
| Checksum                  | *7B     |         |                                                                                                                                                  |
| <CR> <LF>                 |         |         | End of message termination                                                                                                                       |

Depending on the number of satellites tracked multiple messages of GSV data may be required.

## 9.5 RMC---Recommended Minimum Specific GNSS Data

Table 4.9 contains the values for the following example:

\$GNRMC,060406.000,A,2503.7148,N,12138.7451,E,0.01,0.00,180313,,,D\*78

Table 4.9 RMC Data Format

| Name               | Example    | Units   | Description                                                                                                                                                                |
|--------------------|------------|---------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Message ID         | \$GNRMC    |         | RMC protocol header (GNRMC or GPRMC; GP indicates the device receives GPS satellites signal only and GN indicates the position is calculated with BEIDOU satellite signal) |
| UTC Time           | 060406.000 |         | hhmmss.sss                                                                                                                                                                 |
| Status             | A          |         | A=data valid or V=data not valid                                                                                                                                           |
| Latitude           | 2503.7148  |         | ddmm.mmmm                                                                                                                                                                  |
| N/S Indicator      | N          |         | N=north or S=south                                                                                                                                                         |
| Longitude          | 12138.7451 |         | dddmm.mmmm                                                                                                                                                                 |
| E/W Indicator      | E          |         | E=east or W=west                                                                                                                                                           |
| Speed over ground  | 0.01       | knots   | True                                                                                                                                                                       |
| Course over ground | 0.00       | degrees |                                                                                                                                                                            |
| Date               | 180313     |         | ddmmyy                                                                                                                                                                     |
| Magnetic variation |            | degrees |                                                                                                                                                                            |
| Variation sense    |            |         | E=east or W=west (Not shown)                                                                                                                                               |
| Mode               | D          |         | A=autonomous, D=DGPS, E=DR, N=Data not valid, R=Coarse Position, S=Simulator                                                                                               |
| Checksum           | *78        |         |                                                                                                                                                                            |
| <CR> <LF>          |            |         | End of message termination                                                                                                                                                 |

### 9.6 VTG---Course Over Ground and Ground Speed

Table 4.10 contains the values for the following example:

\$GPVTG,0.00,T,,M,0.01,N,0.02,K,D\*3B

Table 4.10 VTG Data Format

| Name               | Example | Units   | Description                                                                  |
|--------------------|---------|---------|------------------------------------------------------------------------------|
| Message ID         | \$GPVTG |         | VTG protocol header                                                          |
| Course over ground | 0.00    | degrees | Measured heading                                                             |
| Reference          | T       |         | True                                                                         |
| Course over ground |         | degrees | Measured heading                                                             |
| Reference          | M       |         | Magnetic                                                                     |
| Speed over ground  | 0.01    | knots   | Measured speed                                                               |
| Units              | N       |         | Knots                                                                        |
| Speed over ground  | 0.02    | km/hr   | Measured speed                                                               |
| Units              | K       |         | Kilometer per hour                                                           |
| Mode               | D       |         | A=autonomous, D=DGPS, E=DR, N=Data not valid, R=Coarse Position, S=Simulator |
| Checksum           | *3B     |         |                                                                              |
| <CR> <LF>          |         |         | End of message termination                                                   |