



Software User Guide

AirPrime XM/XA Series



SIERRA
WIRELESS®

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Rev 3

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2	January 3, 2018	Update Packet Type 120/838/837; Remove Packet Type 447/527, Added SDK commands
3	February 01, 2018	1) Sort command content and index list table. 2) Add GLP command.

内容

1	1	11
1: MTK NMEA Packet Format			11
2	2	13
2: Command Types			13
PMTK001 COMMAND ACK			13
PMTK010 GNSS SYSTEM MSG			13
PMTK011 GNSS SYSTEM MSG			14
PMTK101 GNSS HOT START			14
PMTK102 GNSS WARM START			14
PMTK103 GNSS COLD START			15
PMTK104 GNSS FULL COLD START			15
PMTK127 CLEAR EPO			15
PMTK161 GNSS STANDBY MODE			16
PMTK183 LOCUS QUERY STATUS			16
PMTK184 LOCUS ERASE			17
PMTK185 LOCUS START and STOP			17
PMTK186 LOCUS SNAPSHOT LOG			18
PMTK187 LOCUS CONFIGURATION			18

PMTK223 POWER SAVE PERIODIC EXTENSION	19
PMTK225 POWER SAVE PERIODIC.....	19
PMTK250 DATA TYPE OF DATA PORT	20
PMTK251 NMEA OUTPUT BAUDRATE	21
PMTK253 NMEA OUTPUT MODE.....	22
PMTK255 SYNC 1PPS WITH NMEA.....	23
PMTK256 GNSS TIMING PRODUCT	24
PMTK257 GNSS FAST TTFF and HIGH ACCURACY	24
PMTK262 GLP MODE	25
PMTK265 GNSS NMEA DECIMAL PRECISION	25
PMTK285 1PPS CONFIG	26
PMTK286 GNSS AIC MODE	26
PMTK299 GNSS DEBUG MODE.....	27
PMTK301 GNSS DGPS MODE	27
PMTK306 GNSS MINIMUM SATELLITE CNR THRESHOLD	28
PMTK308 GNSS DR COUNTER	28
PMTK311 GNSS SATELLITE ELEVATION THRESHOLD	29
PMTK313 GNSS SBAS ENABLED	29

PMTK314 NMEA SENTENCES AND FREQUENCIES.....	30
PMTK328 GNSS HIGH HORIZONTAL ACCURACY THRESHOLD.....	31
PMTK330 GNSS DATUM.....	31
PMTK331 GNSS DATUM ADVANCE	32
PMTK351 GNSS QZSS NMEA	32
PMTK352 GNSS QZSS MODE.....	33
PMTK353 GNSS SEARCH MODE.....	34
PMTK355 QUERY GNSS SEARCH MODE.....	35
PMTK356 GNSS HDOP THRESHOLD.....	36
PMTK357 QUERY HDOP THRESHOLD	36
PMTK385 GNSS HIGH SENSITIVITY	37
PMTK386 GNSS STATIC NAVIGATION THRESHOLD	37
PMTK400 QUERY GNSS FIX CONTROL	38
PMTK401 QUERY GNSS DGPS MODE	38
PMTK406 QUERY GNSS MINIMUM SATELLITE SNR THRESHOLD.....	39
PMTK408 QUERY GNSS ESTIMATED FIX COUNTER.....	39
PMTK411 QUERY GNSS SATELLITE ELEVATION THRESHOLD	40
PMTK413 QUERY GNSS SBAS STATUS.....	40

PMTK414 QUERY GNSS NMEA OUTPUT	40
PMTK428 QUERY GNSS HORIZONTAL ACCURACY THRESHOLD	41
PMTK430 QUERY GNSS DEFAULT DATUM MODE	41
PMTK435 QUERY GNSS RTC TIME.....	42
PMTK436 QUERY GNSS HIGH SENSITIVITY.....	42
PMTK500 GNSS FIX CONTROL ACK.....	43
PMTK501 GNSS DGPS MODE ACK.....	43
PMTK506 GNSS MINIMUM SATELLITE SNR THRESHOLD ACK	44
PMTK511 GNSS SATELLITE ELEVATION THRESHOLD ACK.....	44
PMTK513 GNSS SBAS ACK	45
PMTK514 GNSS NMEA OUTPUT ACK.....	45
PMTK528 GNSS HORIZONTAL ACCURACY THRESHOLD ACK	46
PMTK530 GNSS DATUM ACK.....	46
PMTK535 GNSS RTC TIME ACK.....	47
PMTK602 QUERY GNSS DATA PORT	47
PMTK605 QUERY GNSS FW RELEASE VERSION	48
PMTK607 QUERY GNSS EPO INFORMATION.....	48
PMTK622 QUERY GNSS LOCUS DATA	49

PMTK660 QUERY GNSS AVAILABLE EPHEMERIS OF SATELLITE	50
PMTK661 QUERY GNSS AVAILABLE ALMANAC OF SATELLITE	51
PMTK667 QUERY GNSS UTC CORRECTION DATA	52
PMTK668 QUERY GNSS GPS EPHEMERIS DATA	53
PMTK669 QUERY GNSS BEIDOU EPHEMERIS DATA	54
PMTK670 QUERY GNSS GPS IONOSPHERIC	55
PMTK702 GNSS DATA PORT ACK	56
PMTK705 GNSS FW RELEASE VERSION ACK	56
PMTK707 GNSS EPO INFORMATION ACK	57
PMTK721 GNSS ENTRY GPS EPO DATA	57
PMTK740 GNSS ENTRY UTC	58
PMTK741 GNSS ENTRY POS	59
PMTK837 JAMMING SCAN TEST	60
PMTK838 JAMMING DETECTION TEST	61
PMTK869 GNSS EASY MODE	62
PMTK886 GNSS NAVIGATION MODE	63
3: Common Command Operations	3
How to Calculate the Checksum Value	3
How to Acquire that Checksum Value Through the Checksum Tool	3

Command Setting Reset	3
4: SDK Commands	4
Commands Definition	4
Command Format	4
PGCMD218 NMEA SENTENCE TYPE.....	7
PGCMD219 LAST POSITION RETENTION	8
PGCMD220 DECIMAL LENGTH	9
PGCMD221 GEOFENCING	10
PGCMD222 DISTANCE CALCULATION.....	10
PGCMD223 NAVIGATION MODE	11
PGCMD224 SPEED WARN	11
PGCMD226 SERIAL NUMBER.....	12
PGCMD227 QUERY SERIAL NUMBER	12
PGCMD229 GNSS SATELLITE SEARCH MODE	13
PGCMD231 EPE INFORMATION.....	14
PGCMD232 GNSS BAUD RATE	14
PGCMD233 GNSS UPDATE RATE.....	15
PGCMD234 GNSS DGPS MODE	16
PGCMD235 GNSS 1PPS MODE	17

PGCMD236 NMEA PERIOD	18
PGCMD380 GNSS DEFAULT RECOVERY	19
Additional Configuration	20
PGCMD25 GEOFENING PARAMETER	20
PGCMD27 DISTANCE CALCULATION PARAMETER	21
PGCMD200 SPEED WARNING PARAMETER	23



>> 1: MTK NMEA Packet Format

Table 1-1: MTK NMEA Packet Format

Preamble	Talker ID	Pkt Type	Date Field	*	CHK1	CHK2	CR	LF
----------	-----------	----------	------------	---	------	------	----	----

The maximum packet length is restricted to 255 bytes.

Table 1-2: Fields in Packet Format

Field	Length	Type	Description
Preamble	1 byte	Character	"\$"
Talker ID	4 bytes	Character String	"PMTK"
Pkt Type	3 bytes	Character String	An identifier used to tell the decoder how to decode the packet. Range is "000" to "999",
Data Field	variable		A "," must be inserted ahead each data field to help decoder process the <i>Data Field</i> .
*	1 byte	Character	The star symbol is used make the end of <i>Data Field</i> .
CHK1, CHK2	2 bytes	Character String	Checksum of the data between preamble "," and "**"
CR, LF	2 bytes	Binary String	Used to identify the end of a packet

Sample Packet:

\$PMTK000*32<CR><LF>

Table 1-3: Packet Types

Pkt Type	Abbreviation/Syntax	Data Field	Meaning/Example/Return
000	PMTK_TEST	None	Test Packet \$PMTK000*32<CR><LF>
001	PMTK_ACK, PMTK001, Cmd, Flag	Command / packet type the acknowledge responds Flag: <ul style="list-style-type: none">• 0 = invalid command / packet type• 1 = unsupported command / packet type• 2 = valid command / packet, but action failed• 3 = valid command / packet and action succeeded	Acknowledgement of the PMTK command \$PMTK001,604,3*32<CR><LF>
010	PMTK_SYS_MSG PMTK010, MSG	Msg: System message 0: Unknown 1:Startup	Output system message \$PMTK010,001*2E<CR><LF>

When the GPS module is powered-on or restarted via a command, both \$PMTK010,001*2E<CR><LF> and \$PMTK011,MTKGPS*08<CR><LF> will be returned at the same time after the GPS engine has successfully completed the boot-up stage.

Note: when power to the device (module) is removed, any modified settings will be lost and reset back to the factory defaults. If the device (module) has a backup power supply through VBACKUP or a coin battery, the device will keep the modified setting until the backup power is exhausted.

2: Command Types

PMTK001 COMMAND ACK

Command Meaning:

Acknowledgment of the PMTK command executes status.

Data Fields:

PMTK001,Cmd,Flag

- **Cmd:** The command / packet type that the acknowledgment responds.
- **Flag:**
 - “0” = Invalid command / packet.
 - “1” = Unsupported command / packet type.
 - “2” = Valid command / packet, but action failed.
 - “3” = Valid command / packet, and action succeeded.

Example:

Command	Response
Invalid command: \$PMTK604,3*32<CR><LF>	\$PMTK001,604,1*30<CR><LF>
Valid command: \$PMTK104,1*2A<CR><LF>	\$PMTK001,104,3*35<CR><LF>

PMTK010 GNSS SYSTEM MSG

Command Meaning:

System startup status output message.

Data Field:

PMTK010,Type

- **Type:** The system message type.
 - “0” = UNKNOWN
 - “1” = STARTUP
 - “2” = Notification for the host aiding EPO
 - “3” = Notification for the transition to Normal mode completes successfully.

Example:

Command	Response
\$PMTK104,1*2A<CR><LF>	\$PMTK010,002*2D<CR><LF>

PMTK011 GNSS SYSTEM MSG

Command Meaning:

System startup status output message.

Data Field:

PMTK011,Msg

- **Msg:** The system text message.

Example:

Command	Response
\$PMTK104,1*2A<CR><LF>	\$PMTK011,MTKGPS*08<CR><LF>

PMTK101 GNSS HOT START

Command Meaning:

Hot Start. Use the available data in the NVRAM.

System restart with GNSS Hot Start routine.

Data Field:

None

Example:

Command	Response
\$PMTK101*32<CR><LF>	\$PMTK010,002*2D<CR><LF> \$PMTK011,MTKGPS*08<CR><LF>

PMTK102 GNSS WARM START

Command Meaning:

Warm Start. Not using Ephemeris data at start.

System restart with GNSS Warm Start routine.

Data Field:

None

Example:

Command	Response
\$PMTK102*31<CR><LF>	\$PMTK010,002*2D<CR><LF> \$PMTK011,MTKGPS*08<CR><LF>

PMTK103 GNSS COLD START

Command Meaning:

Cold Start. Not using the Position, Almanac and Ephemeris data at start.
System restart with GNSS Cold Start routine.

Data Field:

None

Example:

Command	Response
\$PMTK103*30<CR><LF>	\$PMTK010,002*2D<CR><LF> \$PMTK011,MTKGPS*08<CR><LF>

PMTK104 GNSS FULL COLD START

Command Meaning:

Full Cold Start. In addition to Cold start, this command clears the system/user configurations at start.

It resets the GNSS module to the factory default.

