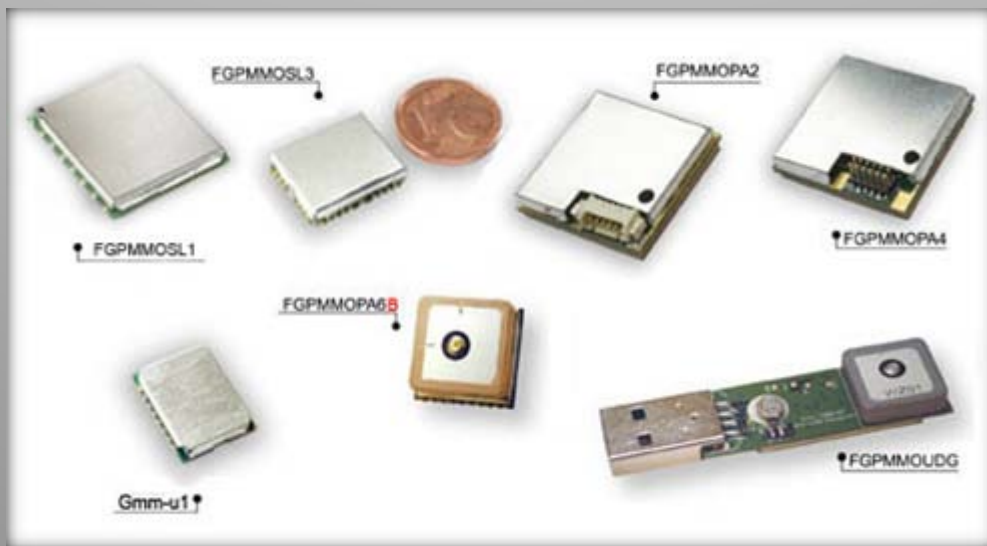


GlobalTop Technology Inc.

# GPS Module Design-In Checklist

Revision: A00



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## Technical Support

If you have any technical problems or cannot find the required information in our documents, please feel free to contact us for technical support. Below is a list of information which you can provide that will be very useful to us in determining source of the problem and the necessary solution:

### Basic information:

- Your company name and website
- Description about application and system
- GPS module type
- GPS firmware version

### Technical information:

- Clear description of the question or problems encountered, together with pictures or videos files and miniGPS log file.
- Test setup configuration: it is best to take a few pictures.
- The problem or issue shown in pictures, and provide the data log for analysis.
- If the problem is related to hardware ,please also provide related schematic about GPS portion with power source

Technical contact information: [support@qtop-tech.com](mailto:support@qtop-tech.com)

## 1. Descriptions

It is highly recommended for every designers interested in developing applications for GlobalTop GPS module to follow the design-In checklist outlined in this document to reduce design risks and minimize debugging efforts.

## 2. Design-in Checklist

In order to obtain good GPS performances, there are some specific rules which will require special attentions to when using GPS modules:

### 2.1 Module Selection

GlobalTop modules have been designed to allow GPS functionality to be optimally tailored for application specific environment. There are some criterions which can be referred to when making the decision on module selection:

#### ■ Using GPS module or GPS antenna module?

If you have RF design experience for antenna fine tuning, the GPS modules without antenna will be a good selection. If otherwise, it is best to choose antenna modules as they are relatively easier to design for.

#### ■ Specified mechanical dimension for your application?

If your application have specified mechanical dimension requirement, please refer to the feature comparison table ([Appendix I](#)) for selection.

## ■ Specified functions needed for your application?

For some applications they will need special functions, for example:

- Do you need two UART interface for your application?  
Then choose SL2, SL3, PA5,
- Do you need USB?  
Then choose PA6B, Gmm-u1.
- Do you need smallest dimension?  
Then choose SL3, Gmm-u1.

Please refer to the feature comparison table of modules ([Appendix I](#)) for selection.

## 2.2 Firmware Selection

**All GlobalTop modules series are delivered with factory loaded firmware.**

Firmware settings for each order are loaded specifically according to “Gtop firmware checklist”, which are tailored to meet your application requirements.

**For more details, please refer to Gtop firmware check list. If you need special setting for your applications, please contact your dealer or GlobalTop sales window.**

## 2.3 Schematic and Layout verification

Please refer to the section 2 of Gtop Module Application Note for more details.

## ■ Power supply Vcc

- Is the power supply within the specification range? (see the data sheet)
- Have you added some filter to reduce power noise?
- GPS receivers require stable and clean power supply, have you checked the ripple on Vcc < 50mVpp?

- Have you used LDO for Vcc supply? For a better performance, please place LDO near the module, and preferably use a wide power line or power planes.
- Have you added enough decoupling capacitors to stabilize the voltage caused by current variation?
- If needed, please make the ground better and its noise isolated from other noise ground, such as switch power supply or high speed digital circuit.

#### ■ VBACKUP(BACKUP\_PWR) backup battery

For better performance, it is recommended to connect the module via VBACKUP to a sustained power source. If no backup battery is connected, some of modules (such as: SL1, PA5, PA6B, Gmm-u1) will simply not work or otherwise performs a Cold start every time when the power is turned on (instead of warm or hot start).

#### ■ UART 0 (RX/TX) –Serial Interface

Have you checked what kind of output interface your product will use? If the interface is RS-232, the level shift will be necessary. Additionally, please don't use external pull-up for RX if you don't plan on using it. Please keep RX open.

#### ■ Antenna Design ,ANTENNA\_IN

- The total noise figure, NF, must be under 1.5db.
- Make sure the antenna is not placed closely to the noisy portion of the whole circuit design.
- For the noise rejection of out-of band, please make sure the antenna do **NOT** have oscillation frequency.
- The GPS module already has a suitable level of ESD protection. But if additional ESD protection components are used near the RF front-end, please make sure this component will not degrade GPS RF performance.

