

# GPS breakout board FGPMMPA6H

## Standard firmware

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## Pin configuration



Pin#	Name		Description	Notes
1	PPS	→	1PPS signal	Time Mark Signal output
2	V+		Power input	3.3 .. 5.5 VDC
3	GND		Power ground	
4	RX	←	Receive data	UART NMEA Input to GPS
5	TX	→	Transmit data	UART NMEA Output from GPS
6	3DFIX	→	Status indicator	FIX status output - active low
7	VBAT		Battery / Sense / Clear	
8	RTCM	←	DGPS RTCM streaming input	Requires special firmware
9	V3		Power output	50 mA external power

### Notes

This version of the breakout board uses an ultra low noise LDO voltage regulator to supply the GPS module. The embedded GPS module is a GlobalTop PA6H with Mediatek MT3339 chipset and the latest standard firmware. SBAS is only available up to a 5 Hz update rate.

See next page for a detailed description of pin use/function.

Pin #

1. 1PPS Time Mark output 2.8V CMOS signal, which is a pulse sent every second that is 100 ms wide active high when the GPS module has an active 3D lock on satellites. An embedded blue LED indicates this as well with same duty cycle giving a distinct blue flash with the high bright LED each second.
2. Power input. This specific module is designed to work in the range between 3.3 .. 5.5 VDC. This power input is protected against polarization failure with a self resettable 200 mA polyswitch SMD fuse.
3. The power ground and common reference for all inputs and outputs.
4. RX - the NMEA input UART LVTTTL received by the GPS module sent from any device such as a microcontroller or a USB controller.
5. TX - the NMEA output UART LVTTTL sent from the GPS module to any receiving device such as a microcontroller or a USB controller.
6. 3DFIX Active low output indicating if the GPS has any active satellites locked in. Before the signal goes stable low, this signal and the embedded red LED blinks on and off with 0.5 Hz with 50/50 Duty cycle.
7. Connected to VBAT on the GPS module where the embedded 3 V rechargeable Magnesium lithium battery is connected through a current limiting resistor. You can use this pin on any external devices to monitor the battery status. This pin is also used when resetting all settings to factory defaults.
8. DGPS RTCM data streaming input, not activated in this firmware version. Please contact us for more information on this mode or any other customized firmware versions of this breakout boards GPS modules chipset firmware.
9. Provides an external power output sourcing 3.3V / 50 mA, this is only usable within the V+ range of 3.50 .. 5.5 VDC.

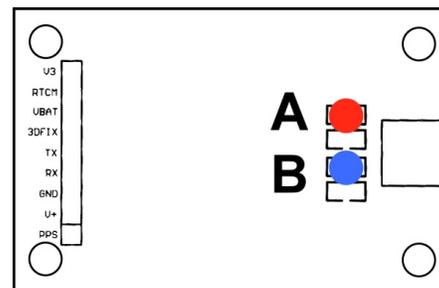
**Important notes**

No output is able to sink or source any substantial amount of current, so if You are using external LEDs or other current consuming devices You must use buffers between the outputs and those external devices. The module may be damaged if for instance You connect a LED to 3DFIX with cathode to the output and plus to the anode even with a current limiting resistor less than 10 ma. The outputs are only suitable for low current microcontroller inputs or similar directly. Please refer to the GlobalTop FGPMMPA6 datasheet for additional important specifications. The embedded rechargeable Magnesium lithium batter is delivered uncharged an will need at least 24 hours charging to be fully charged. LVTTTL logic levels is based on 3.3V for the BoB. However NO damage is done to the BoB - or any functional problems are experienced using 5V TTL levels for RX/TX pins.

**Indicator LEDs**

- A : Fix LED (2D/3D), active low
- B: 1PPS LED active high

Fix LED flashes on/off at 0.5 Hz while searching for satellites, when a 3D fix is found this LED will stay off.  
1PPS LED flashes blue once a second when sufficient satellites is found for giving this Time Mark output.