Data Field:

None

Example:

Command	Response
\$PMTK104*37<CR><LF>	\$PMTK010,002*2D<CR><LF> \$PMTK011,MTKGPS*08<CR><LF>

PMTK127 CLEAR EPO

Command Meaning:

Erase the EPO(AGPS) data that stored in the flash.

Data Field:

None

Example:

Command	Response
\$PMTK127*36<CR><LF>	\$CLR,EPO,000b0000*55<CR><LF>

PMTK161 GNSS STANDBY MODE

Command Meaning:

Enter standby modes for power saving.

Data Field:

PMTK161,Type

- **Type:** The standby mode type.
“0” = Standby type1 mode.
“1” = Standby type2 mode.

Example:

Command	Response
Entry Standby mode: \$PMTK161,0*28<CR><LF>	\$PMTK001,161,3*36<CR><LF>

Note:

1. Software on the host side can send any byte to wake up from standby mode.
2. The standby mode suggests using type1 mode to power save mode.

PMTK183 LOCUS QUERY STATUS

Command Meaning:

Query the GNSS Locus (GNSS Fix Log) status.

Data Field:

None

Returns:

\$PMTKLOG,Serial#,Type, Mode, Content, Interval, Distance, Speed, Status, Log number, Percentage*CH

- **Serial#:** logging serial number : 0~65535.
- **Type:** logging type – 0: Overlap, 1: FullStop.
- **Mode:** logging mode – 0x08: interval logger.
- **Content:** logging contents of configuration.
- **Interval:** logging interval setting (valid when Interval mode selected).
- **Distance:** logging distance setting (valid when Distance mode selected).
- **Speed:** logging speed setting (valid when Speed mode selected).
- **Status:** logging status – 0: Logging, 1: Stop logging.
- **Log number:** Log data numbers.
- **Percent:** logging life used percentage.

Example:

Command	Response
\$PMTK183*38<CR><LF>	\$PMTKLOG,0,0,a,31,15,0,0,1,0,0*10<CR><LF>

Note:

This feature can't use when data cache (PMTK189) is running. This command will get error response when data cache is running.

PMTK184 LOCUS ERASE

Command Meaning:

Erase the logged GNSS data on the flash.

Data Field:

PMTK184,Type

- **Type:** Erase type – 1: erase the logged internal flash data.

Example:

Command	Response
\$PMTK184,1*22<CR><LF>	\$PMTK001,184,3*3D<CR><LF>

PMTK185 LOCUS START and STOP

Command Meaning:

Start and Stop Locus logging.

Data Field:

PMTK185,Status

- **Status:**
 - “0” = Start logging.
 - “1” = Stop logging.

Example:

Command	Response
Start Locus log: \$PMTK185,0*22<CR><LF>	\$PMTK001,185,3*3C<CR><LF>
Stop Locus log: \$PMTK185,1*23<CR><LF>	\$PMTK001,185,3*3C<CR><LF>

Note:

This feature can't use when data cache (PMTK189) is running. Please don't set any data cache configuration when LOCUS is running.

PMTK186 LOCUS SNAPSHOT LOG

Command Meaning:

Snapshot write GNSS log into FLASH.

Data Field:

PMTK186,Type

- **Type:**
"1" = Snapshot data logging.

Example:

Command	Response
\$PMTK186,1*20<CR><LF>	\$PMTK001,186,3*3F<CR><LF>

Note:

This command has been in Locus running status.

PMTK187 LOCUS CONFIGURATION

Command Meaning:

Configure Locus settings by PMTK command.

Data Fields:

PMTK187,mode,setting

- **Mode:**
"1" = interval mode. (1sec<=Interval<=12hours).
- **Setting:**
New setting instead of the original configuration (e.g. change to 5 seconds interval as in the example below).

Example:

Command	Response
\$PMTK187,1,5*14<CR><LF>	\$PMTK001,187,3*3E<CR><LF>

Note:

This feature can't use when data cache (PMTK189) is running. Please don't set any data cache configuration when LOCUS is running.

PMTK223 POWER SAVE PERIODIC EXTENSION

Command Meaning:

Setting power save extension periodic mode parameters. Receiver accord parameters to extension running time on power save periodic mode.

Data Fields:

PMTK223,SV,SNR,Extension Threshold, Extension gap

Below parameters can be modified by Host command message

- **SV:** The range is from 1 to 4. Default value is 1. GNSS search/find new satellite number threshold.
- **SNR:** The range is from 25 to 30. Default value is 30. The search/find satellite signal strength threshold.
- **Extension threshold:** The range is from 40000 to 180000. Default value is 180000 msec. PMTK225 run timer maximum extension time
- **Extension gap:** The range is from 0 to 3600000. Default value is 6000 msec. PMTK225 next run timer maximum extension time.
(Extension gap is the limitation between neighboring Dynamic Ephemeris Extension (DEE)).

Example:

Command	Response
\$PMTK223,1,30,180000,6000*0C<CR><LF>	\$PMTK001,223,3*33<CR><LF>

PMTK225 POWER SAVE PERIODIC

Command Meaning:

GNSS power save periodic mode start and stop.

Due to hardware limitations, the maximum power down duration is 2047 seconds (GNSS sleep time).

If the configured Sleep time interval is larger than 2047 seconds, the GNSS firmware automatically extends the interval using software.

However, the GNSS system is powered on for the interval extension and powered down again after the extension is complete.

Data Fields:

PMTK225,Type,Run time,Sleep time, Second run time,Second sleep time

- **Type:** Set operation mode of power saving
 - “0” = Back to normal mode.
 - “1” = Periodic backup mode.
 - “2” = Periodic standby mode.
 - “4” = Perpetual backup mode.

- “8” = Always Locate standby mode.
- “9” = Always Locate backup mode.
- **Run time:** running time on fix status.
 - “0” = disable.
 - “over 1,000” = enable [Range: 1000~518400000 ms].
- **Sleep time:** sleep time on fix status. [Range: 1000~518400000 ms].
- **Second run time:** running time on no fix status.
 - “0” = disable.
 - “over 1,000” = enable [Range: Second set both 0 or 1000~518400000].
- **Second sleep time:** sleep time on no fix status.
 - “0” = disable.
 - “over 1,000” = enable [Range: Second set both 0 or 1000~518400000].

Example:

Command	Response
Periodic Backup mode: \$PMTK225,0*2B<CR><LF> \$PMTK223,1,25,180000,60000*38<CR><LF> \$PMTK225,1,3000,12000,18000,72000*16<CR><LF>	
Periodic Standby mode: \$PMTK225,0*2B<CR><LF> \$PMTK223,1,25,180000,60000*38<CR><LF> \$PMTK225,2,3000,12000,18000,72000*16<CR><LF>	
Always Locate Standby mode: \$PMTK225,0*2B<CR><LF> \$PMTK225,8*23<CR><LF>	
Always Locate Backup mode: \$PMTK225,0*2B<CR><LF> \$PMTK225,9*22<CR><LF>	

PMTK250 DATA TYPE OF DATA PORT

Command Meaning:

Set data port input/output data type and data port baud rate.

Data Fields:

PMTK250,InType,OutType,Baud rate

- **InType:** Data port input data type
 - “0” = DPORT_IN_NONE (No data input).
 - “1” = DPORT_IN_RTCM (RTCM input).
 - “3” = DPORT_IN_NMEA (MTK NMEA).
- **OutType:** Data port output data type
 - “0” = DPORT_OUT_NONE (No data output).
 - “3” = DPORT_OUT_NMEA (MTK NMEA).

- **Baud rate:** Possible values are: 4800, 9600, 14400, 19200, 38400, 57600, 115200, 460800, 921600.

Example:

Command	Response
\$PMTK250,1,3,9600*14<CR><LF>	\$PMTK001,250,3*37<CR><LF>

PMTK251 NMEA OUTPUT BAUDRATE

Command Meaning:

Configure NMEA port baud rate. This command doesn't save parameter into FLASH.

The setting will be back to default value in the two conditions.

1. Full cold start command is issued.
2. Enter standby mode.

Data Fields:

PMTK251, Baud rate

- **Baud rate:** Possible value are:
4800, 9600, 14400, 19200, 38400, 57600, 115200, 230400, 460800, 921600

Example:

Command	Response
\$PMTK251,38400*27<CR><LF>	\$PMTK001,251,3*36<CR><LF>

Notes:

1. The option "Allow change of baud rate" at the "NMEA" page in the Core Builder would be checked before using this command.

PMTK253 NMEA OUTPUT MODE

Command Meaning:

Configure GNSS NMEA output message mode. The message mode provides NMEA and Binary mode.

The setting will be back to default value in the two conditions.

1. Full cold start command is issued
2. Enter standby mode

Data Fields:

PMTK253, Flag

- **Flag:**
 - “0” = NMEA mode.
 - “1” = Binary mode.

Example:

Command	Response
NMEA Mode: \$PMTK253,0*2A<CR><LF>	\$PMTK001,253,3*34
Binary Mode: \$PMTK253,1*2B<CR><LF>	None

PMTK255 SYNC 1PPS WITH NMEA

Command Meaning:

Enable or disable fixed NMEA output time in one pulse per second (1PPS) function (default value is "0").

The latency range of the beginning of UART Tx is between 170 ms and 180 ms at MT3339 platform (465 ms~485ms at MT3333 platform) and behind the rising edge of 1PPS.

Data Field:

PMTK255,Flag

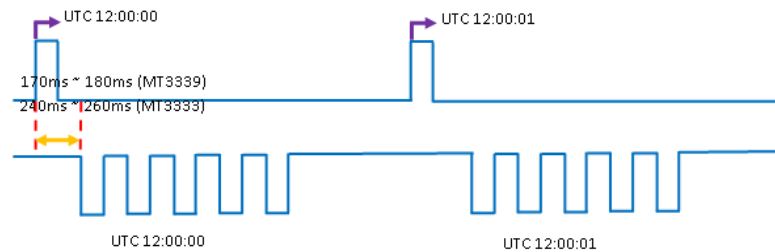
- **Flag:**
 - "0" = Disable.
 - "1" = Enable.

Example:

Command	Response
Enable: \$PMTK255,1*2D<CR><LF>	\$PMTK001,255,3*36<CR><LF>

Notes:

Only support in AXN 3.6/3.8 and 2.3/2.5 after 2014/4/21.



PMTK256 GNSS TIMING PRODUCT

Command Meaning:

Configure GNSS Timing product to enhance 1PPS output timing accuracy.

Data Fields:

PMTK256, Flag

- **Flag:**
 - “0” = Disable.
 - “1” = Enable.

Example:

Command	Response
Enable \$PMTK256,1*2E<CR><LF>	\$PMTK001,256,3*31<CR><LF>

PMTK257 GNSS FAST TTFF and HIGH ACCURACY

Command Meaning:

Configure GNSS fast TTFF or high accuracy in tunnel or garage environment.

Data Fields:

PMTK257, Flag

- **Flag:**
 - “0” = Enable fast TTFF in tunnel or garage.
 - “1” = Enable high accuracy in tunnel or garage.

Example:

Command	Response
Enable High Accuracy \$PMTK257,1*2F<CR><LF>	\$PMTK001,257,3*30<CR><LF>

PMTK262 GLP MODE

Command Meaning:

Enable or Disable GNSS Low Power(GLP) mode.

Data Fields:

PMTK262,Enable

- **Enable:**
 - “0” = Disable GLP mode.
 - “1” = Enable GLP mode for MT3339.
 - “3” = Enable GLP mode for MT3333.

Example:

Command	Response
Enable GLP Mode: \$PMTK262,3*2B<CR><LF>	\$PMTK001,262,3,3*29<CR><LF>

PMTK265 GNSS NMEA DECIMAL PRECISION

Command Meaning:

Configure number of fractional decimal precision in NMEA sentence.

Data Fields:

PMTK265,Number

- **Number:**
 - “1” = 4 digits.
 - “2” = 5 digits.
 - “3” = 6 digits.

Example:

Command	Response
4 Digits: \$PMTK265,1*2E<CR><LF>	\$PMTK001,265,3,1*2C<CR><LF>

PMTK285 1PPS CONFIG

Command Meaning:

Configure 1PPS output settings.

