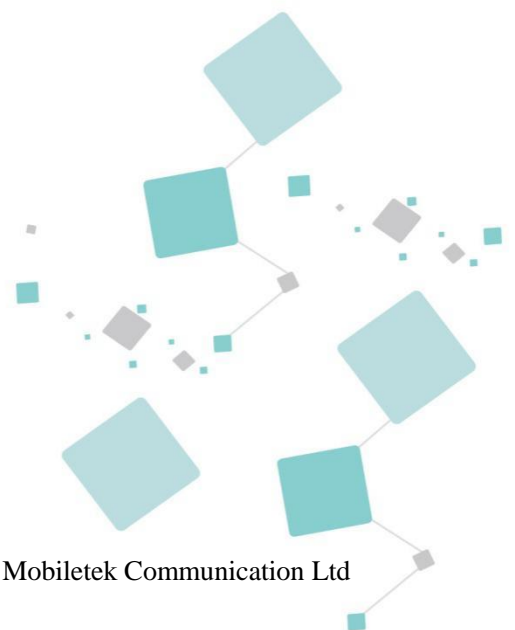# LYNQ_GNSS_SDK_Commands_Manual

GNSS Module Series

Version： V2.1

Date： 2019-10-16

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Version History

Date	Version	Modify records	Author
2016-11-09	V1.0	Initial	wangwei
2017-04-14	V1.1	Delete PMTK:120,330,335	wangwei
2017-05-02	V1.2	Modify PMTK353	wangwei
2017-05-15	V1.3	Delete PMTK 837,	wangwei
2017-06-05	V1.4	Modify PMTK220, 314,500,501,514,815	wangwei
2017-06-10	V1.5	Modify PMTK223,514,815	wangwei
2017-09-01	V1.6	Modify file name	wangwei
2017-12-13	V1.7	Add PMTK328,delete PMTK741	wangwei
2019-07-08	V1.8	Synchronize "MT33xx GNSS PMTK User's Guide V1.3.0"	wangwei
2019-07-30	V1.9	1. Standard NMEA Sentence add commands 2. PTMK400, 428, 430, 431, 435, 436, 447, 458, 461 commands add return sentences. 3. PMTK257 command modify default value 1.	wangwei
2019-08-20	V2.0	Update all	wangwei
2019-10-16	V2.1	Modify PMTK386	wangzhao

Content

Tables

1. Introduction

1.1 Document scope

This manual describes the NMEA protocol of the MTK GPS system or the Beidou + GPS dual GNSS system module.

1.2 Terminology abbreviation

Table 1-1: Terminology Abbreviation

Abbreviation	Terminology
PPS	Pulse Per Second
ASCII	American Standard Code for Information Interchange
ACK	ACKnowledge
DGPS	Differential Global Positioning System
NMEA	National Marine Electronics Association
SBAS	Satellite Based Augmentation System
SDK	Software Development Kit
SW	Software
SV	Space Vehicle
PDOP	Position Dilution Of Precision
HDOP	Horizontal Dilution Of Precision
VDOP	Vertical Dilution Of Precision
BDS	BeiDou Navigation Satellite System
GPS	Global Positioning System
GLONASS	GLObalnaya NAvigatsionnaya Sputnikovaya Sistema

GNSS	Globle Navigation Satellite System
BAUD	Baud rate
RTC	Real Time Clock
AIC	Active Interference Cancellation
SPS	Standard Positioning Service
CR	Carriage Return
LF	Line Feed
TCXO	Temperature Compensate X'tal (crystal) Oscillator
EPO	Extended Prediction Orbit
PPM	Parts Per Million

2. NMEA Sentence

2.1 NMEA Sentence Format

NMEA communication protocol provided by the communication statements are based on ASCII code, NMEA-0183 protocol statement data format is as follows:

'$' Is the sentence preamble.

',' Is the parameter separator.

'*' Is the check code identifier.

The last two digits are the checksum.

The checksum field consists of a '*' and two hex digits representing an 8 bit exclusive OR of all characters between, but not including, the '$' and '*'. A checksum is required on some sentences.

<CR> <LF> is the terminator，All sentences must end with a carriage return line feed, which is the "carriage return" and "line feed" of the ASCII characters.

Table 2-1 Describes NMEA Output Format/ parameters of input message.

Table 2-1: NMEA Output Format/ parameters of input message

Field	Example	Description
Start Field	$GPGGA	Message identification
Data Valid	<Data>	Related message parameters
Checksum	*4F	The checksum field consists of a '*' and two hex digits
Terminator	<CR> <LF>	Each sentence ends with a carriage return/line feed sequence

NOTE：

1. All fields must be present, but valid data parameters can be null ("," or "*" means empty).

2.2 Standard NMEA Sentences

Table 2-2: Standard NMEA Sentences

Field	Description	Possible prefix
GGA	Time, position and fix type data	GP,GN,BD
GLL	Latitude, longitude, UTC time of position fix and status	GP,GN,BD
GSA	GNSS receiver operating mode, satellites used in the position solution, and DOP values	GP, BD
GSV	Number of GNSS satellites in view satellite ID numbers, elevation, azimuth, & SNR values	GP, BD
RMC	Time, date, position, course and speed data	GP,GN, BD
VTG	Course and speed information relative to the ground	GP,GN, BD
ZDA	UTC Date/Time and Local Time Zone Offset	GP,GN, BD

NOTE：

1. Prefix "GP" means GPS.
2. Prefix "GN" means GNSS (Global Navigation Satellite System).
3. Prefix "GL" means GLONASS(Global Navigation Satellite System in Russian).
4. Prefix "BD" means Beidou Global Navigation Satellite System.
In the following sections, the standard NMEA sentences above are described in detail.

