GE310-GNSS
GNSS SW Application Note

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DOCUMENTATION

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APPLICABILITY TABLE

PRODUCTS

- GE310-GNSS

Contents

1. INTRODUCTION

1.1. Scope

Purpose of this document is providing a detailed specification and a comprehensive listing as a reference for the available commands and NMEA protocol available on the GE310-GNSS Telit Module.

1.2. Audience

Readers of this document should be familiar with Telit modules and their ease of controlling by means of AT Commands.

1.3. Contact Information, Support

For general contact, technical support services, technical questions and report documentation errors contact Telit Technical Support at:

- TS-EMEA@telit.com
- TS-AMERICAS@telit.com
- TS-APAC@telit.com
- TS-SRD@telit.com

Alternatively, use:

http://www.telit.com/support

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

http://www.telit.com

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.5. Related Documents

- 80598ST10945A GE310-GNSS AT Commands User Guide
- 1VV0301564 GE310-GNSS Hardware Design Guide

This document is to describe all the GNSS commands implemented on the Telit wireless module GE310-GNSS.

NOTE:

(EN) The integration of the GE310 cellular module within user application shall be done according to the design rules described in this manual.

(IT) L'integrazione del modulo cellulare GE310 all'interno dell'applicazione dell'utente dovrà rispettare le indicazioni progettuali descritte in questo manuale.

(DE) Die Integration des GE310 Mobilfunk-Moduls in ein Gerät muß gemäß der in diesem Dokument beschriebenen Kunstruktionsregeln erfolgen.

(SL) Integracija GE310 modula v uporabniški aplikaciji bo morala upoštevati projektna navodila, opisana v tem priročniku.

(SP) La utilización del modulo GE310 debe ser conforme a los usos para los cuales ha sido deseñado descritos en este manual del usuario.

(FR) L'intégration du module cellulaire GE310 dans l'application de l'utilisateur sera faite selon les règles de conception décrites dans ce manuel.

(HE) האינטגרטור מתבקש ליישם את ההנחיות המפורטות במסמך זה בתהליך האינטגרציה של המודם הסלולרי GE310 עם המוצר.

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2. PRODUCT DESCRIPTION

The GE310-GNSS module provides complete multi-constellation position, velocity, and time (PVT) engines featuring high performance, high sensitivity, and low power consumption.

The Module computes a navigation solution using Multi Costellation signals to yield better coverage, greater accuracy, and improved availability.

2.1. Product Overview

- GPS L1 C/A, Glonass L1, BeiDou B1, and QZSS with 99 search and 33 tracking channels. Galileo ready.
- SBAS corrections capable (WAAS, EGNOS, MSAS, GAGAN)
- AGPS support for extended ephemeris using local or server-based solutions:
- Jamming Rejection: Active Interference Cancellation (AIC)
- 1PPS output
- Fix reporting at 1 Hz (default). Maximum: 10Hz
- NMEA command input and data output
- One serial ports for input commands and output messages

2.2. Working Modes

The GE310-GNSS permits to use the GNSS receiver as a Stand Alone device or as Hosted to the 2G section.

This is done configuring the HW on application in the preferred mode (ref. to HW uiser Guide for details)

When the receiver is used in Hosted, all the controls are run through the Main UART of GE310 and using specific AT commands.

When the GNSS receiver is used in Stand Alone, the application is communicating directly with the GNSS receiver and it is controlled with a set of proprietary PMTK commands.

Ref to the next Chapters for the details on the AT and $PMTK commands.

2.3. EPO

EPO (Extended Prediction Orbit) is an off-line server base Assisted-GNSS (A-GNSS) solution which can improve TTFF significantly.

GE310’s EPO data supports GPS and GLONASS constellations.

3. PRODUCT FEATURES

3.1. Multi-Constellation Navigation

The GPS and GLONASS constellations are enabled by default. BeiDou and Galileo are also supported. If BeiDou is enabled, GLONASS and Galileo are disabled.

The user may enable or disable constellations via the **$PMTK353** command.

3.2. Quasi-Zenith Satellite System (QZSS)

The satellites of the Japanese regional system are in a highly inclined, elliptical geosynchronous orbit, allowing continuous high-elevation coverage over Japan using only three satellites plus one geostationary satellite. SV IDs 193, 194, & 195 are supported. They provide ranging signals to augment the GPS system.

QZSS constellation usage is controlled by the **$PMTK352** command and is disabled by default.