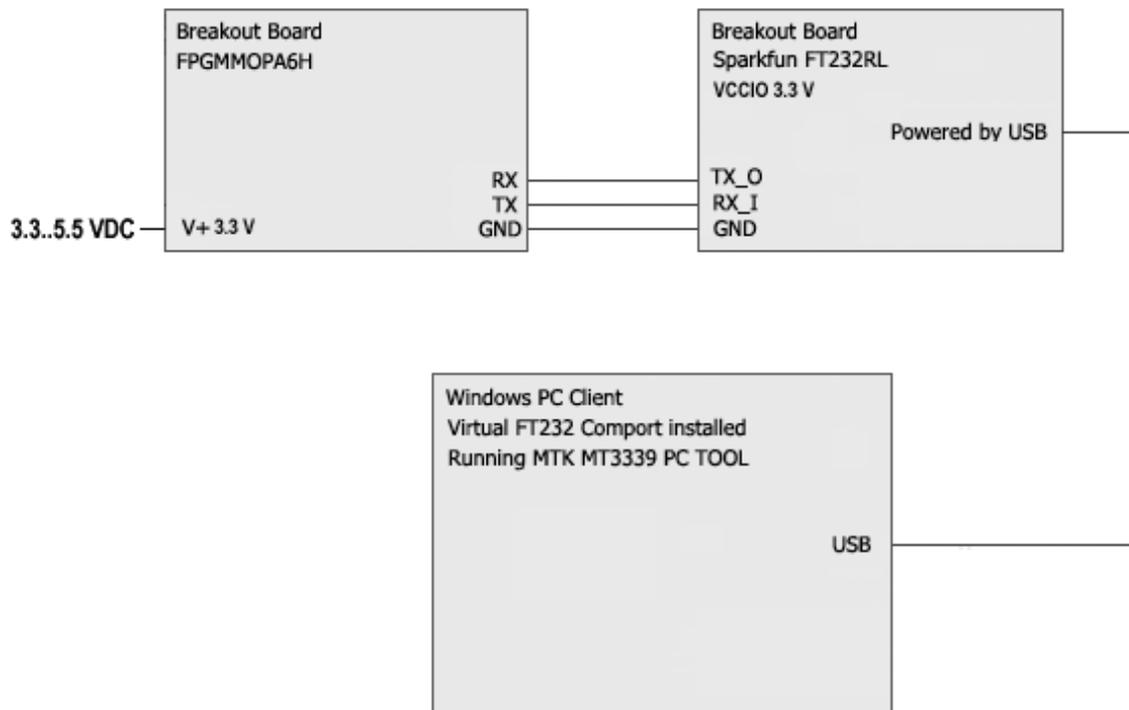
## Physical specifications

Size of breakout board	55 x 36 mm
PCB thickness	1 mm FR4
Finished copper	35 µm
Surface finish	Lead-free HASL
Mounting holes distance	47.12 mm center-center horizontally, 26.94 mm center-center, vertically
Mounting holes diameter	4.00 mm
Weight of breakout board	12 g

## Electrical specifications

GPS solution	Mediatek MT3339 chipset with an embedded ceramic patch antenna
Frequency	L1, 1575.42 MHz
Channels	66 channels
Sensitivity Acquisition	-148 dBm Cold Start
Sensitivity ReAcquisition	-163 dBm Warm Start
Sensitivity Tracking	-165 dBm
TTF HotStart WarmStart ColdStart	1 second typical 33 seconds typical 35 seconds typical
Position accuracy	DGPS(SBAS(WAAS,EGNOS,MSAS)) : 2.5 m 50% (CEP)
Velocity accuracy	DGPS(SBAS(WAAS,EGNOS,MSAS)) : 0.05 m/s 50% (CEP)
Timing accuracy on 1PPS	10ns typical
Altitude	Maximum 50,000 m (165,000 feet)
Velocity	Maximum 515 m/s (1000 knots)
Acceleration	Maximum 4G
Default update rate	1Hz, maximum 10 Hz (SBAS maximum 5 Hz)
Default baud rate	9600 bps
DGPS	SBAS(default) [WAAS,EGNOS,MSAS,GAGAN]
QZSS	Ranging supported
AGPS	Supported
Current consumption	Maximum 50 mA with external antenna (without external V3 load)
Absolute maximum V+	6V DC
Working temperature	-40 °C to +85 °C
External antenna	Right-hand circular polarized 50 ohm active antenna 3..3.6 V (SMA-male)

## Example schematics



## Notes on Software and Firmware

### Windows PC based GPS viewer programs

To use the wiring outlined in the above example schematics running on a Windows PC, first of all You need to install the device driver for the FTDI USB controller chipset. Please note the FTDI should be set for 3.3V logic.

