

YIC



GPS & GLONASS Receiver (G-Mouse)

GU-504GG

Datasheet

www.yic.com.tw

Revision History

| Date | Reversion | Description |
|------------|-----------|-------------------------------|
| 2021/8/10 | 1.0 | First Draft, Based on YIC |
| 2021/12/21 | 1.1 | Update Product Specifications |

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1. Product Information

1.1 Product Description

The GU-504GG is a stand-alone USB interface GNSS receiver, featuring the high performance MediaTek positioning engine. It is flexible and cost effective receiver offers numerous connectivity options in a miniature enclosure 36.3x36.4x13.5 mm. The GU-504GG is IP67 waterproof and can survive wet outdoor environments.

Through the feature of 66-channel, the GU-504GG boasts a hot start in less than 1 second. Innovative design and technology suppresses jamming sources and mitigates multipath effects, assisting GU-504GG GNSS receivers excellent navigation performance even in the most challenging environment.

Applications

- Automotive Navigation
- Personal Positioning
- Fleet Management
- Marine Navigation

1.2 Product Features

- IP67 Waterproof Rating
- Low Power Consumption: Max 45mA@3.3V
- Ultra High Track Sensitivity: -165dBm
- Built in High Gain LNA
- Blue LED Indicating Light for GPS Status
- The built-in Super Capacitor for Backup Ephemeris
- Extremely Fast TTFF at Low Signal Level
- Communication Type: USB
- NMEA-0183 Compliant Protocol or Custom Protocol
- RoHS Compliant

1.3 Product Specifications

| GPS Receiver | | |
|--------------------------|--|----------------------------------|
| Chip | MediaTek | |
| Frequency | Support 99 channels (33 Tracking, 99 Acquisition) GPS&, QZSS, GALILEO: L1 1575.42MHz C/A GLONASS: L1OF 1602MHz BeiDou: B1 1561.098MHz SBAS: WAAS, EGNOS, MSAS, GAGAN | |
| Update Rate | 1Hz (default) , up to 10Hz | |
| Position Accuracy | Position | <2.5m CEP @-130 dBm |
| | Accuracy of 1PPS Signal | not enabled |
| | Acceleration Accuracy | Without aid: 0.1m/s ² |
| Startup Time | Cold start | 35s typ @-130dBm |
| | Warm start | 30s typ @-130dBm |
| | Hot start | 1s typ @-130dBm |
| Sensitivity | Acquisition | -148Bm |
| | Re-acquisition | -156Bm |
| | Tracking | -165dBm |
| GNSS Operating limit | Altitude | 18,000m |
| | Velocity | 515m/s |
| | Acceleration | 4G |
| Protocol Support | USB Port: USB_DP and USB_DM 9600bps (default), Supports baud rate 4800bps to 460800bps NMEA 0183 Protocol | |
| Water proof | IP67 | |
| Environment | Operation temperature | -40°C ~ +85°C |
| | Storage temperature | -45°C ~ +125°C |
| Physical Characteristics | Size | 36.3±0.5 ×36.4±0.5 ×13.5±1mm |
| | Weight | Approx. 55g |

