

Firmware Setting**Customer Name****Module Name****FGPMMOPA6C****Default Value (Highlighted in Blue)****Filled By Customer (Highlighted in Red)****Fundamental Function:****1. Baud Rate (bps) :**
 Default: 9600 bps 4800 14400 19200 38400 57600 115200

 ※ It is only recommend when user choose **Gnd-r5** product:

 9600 19200 38400 115200
2. NMEA Sentence & Interval Period:

Ex. GSV(5) -> Output 1 GSV sentence every 5-times interval. '0' = No output.

 Default: GGA(1), GSA(1), GSV(5), RMC(1), VTG(1), GLL(0), ZDA(0)
 Custom: GGA(), GSA(), GSV(), RMC(), VTG(), GLL(), ZDA()

 ※ It is only recommend when user choose **Gnd-r5** product:

 GGA(1), GSA(1), GSV(1), RMC(1), VTG(0), GLL(0), ZDA(0)
3. Datum:
 Default: WGS84 Tokyo-M Tokyo-A Other: _____

 ※ It is only recommend when user choose **Gnd-r5** product:

 WGS84
4. DGPS mode: ※ RTCM and SBAS cannot be enabled at the same time.

※ RTCM supported products: Gmm-u2p / SL3C / PA6H

※ SBAS can only be supported in 1Hz.

 Default: SBAS
 RTCM: Baud rate (bps): **Default 9600** 4800 14400 19200 38400 57600 115200

 Disable

 ※ It is only recommend when user choose **Gnd-r5** product:

 SBAS
5. Update Rate (1~10Hz) :
 Default: 1Hz **Others:** 2 Hz 3 Hz 4 Hz 5 Hz 6 Hz 7 Hz 8 Hz 9 Hz 10 Hz

 ※ It is only recommend when user choose **Gnd-r5** product:

 1Hz
6. Data Decimal: ※ Sets the number of decimal places for longitude & latitude data in NMEA
 Default: 4 decimal places **6 decimal places**

 ※ It is only recommend when user choose **Gnd-r5** product:

 4 decimal places

7. 3D Fix Output:

Period range: 0.5sec~16sec ; Duty cycle options: OFF(Low), 50ms, 100ms, 200ms, 1/8, 1/2, 7/8, ON(High)

Default setting

No Fix: Period: 2 sec; Duty cycle: 1/2

Fixed: Period: 0.5 sec; Duty cycle: OFF

Custom

No Fix: Period: _____ sec; Duty cycle: OFF 50ms 100ms 200ms 1/8 1/2 7/8 ON

Fixed: Period: _____ sec; Duty cycle: OFF 50ms 100ms 200ms 1/8 1/2 7/8 ON

8. 1PPS Output Duration: (Duty cycle range: 1~999ms)

Default: 100 ms **Custom: Duty cycle: _____ ms** **Not Supported**

※ It is only recommend when user choose Gnd-r5 product:

Custom: Duty cycle: 100 ms

9. Timing Mode: 1PPS pulse output mode selection

Default: Output 1 PPS after obtaining 3D-Fix **Output 1PPS after obtaining 2D-Fix**

Output 1PPS after the first fix **Always Output 1PPS** **Not Supported**

※ It is only recommend when user choose **Gnd-r5** product:

Always Output 1PPS

10. AIC: Active Interference Cancellation

Default: Enabled **Disabled**

11. LOCUS: Internal logger function

※ The baud rate 115200 bps is recommended using for LOCUS function.

※ It does not provide command to change setting of LOCUS function.

※ It is not recommend to use LOCUS when user choose **Gnd-r5** product.

Logging Type: **Default: Full&Stop** **Overlap**

Logging Content: **Default: Basic** **Racing** **Search** **Saving** **All**

Logging Mode:

Default: Interval 15 sec, Fix Only

AL **Fix Only** **Normal** **Interval _____ sec** **Distance _____ meters**

Speed _____ m/s

Custom-made Function:

※ It is not support all of the custom-made function when user choose **Gnd-r5** product.

12. 1-Sentence Output:

※ 1-Sentence output, means to output custom-made ASCII or Binary sentence

※ It provides custom-made command to switch mode between custom-made sentence and standard NMEA sentence (default mode)

※ It only support to output one type of sentence at the same time

Default: Disabled (It only support standard NMEA sentence)

Custom-made (To support customized ASCII or Binary or both of them)

Additional message: ASCII Binary Both

13. Last Position Retention: (Continue to output last known position coordinate when GPS fix is lost)

Default: Disabled

Enable

14. Magnetic variation: Outputs degree of magnetic variation & measured magnetic heading

Default: Disabled

Enable (If enable ,the other custom-made function cannot be enabled because of memory shortage)

15. Geofencing: Allows the user to set radius value around a target position. The GPS receiver will notify the user (in custom-made PGTOP format) if the current position is inside or outside this predefined boundary.


