

# YIC



**GPS & GLONASS Receiver (G-Mouse)**

**GR-504GG**

**Datasheet**

[www.yic.com.tw](http://www.yic.com.tw)

## Revision History

Date	Reversion	Description
2021/8/25	1.0	First Draft, Based on YIC
2021/12/21	1.1	Update Product Features and Product Specifications

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## 1. Product Information

### 1.1 Product Description

The GR-504GG is a stand-alone RS232 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 GR-504GG is IP67 waterproof and can survive wet outdoor environments.

Through the feature of 66-channel, the GR-504GG boasts a hot start in less than 1 second. Innovative design and technology suppresses jamming sources and mitigates multipath effects, assisting GR-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: RS232
- 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	Time pulse signal: RMS 30ns
	Acceleration Accuracy	Without aid: 0.1m/s <sup>2</sup>
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	RS232 Port: RS232_TXD and RS232_RXD 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

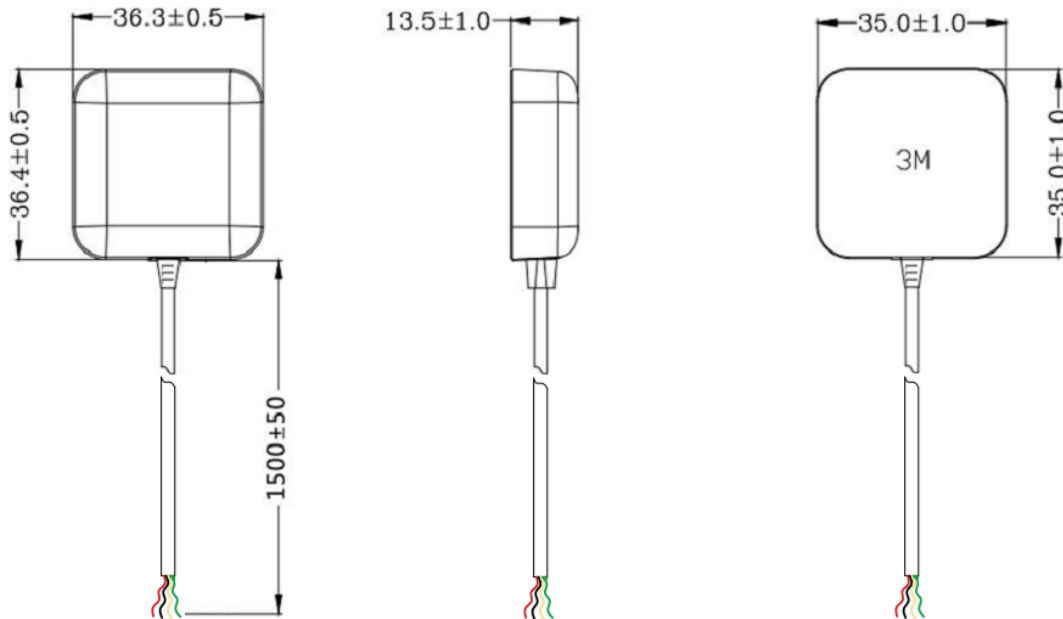
## 1.4 DC Electrical Characteristics

Parameter	Min.	Typ.	Max.	Units
Input Voltage	3.0	3.3	5.5	Volt
Acquisition		45		mA
Tracking		40		mA
Backup Battery		20		uA
Low Level Output Voltage (VOL)			5	Volt
High Level Output Voltage (VOH)	-3			Volt
Low Level Input Voltage (VIL)			5	Volt
High Level Input Voltage (VIH)	-3			Volt
Low Level Output Current (IOL)	1		4	mA
High Level Output Current (IOH)	1		4	mA

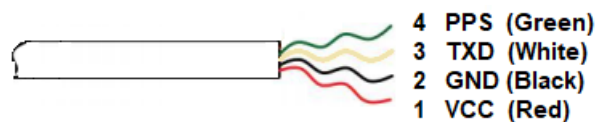
## 2. Physical Dimensions

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

P/N	Mount	Description
GR-504GG-N	Adhesive	No Connector, 4 Wire Open End



### 2.1 Pin Descriptions



Pin NO.	Pin Name	Remark
1	VCC	Module Power Supply
2	GND	Ground
3	TXD	RS232 Serial Data Output
4	PPS	Time Pulse (1PPS) Output
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