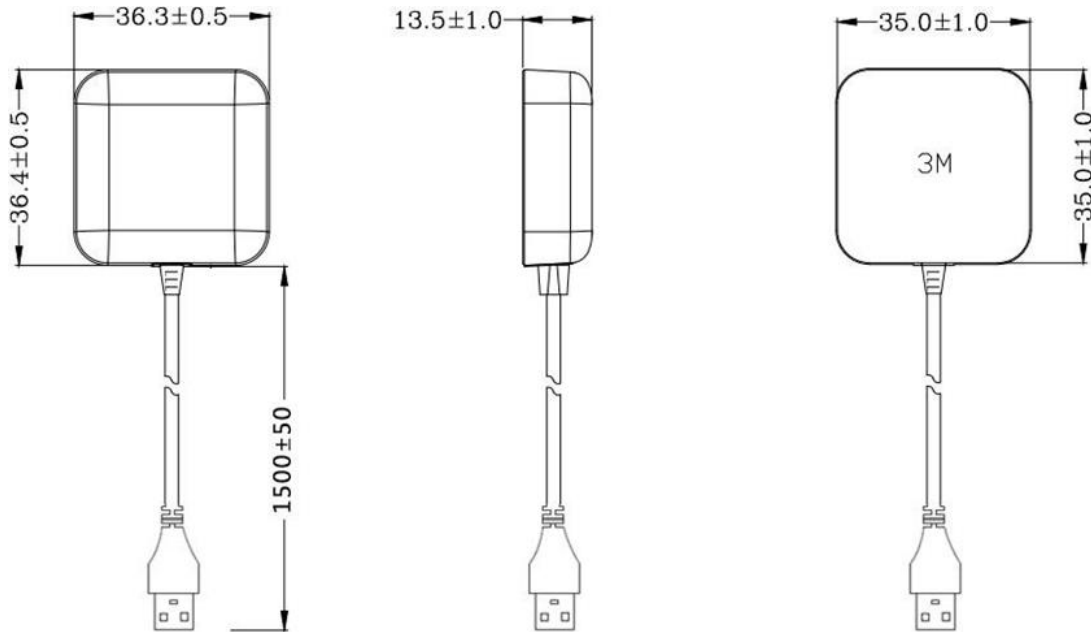
1.4 DC Electrical Characteristics

| Parameter | Min. | Typ. | Max. | Units |
|---------------------------------|---------|------|---------|-------|
| Input Voltage | 4.5 | 5 | 5.5 | Volt |
| Acquisition | | 45 | | mA |
| Tracking | | 40 | | mA |
| Backup Battery | | 20 | | uA |
| Low Level Output Voltage (VOL) | | | 0.2xVCC | Volt |
| High Level Output Voltage (VOH) | 0.8xVCC | | | Volt |
| Low Level Input Voltage (VIL) | | | 0.3xVCC | Volt |
| High Level Input Voltage (VIH) | 0.7xVCC | | | Volt |
| Low Level Output Current (IOL) | | 3 | | mA |
| High Level Output Current (IOH) | | 3 | | mA |

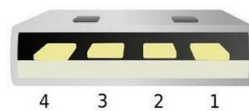
2. Physical Dimensions

(Different Cables & Connectors can be Specified According to Requirements)

| P/N | Mount | Description |
|--------------|----------|-----------------------|
| GU-504GG-USB | Adhesive | Connector: USB A Male |
| | | |



2.1 Pin Descriptions



| Pin NO. | Pin Name | Remark |
|---------|------------|--|
| 1 | VCC | Module Power Supply |
| 2 | USB_DM | USB Data (D-) |
| 3 | USB_DP | USB Data (D+) |
| 4 | GND | Ground |
| LED | GPS Status | LED Off : G-Mouse is No Power LED On : Searching for GPS Signals LED Blinking : Position Fixed |

3. Software Interface

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

4. Protocol

4.1 GGA – Global Positioning System Fix Data

For example:

```
$xxGGA,161229.487,3723.24751,N, 12158.34160,W, 1,07,1.0,9.0,M.0000*18
```

| Field | Name | Example | Units | Description |
|-------|------------------------|-------------|--------|-----------------------------------|
| 1 | Message ID | \$xxGGA | | GGA protocol header |
| 2 | UTC Position | 161229.487 | | hhmmss.sss |
| 3 | Latitude | 3723.24751 | | ddmm.mmmm |
| 4 | N/S indicator | N | | N=north or S=south |
| 5 | Longitude | 12158.34160 | | dddmm.mmmm |
| 6 | E/W Indicator | W | | E=east or W=west |
| 7 | Position Fix Indicator | 1 | | See Table 1-1 |
| 8 | Satellites Used | 07 | | Range 0 to 12 |
| 9 | HDOP | 1.0 | | Horizontal Dilution of Precision |
| 10 | MSL Altitude | 9.0 | meters | |
| 11 | Units | M | meters | |
| 12 | Geoids Separation | | meters | |
| 13 | Units | M | meters | |
| 14 | Age of Diff.Corr. | | second | Null fields when DGPS is not Used |
| 15 | Diff.Ref.Station ID | 0000 | | |
| 16 | Check sum | *18 | | |
| 17 | <CR> <LF> | | | End of message termination |

Table 1-1: 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 | GPS PPS Mode, fix valid |

4.2 GLL – Latitude/Longitude

For example:

\$xxGLL , 3723.24755, N,12158.34161, W,161229.487, A*2C

| Field | Name | Example | Units | Description |
|-------|---------------|-------------|-------|----------------------------------|
| 1 | Message ID | \$xxGLL | | GLL protocol header |
| 2 | Latitude | 3723.24755 | | ddmm.mmmm |
| 3 | N/S Indicator | N | | N=north or S=south |
| 4 | Longitude | 12158.34161 | | dddmm.mmmm |
| 5 | E/W Indicator | W | | E=east or W=west |
| 6 | UTC Position | 161229.487 | | hhmmss.sss |
| 7 | Status | A | | A=data valid or V=data not valid |
| 8 | Check sum | *2C | | |
| 9 | <CR> <LF> | | | End of message termination |