2.2.1　GGA

Table 2-3: GGA

Example:
$GPGGA,091926.000,3113.3166,N,12121.2682,E,1,09,0.9,36.9,M,7.9,M,,0000*56<CR><LF>

Field	Example	Unit	Description
Message ID	$GPGGA		GGA sentence header
UTC Time	091926.000	hhmmss.sss	
Latitude	3113.3166	ddmm.mmmm	degree and minutes

N/S	N		N=North S=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		E=East W=West
Fix Status	1		0=Invalid 1=GNSS fix 2=DGPS fix
Number of SV	09		Number of satellites being used (0~12)
HDOP	0.9		Horizontal Dilution Of Precision
Altitude	36.9	meter	Altitude in meters according to WGS84 ellipsoid
Unit	M	meter	Fixed field, meter
GeoID Separation	7.9	meter	Height of GeoID (mean sea level) above WGS84 ellipsoid, meter
Unit	M	meter	Fixed field, meter
DGPS Age		second	Age of DGPS data in seconds, empty if DGPS is not used
DGPS Station ID	0000		DGPS station ID, empty if DGPS is not used
Checksum	*56		Checksum
Terminator	<CR><LF>		Each of message

Table 2-4: Positioning Type Indication

Value	Description
0	Nnvalid Positioning
1	SPS mode，Positioning is valid
2	DGPS mode，Positioning is valid

2.2.2 GLL

Table 2-5: GLL

Example:

$GPGLL,3113.3157,N,12121.2684,E,094051.000,A,A*59<CR><LF>

Field	Example	Unit	Description
Message ID	$GPGLL		GLL sentence header
Latitude	3113.3166	ddmm.mmmm	degree and minutes
N/S	N		'N'=North 'S'=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		'E'=East 'W'=West
UTC Time	091926.000	hhmmss.sss	
Data Valid	A		'V'=Invalid 'A'=Valid
Positioning Mode	A		'A'=No fix, 'D'=DGPS
Checksum	*59		Checksum
Terminator	<CR><LF>		Each of message

2.2.3 GSA

Table 2-6: GSA

Example:

$GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33<CR><LF>

Field	Example	Unit	Description
Message ID	$GPGSA		GSA sentence header
Mode 1	A		See Table 2-7
Mode 2	3		See Table 2-8
Satellite Used [1]	07		Satellite used on channel 1
Satellite Used [1]	02		Satellite used on channel 2
....			....

Satellite Used [1]			Satellite used on channel 12
PDOP [2]	1.8		Position Dilution of Precision
HDOP [2]	1.0		Horizontal Dilution of Precision
VDOP [2]	1.5		Vertical Dilution of Precision
Checksum	*33		Checksum
Terminator	<CR><LF>		Each of message

NOTE：

1. **Satellite Used ID.**
2. **The default DOP limit is set to 50.**

Table 2-7: Mode 1

Value	Description
M	Manual, forced to switch 2D/3D mode
A	Allowed to automatically switch 2D/3D mode

Table 2-8: Mode 2

Value	Description
1	No fix
2	2D fix
3	3D fix

2.2.4 GSV

Table 2-9: GSV

Example:
$GPGSV,3,1,11,26,68,023,37,15,64,251,33,05,45,058,34,29,33,253,33*75<CR>< LF>
$GPGSV,3,2,11,27,32,164,30,21,25,315,29,02,24,140,31,08,19,048,29*70<CR><LF>
$GPGSV,3,3,11,09,16,180,25,18,08,284,27,10,08,085,18*4E<CR><LF>

Field	Example	Unit	Description
Message ID	$GPGSV		GSV sentence header
Number of Message	2		Number of messages, total number of GPGSV messages being output (1~3)
Sequence Number	1		Sequence number of this entry (1~3)
Satellites in View	11		Total satellites in view
Satellite ID 1	26		Satellite ID 1
Elevation 1	68	Degree	Elevation in degree (0~90)
Azimuth 1	023	Degree	Azimuth in degree (0~359)
SNR 1	37	dBHz	Signal to Noise Ration in dBHz (0~99), empty if not tracking
....			....
Satellite ID 4	29		Satellite ID 1
Elevation 4	33	Degree	Elevation in degree (0~90)
Azimuth 4	253	Degree	Azimuth in degree (0~359)
SNR 4	33	dBHz	Signal to Noise Ration in dBHz (0~99), empty if not tracking
Checksum	*75		Checksum
Terminator	<CR><LF>		Each of message

2.2.5   RMC

Table 2-10: RMC

Example:			
$GPRMC,094330.000,A,3113.3156,N,12121.2686,E,0.51,193.93,171210,,,A*68<CR><LF>			

Field	Example	Unit	Description
Message ID	$GPRMC		RMC sentence header
UTC Time	091926.000	hhmmss.sss	

Data Valid [1]	A		A= Invalid V= Valid
Latitude	3113.3166	ddmm.mmmm	degree and minutes
N/S	N		N=North S=South
Longitude	12121.2682	dddmm.mmmm	degree and minutes
E/W	E		E=East W=West
Speed	0.51	Knot	Speed over ground in knots
COG	193.93	Degree	Course over ground in degree
Date	171210	ddmmyy	Date in format 'ddmmyy'
Magnetic Variation [2]		Degree	Magnetic variation in degree, not being output
E/W [2]			Magnetic variation E/W indicator, not being output
Positioning Mode	A		A=Autonomous GNSS fix D=Differential GNSS fix
Checksum	*75		Checksum
Terminator	<CR><LF>		Each of message

NOTE：

1. In software, this value comes from the combined status of each parameter, including the minimum number of satellites required, DOP cap, DGPS correction, etc. If these conditions are not met, the secondary fix will be marked as invalid.

