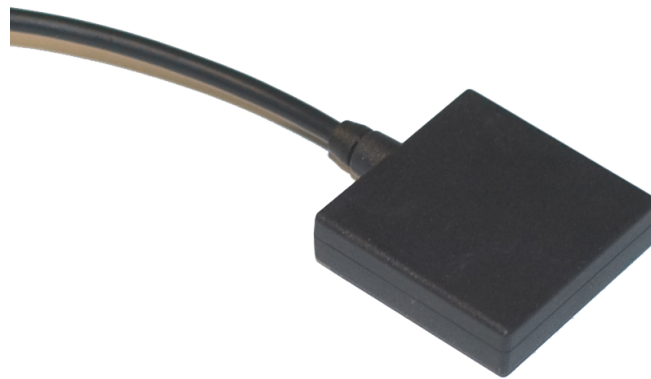


# **66-Channel GPS Receiver**

*with MTK Chipset*



*Low power consumption version*

<b>History</b>		
<b>Date</b>	<b>Rev.</b>	<b>Description</b>
2010/04/20	A00	First Release
2010/04/30	A01	Pin definition and description revised

## Introduction

The FGM-RLP is a POT (Patch on Top) GPS receiver which is special designed for ultra low power consumption purpose environment. It provides a perfect solution to high position and speed accuracy performances as well as high sensitivity and tracking capabilities in urban conditions. The chipsets inside the GM-RLP are designed by **MediaTek Inc.**, which is the world's leading digital media solution provider and largest fab-less IC company in Taiwan.

The FGM-RLP can support up to **66 channels** and simultaneous tracks up to 22 satellites. This GPS solution enables small form factor devices. They deliver major advancements in GPS performances, accuracy, integration, computing power and flexibility. **This product can communicates with other electronic products or instruments via serial communication through RS-232 interface and TTL level. It had also build-in a LED indicator for the positioning state (3D-fix).** The FGM-RLP is designed to simplify the embedded system integration process and also easy to install in handheld goods.

## Features

- ✚ Based on **MediaTek** Single Chip Architecture (MT3329).
- ✚ ARM7 based application processor
- ✚ High sensitivity: -165dBm tracking
- ✚ L1 frequency, C/A code
- ✚ Channels: 66 acquisition, 22 simultaneous tracking
- ✚ Low power consumption: **37mA @ acquisition, 31mA @ tracking**
- ✚ Cold/Warm/Hot start time: <35/<34/<1 seconds
- ✚ Maximum update rate up to **10Hz**
- ✚ GPS data interface: RS232 and TTL level serial port
- ✚ Support NMEA 0183 standard V3.01 and backward compliance
- ✚ Support SBAS – WAAS, EGNOS, GAGAN and MSAS
- ✚ Dimension : **30mm x 34.1mm x 8mm**
- ✚ RoHS compliant