The device drivers can be found here :

<http://www.ftdichip.com/FTDrivers.htm>

You also need a GPS viewer program communicating with the Virtual Comport (this will be available after the chipset device driver is installed). We suggest using the GlobalTop\_MT3339 PC Tool.

You can download this archive including manual on our website [www.servicepunkten.com](http://www.servicepunkten.com)

### Firmware specification

A rather unique feature of the GlobalTop PA6H breakout board, it can be manufactured with customized firmware to fit the needs of your applications.

Please contact us should You need such customized firmware and we will help You manufacture your own OEM PA6H breakout board module.

### Firmware changelog

- |               |   |
|---------------|---|
| AXN2.10_5051  | Initial release, max. altitude limit is 18,000 m.   |
| AXN2.10_5263  | Max altitude limit increased to 50,000 m. Antenna status (\$PGTOP) is not sent on power up. Please refer to page 24 of GlobalTop datasheet. |
| ANX_2.31_5651 | Current firmware version, new kernel version – no changes in function or specifications in this version.                                    |

Please note our modules always use the latest firmware provided by Mediatek upon delivery to our distributors. Any major changes will be announced on [www.servicepunkten.com](http://www.servicepunkten.com). There are no known bugs in any of the firmware releases.

## FAQ

**Q: How do I reset all settings to factory defaults?**

**A: Connect pin 7 (VBAT) to pin 3 (GND) for 10 seconds. The unit will then do a cold start on the next power cycle and all settings will reset to factory defaults. Note: the datalogging is stored in flash memory and will NOT be cleared.**

**Q: I cannot get a fix indoors without an external antenna, why?**

**A: In some cases, depending on house frame and reception conditions, You cannot get a fix on a sufficient number of satellites when indoors without an external antenna. External antennas can for example be placed on the inside of a window, or optimally outdoors on a windowsill.**

**Q: What are the levels used on the input/output pins?**

**A: This is specified in the GlobalTop datasheet, available at [www.servicepunkten.com](http://www.servicepunkten.com)**

**Q: I have an old version of the firmware on my BoB, what is different in the new firmware?**

**A: The first release of the BoB was shipped with firmware version AXN2.10\_5051 and the latest with AXN2.31\_5651. Functionality of the three versions manufactured so far is identical save for some minor changes. For details please refer to the firmware changelog on previous page.**

**Q: I would like to have the latest firmware, where can I find the files/tools for this?**

**A: The programming tools and the firmware binary files are not released publicly. However, we can upgrade your old firmware if you wish, in this case you must send the module(s) to your distributor for re-flashing. Please contact your distributor for further information.**

## Additional notes

**Please note the battery is not fully charged upon delivery. To charge it to full capacity You should leave the module powered on for at least 24 hours prior to usage.**

## **Disclaimer section**

### **Terms of use**

**By using this board You assume all risk, including physical and financial risk. Although this breakout board has been tested for several hundred hours in many different environments there is no way to ensure that nothing may damage the module or any equipment connected to the module. Damage may occur from lightning related over voltages to the power supply or connecting the module in an incorrect manner; please refer to this instruction manual and the GlobalTop datasheets for proper usage.**

### **Cautionary note**

**This breakout board includes a rechargeable Lithium battery and You must never place the breakout board in such a way as to short-circuit the battery. There is always a small risk of overheating the battery in such case during the discharge period.**

## **Standards and environment considerations**

**This module is produced using totally lead-free parts following the RoHS directive. It also strictly follows all specifications regarding noise and EMI generated by the module. Please use proper channels for recycling this product when end of life is reached.**