2. The magnetic declination output is not supported. <Ground angle> is the true north output relative to the WGS-84 coordinate system.

2.2.6   VTG

Table 2-11: VTG

Example:			
$GPVTG,83.37,T,,M,0.00,N,0.0,K,A*32<CR><LF>			
Field	**Example**	**Unit**	**Description**

Message ID	$GPVTG		VTG sentence header
COG(T)	83.37	degree	Course over ground (true) in degree
Unit	T		Fixed field, true
COG(M)		degree	Course over ground (magnetic), not being output
Unit	M		Fixed field, magnetic
Speed	0.00	Knot [2]	Speed over ground in knots
Unit	N		Fixed field, knots [2]
Speed	0.0	km/h[2]	Speed over ground in km/h
Unit	K	km/h	Fixed field.
Positioning Mode	A		A= Autonomous D=DGPS
Checksum	*32		Checksum
Terminator	<CR><LF>		Each of message

NOTE：

1. Does not support the magnetic declination output, <azimuth> is relative to the WGS-84 coordinate system true North output.
2. 1Knot =1.852 km/h.

2.2.7 ZDA

The sentence outputs the date and time.

Table 2-12: ZDA

Example:			
$GPZDA,091926.000,17,12,2010,,*55<CR><LF>			
Field	**Example**	**Unit**	**Description**
Message ID	$GPZDA		ZDA sentence header
UTC Time	091926.000	hhmmss.sss	UTC Time Unit Format:

			hh= UTC hour（00~23） mm= UTC minute（00~59） ss= UTC second （00~59） .sss= .UTC millisecond（.000~.999）
Day	17		1~31
Mouth	12		1~12
Year	2010		1980~2079
Local Hours [2]		Hour	Local Hours
Local Minute[2]		Minute	Local Minute
Checksum	*55		Checksum
Terminator	<CR><LF>		Each of message

NOTE：

1. **By default, the software does not output the ZDA sentences.**
2. **Version is not supported, please contact MOBILETEK.**

2.3　Standard NMEA Sentence

In addition to the standard NMEA output sentences, the MTK GPS module complements the proprietary NMEA sentences, which has both input and output messages. Specific support instructions, see the following table：

Table 2-13: Standard NMEA Sentence

Standard NMEA Sentence	Input	Output
PMTK000: PMTK_TEST	√	
PMTK001: PMTK_ACK		√
PMTK010: PMTK_SYS_MSG		√
PMTK011: PMTK_TXT_MSG		√
PMTK101: PMTK_CMD_HOT_START	√	

PMTK508: PMTK_DT_DR_LIMIT	√	
PMTK511: PMTK_DT_ELEV_MASK		√
PMTK513: PMTK_DT_SBAS_ENABLED		√
PMTK514: PMTK_DT_NMEA_OUTPUT		√
PMTK527: PMTK_DT_STATIC_NAVI_THD		√
PMTK528: PMTK_DT_HACC_MASK		√
PMTK530: PMTK_DT_DATUM		√
PMTK536: PMTK_DT_HIGH_SENSITIVITY_TRACKING_NO_FIX		√
PMTK558: PMTK_DT_POS_XYZ		√
PMTK561: PMTK_DT_VEL_XYZ		√
PMTK605: PMTK_Q_RELEASE	√	
PMTK607: PMTK_Q_EPO_INFO	√	
PMTK622: PMTK_Q_LOCUS_DATA	√	
PMTK660: PMTK_Q_AVAILABLE_SV_EPH	√	
PMTK661: PMTK_Q_AVAILABLE_SV_ALM	√	
PMTK705: PMTK_DT_RELEASE		√
PMTK707: PMTK_DT_EPO_INFO		√
PMTK713: PMTK_DT_LOC	√	
PMTK740: PMTK_DT_UTC	√	
PMTK810: PMTK_TEST_ALL	√	
PMTK811: PMTK_TEST_STOP	√	
PMTK812: PMTK_TEST_FINISH		√
PMTK813: PMTK_TEST_ALL_ACQ		√
PMTK814: PMTK_TEST_ALL_BITSYNC		√
PMTK815: PMTK_TEST_ALL_SIGNAL		√
PMTK837 : PMTK_TEST_JAMMING	√	

PMTK838: PMTK_TEST_JAMMING_DETECTION	√	
PMTK869: PMTK_EASY_ENABLE	√	
PMTK875: PTMK_PMTKLSC_STN_OUTPUT	√	
PMTK886: PMTK_FR_MODE	√	