3.3. Satellite-Based Augmentation System (SBAS)

The receiver is capable of using SBAS satellites as a source of differential corrections. These systems (WAAS, EGNOS, GAGAN and MSAS) use geostationary satellites to transmit signals similar to those of GPS and in the same L1 band.

Enabling SBAS limits the maximum fix rate to 5 Hz. If disabled, the maximum is 10 Hz.

The module is enabled for SBAS by default, but can be disabled by command **PTMK313**.

The GE310-GNSS can accept either SBAS corrections which are configured by the **PMTK301** command.

3.3.1. SBAS Corrections

The SBAS satellites transmit a set of differential corrections to their respective regions. The use of SBAS corrections can improve positioning accuracy

3.4. Assisted GPS (AGPS)

Assisted GPS (or Aided GPS) is a method by which information from a source other than broadcast GPS signals is used to improve (i.e. reduce) TTFF.

The necessary ephemeris data is calculated either by the receiver itself (locally-generated ephemeris) or a server (server-generated ephemeris) and is then stored in the module.

3.5. Static Navigation

Static Navigation is an operating mode in which the receiver will freeze the position fix when the speed falls below a set threshold (indicating that the receiver is stationary).

The course and altitude are also frozen, and the speed is reported as “0”.

The navigation solution is unfrozen when the speed increases above a threshold or when the computed position exceeds a set distance (10 m) from the frozen position (indicating that the receiver is again in motion). The speed threshold can be set via the **PMTK386** command.

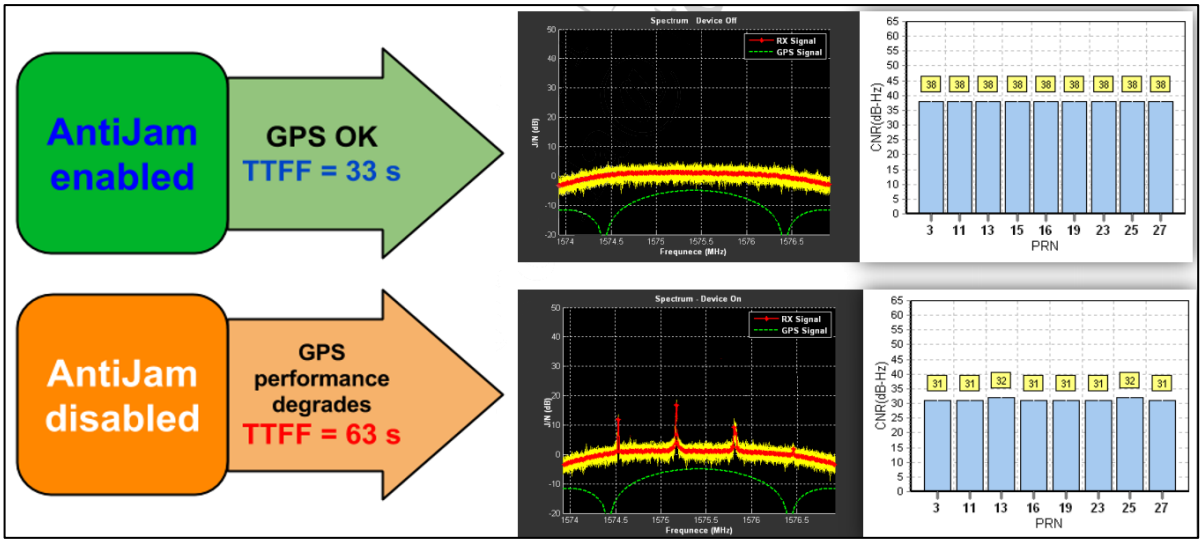
Set the threshold to zero to disable static navigation.

Static Navigation is disabled by default, but can be enabled by command.

3.6. Jamming Rejection – Active Interference Cancellation (AIC)

The receiver module detects and removes narrow-band interfering signals (jamming signals) without the need for external components or tuning. It rejects up to 12 CW (Continuous Wave) type signals of up to –80 dBm (total power signal levels). This feature is useful both in the design stage and during the production stage for uncovering issues related to unexpected jamming. When enabled, Jamming Rejection will increase current drain by about 1 mA, and impact on GNSS performance is low at modest jamming levels. However, at high jamming levels (e. g. –90 to –80 dBm), the RF signal sampling ADC starts to become saturated after which the GNSS signal levels start to diminish.

Jamming rejection is enabled by default, but can be disabled with the **PMTK286** command.



Jamming Rejection

3.7. Power Management Modes

The GNSS receiver supports operating modes that reduce overall current consumption with less frequent position fixes. Availability of GNSS signals in the operating environment will be a factor in choosing power management modes. The designer can choose a mode that provides the best trade-off of navigation performance versus power consumption.