Data Fields:

PMTK285,1PPSType,1PPSPulseWidth

- **1PPSType.** Availability
 - “0” = Disable.
 - “1” = After the first fix.
 - “2” = 3D fix only.
 - “3” = 2D/3D fix only.
 - “4” = Always.
- **1PPSPulseWidth.** 1PPS pulse width (unit: ms)

Example:

Command	Response
1PPS with 2D/3D fix only: \$PMTK285,2,100*23<CR><LF>	\$PMTK001,285,3*3F<CR><LF>

PMTK286 GNSS AIC MODE

Command Meaning:

Enable or disable GNSS active interference cancellation function.

Data Field:

PMTK286,Enabled

- **Enable:**
 - “0” = Disable.
 - “1” = Enable.

Example:

Command	Response
Enable AIC: \$PMTK286,1*23<CR><LF>	\$PMTK001,285,3*3F<CR><LF>

PMTK299 GNSS DEBUG MODE

Command Meaning:

Enable or disable GNSS output debug message.

Data Field:

PMTK299,Enabled

- **Enabled:**
 - “0” = Disable.
 - “1” = Enable.

Example:

\$PMTK299,1*2D<CR><LF>

Command	Response
Output Debug message: \$PMTK299,1*2D<CR><LF>	\$PMTK001,299,3*32<CR><LF>

PMTK301 GNSS DGPS MODE

Command Meaning:

Configure GNSS DGPS system type.

Data Field:

PMTK301,Mode

- **Mode:** DGPS data source mode.
 - “0” = No DGPS source.
 - “1” = RTCM.
 - “2” = SBAS (Include WAAS/EGNOS/GAGAN/MSAS).

Example:

Command	Response
SPS Mode: \$PMTK301,0*2C<CR><LF>	\$PMTK001,301,3*32<CR><LF>
RTCM Mode: \$PMTK301,1*2D<CR><LF>	\$PMTK001,301,3*32<CR><LF>
SBAS Mode: \$PMTK301,2*2E<CR><LF>	\$PMTK001,301,3*32<CR><LF>

PMTK306 GNSS MINIMUM SATELLITE CNR THRESHOLD

Command Meaning:

Configure GNSS minimum satellite CNR threshold. If satellite CNR smaller than this threshold value, GNSS would not to use the satellite information.

Data Fields:

PMTK306,MinCNR

- **MinSNR:**
 - [Range 9~37]

Example:

Command	Response
SNR 15: \$PMTK306,15*1F<CR><LF>	\$PMTK001,306,3,15*1D<CR><LF>

PMTK308 GNSS DR COUNTER

Command Meaning:

Configure GNSS DR estimated fix counter. When Satellite signal from strong to weak status, GNSS will use estimated to output fix message until this counter to zero.

Data Fields:

PMTK308,DRCounter

- **DRCounter:**
 - [Range 0~500]

Example:

Command	Response
Disable: \$PMTK308,0*25<CR><LF>	\$PMTK001,308,3,0,0*3B<CR><LF>
DR Counter 3: \$PMTK308,3*26<CR><LF>	\$PMTK001,308,3,3,0*38<CR><LF>

PMTK311 GNSS SATELLITE ELEVATION THRESHOLD

Command Meaning:

Configure GNSS satellite elevation threshold. GNSS would not use satellite that elevation is smaller than satellite elevation threshold.

Data Fields:

PMTK311,Degree

- **Degree:**
 - [Range 0~346]

Example:

Command	Response
Satellite elevation 5 degree: \$PMTK311,5*28<CR><LF>	\$PMTK001,311,3*33<CR><LF>

PMTK313 GNSS SBAS ENABLED

Command Meaning:

Enable/Disable GNSS to search a SBAS satellite.

Data Field:

PMTK313,Enabled

- **Enabled:**
 - "0" = Disable.
 - "1" = Enable.

Example:

Command	Response
Enable: \$PMTK313,1*2E<CR><LF>	\$PMTK001,313,3*31<CR><LF>

PMTK314 NMEA SENTENCES AND FREQUENCIES

Command Meaning:

Specific output NMEA sentences and frequencies. GNSS support 19 NMEA sentences to indicate GNSS status. Refer to NMEA output static string type in the Appendix A.

Data Field:

PMTK314,Field0,Field1,....Field18

Field Index	Name	Description
0	GLL	Geographic Position - Latitude longitude
1	RMC	Recommended Minimum Specific GNSS Sentence
2	VTG	Course Over Ground and Ground Speed
3	GGA	GPS Fix Data
4	GSA	DOPS and Active Satellites
5	GSV	Satellites in View
6	GRS	Range Residuals
7	GST	Pseudorange Erros Statistics
8	PLT	Time
9	PLP	Position (Lat, Long)
10	PLS	Satellite data
11	PLI	Additional Information
12	PLH	HDS Time Information
13	MALM	almanac information
14	MEPH	ephemeris information
15	MDGP	differential correction information
16	MDBG	MTK debug information
17	ZDA	Time & Date
18	MCHN	channel status

Field value (Frequency) [Range: 0 ~ 31]

Field value indicates the NMEA sentence output counter threshold. When the Field of NMEA sentence output counter over this threshold, GNSS will send this NMEA sentence and restart counter.

0: Disabled or not supported sentence.

1~31: Field NMEA counter threshold.

Example:

Command	Response
Output NMEA: GLL, RMC, VTG, GGA, GSA, GSV, MDBG, ZDA \$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,1,1,0*30<CR><LF> >	\$PMTK001,314,3*36<CR><LF> >

Notes:

- 1) Settings of GST and GRS are valid only when firmware supports GST/GRS sentences.
- 2) Above AXN5.1 version, refer to PGCMD236 to configure GLL, RMC, VTG, GSA, GSV, GGA and ZDA sentences.

PMTK328 GNSS HIGH HORIZONTAL ACCURACY THRESHOLD

Command Meaning:

Setting GNSS horizontal accuracy threshold value on GPS system. GPS will get fix only when GPS high accuracy smaller than high accuracy threshold.

Data Fields:

PMTK328,threshold

- **threshold:** [Range: Enable, 30~200 meter; Disable, 0]

Example:

Command	Response
\$PMTK328,50*12<CR><LF>	\$PMTK001,328,3*39<CR><LF>

PMTK330 GNSS DATUM

Command Meaning:

Configure GNSS datum mode.

Data Field:

PMTK330,Datum

- **Datum:**
 - "0" = WGS84.
 - "1" = TOKYO-M.
 - "2" = TOKYO-A.

Supports 219 different datum. The total datums list in the Appendix A.

Example:

Command	Response
WGS84: \$PMTK330,0*2E<CR><LF>	\$PMTK001,330,3*30<CR><LF>

PMTK331 GNSS DATUM ADVANCE

Command Meaning:

Setting GNSS datum system by user.

Data Fields:

PMTK331,majA,ecc,dX,dY,dZ

- **majA**: user defined datum semi-major axis [m] [Range: 0 ~ 7000000].
- **ecc**: user defined datum eccentric [m] [Range: 0~330].
- **dX**: user defined datum to WGS84 X axis offset [m].
- **dY**: user defined datum to WGS84 Y axis offset [m].
- **dZ**: user defined datum to WGS84 Z axis offset [m].

Example:

Command	Response
USER DATUM SYSTEM: \$PMTK331,6377397.155,299.1528128,-148.0,507.0,685.0*16<CR><LF>	None

PMTK351 GNSS QZSS NMEA

Command Meaning:

Configure GNSS output QZSS NMEA.

Data Fields:

PMTK351,Enable

- **Enable**:
 - "0" = Disable.
 - "1" = Enable.

Example:

Command	Response
Enable: \$PMTK351,1*28<CR><LF>	QZQSA sentence. QZGSV sentence.

PMTK352 GNSS QZSS MODE

Command Meaning:

Configure GNSS QZSS mode. If GNSS setting Enable, GNSS will use QZSS satellite information.

Data Fields:

PMTK352,Enable

- **Enable:**
 - "0" = Enable.
 - "1" = Disable.

Example:

Command	Response
Enable: \$PMTK352,0*2<CR><LF>	\$PMTK001,352,3*34<CR><LF>

PMTK353 GNSS SEARCH MODE

Command Meaning:

Configure GNSS search satellites system. Support GPS, GLONASS, BEIDOU and GALILEO system.

Data Fields:

\$PMTK353,GPS_Enabled,GLONASS_Enabled,GALILEO_Enabled, Reserve ,BEIDOU_Enabled.

- **GPS_Enabled:**
 - “0” = disable (DO NOT search GPS satellite).
 - “1” or non-ZERO value = search GPS satellite.
- **GLONASS_Enabled:**
 - “0” = disable (DO NOT search GLONASS satellite).
 - “1” or non-ZERO value = search GLONASS satellite.
- **GALILEO_Enabled:**
 - “0” = disable (DO NOT search GALILEO satellite).
 - “1” or non-ZERO value = search GALILEO satellite.
- **Reserve:**
 - no used.
- **BEIDOU_Enabled:**
 - “0” = disable (DO NOT search BEIDOU satellite).
 - “1” or non-ZERO = search BEIDOU satellite.

Example:

Command	Response
Search GPS Only: \$PMTK353,1,0,0,0,0*2A<CR><LF>	
Search GPS and GLONASS: \$PMTK353,1,1,0,0,0*2B<CR><LF>	
Search GPS and GALILEO \$PMTK353,1,0,1,0,0*2B<CR><LF>	
Search GPS, GLONASS and GALILEO \$PMTK353,1,1,1,0,0*2A	
Search GPS and BEIDOU \$PMTK353,1,0,0,0,1*2B	

Note:

1. Use (GPS + GLONASS) or (GPS + BeiDou) or (GPS + GALILEO) or (GPS + GLONASS + GALILEO) in your applications. GLONASS and BeiDou cannot be enabled at the same time. GALILEO and BeiDou cannot be enabled at the same time.

PMTK355 QUERY GNSS SEARCH MODE

Command Meaning:

Query GNSS search system mode. This command is to get GPS, GLONASS, BeiDou and GALILEO search settings status.

Data Field:

None

Example:

Command	Response
\$PMTK355*31<CR><LF>	\$PMTK001,355,3,1,0,0,0*32<CR><LF> (GNSS search satellite system mode: GPS Only)

Response Definition:

- Command ID:355
- Static string:3
- GPS system
 - "0" = Disable
 - "1" = Enable
- GLONASS system
 - "0" = Disable
 - "1" = Enable
- BEIDOU system
 - "0" = Disable
 - "1" = Enable
- GALILEO system
 - "0" = Disable
 - "1" = Enable

PMTK356 GNSS HDOP THRESHOLD

Packet Meaning:

Configure GNSS HDOP threshold.

When GNSS HDOP value is larger than this threshold value, GNSS will not be fixed mode.

Data Field:

PMTK356,HDOPThreshold

- **HDOPThreshold:**

"0" = Disable this function.

Other value: Enable set the HDOP threshold.

Example:

Command	Response
\$PMTK356,0.8*38<CR><LF>	\$PMTK356,0.8 Set OK!*5F<CR><LF>

PMTK357 QUERY HDOP THRESHOLD

Command Meaning:

Query GNSS HDOP threshold.

Data Field:

None

Example:

Command	Response
\$PMTK357*33<CR><LF>	\$PMTK357,0.8*39<CR><LF> Return parameters: -GNSS HDOP threshold:0.8

Response Definition:

- Command ID:357
- HDOP threshold

PMTK385 GNSS HIGH SENSITIVITY

Command Meaning:

Configure GNSS high sensitivity in tracking status.

Data Field:

\$PMTK385, Flag

- **Flag**
 - “0” =Enable.
 - “1” = Disable.

Example:

Command	Response
\$PMTK385,1*21<CR><LF>	\$PMTK001,385,3*3E<CR><LF>

PMTK386 GNSS STATIC NAVIGATION THRESHOLD

Command Meaning:

Configure GNSS speed threshold for static navigation. If the GNSS actual speed is below the threshold, GNSS output lastly position and the output speed value will be zero.

If the threshold value is set to 0, this function is disabled.