Table 2-14: Standard NMEA Sentence Relationship

Input Sentence	Corresponding to the output Sentence (Proactive reporting/Acknowledgment/Response)
--	PMTK010: PMTK_SYS_MSG
--	PMTK011: PMTK_TXT_MSG
PMTK000: PMTK_TEST	PMTK001: PMTK_ACK
PMTK101: PMTK_CMD_HOT_START	See Note [1]
PMTK102: PMTK_CMD_WARM_START	See Note [1]
PMTK103: PMTK_CMD_COLD_START	See Note [1]
PMTK104: PMTK_CMD_FULL_COLD_START	See Note [1]
PMTK161: PMTK_CMD_STANDBY_MODE	PMTK001: PMTK_ACK,Cmd 161,Flag 3
PMTK220: PMTK_SET_POS_FIX	PMTK001: PMTK_ACK,Cmd 220,Flag 3
PMTK223: PMTK_SET_AL_DEE_CFG	PMTK001: PMTK_ACK,Cmd 223,Flag 3
PMTK225: PMTK_SET_PERIODIC_MODE	PMTK001: PMTK_ACK,Cmd 225,Flag 3
PMTK251: PMTK_SET_NMEA_BAUDRATE	See Note[2]
PMTK286: PMTK_SET_AIC_CMD	PMTK001: PMTK_ACK,Cmd 286,Flag 3
PMTK300: PMTK_API_SET_FIX_CTL	PMTK001: PMTK_ACK,Cmd 300,Flag 3
PMTK301: PMTK_API_SET_DGPS_MODE	PMTK001: PMTK_ACK,Cmd 301,Flag 3
PMTK313: PMTK_API_SET_SBAS_ENABLED	PMTK001: PMTK_ACK,Cmd 313,Flag 3
PMTK314: PMTK_API_SET_NMEA_OUTPUT	PMTK001: PMTK_ACK,Cmd 314,Flag 3

PMTK330: PMTK_API_SET_DATUM	PMTK001: PMTK_ACK,Cmd 330,Flag 3
PMTK331: PMTK_API_SET_DATUM_ADVANCE	PMTK001: PMTK_ACK,Cmd 331,Flag 3
PMTK351: PMTK_API_SET_SUPPORT_QZSS_NMEA	PMTK001: PMTK_ACK,Cmd 351,Flag 3
PMTK352: PMTK_API_SET_STOP_QZSS	PMTK001: PMTK_ACK,Cmd 352,Flag 3
PMTK353: PMTK_API_SET_GNSS_SEARCH_MODE	PMTK001: PMTK_ACK,Cmd 353,Flag 3
PMTK386: PMTK_API_SET_STATIC_NAV	PMTK001: PMTK_ACK,Cmd 386,Flag 3
PMTK400: PMTK_API_Q_FIX_CTL	PMTK500: PMTK_DT_FIX_CTL
PMTK401: PMTK_API_Q_DGPS_MODE	PMTK501: PMTK_DT_DGPS_MODE
PMTK413: PMTK_API_Q_SBAS_ENABLED	PMTK513: PMTK_DT_SBAS_ENABLED
PMTK414: PMTK_API_Q_NMEA_OUTPUT	PMTK514: PMTK_DT_NMEA_OUTPUT
PMTK430: PMTK_API_Q_DATUM	PMTK530: PMTK_DT_DATUM,Datum
PMTK431: PMTK_API_Q_DATUM_ADVANCE	PMTK530: PMTK_DT_DATUM,Advance Data
PMTK605: PMTK_Q_RELEASE	PMTK705: PMTK_DT_RELEASE
PMTK607: PMTK_Q_EPO_INFO	PMTK707: PMTK_DT_EPO_INFO[3]
PMTK660: PMTK_Q_AVAILABLE_SV_EPH	PMTK001: PMTK_ACK,Cmd 660, EPH info
PMTK661: PMTK_Q_AVAILABLE_SV_ALM	PMTK001: PMTK_ACK,Cmd 661, ALM info
PMTK740: PMTK_DT_UTC	PMTK001: PMTK_ACK,Cmd 740, Flag 3
PMTK810: PMTK_TEST_ALL	PMTK001: PMTK_ACK,Cmd 810, Flag 3
PMTK811: PMTK_TEST_STOP	PMTK001: PMTK_ACK,Cmd 811, Flag 3
PMTK810: PMTK_TEST_ALL[4]	PMTK813: PMTK_TEST_ALL_ACQ
	PMTK814: PMTK_TEST_ALL_BITSYNC
	PMTK815: PMTK_TEST_ALL_SIGNAL
	PMTK812: PMTK_TEST_FINISH

PMTK 000 : PMTK_TEST

Test Command.
Keep status after reboot –> No.

Table 2-15: 000 PMTK_TEST

Data Field: PMTK000			
Example: $PMTK000*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 001 : PMTK_ACK

Acknowledge of PMTK command.
Keep status after reboot –> No.

Table 2-16: 001 PMTK_ACK

Data Field: PMTK001,<Cmd>,<Flag>			
Example: $PMTK001,604,3*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
Cmd	--	--	The packet type that the acknowledge responds
Flag	--	--	'0' = Invalid packet '1' = Unsupported packet type '2' = Valid packet, but action failed '3' = Valid packet, action succeeded

PMTK 010 : PMTK_SYS_MSG

System output message.
Keep status after reboot –> No.

Table 2-17: 010 PMTK_SYS_MSG

Data Field: PMTK010,<Message>			
Example: $PMTK010,001*2E<CR><LF>			
Field	Unit	Default	Description
Message	--	--	System message '0' = Unknown '1' = Startup '2' = Notification for the host aiding EPO '3' = Notification for the transition to normal mode is successfully done

PMTK 011 : PMTK_TXT_MSG

Output system text message.
Keep status after reboot –> No.