The various power management modes can be enabled using te PMTK225 command

3.7.1. Full Power Continuous Mode

The receiver starts in full power continuous mode when powered up. This mode uses the acquisition engine to search for all possible satellites at full performance, resulting in the highest sensitivity and the shortest possible TTFF.

The receiver then switches to the tracking engine to lower the power consumption when:

- A valid GPS/GNSS position is obtained
- The ephemeris for each satellite in view is valid

To return to Full Power mode from a low power mode, send the NMEA command:
$PMTK225,0*2B just after the module wakes up from its previous sleep cycle.

If power is removed from Vbatt, then Time, Ephemeris, Almanac, EASY and PMTK configuration data will be lost. If Vbatt is maintained, no data will be lost.

3.7.2. Standby Modes

In these modes, the receiver stops navigation, the internal processor enters the standby state, and the current drain at main supply is substantially reduced.

STOP: GNSS baseband, RF, and TCXO are powered down

SLEEP: GNSS baseband and RF are powered down

Standby mode is entered by sending the following NMEA command:

$PMTK161,0*28 (STOP Mode)

$PMTK161,1*29 (SLEEP Mode)

To exit a Standby mode, send any byte to the host port (RX).

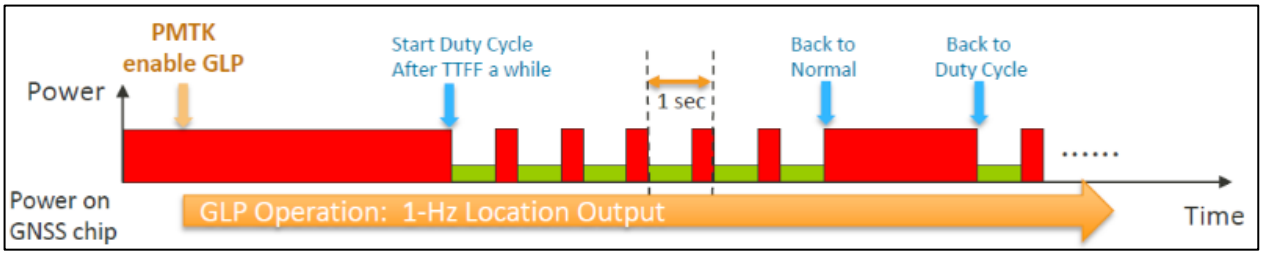
3.7.3. GLP Mode

In the GNSS Low Power (GLP) mode, power consumption is reduced for some time during a one second period. The module will alternate this cycling with periods of full power when necessary, for example weak signals or decoding the navigation message.

A typical current draw is 10 to 14 mA, depending on conditions.

Note that position accuracy will be reduced during GLP operation, therefore the user must determine the tradeoff between power consumption and desired accuracy.

A timeline is shown below:



GNSS Low Power (GLP) mode diagram

To enter the GLP mode, send the command:

$PMTK262,3

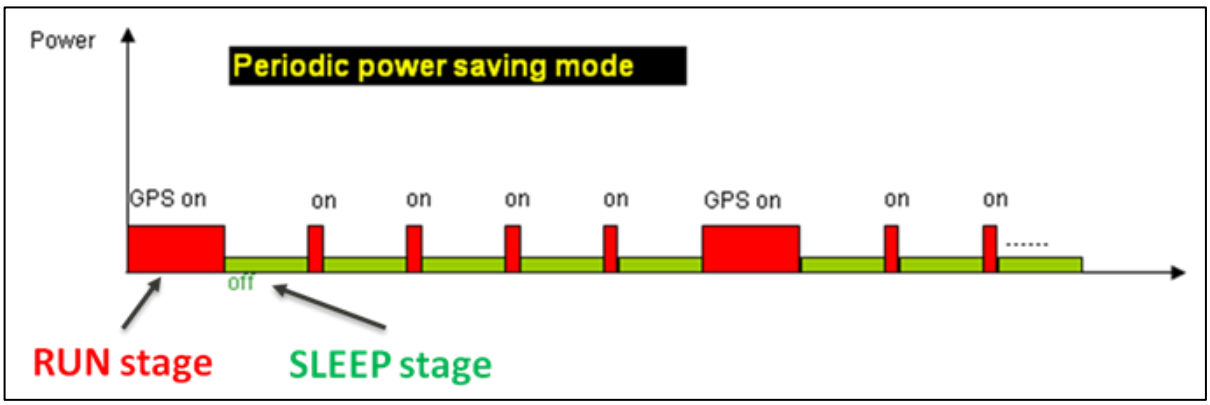
To exit the GLP mode and return to full-power mode, send the command:

$PMTK262,0

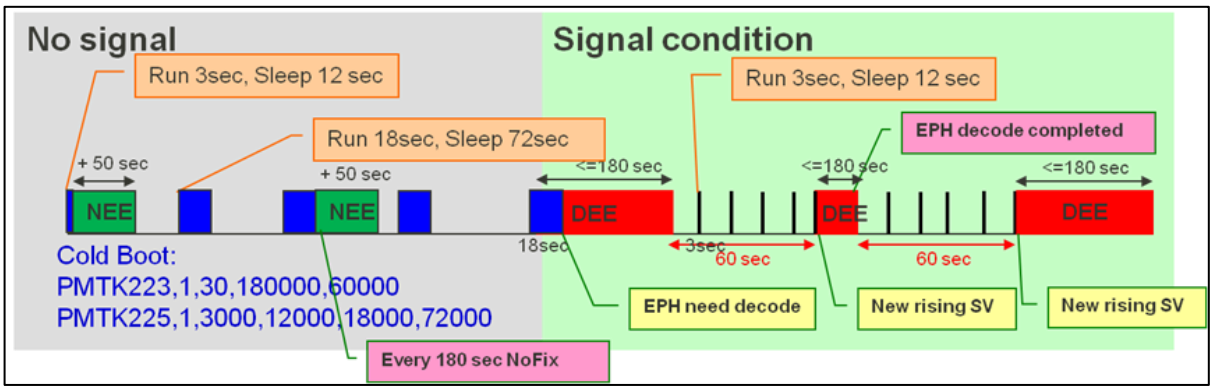
3.7.4. Periodic Modes

These modes allow autonomous power on/off control with reduced fix rate to decrease average power consumption. The main power supply pin is still on, but power distribution to internal circuits is controlled by the receiver firmware.

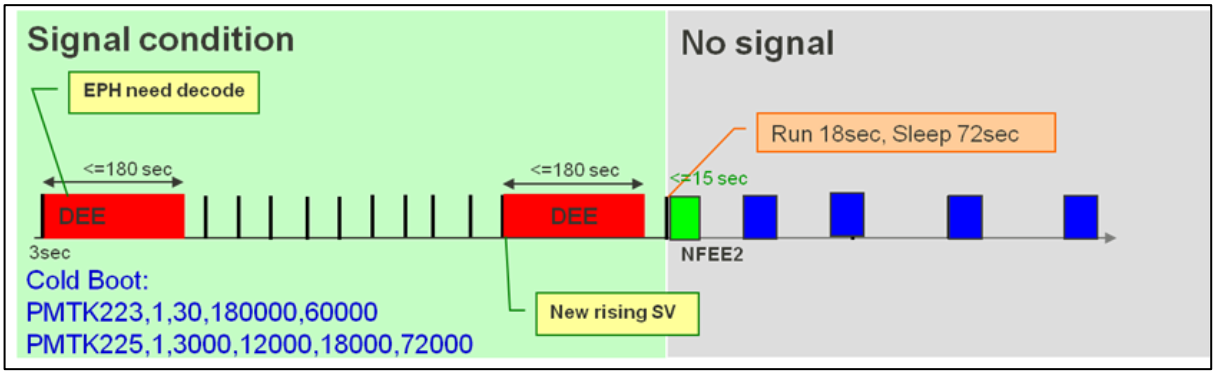
- STANDBY(SLEEP): GNSS baseband and RF are powered down.
- BACKUP: GNSS baseband, RF, and TCXO are powered down. RTC is powered up.



Periodic Modes diagram



Periodic Mode example 1



Periodic Mode example 2

To enter a Periodic mode, send the following NMEA command(s):

$PMTK223,<SV>,<SNR>,<Extension threshold>,<Extension gap>*<checksum> (Optional)

Where:

SV = 1 to 4, default = 1

SNR = 25 to 30, default = 28

Ext. threshold = 40 000 to 180 000 ms, default = 180 000

Ext. gap = 0 to 3 600 000 ms, default = 180 000

This is the limit between successive DEE

$PMTK225,<Type>,<Run_time>,<Sleep_time>,<2nd_run_time>,<2nd_sleep_time>*<checkum>

Where:

Type = 1 for Periodic (backup) mode or 2 for Periodic (standby) mode
Run_time = Full Power period (ms)
Sleep_time = Standby period (ms)
2nd_run_time = Full Power period (ms) for extended acquisition if GNSS acquisition fails during Run_time
2nd_sleep_time = Standby period (ms) for extended sleep if GNSS acquisition fails during Run_time

Example: $PMTK225,1,3000,12000,18000,72000*16
for periodic mode with 3 s navigation and 12 s sleep in backup state.