Data Fields:

PMTK386, speedThreshold

- **speedThreshold**: 0 ~ 2 (m/s).
The minimum is 0.1 ms, the maximum value is 2.0 m/s.

Example:

Command	Response
\$PMTK386,0.4*19<CR><LF>	\$PMTK386,3*3D<CR><LF>

PMTK400 QUERY GNSS FIX CONTROL

Command Meaning:

Query GNSS position fix interval, duration, run interval, one-sigma estimated Horizontal position accuracy and so on. (Refer to PMTK500)

Data Field:

None

Example:

Command	Response
\$PMTK400*36<CR><LF>	\$PMTK500,1000,0,0,0,0,0,0*1A<CR><LF>

PMTK401 QUERY GNSS DGPS MODE

Command Meaning:

Query GNSS DGPS mode. GNSS response DGPS mode: SPS, RTCM, WAAS, and so on. (Refer to PMTK501)

Data Field:

None

Example:

Command	Response
\$PMTK401*37<CR><LF>	\$PMTK501,2*28<CR><LF>

PMTK406 QUERY GNSS MINIMUM SATELLITE SNR THRESHOLD

Command Meaning:

Query GNSS minimum satellite SNR threshold value. (Refer to PMTK506)

Data Field:

None

Example:

Command	Response
\$PMTK406*30<CR><LF>	The minimum satellite SNR threshold is 15: \$PMTK506,15*19<CR><LF> Disable: \$PMTK506,0*2D<CR><LF>

PMTK408 QUERY GNSS ESTIMATED FIX COUNTER

Command Meaning:

Query GNSS estimated fix counter. (Refer to PMTK508)

Data Field:

None

Example:

Command	Response
\$PMTK408*3E<CR><LF>	Estimated fix counter is 3: \$PMTK508,3,0*3C<CR><LF> Disable: \$PMTK508,0,0*3F<CR><LF>

PMTK411 QUERY GNSS SATELLITE ELEVATION THRESHOLD

Command Meaning:

Query GNSS satellite elevation threshold value. (Refer to PMTK511)

Data Field:

None

Example:

Command	Response
\$PMTK411*36<CR><LF>	Elevation is 1 degree: \$PMTK511,1*2A<CR><LF> Disable: \$PMTK511,0*2B<CR><LF>

PMTK413 QUERY GNSS SBAS STATUS

Command Meaning:

Query GNSS SBAS Enable/ Disable status. (Refer to PMTK513)

Data Field:

None

Command	Response
\$PMTK413*34<CR><LF>	\$PMTK513,1*28<CR><LF>

PMTK414 QUERY GNSS NMEA OUTPUT

Command Meaning:

Query GNSS current NMEA sentence output frequencies and types. (Refer to PMTK314 and PMTK514)

Data Field:

None

Example:

Command	Response
\$PMTK414*33<CR><LF> >	\$PMTK514,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,0*28<CR><LF> >

PMTK428 QUERY GNSS HORIZONTAL ACCURACY THRESHOLD

Command Meaning:

Query GNSS horizontal accuracy threshold value. (Refer to PMTK328 and PMTK528)

Data Field:

None

Example:

Command	Response
\$PMTK428*3C<CR><LF>	\$PMTK528,-1.00*23<CR><LF>

PMTK430 QUERY GNSS DEFAULT DATUM MODE

Command Meaning:

Query GNSS default datum mode. (Refer to PMTK530)

Data Field:

None

Example:

Command	Response
\$PMTK430*35<CR><LF>	\$PMTK530,0*28<CR><LF>

PMTK435 QUERY GNSS RTC TIME

Packet Meaning:

Query GNSS current RTC time.

(Refer to PMTK535)

Data Field:

None

Example:

Command	Response
\$PMTK435*30<CR><LF>	\$PMTK535,2018,2,12,7,26,24*3E<CR><LF>

PMTK436 QUERY GNSS HIGH SENSITIVITY

Packet Meaning:

Query GNSS high sensitivity value. (Refer to PMTK536)

Data Field:

None

Example:

Command	Response
\$PMTK436*33<CR><LF>	High Sensitivity Enable: \$PMTK536,0*2E<CR><LF>

PMTK500 GNSS FIX CONTROL ACK

Command Meaning:

GNSS acknowledge message about fix interval, duration, run interval, one-sigma estimated horizontal and so on.

Data Field:

\$PMTK500,FixInterval,Duration,RunInterval,HAcc,VAcc

- **Fixinterval:** position fix interval. (msec) [Range: 100 ~ 10000].
- **Duration:** Duration to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode. (msec)
- **RunInterval:** Interval to come out of a minimum power sleep mode and start running in order to get a new position fix. (msec)
- **HAcc:** One-sigma estimated Horizontal position accuracy mask at which point a suitable fix is deemed to have been obtained and the receiver may prematurely switch into its minimum power sleep mode. (m)
- **VAcc:** One-sigma estimated Vertical position accuracy mask at which point a suitable fix is deemed to have been obtained and the receiver may prematurely switch into its minimum power sleep mode. (m)

Example:

Command	Response
\$PMTK400*36<CR><LF>	\$PMTK500,1000,0,0,0,0,0*1A<CR><LF>

PMTK501 GNSS DGPS MODE ACK

Command Meaning:

GNSS acknowledge message that GNSS DGPS mode.

Data Field:

PMTK501,Mode

- **Mode:** DGPS data source mode.
 - "0" = No DGPS source.
 - "1" = RTCM.
 - "2" = WAAS.
 - "3" = GSM.
 - "4" = WCDMA.
 - "5" = CDMA2K.

Example:

Command	Response
\$PMTK401*37<CR><LF>	\$PMTK501,2*28<CR><LF>

PMTK506 GNSS MINIMUM SATELLITE SNR THRESHOLD ACK

Command Meaning:

GNSS acknowledge message that minimum satellite SNR threshold value.

Data Field:

None

Example:

Command	Response
\$PMTK406*30<CR><LF>	The minimum satellite SNR threshold is 15: \$PMTK506,15*19<CR><LF> Disable: \$PMTK506,0*2D<CR><LF>

PMTK511 GNSS SATELLITE ELEVATION THRESHOLD ACK

Command Meaning:

GNSS acknowledge message that satellite elevation threshold value.

Data Field:

None

Example:

Command	Response
\$PMTK411*36<CR><LF>	Elevation is 1 degree: \$PMTK511,1*2A<CR><LF> Disable: \$PMTK511,0*2B<CR><LF>

PMTK513 GNSS SBAS ACK

Command Meaning:

GNSS acknowledge message that GNSS SBAS status.

Data Field:

PMTK513,Enabled

- **Enabled:**
 - “0” = Disable.
 - “1” = Enable.

Example:

Command	Response
\$PMTK413*34<CR><LF>	\$PMTK513,1*28<CR><LF>

PMTK514 GNSS NMEA OUTPUT ACK

Command Meaning:

GNSS acknowledge message that GNSS NMEA sentence output frequency status

Data Field:

There are totally 20 data fields that present output frequencies for the 20 supported NMEA sentences individually. Please refer to PMTK_API_SET_NMEA_OUTPUT for the Supported NMEA Sentences and Frequency Setting.

Example:

Command	Response
\$PMTK414*33<CR><LF>	\$PMTK514,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0*2B<CR><LF>

PMTK528 GNSS HORIZONTAL ACCURACY THRESHOLD ACK

Command Meaning:

GNSS acknowledge message that horizontal accuracy threshold value.

Data Field:

None

Example:

Command	Response
\$PMTK428*3C<CR><LF>	\$PMTK528,-1.00*23<CR><LF>

PMTK530 GNSS DATUM ACK

Command Meaning:

GNSS response current datum status.

Data Field:

PMTK530,Datum

- **Datum:**
 - “0” = WGS84.
 - “1” = TOKYO-M.
 - “2” = TOKYO-A.
- Supports 219 different datum. The total datums list in the Appendix A.

Example:

Command	Response
\$PMTK430*35<CR><LF>	\$PMTK530,0*28<CR><LF>

PMTK535 GNSS RTC TIME ACK

Command Meaning:

GNSS RTC time acknowledge message.

Data Fields:

PMTK535,Year,Month,Day,Hour,Min,Sec

- **Year:** Year
- **Month:** 1~12.
- **Day:** 1~31.
- **Hour:** 0~23.
- **Min:** 0~59.
- **Sec:** 0~59.

Example:

Command	Response
\$PMTK435*30<CR><LF>	\$PMTK535,2018,2,12,8,2,0*31<CR><LF>

PMTK602 QUERY GNSS DATA PORT

Command Meaning:

Query GNSS DPORT configuration and baudrate. (Refer to PMTK702)

Data Field:

None

Example:

Command	Response
\$PMTK602*36<CR><LF>	\$PMTK702,1,3,115200*1E<CR><LF>

PMTK605 QUERY GNSS FW RELEASE VERSION

Command Meaning:

Query GNSS firmware release information. (Refer to PMTK705)

Data Field:

None

Example:

Command	Response
\$PMTK605*31<CR><LF>	\$PMTK705,AXN 5.10 3333 17122000,0000,XM Series*2B<CR><LF>

PMTK607 QUERY GNSS EPO INFORMATION

Command Meaning:

Query GNSS EPO data status. (Refer to PMTK707)

Data Field:

None

Example:

Command	Response
\$PMTK607*33<CR><LF>	\$PMTK707,0,0,0,0,0,0,0,0,0*2E<CR><LF>

PMTK622 QUERY GNSS LOCUS DATA

Command Meaning:

Dump Locus data log from the NVRAM.

Data Fields:

PMTK622,Type

- **Type:**
 - “0” = Dump full LOCUS flash data.
 - “1” = Dump partial in use LOCUS flash data.

PMTK622,type,offset,size

- **Type:**
 - “2” = Dump specified sector’s LOCUS flash data.
- **offset:** The start address for the dump (0<=offset<=32, the unit is sector [4KB]).
- **size:** the dump length (0<=offset<=32, the unit is sector [4KB]).

Example:

Command	Response
\$PMTK622,0*28<CR><LF>	\$PMTKLOX,Data1 \$PMTKLOX,Data2 : : \$PMTKLOX,2*47<CR><LF>

Note:

If the input values of offset and size are out of range, it will dump all LOCUS flash like using \$PMTK622,0*28.

PMTK660 QUERY GNSS AVAILABLE EPHEMERIS OF SATELLITE

Command Meaning:

Dump satellites that has available ephemeris data. This command only support GPS system and the TimeInterval maximum value is 2 hours. GNSS reply 32-bit flags of 32 GPS satellites to indicate which ephemeris will be available after the specified time interval.

Data Fields:

PMTK660,TimeInterval

- **TimeInterval:**
 - [Range: 1 ~ 7200]

Example:

Command	Response
\$PMTK660,1800*17<CR><LF>	\$PMTK001,660,3,40449464*17<CR><LF> (Valid satellite: 3,6,7,11,13,16,19,23,31)

Response Definition:

- Command ID:660
- Static string:3
- Valid Satellite Number of bit mapping.

PMTK661 QUERY GNSS AVAILABLE ALMANACE OF SATELLITE

Command Meaning:

Dump satellites that has available almanace data. This command only support GPS system and the TimeInterval maximum value is 1 year. GNSS reply 32-bit flags of 32 GPS satellites to indicate which ephemeris will be available after the specified time interval.

Data Fields:

PMTK661,TimeInterval

- **TimeInterval:**
 - [Range: 1 ~ 365]

Example:

Command	Response
\$PMTK661,30*1C<CR><LF>	\$PMTK001,661,3,fec0bfff*49<CR><LF> (Valid satellite: 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,23,24,26,27,28,29,30,31,32)

Response Definition:

- Command ID:661
- Static string:3
- Valid Satellite Number of bit mapping.