Table 2-18: 011 PMTK_TXT_MSG

Data Field: PMTK011,<Message>			
Example: $PMTK011,MTKGPS*08 <CR><LF>			
Field	Unit	Default	Description
Message	--	--	Module Message Text

PMTK 101 : PMTK_CMD_HOT_START

Hot Start. Use the available data in the NVRAM.
Keep status after reboot –> No.

Table 2-19: 101 PMTK_CMD_HOT_START

Data Field: PMTK101			
Example: $PMTK101*32<CR><LF>			
Field	Unit	Default	Description

--	--	--	--

PMTK 102 : PMTK_CMD_WARM_START

Warm Start. Not using Ephemeris data at start.
Keep status after reboot –> No.

Table 2-20: 102 PMTK_CMD_WARM_START

Data Field: PMTK102			
Example: $PMTK102*31<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 103 : PMTK_CMD_COLD_START

Cold Start. Not using the Position, Almanac and Ephemeris data at start.
Keep status after reboot –> No.

Table 2-21: 103 PMTK_CMD_COLD_START

Data Field: PMTK103			
Example: $PMTK103*30<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 104 : PMTK_CMD_FULL_COLD_START

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.
Keep status after reboot –> No.

Table 2-22: 104 PMTK_CMD_FULL_COLD_START

Data Field: PMTK104

Example: $PMTK104*37<CR><LF>

Field	Unit	Default	Description
--	--	--	--

PMTK 120 : PMTK_CMD_CLEAR_FLASH_AID

Clear the aiding data in flash memory area.
Keep status after reboot –> No.

Table 2-23: 120 PMTK_CMD_CLEAR_FLASH_AID

Data Field: PMTK120

Example: $PMTK120*31<CR><LF>

Field	Unit	Default	Description
--	--	--	--

PMTK 127 : PMTK_CMD_CLEAR_EPO

Erase the EPO data stored in the flash memory.
Keep status after reboot –> No.

Table 2-24: 127 PMTK_CMD_CLEAR_EPO

Data Field: PMTK127

Example: $PMTK127*36<CR><LF>

Field	Unit	Default	Description
--	--	--	--

PMTK 161 : PMTK_CMD_STANDBY_MODE

Enter standby modes (stop mode or sleep mode) for power saving.
Keep status after reboot –> No.

Table 2-25: 161 PMTK_CMD_STANDBY_MODE

Data Field: PMTK161,<Type>			
Example: $PMTK161,0*28<CR><LF>			
Field	**Unit**	**Default**	**Description**
Type	--	--	Standby Mode： '0' = Stop mode '1' = Sleep mode

PMTK 220 : PMTK_SET_POS_FIX

Position Fix Interval.

Table 2-26: 220 PMTK_SET_POS_FIX

Data Field: PMTK220,<Interval>			
Example: $PMTK220,1000*1F<CR><LF>			
Field	**Unit**	**Default**	**Description**
Interval	Msec	1000	Position fix interval in milliseconds (ms). For time <= 1000ms, position fix interval is as setting value (time). For time > 1000ms and time <= 10000ms, position fix interval will be rounded to integral sec (1000ms, 2000ms, ... , 10000ms).

PMTK 223 : PMTK_SET_AL_DEE_CFG

This message is used to set periodic mode dynamic ephemeris extension parameters, and is used after PMTK225 command.

Table 2-27: 223 PMTK_SET_AL_DEE_CFG

Data Field: PMTK223,<SV>,<SNR>,<Extension Threshold>,<Extension Gap>			
Example: $PMTK223,1,30,180000,60000*3C<CR><LF>			
Field	**Unit**	**Default**	**Description**
SV	--	1	Required number of SV which satisfy the SNR condition to trigger dynamic ephemeris extension. The range is from 1 to 4. Default value is 1.
SNR	dBHz	30	SV singnal SNR criterial used to trigger dynamic ephemeris extension. The range is from 25 to 30. Default value is 30.
Extension Threshold	Msec	180000	Time duration of dynamic ephemeris extension. The range is from 40000 to 180000 ms.Default value is 180000 ms.
Extension Gap	Msec	60000	he range is from 0 to 3600000 ms. Default value is 60000 ms. (Extension gap is the limitation between neighboring Dynamic Ephemeris Extension (DEE)).

PMTK 225 : PMTK_SET_PERIODIC_MODE

Periodic Power Saving Mode Settings: (See following chart)

In RUN stage, the GPS receiver measures and calculates positions.

In SLEEP stage, the GPS receiver may enter two different power saving modes. One is "Periodic Standby Mode", and another is "Periodic Backup Mode". Due to hardware limitation, the maximum power down duration (SLEEP) is 2047 seconds. If the configured "SLEEP" interval is larger than 2047 seconds, GPS firmware will automatically extend the interval by software method. However, GPS system will be powered on for the interval extension and powered down again after the extension is done.