Default: Disabled

Enable

16. Distance Calculation: Outputs straight line distance between two coordinates

Default: Disabled

Enable

 Please make sure you read through the notes section carefully on page 4 and 5. If you have any questions, please feel free to contact our sales or support personnel.

Confirmed by Customer

Name (Printe)

Signature

Date

Note:

Confirmed by Sales (GlobalTop)

Name (Printed)

Signature

Date

Filled by R&D (GlobalTop)

Signature

Date

File Name

Version

Internal Code

Notes:**Fundamental Function:**

1. **Baud Rate:** High baud-rate is required for high update rate, as well as for additional NMEA output sentences. Please see "2. Update Rate" and "6. NMEA Sentence & Interval Period" for more details. Formula for calculating required baud rate, assuming each NMEA sentence takes a set amount of #: GLL=6, RMC=8, VTG=4, GSA=7, GSV=26, GGA=8, ZDA=5

If all NMEA sentences are turned on,

The selected baud rate must be greater than $> (6+8+4+7+26+8+5) \times \text{update rate} \times 100$

So if the update rate is at 1 Hz with all NMEA sentences turned on, the formula will be equal to 6400, thus the selected baud rate must be 9600bps or greater!



Caution: This formula is not applicable when setting baud rate / update rate / NMEA sentence using Mini GPS Tool or PMTK Command!

2. **NMEA Sentence & Interval Period:** This option sets the output interval period for each of the NMEA sentences. Please keep in mind that the rate of the NMEA sentences output is directly affected by the update rate. For example, if the default setting is chosen: "GGA(1), GSA(1), GSV(5), RMC(1), VTG(1)", then GGA, GSA, RMC and VTG sentences will output once per second, while GSV will output once every 5 seconds if the update rate is at 1Hz. If the update rate is set to 10Hz, then using the above setting, GGA, GSA, RMC and VTG will now output 10 times per second, while GSV outputs 2 times per second.
3. **Datum:** Please ask our support personnel for a complete list of datum.
4. **DGPS mode: SBAS and RTCM** cannot be enabled at the same time. And SBAS can only be supported in 1Hz.
5. **Update Rate:** High baud-rate is required for high update rate. For example: it is 38400 bps recommended for 5Hz update rate or 115200 bps for 10Hz update rate.
6. **Data Decimal:** Set the number of decimal places for longitude & latitude data reported in NMEA.
7. **3D Fix Output:** "Period" specifies the entire cycle time (high + low level signal), while "Duty cycle" specifies the period of time when the signal level is high. For example, if period is set to 2 sec and Duty cycle is set to 100ms, the entire cycle time will be 2sec, where the signal will be high for 100ms and low for 1.9sec. If period is set to 2 sec and duty cycle is set to 1/2, the signal will remain high for 500ms (1/2 of period), and low for 500ms. If duty cycle is OFF or ON, then the period time will be of no use, since it will remain low or high.
8. **1PPS:** Sets the length (duration) of the pulse for 1PPS.

9. **Timing Mode:** Timing mode functions listed below can be set for factory setting by GlobalTop

- ◆ 1PPS Output Duration
- ◆ 1PPS pulse output mode selection

10. **Active Interference Cancellation (AIC):** Provides effective narrow-band interference and jamming elimination. The GPS signal could be recovered from the jammed signal, and let user get better navigation quality.

11. **LOCUS (Data Logger solution):**

11.1 Auto logging data to MTK chip internal flash, no need to wakeup HOST side.

11.2 Smart overlapping mechanism to keep latest logger data (4KB base).

11.3 Flexible configuration to support most logging type, mode and contents.

11.4 Logger capability in MTK chip internal flash:

(1) With 1 sector flash (64KB), user can log >16 hours. The version support 2 sector (128KB).