PMTK667 QUERY GNSS UTC CORRECTION DATA

Command Meaning:

Dump UTC correction data. The UTC correction data as:

Field	Content
Action flag	'3' means UTC correction data are available. '2' means UTC correction data are not available.
A0	UTC parameter A0. Unit is (seconds)/(2 ³⁰).
A1	UTC parameter A1. Unit is (seconds/second)/(2 ⁵⁰).
dtLS	UTC time difference due to leap seconds before event. Unit is seconds.
Tot	UTC reference time of week. Unit is seconds.
WNt	UTC reference week number. Unit is weeks.
WNLSF	UTC week number when next leap second event occurs. Unit is weeks
DN	UTC day of week when next leap second event occurs. Unit is days
dtLSF	UTC time difference due to leap seconds after event. Unit is seconds.

Data Fields:

None

Example:

Command	Response
\$PMTK667*35<CR><LF>	UTC correction data are available \$PMTK001,667,3,0,4,18,233472,198,137,7,18*02<CR><LF> UTC correction data are not available \$PMTK001,667,2*36<CR><LF>

PMTK668 QUERY GNSS GPS EPHEMERIS DATA

Command Meaning:

Dump GPS ephemeris data. The GPS ephemeris data as:

Field	Content
PRN	SVID of satellite
WeekNo	Reference week number[weeks]
URAI	Figure of Merit - Defines URA
IDOT	Rate of inclination angle[rad/s]
IODE	Issue of data counter
Toc	Reference time of week[s]
af2	SV clock correction polynomial coefficient[s/s/s]
af1	SV clock correction polynomial coefficient[s/s]
af0	SV clock correction polynomial coefficient[s]
IODC	Issue of data counter
Crs	Ampof sin harmonic corr term orbit radius[m]
dn	Delta n mean motion diff from computed value[rad/s]
M0	Mean anomaly at reference time[rad]
Cuc	Amplitude of cos harm corr term arg of latitude[rad]
e	Eccentricity
Cus	Amplitude of sin harm corr term arg of latitude[rad]
SqrtA	Square root of the semi-major axis
Toe	Reference time of week[Ephemeris terms][s]
Cic	Amplitude of cos harm corr term ang of inclination[rad]
Omega0	Longitude of ascending node of orbit plane[rad]
Cis	Amplitude of sin harm corr term ang of inclination[rad]
i0	Inclination angle at reference time[rad]
Crc	Amplitude of cos harm corr term orbit radius[rad]
w	Argument of perigee[rad]
OmegaDot	Rate of right ascension[rad/s]
Tgd	Group delay[s]
SVHealth	The 5 LSBs of the NAV data's health status from the ephemeris

Data Fields:

PMTK668,PRN

- **PRN:**
 - GPS satellite number. [Range: 1 ~ 32]

Example:

Command	Response
GPS Satellite 3 \$PMTK668,3*25<CR> <LF>	\$PMTK668,3,804,0,1378,97,18900,0,211,348491,97,1529,14047,- 433441886,1302,8251567,3333,2702051329,18900,26,935176585,4,65 5529795,8214,-2063355058,-23169,3,0*3D<CR><LF>

PMTK669 QUERY GNSS BEIDOU EPHEMERIS DATA

Command Meaning:

Dump BEIDOU ephemeris data. The BEIDOU ephemeris data as:

Field	Content
PRN	SVID of satellite
WeekNo	Reference week number[weeks]
URAI	Figure of Merit - Defines URA
IDOT	Rate of inclination angle[rad/s]
IODE	Issue of data counter
Toc	Reference time of week[s]
af2	SV clock correction polynomial coefficient[s/s/s]
af1	SV clock correction polynomial coefficient[s/s]
af0	SV clock correction polynomial coefficient[s]
IODC	Issue of data counter
Crs	Ampof sin harmonic corr term orbit radius[m]
dn	Delta n mean motion diff from computed value[rad/s]
M0	Mean anomaly at reference time[rad]
Cuc	Amplitude of cos harm corr term arg of latitude[rad]
e	Eccentricity
Cus	Amplitude of sin harm corr term arg of latitude[rad]
SqrtA	Square root of the semi-major axis
Toe	Reference time of week[Ephemeris terms][s]
Cic	Amplitude of cos harm corr term ang of inclination[rad]
Omega0	Longitude of ascending node of orbit plane[rad]
Cis	Amplitude of sin harm corr term ang of inclination[rad]
i0	Inclination angle at reference time[rad]
Crc	Amplitude of cos harm corr term orbit radius[rad]
w	Argument of perigee[rad]
OmegaDot	Rate of right ascension[rad/s]
Tgd	Group delay[s]
SVHealth	The 5 LSBs of the NAV data's health status from the ephemeris

Data Fields:

PMTK669,PRN

- **PRN:**
 - BEIDOU satellite number.

Example:

Command	Response
BEIDOU Satellite 3 \$PMTK668,3*25<CR><LF>	\$PMTK669,3,804,0,1567,2,38250,0,-26092,-4263927,0,-21176,581,1267872402,-23869,2546953,66039,3404432795,38250,-126,22528884,-260,55957758,-59905,-1898601724,2465,6,0*19<CR><LF>

PMTK670 QUERY GNSS GPS IONOSPHERIC

Command Meaning:

Dump GPS ionospheric parameters. The ionospheric data as:

Field	Content
a0	IONO parameter a0. Unit is Seconds
a1	IONO parameter a1. Unit is sec/semi-circle
a2	IONO parameter a2. Unit is sec/(semi-circle)^2
a3	IONO parameter a3. Unit is sec/(semi-circle)^3
b0	IONO parameter b0. Unit is Seconds
b1	IONO parameter b1. Unit is sec/semi-circle
b2	IONO parameter b2. Unit is sec/(semi-circle)^2
b3	IONO parameter b3. Unit is sec/(semi-circle)^3

Data Fields:

None

Example:

Command	Response
\$PMTK670*33<CR><LF>	\$PMTK001,670,3,19,3,-2,-1,63,10,-3,-4*15<CR><LF>

Note:

If ionospheric parameters are not available, the GNSS returns
\$PMTK001,670,2*30

PMTK702 GNSS DATA PORT ACK

Command Meaning:

GNSS Acknowledge message that Data port input/output data type and baud rate.

Data Fields:

\$PMTK702,InType,OutType,Baud

- **InType:** Data port input data type
 - “0” = DPORT_IN_NONE.
 - “1” = DPORT_IN_RTCM.
 - “3” = DPORT_IN_NMEA.
- **OutType:** Data port output data type
 - “0” = DPORT_OUT_NONE.
 - “1” = DEBUG.
 - “3” = DPORT_OUT_NMEA.
- **Baud:** Baudrate setting
4800/9600/19200/38400/57600/115200.

Example:

Command	Response
\$PMTK602*36<CR><LF>	\$PMTK702,1,3,115200*1E<CR><LF>

PMTK705 GNSS FW RELEASE VERSION ACK

Command Meaning:

GNSS firmware release information.

Data Fields:

PMTK705, ReleaseStr,Build_ID,Product_Model, (SDK_Version,)

ReleaseStr: Firmware release name and version

- **3318:** Mcore_x.x
- **3329/3339/3333:** AXN_x.x
- **Build_ID:** Build ID set in Core Builder for firmware version control
- **Product_Model:** Product Model set in Core Builder for product identification.
- **SDK_Version:** Showing SDK version if the firmware is used for SDK.

Example:

Command	Response
\$PMTK605*31<CR><LF>	\$PMTK705,AXN 5.10 3333 17122000,0000,XM Series*2B<CR><LF>

PMTK707 GNSS EPO INFORMATION ACK

Command Meaning:

GNSS response message about EPO data.

Data Fields:

PMTK707,Set,FWN,FTOW,LWN,LTOW,FCWN,FCTOW,LCWN,LCTOW

- **Set:** Total number sets of EPO data stored in chip.
- **FWN & FTOW:** GPS week number & TOW of the first set of EPO data stored in chip respectively.
- **LWN & LTOW:** GPS week number & TOW of the last set of EPO data stored in chip respectively.
- **FCWN & FCTOW:** GPS week number & TOW of the first set of EPO data that are currently used respectively.
- **LCWN & LCTOW:** GPS week number & TOW of the last set of EPO data that are currently used respectively.

Example:

Command	Response
\$PMTK607*33<CR><LF>	\$PMTK707,0,0,0,0,0,0,0,0*2E<CR><LF>

PMTK721 GNSS ENTRY GPS EPO DATA

Command Meaning:

Entry GNSS GPS EPO(Ephemeris) data for GPS satellite to reduce TTFF time.

Data Fields:

PMTK721,SatID,w[0],...,w[17]

SatID: Range 1 ~ 32. Satellite PRN number [Represented in HEX characters] for the EPO data to follow.

W[0] ~ W[17]: words [LSB first] of one EPO segment data (total 72 bytes).

Example:

Command	Response
\$PMTK721,0000,0002,0003,.....,0017*37<CR><LF>	

PMTK740 GNSS ENTRY UTC

Command Meaning:

Entry current UTC time into module to reduce TTFF time.

Please do not use local time, which has time-zone offset.

To have faster TTFF, the accuracy of reference UTC shall be better less than 3 seconds.

Data Fields:

PMTK740,YYYY,MM,DD,hh,mm,ss

YYYY: year > 1980 UTC time: year in 4 digits.

MM: month 1 - 12 UTC time: month.

DD: day 1 - 31 UTC time: day.

hh: hour 0 - 23 UTC time: hour.

mm: minute 0 - 59 UTC time: minute.

ss: second 0 - 59 UTC time: second.

Example:

Command	Response
\$PMTK740,2010,2,10,9,0,58*05<CR><LF>	\$PMTK740,3*33<CR><LF>

PMTK741 GNSS ENTRY POS

Command Meaning:

Entry GNSS module position to reduce TTFF time.

Data Fields:

PMTK741,Lat,Long,Alt,YYYY,MM,DD,hh,mm,ss

Name	Unit	Range	Description
Lat	degree	-90.0 ~ 90.0	WGS84 geodetic latitude. Suggest to express this value in floating-point with 6 decimal points. Minus: south; Plus: north
Long	degree	-180.0 ~ 180.0	WGS84 geodetic longitude. Suggest to express this value in floating-point with 6 decimal points. Minus: west; Plus: east
Alt	m	—	WGS84 ellipsoidal altitude.
YYYY	year	> 1980	Reference UTC time: year in 4 digits
MM	month	1 - 12	Reference UTC time: month
DD	day	1 - 31	Reference UTC time: day
hh	hour	0 - 23	Reference UTC time: hour
mm	minute	0 - 59	Reference UTC time: minute
ss	second	0 - 59	Reference UTC time: second

Example:

Command	Response
\$PMTK741,24.772816,121.022636,160,2011,8,1,08,00,00*12<CR><LF>	\$PMTK741,3*33<CR><LF>

PMTK837 JAMMING SCAN TEST

Command Meaning:

GNSS Jamming scan test.

Data Fields:

PMTK837, JamScanType, JamScanNum*CS<CR><LF>

- **JamScanType:**
 - "0" = enable GPS jamming scan.
 - "1" = enable GLONASS jamming scan.
 - "2" = enable BEIDOU jamming scan.
- **JamScanType:** Jamming scan test times.

Example:

Command	Response
GPS Jamming scan 50 times \$PMTK837,0,50*0B<CR><LF>	\$PMTK837,3,0*20<CR><LF>
GLONASS Jamming scan 50 times \$PMTK837,1,50*0A<CR><LF>	\$PMTK837,3,1*21<CR><LF>
BEIDOU Jamming scan 50 times \$PMTK837,2,50*09<CR><LF>	\$PMTK837,3,2*22<CR><LF>

PMTK838 JAMMING DETECTION TEST

Command Meaning:

GNSS Jamming detection test command.

Data Fields:

PMTK838,CmdType*CS<CR><LF>

- **CmdType:**
 - "0" = disable jamming detection message output.
 - "1" = enable jamming detection message output.

Example:

Command	Response
Jamming detection \$PMTK838,1*2C<CR><LF>	\$PMTK838,3,1*2E<CR><LF> \$PMTKSPF,2*59<CR><LF>

Note:

PMTKSPF,1 :GNSS signal HEALTHY status.

PMTKSPF,2 :GNSS signal WARNING status.

PMTKSPF,3 :GNSS signal CRITICAL status.