### ■ 3D\_Fix ,1PPS

- 3D\_Fix and 1PPS are output pins, if they are not going to be used, please keep it no connection (NC)

## 2.4 Layout Guideline

Have you followed the Layout guideline on your application design? For more details, please refer to the application note. Here are some of the things to watch out for:

- Clearance
- Placement
- Trace
- Ground Segmentation
- About 50 ohm of matching Line - the micro strip has been kept as short as possible.

## 2.5 Function Test

When testing out the GPS functions, we highly recommend that the test is performed under an open sky test environment. It is very important when you first test out your application design to make sure the GPS signal is not a variant which can affect the test result. To check if your related design is not having any effect on the GPS reception, it will be helpful to use some kind of GPS software tools (such as MiniGPS) to monitor the status of GPS reception. Generally, we suggest the following test items to check for basic GPS performance and operation:

### 1. Stationary test

- a. Monitor GPS reception status (For example: CNR, satellites number)
- b. Perform TTFF test (Cold start, Warm Start, Hot Start)



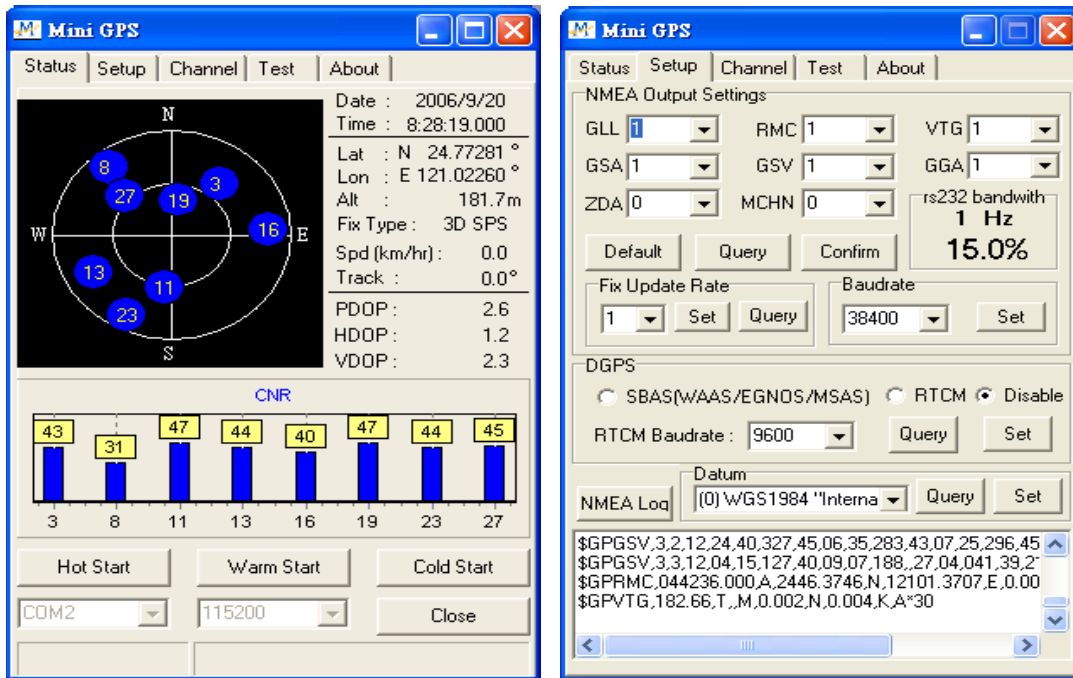


Figure 1: MiniGPS



Figure 2: Open Sky (Test condition)

## 2. Road Test

When performing a road test, we highly recommended you to choose one dedicated route as one of the test condition. By doing this, it will be easier for you to check out related information and have a benchmark data to compare it to. In addition, it is better to record a log data for every test performed, and afterwards use GoogleEarth™ for more detail analysis.



Figure 3: the route on Google Earth™

# Appendix I

Model	Chipset	Size (mm)	Sensitivity (dBm)		Power Consumption (mA)		Interface		TCXO Design	Patch Antenna	Backup Coin Battery	Data Update rate	AGPS	RTCM	Connection Type			Embedded Active LNA	1-PPS Support
			Acq	Track	Acq	Track	UART	USB							SMD	Pin-Head	Connect-or		
FGPMMOSL1	MT3301	22x25x2.65	-146	-158	55	38	2 (TTL)		•			up to 5 Hz		•	•				•
FGPMMOSL3	MT3318	11.5x13x1.9	-148	-158	55	39	2 (TTL)		•			up to 5 Hz	•	•	•			•	•
FGPMMOPA2	MT3318	26x26x6.1	-148	-158	62	46	1 (TTL)		•	•	•	up to 5 Hz	•			•	•		
FGPMMOPA4	MT3318	26x26x11.7	-148	-158	55	40	1 (TTL)		•	•	•	up to 5 Hz	•			•		•	
FGPMMOPA5	MT3318	25x25x6.8	-148	-158	58	39	2 (TTL)		•	•		up to 5 Hz	•	•	•			•	•
FGPMMOPA6B	MT3329	16x16x6	-148	-165	48	37	1 (TTL)	1	•	•		up to 10Hz	•		•			•	•*
FGPMMOUDG	MT3329	59.9x15x6.3	-148	-163	48	37		1	•	•	•	up to 10Hz	•					•	
Gmm-u1	MT3329	13x10x2.1	-148	-165	48	37	1 (TTL)	1	•			up to 10Hz	•	•	•			•	•

\*Requires Special Firmware - Use 3D-Fix Pin.