Table 2-28: 225 PMTK_SET_PERIODIC_MODE

Data Field: PMTK225, <Type>,<Run Time>,<Sleep Time>,<Second Run Time>,<Second Sleep Time>

Example: Enter the cycle standby mode
     Regular Backup Mode
         PMTK225,0

```
        PMTK223,1,25,180000,60000
        PMTK225,1,3000,12000,18000,72000
    Regular Standby Mode
        PMTK225,0
        PMTK223,1,25,180000,60000
        PMTK225,2,3000,12000,18000,72000
```
Example: Enter AlwaysLocate™ Mode
```
    AlwaysLocate™ Standby Mode
        PMTK225,0
        PMTK225,8
    AlwaysLocate™ Backup Mode
        PMTK225,0
        PMTK225,9
```

Field	Unit	Default	Description
Type	--	--	'0' = Back to normal mode '1' = Periodic Backup mode '2' = Periodic Standby mode '4' = Perpetual Backup mode '8' = AlwaysLocate Standby mode '9' = AlwaysLocate Backup mode
Run Time	Msec		Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode. '0': Disable >='1000': Enable [Range: 1000~518400000]
Sleep Time	Msec		Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix. [Range: 1000~518400000]
Second Run Time	Msec		Duration [msec] to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode. '0': Disable >= '1000': Enable [Range: Second set both 0 or 1000~518400000]
Second Sleep Time	Msec		Interval [msec] to come out of a minimum power sleep mode and start running in order to get a new position fix. [Range: Second set both 0 or 1000~518400000]

NOTE：

    1. the Second run time should larger than First run time when non-zero value.

    2. AlwaysLocate™ is a registered trademark of MediaTek.

PMTK 251 : PMTK_SET_NMEA_BAUDRATE

Set NMEA port baudrate. Using PMTK251 command to setup baud rate setting, the setting will be back to defatult value in the two conditions.
1. Full cold start command is issued
2. Enter standby mode

Table 2-29: 251 PMTK_SET_NMEA_BAUDRATE

Data Field: PMTK251,<Baudrate>			
Example: $PMTK251,38400*27<CR><LF>			
Field	**Unit**	**Default**	**Description**
Baudrate	bps	--	Baudrate: Baudrate setting 0 – default setting 4800 9600 14400 19200 38400 57600 115200 230400 460800 921600

PMTK 256 : PMTK_SET_TIMING_PRODUCT

Enable or disable timing product mode (Default off).
The timing product mode will enhance the PPS output timing accuracy which is listed in below table.

Table 2-30: 256 PPS output timing accuracy list table

Constellation	Previous	AXN 3.8
GPS	20 ns	<15 ns
G+G	35 ns	<15 ns
G+B	50 ns	<15 ns

Table 2-31: 256 PMTK_SET_TIMING_PRODUCT

Data Field: PMTK256,<Enabled>			
Example: $PMTK256,1*2E<CR><LF>			
Field	**Unit**	**Default**	**Description**
Enabled	--	0	'0', Disable. '1', Enable.

NOTE：

Please measure the accuracy after the device collect all satellites almanac.

PMTK 257 : PMTK_SET_HIGH_ACCURACY

Enable fast TTFF or high accuracy function when out of the tunnel or garage. (Default enabled high accuracy function).
Keep status after reboot –> No.

Table 2-32: 257 PMTK_SET_HIGH_ACCURACY

Data Field: PMTK257,<Functionality>			
Example: $PMTK257,1*2F<CR><LF>			
Field	**Unit**	**Default**	**Description**
Functionality	--	1	'0' = Enable fast TTFF when out of the tunnel or garage '1' = Enable high accuracy when out of the tunnel or garage

PMTK 262 : PMTK_SET_GLP_MODE

Enable or disable GNSS Low Power(GLP) mode.
Keep status after reboot –> No.

Table 2-33: 262 PMTK_SET_GLP_MODE

Data Field: PMTK262,<Enabled>

Example:
$PMTK262,1*29<CR><LF> (Enable GLP mode for MT3339)
$PMTK262,3*2B<CR><LF> (Enable GLP mode for MT3333)

Field	Unit	Default	Description
Enabled	--	0	'0' = Disable GLP mode '1' = Enable GLP mode for MT3339 '3' = Enable GLP mode for MT3333

PMTK 265 : PMTK_SET_NMEA_DECIMAL_PRECISION

Set number of fractional digit in NMEA.
Keep status after reboot –> No.

Table 2-34: 265 PMTK_SET_NMEA_DECIMAL_PRECISION

Data Field: PMTK265,<Number>

Example:$PMTK265,1*2E <CR><LF>

Field	Unit	Default	Description
Number	--	1	'1', 4 digits '2', 5 digits '3', 6 digits

PMTK 285 : PMTK_SET_PPS_CONFIG_CMD

Configure the PPS settings.
Keep status after reboot –> Yes.

Table 2-35: 285 PMTK_SET_PPS_CONFIG_CMD

Data Field: PMTK285,<PPSType>,<PPSPulseWidth>

Example:$PMTK285,2,100*3E<CR><LF>

Field	Unit	Default	Description
PPSType	--	1	Availability '0', Disable '1', After the first fix

			'2', 3D fix only
			'3', 2D/3D fix only
			'4', Always
PPSPulseWidth	ms	--	PPS Pulse Width

PMTK 286 : PMTK_SET_AIC_CMD

Enable or disable active interference cancellation function.

Keep status after reboot –> No.

Table 2-36: 286 PMTK_SET_AIC_CMD

Data Field: PMTK286,<Enabled>			
Example: $PMTK286,1*23<CR><LF>			
Field	Unit	Default	Description
Enabled	--	--	Enable or disable '0' = Disable '1' = Enable

PMTK 301 : PMTK_API_SET_DGPS_MODE

DGPS correction data source mode.