PMTK869 GNSS EASY MODE

Command Meaning:

Configure GNSS EASY mode to reduce TTFF time.

Data Fields:

PMTK869,CmdType, [Enable], [Extension Day]

- **CmdType:**
 - “0” = Query.
 - “1” = Set.
 - “2” = Result for the Query operation.
- **Enable:**
 - “0” = Disable.
 - “1” = Enable.
- Extension Day: Finished extension day. [Range 1~3 days]

Example:

Command	Response
Enable EASY \$PMTK869,1,1*35<CR><LF>	\$PMTK001,869,3*37<CR><LF>
Disable EASY \$PMTK869,1,0*36<CR><LF>	\$PMTK001,869,3*37<CR><LF>
Query EASY Status \$PMTK869,0*29<CR><LF>	EASY Disable \$PMTK869,2,0,0<CR><LF> EASY Enable, Finished 1-day extension \$PMTK869,2,1,1<CR><LF>

PMTK886 GNSS NAVIGATION MODE

Command Meaning:

Configure GNSS navigation mode.

Data Field:

PMTK886,CmdType

- **CmdType:**

- “0” = Normal mode: For general purpose
- “1” = Fitness mode: For running and walking purpose that the low-speed (< 5m/s) movement will have more effect on the position calculation.
- “2” = Aviation mode: For high-dynamic purpose that the large-acceleration movement will have more effect on the position calculation.
- “3” = Balloon mode: For high-altitude balloon purpose that the vertical movement will have more effect on the position calculation.
- “4” = Stationary mode: For stationary applications that zero dynamics is assumed.

Example:

Command	Response
Normal mode \$PMTK886,0*28<CR><LF>	\$PMTK001,886,3*36<CR><LF>
Fitness mode \$PMTK886,1*29<CR><LF>	\$PMTK001,886,3*36<CR><LF>
Aviation mode \$PMTK886,2*2A<CR><LF>	\$PMTK001,886,3*36<CR><LF>
Balloon mode \$PMTK886,3*2B<CR><LF>	\$PMTK001,886,3*36<CR><LF>
Stationary mode \$PMTK886,4*2C<CR><LF>	\$PMTK001,886,3*36<CR><LF>

Note:

Each mode has its altitude limitation. Please base on below table to choose the appropriate mode. If your test scenario exceeds the limitation, the position calculation will be incorrect.

Mode	Altitude Limitation
Normal	10000m
Fitness	10000m
Aviation	10000m
Stationary	10000m
Balloon	80000m

>> 3: Common Command Operations

How to Calculate the Checksum Value

Example:

```
$PMTK605*31<CR><LF>
```

31 is the checksum and is calculated by XOR'ing all characters between \$ and *.

CR, LF: Two bytes binary data

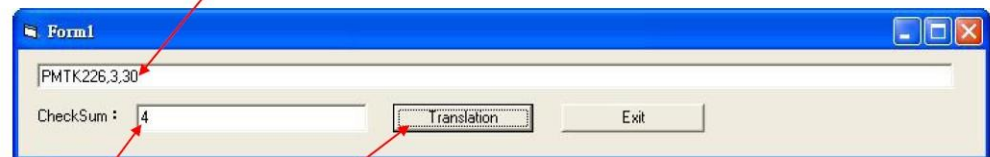
The two bytes are used to identify the end of a packet

How to Acquire that Checksum Value Through the Checksum Tool

Example:

```
$PMTK226,3,30*4<CR><LF>
```

1. Key in command contents



2. Click Translation

3. That checksum will display

Figure 3-1: Checksum Tool

Command Setting Reset

Command packets only temporarily change the module baud rate and update rate. When the module power resets, the update rate and baud rate are reset back to their original settings. If you want to change the baud rate and update rate of the module to another value, this will require Sierra Wireless to re-edit new firmware and burn it to the module.

>> 4: SDK Commands

Commands Definition

Sierra Wireless GNSS modules support SDK commands which are defined and developed by Sierra Wireless. These commands allow users to configure and change some default parameters of the module that can then be saved in the flash memory. SDK commands are only supported on flash-based GNSS modules.

Command Format

Table 4-1: SDK Command Format

Preamble	Talker ID	Command ID	Data Field	*	CHK1	CHK2	CR	LF
----------	-----------	------------	------------	---	------	------	----	----

The SDK Command Format is as follows:

Table 4-2: Fields in Packet Format

Field	Length	Type	Description
Preamble	1 byte	Character	"\$"
Talker ID	5 bytes	Character String	"PGCMD"
Command ID	3 bytes	Character String	An identifier used to tell the decoder how to decode the packet. Range is "000" to "999".
Data Field	variable		A "," must be inserted ahead each data field to help decoder process the <i>Data Field</i> .
*	1 byte	Character	The star symbol is used make the end of <i>Data Field</i> .
CHK1, CHK2	2 bytes	Character String	Checksum of the data between preamble "," and "*"
CR, LF	2 bytes	Binary String	Used to identify the end of a packet

Example:

```
$PGCMD,218,1*57\r\n
```



Initial Procedure:

The SW Feature Configuration commands process is explained in [Figure 4-1](#). Key steps include:

Step one:

Execute command `PGCMD, 380, 7` to initialize the command process.

Step two: (optional)

Use command `PGCMD, 226` to create a custom serial number for the module, if needed.

Step three:

Use any of the SW Feature Configuration commands to change default parameters of the modules. A full COLD start is required before the changes can take effect.

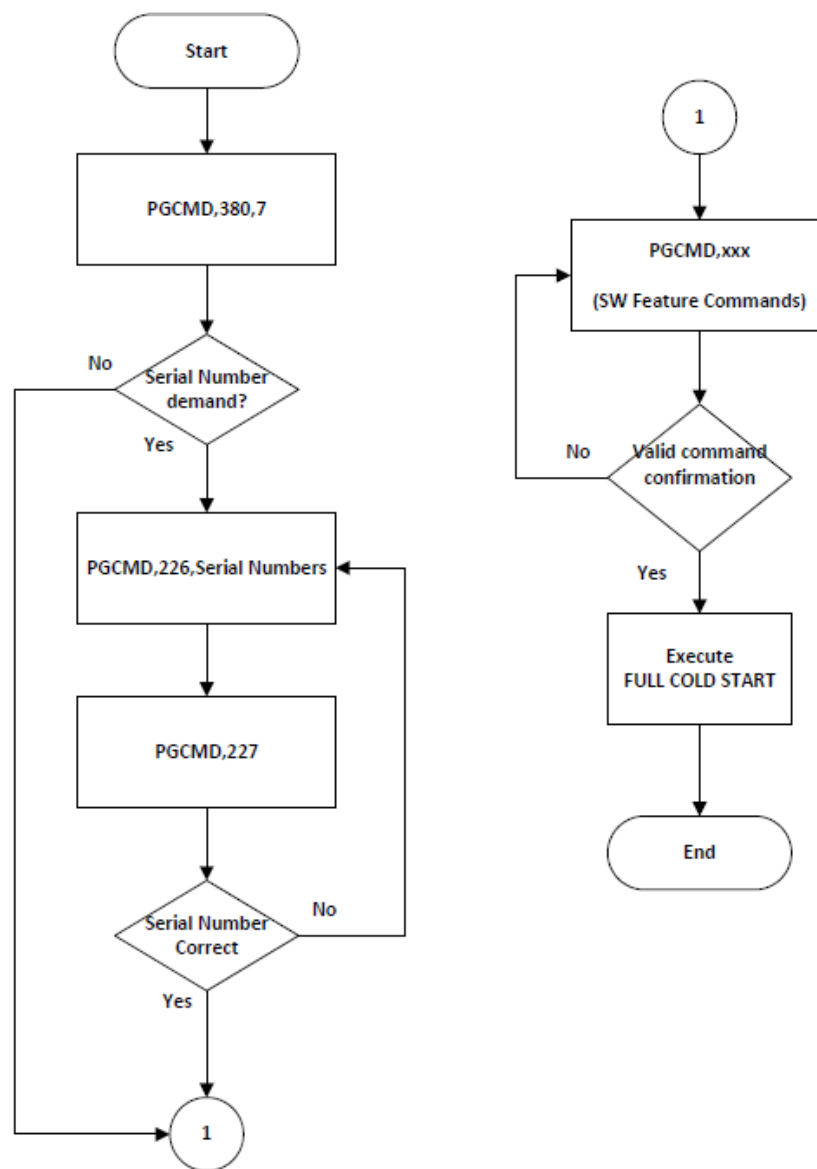


Figure 4-1: SDK Command Configuration Flowchart - SDK command, initial procedure.

Figure 4-1 shows the SDK initialization procedure. If not executed properly the module will revert to default settings.

PGCMD218 NMEA SENTENCE TYPE

Command Meaning:

Configure GNSS module sentence type and saving into GNSS configuration. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,218,Field*CS<CR><LF>

- **Field:**
 - "1" = NMEA Mode.
 - "2" = ASCII Mode.
 - "3" = Binary Mode.

Default Setting: NMEA Mode.

Example:

Command	Response
NMEA mode \$PGCMD,218,1*57<CR><LF>	\$PGACK,218, Command_valid*2B<CR><LF>

PGCMD219 LAST POSITION RETENTION

Command Meaning:

Configure GNSS module keeps the latitude and longitude of the last position in the GNGGA sentence in Fixed status or No-Fix status. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,219,Field1,Field2*CS<CR><LF>

- **Field1:**
 - "0" = Disable.
 - "1" = Enable.
- **Field2:**
 - "0" = 6 which is Number of fractional digits of NMEA sentence.
 - "1" = 4 which is Number of fractional digits of NMEA sentence.

Default Setting: Disable

Example:

Command	Response
Enable and NMEA with 6 fractional digits \$PGCMD,219,1,0*4A<CR><LF>	\$PGACK,219, Command_valid*2A<CR><LF>

PGCMD220 DECIMAL LENGTH

Command Meaning:

GNSS configure the fractional digits of NMEA output. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,220,Field*CS<CR><LF>

- **Field:**

- "0" = NMEA fractional digits for 4.
- "1" = NMEA fractional digits for 6.

Default Setting: The fractional digits of NMEA is 6.

Example:

Command	Response
NMEA with 6 fractional digits \$PGCMD,220,0*5D<CR><LF>	\$PGACK,220, Command_valid*20<CR><LF>

PGCMD221 GEOFENCING

Command Meaning:

Configure GNSS Geofencing feature. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,221,Field*CS<CR><LF>

- **Field:**
 - "0" = Disable.
 - "1" = Enable.

Default Setting: Disable

Example:

Command	Response
Enable GEO \$PGCMD,221,1*5D<CR><LF>	\$PGACK,221, Command_valid*21<CR><LF>

Note: For further configuration, refer to command PGCMD,25

PGCMD222 DISTANCE CALCULATION

Command Meaning:

Configure GNSS distance calculation feature. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,222,Field*CS<CR><LF>

- **Field:**
 - "0" = Disable.
 - "1" = Enable.

Default Setting: Disable

Example:

Command	Response
Enable \$PGCMD,222,1*5E<CR><LF>	\$PGACK,222, Command_valid*22<CR><LF>

Note: For further configuration settings, refer to command PGCMD,27

PGCMD223 NAVIGATION MODE

Command Meaning:

Configure GNSS navigation modes. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,223,Field*CS<CR><LF>

- **Field:**
 - "0" = Normal (Vehicle).
 - "1" = Fitness.
 - "2" = Aviation.
 - "3" = Balloon.
 - "4" = Stationary.

Default Setting: Normal

Example:

Command	Response
Fitness Mode \$PGCMD,223,1*5F<CR><LF>	\$PGACK,223, Command_valid*23<CR><LF>

PGCMD224 SPEED WARN

Command Meaning:

Configure GNSS speed warning. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,224,Field*CS<CR><LF>

- **Field:**
 - "0" = Disable.
 - "1" = Enable.