The acknowledgement response for the command is:
$PMTK001,225,3*35

To exit Periodic Sleep mode, send the NMEA command
$PMTK225,0*2B
just after the module wakes up from a previous sleep cycle.

3.7.5. AlwaysLocate™ Mode

AlwaysLocate™ is an intelligent controller of the Periodic mode where the main supply pin VCC_IN is still powered, but power distribution is controlled internally. Depending on the environment and motion conditions, the module can autonomously and adaptively adjust the parameters of the Periodic mode (e.g. RF on/off ratio and fix rate) to achieve a balance in positioning accuracy and power consumption. The average current drain will vary based on conditions.

To enter an AlwaysLocate mode, send the following NMEA command:

$PMTK225,<mode>*<checksum><CR><LF>

Where mode = 8 for AlwaysLocate (standby) mode or 9 for AlwaysLocate (backup) mode

Example: $PMTK225,9*22

The acknowledgement response for the command is:

$PMTK001,225,3*35

To exit AlwaysLocate mode, send the NMEA command:

$PMTK225,0*2B

just after the module wakes up from its previous sleep cycle.

3.8. DATA RETENTION

The receiver is capable of retaining certain data elements under the various initialization types.

The following table shows which data elements are saved under each type of initialization if the GNSS power supply is maintained.

Initialization	Almanac	Ephemeris	EASY	Position	Time
Power Cycle					
Reset (signal)					
Full Cold Start					
Cold Start			Y		Y
Warm Start	Y		Y	Y	Y
Hot Start	Y	Y	Y	Y	Y
Reacquisition	Y	Y	Y	Y	Y

NOTE:

Commanded parameters (e.g. UART speed, feature enables, etc.) are not preserved over a power cycle.

The standard definition of “Cold Start” does not allow time to be preserved.

Use “Full Cold Start” to compare with other vendor’s products’ “Cold Start”.

4. GNSS AT COMMAND

The following commands can be used on the MAIN UART of GE310 module and when the GNSS receiver is connected in Hosted configuration.

4.1. AT+EGPSC – Power on/off GPS

4.1.1. Description

Power on/off GNSS receiver

4.1.2. Format

Command	Possible response(s)
+EGPSC=<state>	OK +CME ERROR: <err>
+EGPSC?	+EGPSP:<state> +CME ERROR: <err>
+EGPSC=?	+EGPSC:(list of supported <state>s)

4.1.3. Field

<state>:

0 power off GPS

1 power on GPS

When the command is executed the module will start to present the NMEA sentences on the Main UART.

The supported speed is 115200 bps; the standard rate is 1 sec per update.

4.2. AT+EGPSS – Send PMTK Command

4.2.1. Description

Send PMTK command to GPS receiver

4.2.2. Format

Command	Possible response(s)
+EGPSS="<pmtk>"	OK +CME ERROR: <err>
+EGPSS?	Not supported
+EGPSS=?	Not supported

4.2.3. Field

<pmtk>:

PMTK command string without '$' character before PMTK string

4.3. AT+EGPSEPO – Set EPO Parameter

4.3.1. Description

Open/Close EPO downloading and aiding features.

Set EPO data account

4.3.2. Format

Command	Possible response(s)
+EGPSEPO=<status>,<data account>	OK +CME ERROR: <err>
+EGPSEPO?	Not supported
+EGPSEPO=?	Not supported

4.3.3. Field

<status>:

1: Enable EPO

0: Disable EPO

<data account>

0-3 network data account when you send “ AT+ECGDCONT=0,”IP”,”cmnet” “

NOTE:

When you set EPO enable you must set the correct network data account

EPO used TCPIP so you need to set the network data account and to active the TCP/IP using the right AT commands before activating EPO:

AT+EGDCONT=0,”IP”,”cmnet”

AT+ETCPIP=1,0

4.4. AT+EGPSTS – Set GPS Time Sync Parameter

4.4.1. Description

Open/Close GPS time sync and aiding.