Keep status after reboot –> Yes.

Table 2-37: 301 PMTK_API_SET_DGPS_MODE

Data Field: PMTK301,<Mode>			
Example: $PMTK301,1*2D<CR><LF>			
Field	Unit	Default	Description
Mode	--	--	Mode: DGPS data source mode. '0': No DGPS source '1': RTCM '2': SBAS(Include WAAS/EGNOS/GAGAN/MSAS)

PMTK 306 : PMTK_API_SET_MIN_SNR

Set the minimum SNR of used satellites.
Keep status after reboot –> No.

Table 2-38: 306 PMTK_API_SET_MIN_SNR

Data Field: PMTK306,<MIN_SNR>			
Example: $PMTK306,15*1F<CR><LF> Set the minimum SNR threshold to 15, the chip would not use the satellite which SNR is smaller than 15.			
Field	Unit	Default	Description
MIN_SNR	--	9	Minimum SNR threshold of used satellites. [Valid range: 9~37]

PMTK 308 : PMTK_API_SET_DR_LIMIT

Set the number of estimated fix when entering the tunnel.
Keep status after reboot –> No.

Table 2-39: 308 PMTK_API_SET_DR_LIMIT

Data Field: PMTK308,<DR_LIMIT>			
Example: $PMTK308,0*25<CR><LF> Disable the estimated fix when entering the tunnel. $PMTK308,3*26<CR><LF> Keep outputting 3 fix when entering the tunnel.			
Field	Unit	Default	Description
DR_LIMIT	--	0	Number of estimated fix. [Valid range: 0~500]

PMTK 313 : PMTK_API_SET_SBAS_ENABLED

Enable to search a SBAS satellite or not.
Keep status after reboot –> Yes.

Table 2-40: 313 PMTK_API_SET_SBAS_ENABLED

Data Field: PMTK313,<Enable>			
Example: $PMTK313,1*2E<CR><LF>			
Field	**Unit**	**Default**	**Description**
Enable	--	--	Enabled: Enable or disable '0' = Disable '1' = Enable

PMTK 314 : PMTK_API_SET_NMEA_OUTPUT

Set the NMEA sentence output type and frequencies.
Keep status after reboot –> Yes.

Table 2-41: Supported Frequency Settings NMEA

No	Field	Description
0	NMEA_SEN_GLL	GPGLL interval - Geographic Position - Latitude longitude
1	NMEA_SEN_RMC	GPRMC interval - Recomended Minimum Specific GNSS Sentence
2	NMEA_SEN_VTG	GPVTG interval - Course Over Ground and Ground Speed
3	NMEA_SEN_GGA	GPGGA interval - GPS Fix Data
4	NMEA_SEN_GSA	GPGSA interval - GNSS DOPS and Active Satellites
5	NMEA_SEN_GSV	GPGSV interval - GNSS Satellites in View
6	NMEA_SEN_GRS	GPGRS interval - GNSS Range Residuals
7	NMEA_SEN_GST	GPGST interval - GNSS Pseudorange Erros Statistics
8	NMEA_SEN_PLT	POLYT interval - Time
9	NMEA_SEN_PLP	POLYP interval - Position (Lat, Long)
10	NMEA_SEN_PLS	POLYS interval - Satellite data
11	NMEA_SEN_PLI	POLYI interval - Additional Information
12	NMEA_SEN_PLH	POLYH interval - HDS Time Information
13	NMEA_SEN_MALM	PMTKALM interval - GPS almanac information

14	NMEA_SEN_MEPH	PMTKEPH interval - GPS ephmeris information
15	NMEA_SEN_MDGP	PMTKDGP interval - GPS differential correction information
16	NMEA_SEN_MDBG	PMTKDBG interval - MTK debug information
17	NMEA_SEN_ZDA	GPZDA interval - Time & Date
18	NMEA_SEN_MCHN	PMTKCHN interval - GPS channel status
19	NMEA_SEN_DTM	DTM interval - GNSS datum reference information
20	NMEA_SEN_GBS	GBS interval - GNSS satellite fault detection
21	NMEA_SEN_GPACC URACY	GPACCURACY interval - Position quality index

Supported Frequency Settings：

    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

Example:

$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,1,1,0,1,1,0*2C<CR><LF>

This command set GLL output frequency to be outputting once every 1 position fix, and RMC to be outputting once every 1 position fix, and so on.

You can also restore the system default setting via issue:

$PMTK314,-1*04<CR><LF>

NOTE：

    Settings of GST and GRS are valid only when firmware supports GST/GRS sentences.

PMTK 326 : PMTK_API_SET_PPS

This packet contains the local time in milliseconds and phase where the PPS should be placed.
Keep status after reboot –> No.

Table 2-42: 326 PMTK_API_SET_PPS

Data Field: PMTK326,<PPS_BY_USER>,<Local_ms>,<phase>

Example: $PMTK326,1,1345,555*1E<CR><LF>

Field	Unit	Default	Description
PPS_BY_USER	--	--	'1', PPS output by user. '0', PPS automatic output.
Local_ms	--	--	Local receiver time tick. Range is from 0 to 4294967295 (232-1). If PSS enable, this parameter will aligned TOW
phase	--	--	Time tick phase range is from 0 to 262143. If PSS enable, this parameter will aligned TOW.