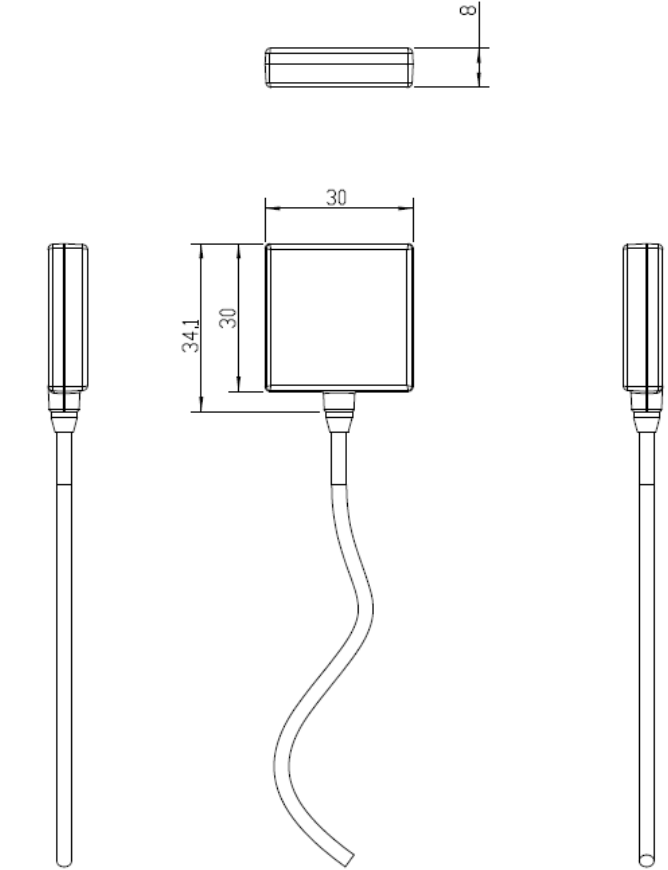
## Chipset Characteristics

<b>General</b>	
Chipset	MTK MT3329
Frequency	L1, 1575.42MHz
C/A Code	1.023 MHz
Channels	66 channels
SBAS	WAAS, EGNOS, GAGAN,MSAS Supported
Datum	WGS84(Default), Tokyo-M, Tokyo-A, User Define
CPU	ARM7EJ-S
<b>Dimensions</b>	
Width / Length /Height	30 x 34.1 x 8mm
Weight	50 g (with 2m standard cable and housing)
Cable Length	2.0meter
Connector type	PS/2
**Note: Please contact with us if you need customize cable length and connector type.	
<b>Performance Characteristics</b>	
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 Accuracy	Without aid : 0.1 m/s <sup>2</sup>
	DGPS (RTCM, SBAS (WAAS, EGNOS, MSAS)) : 0.05m/s <sup>2</sup>
Timing Accuracy	100 ns RMS
Sensitivity	Acquisition : -148dBm (Cold Start)
	Reacquisition : -157dBm
	Tracking : -165dBm

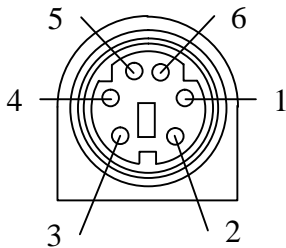
Maximum Update Rate	Up to <b>10Hz</b> (Default: 1Hz)
<b>Acquisition (Open sky, stationary)</b>	
Reacquisition Time	Less than 1 second
Hot start	1.0s (Typical)
Warm start	34s (Typical)
Cold start	35s (Typical)
<b>Dynamic</b>	
Altitude	Maximum 18,000m
Velocity	Maximum 515m/s
Acceleration	Maximum 4G
<b>Power</b>	
Input Voltage	DC 5V Typical
Power Consumption @ 5V	<b>Acquisition : 37mA Typical</b>
	<b>Tracking : 31mA Typical</b>
<b>I/O</b>	
Signal Output	RS232 and TTL level, 8 data bits, no parity, 1 stop bit
Available Baud Rates	4800/9600/38400/57600/115200 bps(Default : 9600)
Protocols	NMEA 0183 v3.01 (Default : GGA,GSA,GSV,RMC,VTG) RTCM MTK NMEA Command Network Assistance Messages
<b>Data output Interface</b>	
Protocol messages	9600 bps/8/N/1 (Default)
Output format	GGA(1sec),GSA(1sec),RMC(1sec),VTG(1sec), GSV(5sec) (Default)
<b>Environment</b>	
Operating Temperature	-30 °C to 85 °C
Storage Temperature	-40 °C to 125 °C
Operating Humidity	5% to 95% (no condensing)

# Mechanic Dimension

Unit : mm



## Connector Pin Assignment PS/2 type (female)



Pin	Signal
1	RxD(RS232)
2	VCC
3	Tx(TTL)
4	GND
5	Rx(TTL)
6	TxD(RS232)

## Pin Definition

Pin	Name	I/O	Description
1	RxD	O	RS232 Serial Data into PC
2	VCC	P	+5V $\pm$ 5% DC Power Supply Input
3	Tx	O	Serial Data Output(TTL) from GM-RLP
4	GND	P	Ground
5	Rx	I	Serial Data(TTL) into GM-RLP
6	TxD	I	RS232 Serial Data Output from PC

## Description of I/O Pin

### RxD (Pin1)

This is the RS232 receiving pin of PC or the transmitting pin of the GM-RLP. It outputs the GPS information from GM-RLP to PC for application.

### VCC (Pin2)

+5V  $\pm$  5% DC power supply input.

### Tx (Pin3)

This is the serial data transmitting pin of the GM-RLP in TTL signal level. It outputs the GPS information for application.

### GND (Pin4)

This is the ground of the module.

### Rx (Pin5)

This is the serial data receiving pin of the GM-RLP in TTL signal level. It is used to receive software commands and firmware update.