Set time sync data account

4.4.2. Format

Command	Possible response(s)
+EGPSTS=<status>,<data account>	OK +CME ERROR: <err>
+EGPSTS?	Not supported
+EGPSTS=?	Not supported

4.4.3. Field

<status>:

1: Enable GPS time sync

0: Disable GPS time sync

<data account>

0-3 network data account when you send " AT+ECGDCONT=0,"IP","cmnet" "

NOTE:

When you set EPO enable you must set the correct network data account

EPO used TCPIP so you need to set the network data account and to active the TCP/IP using the right AT commands before activating EPO:

AT+EGDCONT=0,"IP","cmnet"

AT+ETCPIP=1,0

5. PMTK COMMANDS

The PMTK are a set of proprietary commands usable to control the GNSS receiver.

5.1. PMTK Protocol Format

The PMTK is using a proprietary protocol with this structure:

$	PMTK	<command>	<Data Field>	*	<Checksum>	CR	LF

The content is the following:

Item	Type	Length	Description
$	char	1	Preamble Character; Always “$”
PMTK	string	4	String ID; always “PMTK”
<command>	string	3	Numeric string (from 000 to 999) identifying the command
<Data Field>	char	variable	The Data fiels has a variable length because depending on the specific command. A comma “,” character has to be used between each data field.
*****	char	1	End of Data Field Marker; Always “*”
<Checksum>	char	2	Two Bytes checksum of the data between $ and * The checksum is an XOR of all the bytes between the $ and the * (not including the delimiters themselves), and written in hexadecimal.
CR	Char	1	Carriage Return
LF	Char	1	Line Feed

5.2. PMTK Commands

5.2.1. PMTK000 – Test

5.2.1.1. Description

Test Command

5.2.1.2. Example

$PMTK000*32<CR><LF>

5.2.2. PMTK001 – PMTK Acknowledge

5.2.2.1. Description

Acknowledge to a PMTK command

5.2.2.2. Format

PMTK001,cmd, flag

5.2.2.3. Fields

<cmd>

The command / packet type the acknowledge responds.

<flag>

0 = Invalid command/packet

1 = Unsupported Command / Packet Type

2 = Valid command / packet but action failed

3 = Valid Command/Packet and action correctly completed

5.2.2.4. Example

$PMTK001,604,3*32<CR><LF>

5.2.3. PMTK101 – HOT Start

5.2.3.1. Description

The command forces the GNSS receiver to perform an Hot Start.

The module will use all the data already stored in NVM.

5.2.3.2. Format

PMTK101

5.2.3.3. Fields

None

5.2.3.4. Example

$PMTK101*31<CR><LF>

5.2.4. PMTK102 – WARM Start

5.2.4.1. Description

The command forces the GNSS receiver to perform an Warm Start.

The module will restart without re-using the stored Ephemeries..

5.2.4.2. Format

PMTK102

5.2.4.3. Fields

None

5.2.4.4. Example

$PMTK102*31<CR><LF>

5.2.5. PMTK103 – COLD Start

5.2.5.1. Description

The command forces the GNSS receiver to perform an Cold Start.

The module will restart without using the stored Position, Almanacs and Ephemeries..

5.2.5.2. Format

PMTK103

5.2.5.3. Fields

None

5.2.5.4. Example

$PMTK103*30<CR><LF>

5.2.6. PMTK104 – FULL COLD Start

5.2.6.1. Description

The command forces the GNSS receiver to perform an Cold Start cleaning also the system/user configurations to the factory defaults.

5.2.6.2. Format

PMTK104

5.2.6.3. Fields

None

5.2.6.4. Example

$PMTK104*37<CR><LF>

5.2.7. PMTK161 – StandBy Mode

5.2.7.1. Description

Enter Stand By Mode

5.2.7.2. Format

PMTK161, <mode>

5.2.7.3. Fields

<mode>

0 = Stop Mode

1 = Sleep Mode

5.2.7.4. Example

$PMTK161,0*28<CR><LF>

5.2.8. PMTK223 – Set Period Mode Parameters

5.2.8.1. Description

The command permits to set the Period Mode parameters and need to be used followed by PMTK225.

5.2.8.2. Format

PMTK223,<SV>,<SNR>,<Extension Threshold>,<Extension Gap>

5.2.8.3. Fields

<SV>

number of satellites rise

Range: 1 to 4 (default value is 1)

<SNR>

Minimum SNR level of the rising satellites

25 to 30 (default value is 30)

< Extension Threshold >

Value in msec of Extension Threshold

40000 to 180000 ms (default value is 180000 ms)

< Extension Gap >

Value in msec of Extension Gap.