4.3 GSA – GNSS DOP and Active Satellites

For example:

\$xxGSA , A, 3, 07, 02, 26,27, 09, 04,15, , , , , , 1.8,1.0,1.5*33

| Field | Name | Example | Units | Description |
|-------|----------------|---------|-------|----------------------------------|
| 1 | Message | \$GPGSA | | GSA protocol header |
| 2 | Mode 1 | A | | See Table 1-2 |
| 3 | Mode 2 | 3 | | See Table 1-3 |
| 4 | Satellite Used | 07 | | Sv on Channel 1 |
| 5 | Satellite Used | 02 | | Sv on Channel 2 |
| 6 | ... | ... | | ... |
| 7 | Satellite Used | | | Sv on Channel 12 |
| 8 | PDOP | 1.8 | | Position Dilution of Precision |
| 9 | HDOP | 1.0 | | Horizontal Dilution of Precision |
| 10 | VDOP | 1.5 | | Vertical Dilution of Precision |
| 11 | Check sum | *33 | | |
| 12 | <CR> <LF> | | | End of message termination |

Table 1-2

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

Table 1-3

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

4.4 GSV – GNSS Satellites in View

For example :

\$xxGSV , 2, 1, 07, 07, 79,048, 42, 02, 51,062, 43, 26, 36,256, 42, 27, 27, 138,42*71

\$xxGSV, 2, 2, 07, 09, 23,313, 42, 04, 19, 159, 41, 15,12,041, 42*41

| Field | Name | Example | Units | Description |
|-------|--------------------|---------|---------|---------------------------------------|
| 1 | Message ID | \$xxGSV | | GSV protocol header |
| 2 | Number of Message | 2 | | Range 1 to 3 |
| 3 | Message Number | 1 | | Range 1 to 3 |
| 4 | Satellites in View | 07 | | |
| 5 | Satellite ID | 07 | | Channel 1(Range 1 to 32) |
| 6 | Elevation | 79 | degrees | Channel 1(Maximum 90) |
| 7 | Azinmuth | 048 | degrees | Channel 1(True, Range 0 to 359) |
| 8 | SNR(C/NO) | 42 | dBHz | Range 0 to 99,null when not tracking |
| 9 | ... | | | ... |
| 10 | Satellite ID | 27 | | Channel 4(Range 1 to 32) |
| 11 | Elevation | 27 | degrees | Channel 4(Maximum 90) |
| 12 | Azimuth | 138 | degrees | Channel 4(True, Range 0 to 359) |
| 13 | SNR(C/NO) | 42 | dBHz | Range 0 to 99, null when not tracking |
| 14 | Check sum | *71 | | |
| 15 | <CR> <LF> | | | End of message termination |

4.5 RMC – Recommended Minimum Specific GNSS Data

Structure:

\$xxRMC, 161229.487, A, 3723.24751, N, 12158.34161, W, 0.13,309.62, 120598,, *10

| Field | Name | Example | Description |
|-------|--------------------|-------------|----------------------------------|
| 1 | Message ID | \$xxRMC | RMC protocol header |
| 2 | UTS Position | 161229.487 | hhmmss.sss |
| 3 | Status | A | A=data valid or V=data not valid |
| 4 | Latitude | 3723.24751 | ddmm.mmmmm |
| 5 | N/S Indicator | N | N=north or S=south |
| 6 | Longitude | 12158.34161 | dddmm.mmmmm |
| 7 | E/W Indicator | W | E=east or W=west |
| 8 | Speed Over Ground | 0.13 | |
| 9 | Course Over | 309.62 | True |
| 10 | Ground | | |
| 11 | Date | 120598 | dummy |
| 12 | Magnetic variation | | E=east or W=west |
| 13 | Check sum | *10 | |
| 14 | <CR> <LF> | | End of message termination |

4.6 VTG – Course Over Ground and Ground Speed

Structure:

\$xxVTG, 309.62, T, M, 0.13, N, 0.2, K*6E

| Field | Name | Example | Description |
|-------|------------|---------|----------------------------|
| 1 | Message ID | \$xxVTG | VTG protocol header |
| 2 | Course | 309.62 | Measured heading |
| 3 | Reference | T | True |
| 4 | Course | | Measured heading |
| 5 | Reference | M | Magnetic |
| 6 | Speed | 0.13 | Measured horizontal speed |
| 7 | Units | N | Knots |
| 8 | Speed | 0.2 | Measured horizontal speed |
| 9 | Units | K | Kilometer per hour |
| 10 | Check sum | *6E | |
| 11 | <CR> <LF> | | End of message termination |