11.5 Details for logging content:

Table	Naming	Size (bytes)	UTC (4)	Fix Type (1)	Lat (4)	Lon (4)	Height (2)	Speed (2)	Heading (2)	HDOP (2)	SatNo (1)	Checksum (1)
A	Basic	16	○	○	○	○	○					○
B	Racing	20	○	○	○	○	○	○	○			○
C	Search	19	○	○	○	○	○			○	○	○
D	Saving	13	○		○	○						○
E	All	23	○	○	○	○	○	○	○	○	○	○

11.6 LOCUS operation during Normal and Power saving mode

Below is the Logging mode behavior during Position normal mode

Positioning LOCUS config	Normal mode	Power saving mode (Periodic/AlwaysLocate)
AL mode	No logging	Logging once before go to sleep
Normal mode	Logging per fix	Logging per fix
Customization	Logging when over the customization criterion	Logging when over the customization criterion
AL + Normal	Logging per fix	Logging once before go to sleep
AL + Customization	Logging when over the customization criterion	Logging once before go to sleep
Normal + Customization	Logging per fix	Logging per fix
AL + Normal + Customization	Logging when over the interval	Logging once before go to sleep

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- 11.7 The baud rate 115200 bps is recommended, because of using it for dumping data from internal memory of chip successfully.
- 11.8 It does not provide command to change setting of LOCUS function. It is only set by GlobalTop.
- 11.9 The "Fix Only" is compatible with all other options.
- 11.10 The "AL" is used to save flash data and only Log once before going to sleep when AL running
- 11.11 The "Interval", "Distance", "Speed" are called "Customization mode" in this table, and all of them Are &&(AND) condition with other configuration.

Custom-made Function:

12. **1-Sentence:** Custom-made and compact the output NMEA sentence to decrease MCU loading. See [One Sentence Output](#) page for more details. If you wish to use binary mode, one sentence output must be enabled, please specify the desired NMEA items or follow GlobalTop specification document. Optional functions are supported, but customer will need to supply detail algorithm or methods.
13. **Last Position Retention:** convenient yet elegant solution that allows the GPS module to continue output its last known position in the event of losing GPS satellite fix. Please refer to our [website](#).
14. **Magnetic variation:** Magnetic Variation data output allows electronic compass based device to adjust for declination when using bearing to determine directions (Ex. Ships) Please refer to [website](#)
15. **Geofencing:** Set a radius value around a target position, and informs the user if the receiver position is inside or outside this predefined boundary, **like school attendance zone or neighborhood boundary**. Please refer to [website](#)
16. **Distance calculation:** GlobalTop GPS module is able to specify the exact **line-of-sight distances** between current location and other points of interests. This calculation is done internally within the GPS module and can help decrease the calculation loading on the main processor. Please refer to [website](#)

Other Notes:

1. **AGPS** function is supported in firmware version Mcore2.02 & AXN0.3 or later revisions.
2. **“Navigation Speed Threshold”** function can be enabled in all GPS modules to help reduce stationary drifting problem of GPS through a special drifting elimination algorithm. If you wish to enable or change the threshold value (1.0 m/s), please contact us. In addition, the setting can also be changed temporarily using MTK packet command. The feature is disabled (0.0 m/s) for default.
3. Items 1, 2, 3 (mini GPS Tool only), 5, 6, can be changed through PMTK command or Mini GPS Tool, but will return to chosen setting when re-booted without supplying backup power. Please contact us for the complete PMTK command document or download Mini GPS Tool from www.gtop-tech.com.
4. **“Application notes”** document for our module is available. It contains design tips, layouts, and cautions you should watch out for when designing around GlobalTop GPS modules. Please contact us if you have not received your application notes document.
5. **Embedded Assist System (EASY):** is the abbreviation of **Embedded Assist System**. The benefits are including:
 - ◆ **EASY to TTFF**

EASY works as an embedded software which can accelerate TTFF by predicting satellite navigation messages from received ephemeris.
 - ◆ **EASY to calculate**

No additional computing interval for EASY task. EASY was efficiently scheduled and computed in the free time of every second after GPS navigation solution.
 - ◆ **EASY to design-in**

World leading technology with no additional design-in efforts.



Caution: The EASY only support update rate 1Hz, and it can disable/enable by PMTK command. And “VBACKUP” pin needs to be connected for this feature. Please contact us for more details.

EASY function is conceptually designed to automatically engage for predicting after first receiving the broadcast ephemeris. A while later (generally, tens of second), 3 day extensions is completely generated then all EASY function will be maintained at standby condition. EASY assist is going to be engaged when GPS request in new TTFF condition or re-generate again with another new received ephemeris. At meanwhile, the TTFF is benefited by EASY assist.