The Extension Gap is the limitation between neighbor DEE

0 to 3600000 ms (default value is 60000 ms)

5.2.8.4. Example

Example of settings in Period Mode

$PMTK225,0*2B<CR><LF> → set to Normal Mode

$PMTK223,2,25,1,180000,60000*26<CR><LF> → defines the parameters

$PMTK225,2,3000,12000,18000,72000*15<CR><LF> → enable the mode

Description of setting command $PMTK223,2,25,1,180000,60000:

- Period Mode active
- Two more satellities rise to be used
- SNR of new riding satellities is over 25db

If the above three conditions are satisfied the GNSS receiver will extend Run Time to the defined Extension Threshold (180000 ms) for decoding Ephemeries.

The last parameter (Extension Gap defined as 60000 ms) means that the interval of run time extension will be more than 60 seconds.

5.2.9. PMTK225 – Set Periodic Power Saving Mode

5.2.9.1. Description

The command permits to define the periodic Power Saving Mode settings.

In Normal mode the module the receiver measures and calculates positions.

In Sleep mode the receiver enters in one of the available power saving modes:

- Periodic StandBy Mode
- Periodic Backup Mode

5.2.9.2. Format

PMTK225,<Type>,<Run Time>,<Sleep Time>,<Second Run Time>, <Second Sleep Time>

5.2.9.3. Fields

<Type>

Defines the power saving operation mode.

0 = Normal Mode

1 = Periodic Backup Mode

2 = Periodic StandBy Mode

8 = AlwaysLocate™ StandBy Mode

9 = AlwaysLocate™ Backup Mode

<Run Time>

Duration (in ms) to fix for (or to attempt to fix for) before switching from Normal Mode to Power Saving Mode.

0 = Disabled

>= 1000 Enabled (range 1000 to 518400000)

<Sleep Time>

Interval (in ms) to exit from Power Saving and start Normal Mode to get a new Position Fix.

Accepted Values: from 1000 to 518400000

<Second Run Time>

Duration (in ms) to fix for (or to attempt to fix for) before switching from Normal Mode to Power Saving Mode.

0 = Disabled

>= 1000 Enabled (range 1000 to 518400000)

<Second Sleep Time>
Interval (in ms) to exit from Power Saving and start Normal Mode to get a new Position Fix.
Accepted Values: from 1000 to 518400000

5.2.9.4. Example

How to enable a Periodic Backup Mode
$PMTK225,0*2B<CR><LF> → set to Normal Mode
$PMTK223,1,25,180000,60000*38<CR><LF> → defines the parameters
$PMTK225,1,3000,12000,18000,72000*16<CR><LF> → enable the mode

How to enable a Periodic StandBy Mode
$PMTK225,0*2B<CR><LF> → set to Normal Mode
$PMTK223,2,25,1,180000,60000*26<CR><LF> → defines the parameters
$PMTK225,2,3000,12000,18000,72000*15<CR><LF> → enable the mode

How to enable the AlwaysLocate™ StandBy Mode
$PMTK225,0*2B<CR><LF> → set to Normal Mode
$PMTK225,8*23<CR><LF> → enable the mode

How to enable the AlwaysLocate™ BackUp Mode
$PMTK225,0*2B<CR><LF> → set to Normal Mode
$PMTK225,9*22<CR><LF> → enable the mode

5.2.10. PMTK262 – Set GLP Power Saving Mode

5.2.10.1. Description

The command enables the GLP Power saving Mode (1Hz positioning)

5.2.10.2. Format

PMTK262,<enabled>

5.2.10.3. Fields

<enabled>

0 =disabled

3 = enabled

5.2.10.4. Example

$PMTK262,3*2B<CR><LF>

5.2.11. PMTK286 – Interference Cancellation Enable

5.2.11.1. Description

The command enables the Interference Cancellation function.

5.2.11.2. Format

PMTK286,<enabled>

5.2.11.3. Fields

<enabled>

1 = enabled

0 =disabled

5.2.11.4. Example

$PMTK286,1*23<CR><LF>

5.2.12. PMTK301 – Set DGPS Mode

5.2.12.1. Description

The command defines the DGPS data source mode

5.2.12.2. Format

PMTK301,<mode>

5.2.12.3. Fields

<mode>

0 = disabled

2 = SBAS (including WAAS/EGNOSGAGAN/MSAS)

5.2.12.4. Example

$PMTK301,1*2D<CR><LF>

5.2.13. PMTK313 – Set SBAS Enabled

5.2.13.1. Description

The command set the GNSS receiver to include also the SBAS satellites in its position calculation.