### TxD (Pin6)

This is the RS232 transmitting pin of PC or the receiving pin of the GM-RLP. It is used to receive software commands and firmware update.

## NMEA Output Sentence

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

<b>NMEA Output Sentence</b>		<b>Table-1</b>
<b>Option</b>	<b>Description</b>	
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,064951.000,2307.1256,N,12016.4438,E,1,8,0.95,39.9,M,17.8,M,,\*65

GGA Data Format			Table-2
Name	Example	Units	Description
Message ID	\$GPGGA		GGA protocol header
UTC Time	064951.000		hhmmss.sss
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See <b>Table-3</b>
Satellites Used	8		Range 0 to 14
HDOP	0.95		Horizontal Dilution of Precision
MSL Altitude	39.9	meters	Antenna Altitude above/below mean-sae-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	*65		
<CR> <LF>			End of message termination

Position Fix Indicator		Table-3
Value	Description	
0	Fix not available	
1	GPS fix	
2	Differential GPS fix	

**GSA—GNSS DOP and Active Satellites**

**Table-4** contains the values for the following example :

\$GPGSA,A,3,29,21,26,15,18,09,06,10,,,,,2.32,0.95,2.11\*00

<b>GSA Data Format</b>				<b>Table-4</b>
<b>Name</b>	<b>Example</b>	<b>Units</b>	<b>Description</b>	
Message ID	\$GPGSA		GSA protocol header	
Mode 1	A		See <b>Table-5</b>	
Mode 2	3		See <b>Table-6</b>	
Satellite Used	29		SV on Channel 1	
Satellite Used	21		SV on Channel 2	
....	....	....	....	
Satellite Used			SV on Channel 12	
PDOP	2.32		Position Dilution of Precision	
HDOP	0.95		Horizontal Dilution of Precision	
VDOP	2.11		Vertical Dilution of Precision	
Checksum	*00			
<CR> <LF>			End of message termination	

<b>Mode 1</b>		<b>Table-5</b>
<b>Value</b>	<b>Description</b>	
M	Manual—forced to operate in 2D or 3D mode	
A	2D Automatic—allowed to automatically switch 2D/3D	

<b>Mode 2</b>		<b>Table-6</b>
<b>Value</b>	<b>Description</b>	
1	Fix not available	
2	2D (< 4 SVs used)	
3	3D ( $\geq$ 4 SVs used)	

**GSV—GNSS Satellites in View**

**Table-7** contains the values for the following example :

\$GPGSV,3,1,09,29,36,029,42,21,46,314,43,26,44,020,43,15,21,321,39\*7D

\$GPGSV,3,2,09,18,26,314,40,09,57,170,44,06,20,229,37,10,26,084,37\*77

\$GPGSV,3,3,09,07,,,26\*73

GSV Data Format			Table-7
Name	Example	Units	Description
Message ID	\$GPGSV		GSV protocol header
Number of Messages	3		Range 1 to 3 <i>(Depending on the number of satellites tracked, multiple messages of GSV data may be required.)</i>
Message Number1	1		Range 1 to 3
Satellites in View	09		
Satellite ID	29		Channel 1 (Range 1 to 32)
Elevation	36	degrees	Channel 1 (Maximum 90)
Azimuth	029	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/No)	42	dBHz	Range 0 to 99, (null when not tracking)
....	....	....	....
Satellite ID	15		Channel 4 (Range 1 to 32)
Elevation	21	degrees	Channel 4 (Maximum 90)
Azimuth	321	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/No)	39	dBHz	Range 0 to 99, (null when not tracking)
Checksum	*7D		
<CR> <LF>			End of message termination

**RMC—Recommended Minimum Navigation Information**

**Table-8** contains the values for the following example :

\$GPRMC,064951.000,A,2307.1256,N,12016.4438,E,0.03,165.48,260406,,,A\*55

RMC Data Format			Table-8
Name	Example	Units	Description
Message ID	\$GPRMC		RMC protocol header
UTC Time	064951.000		hhmmss.sss
Status	A		A=data valid or V=data not valid
Latitude	2307.1256		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12016.4438		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.03	knots	
Course Over Ground	165.48	degrees	True
Date	260406		ddmmyy
Magnetic Variation		degrees	E=east or W=west <i>(MTK does not support magnetic declination)</i>
Mode	A		A= Autonomous mode D= Differential mode E= Estimated mode
Checksum	*65		
<CR> <LF>			End of message termination