Default Setting: Disable

Example:

Command	Response
Fitness Mode \$PGCMD,224,1*58<CR><LF>	\$PGACK,224, Command_valid*24<CR><LF>

Note: For further configuration, refer to command PGCMD,200

PGCMD226 SERIAL NUMBER

Command Meaning:

Write a serial number into the GNSS module. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,226,Field*CS<CR><LF>

- **Field:**

- Serial Number Format: 10 characters (range: 0~9, a~z, A~Z).

Example:

Command	Response
Write Serial number \$PGCMD,226,0123456789*6A<CR><LF>	\$PGACK,226, Command_valid*26<CR><LF>

PGCMD227 QUERY SERIAL NUMBER

Command Meaning:

Query the serial number of the GNSS module.

Data Fields:

None

Default Setting:

- Default serial number value = FF:FF:FF:FF:FF:FF:FF:FF:FF:FF

Example:

Command	Response
Query Serial number \$PGCMD,227*46<CR><LF>	\$PGACK,227, 0123456789*27<CR><LF>

PGCMD229 GNSS SATELLITE SEARCH MODE

Command Meaning:

Select the default satellite system combination. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,229, GPS, Glonass, Beidou, Galileo, Enable*CS<CR><LF>

- **GPS:**
 - "0" = Disable.
 - "1" = Search GPS satellite System.
- **Glonass:**
 - "0" = Disable.
 - "1" = Search Glonass satellite System.
- **Beidou:**
 - "0" = Disable.
 - "1" = Search Beidou satellite System.
- **Galileo:**
 - "0" = Disable.
 - "1" = Search Galileo satellite System.
- **Enable:**
 - "0" = Disable. Satellite search control by PMTK353 or Cord Builder.
 - "1" = Enable. Satellite search control by PGCMD229 and PMTK353 will be deny.

Default Setting:

- XM1110, XA1110 = GPS+Glonass.
- XA1120 = GPS+BeiDou,.
- XA1130 = GPS+Galileo.

*Note: Current Multi-GNSS modules can only support below listed combinations:
GPS Only, GPS+GLONASS, GPS+BEIDOU, GPS+GALILEO and GPS+GLONASS+GALILEO.*

Example:

Command	Response
PGCMD229, GPS+GALILEO \$PGCMD,229,1,0,0,1,1*55<CR><LF>	\$PGACK,229, Command_valid*29<CR><LF>
PGCMD229, GPS+GLONASS \$PGCMD,229,1,1,0,0,1*55<CR><LF>	\$PGACK,229, Command_valid*29<CR><LF>
Control by Cord Builder or PMTK353 \$PGCMD,229,x,x,x,x,0*x<CR><LF>	\$PGACK,229, Command_valid*29<CR><LF>

PGCMD231 EPE INFORMATION

Command Meaning:

Configure GNSS position EPE message output. This message is only supported in one NMEA sentence mode. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,231,Field*CS<CR><LF>

- **Field:**
 - "0" = Disable.
 - "1" = Enable.

Default Setting: Enable

Example:

Command	Response
Enable \$PGCMD,231,1*5C<CR><LF>	\$PGACK,231, Command_valid*20<CR><LF>

Note: Outputs EPE message in NMEA type sentence

PGCMD232 GNSS BAUD RATE

Command Meaning:

Configure GNSS Baud rate of UART0 for NMEA output and RTCM input. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,232,Field*CS<CR><LF>

- **Field:**
 - "0" = 4800.
 - "1" = 9600.
 - "2" = 14400.
 - "3" = 19200.
 - "4" = 38400.
 - "5" = 57600.
 - "6" = 115200.

Default Setting: 115200

Example:

Command	Response
---------	----------

Baud Rate 115200 \$PGCMD,232,6*58<CR><LF>	\$PGACK,232, Command_valid*23<CR><LF>
---	---------------------------------------

PGCMD233 GNSS UPDATE RATE

Command Meaning:

Set update rate of NMEA output. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,233,Field*CS<CR><LF>

- **Field:**
 - "1" = 1Hz.
 - "2" = 5Hz.
 - "3" = 10Hz.

Default Setting: 1Hz

Example:

Command	Response
5Hz \$PGCMD,233,2*5D<CR><LF>	\$PGACK,233, Command_valid*22<CR><LF>

Note: Use the supported baud rates for the following update rates: 1.) 5Hz = use baud rates: 19200, 38400, 57600 or 115200. 2.) 10Hz = use baud rates: 38400, 57600 or 115200

PGCMD234 GNSS DGPS MODE

Command Meaning:

Configure GNSS DGPS mode selection. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,234,Field*CS<CR><LF>

- Field:
 - "1" = SBAS.
 - "2" = RTCM.
 - "3" = Disable.

Default Setting: SBAS

Example:

Command	Response
SBAS \$PGCMD,234,1*59<CR><LF>	\$PGACK,234, Command_valid*25<CR><LF>

Note: SBAS only works with a max update rate of 5Hz

PGCMD235 GNSS 1PPS MODE

Command Meaning:

Set 1PPS status and duration. After executing this command, GNSS need to execute FULL Cold start to restart.
(GNSS FULL Cold start, user can configure all need PGCMDs and then execute it)

Data Fields:

PGCMD,235,Field1,Field2*CS<CR><LF>

- **Field1:**
 - "0" = Disable
 - "1" = After first only.
 - "2" = After 3D fix only.
 - "3" = After 2D or 3D fix.
 - "4" = Always output.
- **Field2:**
 - 1PPS pulse width [Range 0~998, Unit:ms].

Example:

Command	Response
After 3D fix only \$PGCMD,235,2*5B<CR><LF>	\$PGACK,235, Command_valid*24<CR><LF>

Note: If the update rate is over 1Hz, 1PPS width cannot be set over 195ms.

Note: 'Always output' only works with a 1Hz update rate.

PGCMD236 NMEA PERIOD

Command Meaning:

Set GNSS NMEA sentence output periods. After executing this command, GNSS need to execute FULL Cold start to restart (GNSS FULL Cold start, user can configure all need PGCMDs and then execute it).

Refer to NMEA output static string type in the Appendix A.

Data Fields:

PGCMD,236,Field1,Field2,Field3, Field4, Field5, Field6, Field7*CS<CR><LF>

Field Index	Name	Description
1	ZDA	ZDA sentence period, [Range 0~ 31]
2	GGA	GGA sentence period, [Range 0~ 31]
3	GSV	GSV sentence period, [Range 0~ 31]
4	GSA	GSA sentence period, [Range 0~ 31]
5	VTG	VTG sentence period, [Range 0~ 31]
6	RMC	RMC sentence period, [Range 0~ 31]
7	GLL	GLL sentence period, [Range 0~ 31]

Example:

Command	Response
Enable ZDA,GGA,GSV,GSA,VTG,RMC,GLL \$PGCMD,236,1,1,1,1,1,1,1*46<CR><LF>	\$PGACK,236, Command_valid*27<CR><LF>

PGCMD380 GNSS DEFAULT RECOVERY

Command Meaning:

Recover factory default configuration.

Data Fields:

PGCMD,380,Field1*CS<CR><LF>

- **Field1:**

- "7" = Reset configuration to factory setting.
- "8" = Reset the Serial Number of module.

Example:

Command	Response
Reset all configuration to factory defaults: \$PGCMD,380,7*51<CR><LF>	\$PGACK,380, Command_valid*2B<CR><LF>
Reset factory default for Serial Number: \$PGCMD,380,8*5E<CR><LF>	\$PGACK,380, Command_valid*2B<CR><LF>

Additional Configuration

PGCMD25 GEOFENCING PARAMETER

Command Meaning:

Set/Query the geofencing parameters.

Data Fields:

PGCMD,25,Field1,Field2,Field3,Field4,Field5*CS<CR><LF>

- **Field1:**
 - "1" = Configure Geofencing parameters.
 - "2" = Query Geofencing parameters.
- **Field2:**
 - Set radius. [Range 0~5000, Unit: meter(integer)].
- **Field3:**
 - Set reference point for Latitude. Unit: degree (4 decimal places).
- **Field4:**
 - "N" = Latitude indication North.
 - "S" = Latitude indication South.
- **Field5:**
 - Set reference point for Longitude. Unit: degree (4 decimal places).
- **Field6:**
 - "E" = Longitude indication East.
 - "W" = Longitude indication West.

Note: Before using this function, you need to enable geofencing with "PGMD,221" command.

Example:

Command	Response
Setting: \$PGCMD,25,1,1234,23,N,120,E*7F<CR><LF>	\$PGACK,25,1*68<CR><LF> GNSS module position over Geofencing radius: \$PGTOP,3,002,2,31025.95,13.20,131*65<CR><LF> GNSS module position in Geofencing radius: \$PGTOP,3,002,1,14.87,13.64,1.36*52<CR><LF> GNSS module no Fix: \$PGTOP,3,002,0,0.00,0,0*73<CR><LF> Geofencing doesn't entry any parameters: \$PGTOP,3,001,3,0.00,0,0*73<CR><LF>
Query: \$PGCMD,25,2	\$PGACK,25,2,1234,23.000000,N,120.000000,E*7A<CR><LF>

PGCMD27 DISTANCE CALCULATION PARAMETER

Command Meaning:

Set/Query Distance Calculation parameters.

Data Fields:

PGCMD,27,Field1,Field2,Field3,Field4,Field5*CS<CR><LF>

- **Field1:**
 - "1" = Set GNSS module current position as starting reference position.
 - "2" = Set user specified position as starting reference position.
 - "3" = Query distance between starting reference position and current position.
 - **Field2:**
 - Latitude value. Unit: degree (4 decimal places)
 - **Field3:**
 - "N" = Latitude indication North.
 - "S" = Latitude indication South.
 - **Field4:**
 - Longitude value. Unit: degree (4 decimal places).
 - **Field5:**
 - "E" = Longitude indication East.
 - "W" = Longitude indication West.
-

Note: Before using this function, you need to enable distance calculation with "PGMD,222" command.

Example:

Command	Response
	Accept: \$PGACK,27,2*69<CR><LF>
	Fail: \$PGACK,27,1*6A<CR><LF>
Auto entry current position as starting reference point:	
\$PGCMD,27,1*69<CR><LF>	\$PGACK,27,2*69<CR><LF>
Entry specified position as starting reference point	
\$PGCMD,27,2,23.1234,N,120,1234,E*51<CR><LF>	\$PGACK,27,2*69<CR><LF>
Query: \$PGCMD,27,3*6B<CR><LF>	\$PGACK,27,3,31052.36*5A<CR><LF> Return parameters: -status string:3 -distance value(Unit: meter):31052.36

PGCMD200 SPEED WARNING PARAMETER

Command Meaning:

Set/Query Speed warning parameters:

Data Fields:

PGCMD,200,Field1,Field2,Field3*CS<CR><LF>

- **Field1:**
 - "0" = Configure speed warning parameters.
 - "1" = Query speed warning parameters.
- **Field2:**
 - "0" = Disable speed warning.
 - "1" = Enable speed warning.
- **Field3:**
 - Set speed warning threshold value. [Range 0~ 1854.00, Unit:km/hr]

Note: Before using this function, you need to enable the speed warning feature using the "PGMD,224" command.