5.2.13.2. Format

PMTK313,<enabled>

5.2.13.3. Fields

<enabled>

1 = enabled

0 =disabled

5.2.13.4. Example

$PMTK313,1*2E<CR><LF>

5.2.14. PMTK314 – Set NMEA Output

5.2.14.1. Description

The command permits to define which NMEA sentences are reported by the receiver and their output frequency.

Please refer to the next chapters for the details on the NMEA sentences.

5.2.14.2. Format

PMTK314,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,0,0,0,0,0,0,0,0,0,0,<ZDA>,0

5.2.14.3. Fields

<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV> and <ZDA>

Each field represent an NMEA sentence and the possible configurations are the following:

0 = disabled or not supported sentence

1 = Output once every one position Fix

2 = Output once every two position Fixes

3 = Output once every three position Fixes

4 = Output once every four position Fixes

5 = Output once every five position Fixes

5.2.14.4. Example

$PMTK314,0,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,1,0*28<CR><LF>

This command enables all the sentences with 1 position fix frequency except the GLL that is set as disabled.

5.2.15. PMTK352 – Enable QZSS

5.2.15.1. Description

Since QZSS is a regional positioning service, this command allows the user to enable/disable the function.

5.2.15.2. Format

PMTK352,<disable>

5.2.15.3. Fields

<disable>

0 = enabled

1 = disable

5.2.15.4. Example

$PMTK352,0*2B<CR><LF> : enable QZSS function

$PMTK352,1*2A<CR><LF> : disable QZSS function

5.2.16. PMTK353 – Set GNSS Search Mode

5.2.16.1. Description

The command permits to select the preferred satellite system.

5.2.16.2. Format

PMTK353,<GPS>, <GLONASS>,<GALILEO>,<GALILEO FULL>,<BEIDOU>

5.2.16.3. Fields

<GPS>, <GLONASS>,<GALILEO>,<GALILEO FULL>,<BEIDOU>

1 = enabled

0 =disabled

5.2.16.4. Example

$PMTK353,0,1,0,0,0,*2A<CR><LF> : Search GLONASS satellites only

$PMTK353,1,0,0,0,0,*2A<CR><LF> : Search GLONASS satellites only

$PMTK353,1,1,0,0,0,*2B<CR><LF> : Search GPS and GLONASS satellites

$PMTK353,1,1,1,0,0,*2A<CR><LF> : Search GPS, GLONASS and Galileo satellites

$PMTK353,0,0,0,0,1,*2A<CR><LF> : Search BEIDOU satellites only

$PMTK353,1,0,0,0,1,*2B<CR><LF> : Search GPS and BEIDOU satellites

NOTE:

The GLONASS only, BEIDOU only and GALILEO only modes are for testing purpose.

Please use GPS + GLONASS or GPS + BEIDOU in real application configuration.

GLONASS and BEIDOU can not be enabled at the same time

5.2.17. PMTK386 – Set Static Navigation Threshold

5.2.17.1. Description

Set the speed threshold for static navigation. If the actual speed is below the threshold, output position will keep the same and output speed will be zero. If the threshold value is set to 0 the function is disabled

5.2.17.2. Format

PMTK386,<speed_threshold>

5.2.17.3. Fields

<speed_threshold>

0 = disabled

0.1 to 2.0 = enabled with the set threshold in ms

5.2.17.4. Example

$PMTK386,0.4*19<CR><LF> : enable Static navigation with a threshold of 0.4mS

6. NMEA OUTPUT MESSAGES

- The GE310-GNSS Message protocol is NMEA-0183.
- Default: GPS and GLONASS constellations are enabled
- Default fix rate: 1 Hz. Maximum rate is 10 Hz.
- Multiple GSA and GSV messages may be output on each cycle.

6.1. Available NMEA Messages

The following messages are available by default when the GNSS receiver is activated:

Message ID	Description
RMC	GNSS Recommended minimum navigation data
GGA	GNSS position fix data
GSA	GNSS Dilution of Precision (DOP) and active satellites
GSV	GNSS satellites in view.

The following messages can be enabled by command (ref to PMTK314):

Message ID	Description
GLL	Geographic Position – Latitude & Longitude
VTG	Course Over Ground & Ground Speed
ZDA	Time & Date

The following table shows the Talker IDs used:

Talker ID	Constellation
BD	BeiDou
GA	Galileo
GL	GLONASS
GP	GPS
QZ	QZSS

NOTE:
Some sentences may exceed the NMEA length limitation of 80 characters.

7. DOCUMENT HISTORY

Revision	Date	Changes
0	2018-12-18	First issue
1	2019-02-12	Added AT+EGPSEPO and AT+EGPSTS

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