Example:

Command	Response
	Accept: \$PGACK,27,0,1*41<CR><LF>
	Fail: \$PGACK,200,0*5C<CR><LF>
Set Speed warning threshold 123.45 km/hr: \$PGCMD,200,0,1,123.45*73<CR><LF>	\$PGACK,200,0,1*41<CR><LF>
	Speed over speed warning threshold: \$PGTOP,200,2,123.45,124*74<CR><LF>
Query: \$PGCMD,200,1	\$PGTOP,200,1,123.45,0.05*5A Return parameters: -speed warning status: 1:Enable 0:Disable -speed warning threshold:123.45 -GNSS now speed:0.05

Appendix A

- GNSS Support Datum List

No	Datum	Region
0	WGS1984	International
1	Tokyo	Japan
2	Tokyo	Mean For Japan, South Korea, Okinawa
3	User Setting	User Setting
4	Adindan	Burkina Faso
5	Adindan	Cameroon
6	Adindan	Ethiopia
7	Adindan	Mali
8	Adindan	Mean For Ethiopia, Sudan
9	Adindan	Senegal
10	Adindan	Sudan
11	Afgooye	Somalia
12	Ain El Abd1970	Bahrain
13	Ain El Abd1970	Saudi Arabia
14	American Samoa1962	American Samoa Islands
15	Anna 1 Astro1965	Cocos Island
16	Antigua Island Astro1943	Antigua(Leeward Islands)
17	Arc1950	Botswana
18	Arc1950	Burundi
19	Arc1950	Lesotho
20	Arc1950	Malawi

21	Arc1950	Mean For Botswana, Lesotho, Malawi, Swaziland, Zaire, Zambia, Zimbabwe
22	Arc1950	Swaziland
23	Arc1950	Zaire
24	Arc1950	Zambia
25	Arc1950	Zimbabwe
26	Arc1960	Mean For Kenya Tanzania
27	Arc1960	Kenya
28	Arc1960	Tanzania
29	Ascension Island1958	Ascension Island
30	Astro Beacon E 1945	Iwo Jima
31	Astro Dos 71/4	St Helena Island
32	Astro Tern Island (FRIG) 1961	Tern Island
33	Astronomical Station 1952	Marcus Island
34	Australian Geodetic 1966	Australia, Tasmania
35	Australian Geodetic 1984	Australia, Tasmania
36	Ayabelle Lighthouse	Djibouti
37	Bellevue (IGN)	Efate and Erromango Islands
38	Bermuda 1957	Bermuda
39	Bissau	Guinea-Bissau
40	Bogota Observatory	Colombia
41	Bukit Rimpah	Indonesia(Bangka and Belitung Ids)
42	Camp Area Astro	Antarctica(McMurdi Camp Area)

43	Campo Inchauspe	Argentina
44	Canton Astro1966	Phoenix Island
45	Cape	South Africa
46	Cape Canaveral	Bahamas, Florida
47	Carthage	Tunisia
48	Chatham Island Astro1971	New Zealand(Chatham Island)
49	Chua Astro	Paraguay
50	Corrego Alegre	Brazil
51	Dabola	Guinea
52	Deception Island	Deception Island, Antarctica
53	Djakarta (Batavia)	Indonesia(Sumatra)
54	Dos 1968	New Georgia Islands (Gizo Island)
55	Easter Island 1967	Easter Island
56	Estonia Coordinate System1937	Estonia
57	European 1950	Cyprus
58	European 1950	Egypt
59	European 1950	England, Channel Islands, Scotland, Shetland Islands
60	European 1950	England, Ireland, Scotland, Shetland Islands
61	European 1950	Finland, Norway
62	European 1950	Greece
63	European 1950	Iran
64	European 1950	Italy (Sardinia)
65	European 1950	Italy (Sicily)

66	European 1950	Malta
67	European 1950	Mean For Austria, Belgium,Denmark, Finland, France, W Germany, Gibraltar, Greece, Italy, Luxembourg, Netherlands, Norway, Portuga,l Spain, Sweden, Switzerland
68	European 1950	Mean For Austria, Debnmark,France, W Germany, Netherland ,Switzerland
69	European 1950	Mean For Irag, Israel, Jordan, Lebanon, Kuwait, Saudi Arabia, Syria
70	European 1950	Portugal, Spain
71	European 1950	Tunisia,
72	European 1979	Mean For Austria, Finland ,Netherlands ,Norway, Spain, Sweden, Switzerland
73	Fort Thomas 1955	Nevis St Kitts (Leeward Islands)
74	Gan 1970	Republic Of Maldives
75	Geodetic Dataum 1970	New Zealand
76	Graciosa Base SW1948	Azores (Faial, Graciosa, Pico, Sao, Jorge, Terceria)
77	Guam1963	Guam
78	Gunung Segara	Indonesia (Kalimantan)
79	Gux l Astro	Guadalcanal Island
80	Herat North	Afghanistan
81	Hermannskogel Datum	Croatia-Serbia, Bosnia-Herzegovina
82	Hjorsey 1955	Iceland
83	Hongkong 1963	Hongkong

84	Hu Tzu Shan	Taiwan
85	Indian	Bangladesh
86	Indian	India,Nepal
87	Indian	Pakistan
88	Indian 1954	Thailand
89	Indian 1960	Vietnam (Con Son Island)
90	Indian 1960	Vietnam (Near 16 deg N)
91	Indian 1975	Thailand
92	Indonesian 1974	Indonesian
93	Ireland 1965	Ireland
94	ISTS 061 Astro 1968	South Georgia Islands
95	ISTS 073 Astro 1969	Diego Garcia
96	Johnston Island 1961	Johnston Island
97	Kandawala	Sri Lanka
98	Kerguelen Island 1949	Kerguelen Island
99	Kertau 1948	West Malaysia and Singapore
100	Kusaie Astro 1951	Caroline Islands
101	Korean Geodetic System	South Korea
102	LC5 Astro 1961	Cayman Brac Island
103	Leigon	Ghana
104	Liberia 1964	Liberia
105	Luzon	Philippines (Excluding Mindanao)
106	Luzon	Philippines (Mindanao)
107	M'Poraloko	Gabon
108	Mahe 1971	Mahe Island

109	Massawa	Ethiopia (Eritrea)
110	Merchich	Morocco
111	Midway Astro 1961	Midway Islands
112	Minna	Cameroon
113	Minna	Nigeria
114	Montserrat Island Astro 1958	Montserrat (Leeward Island)
115	Nahrwan	Oman (Masirah Island)
116	Nahrwan	Saudi Arabia
117	Nahrwan	United Arab Emirates
118	Naparima BWI	Trinidad and Tobago
119	North American 1927	Alaska (Excluding Aleutian Ids)
120	North American 1927	Alaska (Aleutian Ids East of 180 degW)
121	North American 1927	Alaska (Aleutian Ids West of 180 degW)
122	North American 1927	Bahamas (Except San Salvador Islands)
123	North American 1927	Bahamas (San Salvador Islands)
124	North American 1927	Canada (Alberta, British Columbia)
125	North American 1927	Canada (Manitoba, Ontario)
126	North American 1927	Canada (New Brunswick, Newfoundland, Nova Scotia, Qubec)
127	North American 1927	Canada (Northwest Territories, Saskatchewan)
128	North American 1927	Canada (Yukon)
129	North American 1927	Canal Zone
130	North American 1927	Cuba
131	North American 1927	Greenland (Hayes Peninsula)

132	North American 1927	Mean For Antigua, Barbados, Barbuda, Caicos Islands, Cuba, Dominican, Grand Cayman, Jamaica, Turks Islands
133	North American 1927	Mean For Belize, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua
134	North American 1927	Mean For Canada
135	North American 1927	Mean For Conus
136	North American 1927	Mean For Conus (East of Mississippi, River Including Louisiana, Missouri, Minnesota)
137	North American 1927	Mean For Conus (West of Mississippi, Rive Excluding Louisiana, Minnesota, Missouri)
138	North American 1927	Mexico
139	North American 1983	Alaska (Excluding Aleutian Ids)
140	North American 1983	Aleutian Ids
141	North American 1983	Canada
142	North American 1983	Conus
143	North American 1983	Hahawii
144	North American 1983	Mexico, Central America
145	North Sahara 1959	Algeria
146	Observatorio Meteorologico 1939	Azores (Corvo and Flores Islands)
147	Old Egyptian 1907	Egypt
148	Old Hawaiian	Hawaii
149	Old Hawaiian	Kauai
150	Old Hawaiian	Maui
151	Old Hawaiian	Mean For Hawaii, Kauai, Maui, Oahu
152	Old Hawaiian	Oahu

153	Oman	Oman
154	Ordnance Survey Great Britian 1936	England
155	Ordnance Survey Great Britian 1936	England, Isle of Man, Wales
156	Ordnance Survey Great Britian 1936	Mean For England ,Isle of Man, Scotland, Shetland Island, Wales
157	Ordnance Survey Great Britian 1936	Scotland, Shetland Islands
158	Ordnance Survey Great Britian 1936	Wales
159	Pico de las Nieves	Canary Islands
160	Pitcairn Astro 1967	Pitcairn Island
161	Point 58	Mean For Burkina Faso and Niger
162	Pointe Noire 1948	Congo
163	Porto Santo 1936	Porto Santo, Maderia Islands
164	Provisional South American 1956	Bolovia
165	Provisional South American 1956	Chile (Northern Near 19 deg S)
166	Provisional South American 1956	Chile (Southern Near 43 deg S)
167	Provisional South American 1956	Colombia
168	Provisional South American 1956	Ecuador
169	Provisional South American 1956	Guyana
170	Provisional South American 1956	Mean For Bolivia Chile,Colombia, Ecuador, Guyana, Peru, Venezuela

171	Provisional South American 1956	Peru
172	Provisional South American 1956	Venezuela
173	Provisional South Chilean 1963	Chile (Near 53 deg S) (Hito XVIII)
174	Puerto Rico	Puerto Rico, Virgin Islands
175	Pulkovo 1942	Russia
176	Qatar National	Qatar
177	Qornoq	Greenland (South)
178	Reunion	Mascarene Island
179	Rome 1940	Italy (Sardinia)
180	S-42 (Pulkovo 1942)	Hungary
181	S-42 (Pulkovo 1942)	Poland
182	S-42 (Pulkovo 1942)	Czechoslovakia
183	S-42 (Pulkovo 1942)	Lativa
184	S-42 (Pulkovo 1942)	Kazakhstan
185	S-42 (Pulkovo 1942)	Albania
186	S-42 (Pulkovo 1942)	Romania
187	S-JTSK	Czechoslovakia (Prior 1 Jan1993)
188	Santo (Dos) 1965	Espirito Santo Island
189	Sao Braz	Azores (Sao Miguel, Santa Maria Ids)
190	Sapper Hill 1943	East Falkland Island
191	Schwarzeck	Namibia
192	Selvagem Grande 1938	Salvage Islands
193	Sierra Leone 1960	Sierra Leone

194	South American 1969	Argentina
195	South American 1969	Bolivia
196	South American 1969	Brazil
197	South American 1969	Chile
198	South American 1969	Colombia
199	South American 1969	Ecuador
200	South American 1969	Ecuador (Baltra, Galapagos)
201	South American 1969	Guyana
202	South American 1969	Mean For Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Guyana, Paraguay, Peru, Trinidad and Tobago, Venezuela
203	South American 1969	Paraguay
204	South American 1969	Peru
205	South American 1969	Trinidad and Tobago
206	South American 1969	Venezuela
207	South Asia	Singapore
208	Tananarive Observatory 1925	Madagascar
209	Timbalai 1948	Brunei, E Malaysia (Sabah Sarawak)
210	Tokyo	Japan
211	Tokyo	Mean For Japan, South Korea, Okinawa
212	Tokyo	Okinawa
213	Tokyo	South Korea
214	Tristan Astro 1968	Tristan Da Cunha
215	Viti Levu 1916	Fiji (Viti Levu Island)
216	Voirol 1960	Algeria

217	Wake Island Astro 1952	Wake Atoll
218	Wake-Eniwetok 1960	Marshall Islands
219	WGS 1972	Global Definition
220	WGS 1984	Global Definition
221	Yacare	Uruguay
222	Zanderij	Suriname

- **NMEA Output Static String Type**

NMEA 3.01 Output Type					
System	GGA	GSA	GSV	RMC	VTG
GPS Only	GPGGA	GPGSA	GPGSV	GPRMC	GPVTG
GPS+GLONASS	GNGGA	GPGSA GLGSA	GPGSV GLGSV	GNRMC	GNVTG
GPS+BEIDOU	GNGGA	GPGSA BDGSA	GPGSV BDGSV	GNRMC	GNVTG
GPS+GALILEO	GNGGA	GPGSA GAGSA	GPGSV GAGSV	GNRMC	GNVTG
GPS+GLONASS+GALILEO	GNGGA	GPGSA GLGSA GAGSA	GPGSV GLGSV GAGSV	GNRMC	GNVTG

Note: AXN3.8 and above AXN5.1 use same NMEA static string type of NMEA 3.01.