PMTK 328 : PMTK_API_SET_HACC_MASK

Set horizontal accuracy mask. Range from 30m to 200m or -1. GPS will get fix only when hacc value < mask.
Keep status after reboot –> Yes.

Table 2-43: 328 PMTK_API_SET_HACC_MASK

Data Field: PMTK328,<HaccMask>			
Example: $PMTK328,50*12<CR><LF>			
Field	**Unit**	**Default**	**Description**
HaccMask	--	-1	HaccMask: 30~200: enable hacc mask feature. (Units: meter) -1 [Default Value]: disable hacc mask feature.

PMTK 330 : PMTK_API_SET_DATUM

Set default datum.
Keep status after reboot –> Yes.

Table 2-44: 330 PMTK_API_SET_DATUM

Data Field: PMTK330,<Datum>			
Example: $PMTK330,0*2E<CR><LF>			
Field	**Unit**	**Default**	**Description**

Datum	--	0	Datum: 0: WGS84
			    1: TOKYO-M
			    2: TOKYO-A
			The total datums list in the AppendixA Datum List.

PMTK 331 : PMTK_API_SET_DATUM_ADVANCE

Set user defined datum.
Keep status after reboot –> Yes.

Table 2-45: 331 PMTK_API_SET_DATUM_ADVANCE

Data Field: PMTK331,<majA>,<eec>,<dX>,<dY>, <dZ>			
Example: $PMTK331,6377397.155,299.1528128,-148.0,507.0,685.0*16<CR><LF>			
Field	**Unit**	**Default**	**Description**
majA	m	--	User defined datum semi-major axis [m] [Range: 0 ~ 7000000]
eec	m	--	User defined datumeccentric [m] [Range:　0 ~ 330]
dX	m	--	User defined datum to WGS84 X axis offset [m]
dY	m	--	User defined datum to WGS84 X axis offset [m]
dZ	m	--	User defined datum to WGS84 X axis offset [m]

PMTK 351 : PMTK_API_SET_SUPPORT_QZSS_NMEA

The receiver supports new NMEA format for QZSS. The command allow user enable or disable QZSS NMEA format.
Default is disabling QZSS NMEA format. (Using NMEA 0183 V3.01)
Keep status after reboot –> Yes.

Table 2-46: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

Data Field: PMTK351,<Enabled>
Example: $PMTK351,0*29 : Disable QZSS NMEA format

$PMTK351,1*28 : Enable QZSS NMEA format				

Field	Unit	Default	Description
Enabled	--	0	'0': Disable '1': Enable

PMTK 352 : PMTK_API_SET_STOP_QZSS

Since QZSS is regional positioning service. The command allow user enable or disable QZSS function.
Default is enable QZSS function.
Keep status after reboot –> Yes.

Table 2-47: 352 PMTK_API_SET_STOP_QZSS

Data Field: PMTK352,<Enabled>				
Example: $PMTK352,0*2A : Enable QZSS function $PMTK352,1*2B : Disable QZSS function				

Field	Unit	Default	Description
Enabled	--	0	'0': Enable '1': Disable

PMTK 353 : PMTK_API_SET_GNSS_SEARCH_MODE

Configure the receiver to start searching for satellites. The setting is available when the NVRAM data is valid.
Keep status after reboot –> Yes.

Table 2-48: 353 PMTK_API_SET_GNSS_SEARCH_MODE

Data Field:PMTK353,<GPS_Enabled>,<GLONASS_Enabled>,<GALILEO_Enabled>,<Reserve>,<BEIDOU_Enable>

Example:
    $PMTK353,0,1,0,0,0*2A : Search GLONASS satellites only.
    $PMTK353,1,0,0,0,0*2A : Search GPS satellites only.
    $PMTK353,1,1,0,0,0*2B : Search GPS and GLONASS satellites.
    $PMTK353,1,0,1,0,0*2B : Search GPS and GALILEO satellites.
    $PMTK353,1,1,1,0,0*2A : Search GPS GLONASS, GALILEO satellites.

$PMTK353,0,0,0,0,1*2A : Search BEIDOU satellites only.

$PMTK353,1,0,0,0,1*2B : Search GPS and BEIDOU satellites.

Field	Unit	Default	Description
GPS_Enable	--	--	'0': disable (DO NOT search GPS satellites) '1' or non-ZERO: search GPS satellites
GLONASS_Enabled	--	0	'0': disable (DO NOT search GLONASS satellites) '1' or non-ZERO: search GLONASS satellites
GALILEO_Enabled	--	0	'0', disable (DO NOT search GALILEO satellites). '1', or non-ZERO: search GALILEO satellites.
Reserve	--	0	Reserve Field
BEIDOU_Enable	--	--	'0': disable (DO NOT search BEIDOU satellites) '1' or non-ZERO: search BEIDOU satellites

NOTE：

GLONASS only, BeiDou only and GALILEO only mode is only for testing purpose.
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.

PMTK 356 : PMTK_API_SET_HDOP_THRESHOLD

This command is to set the HDOP threshold.
If the HDOP value is larger than this threshold value, the position will not be fixed.
Keep status after reboot –> No.

Table 2-49: 356 PMTK_API_SET_HDOP_THRESHOLD

Data Field: PMTK356,<HDOPThreshold>
Example: $PMTK356,0.8*38 **Return:** $PMTK356,0.8 Set OK!*5F

Field	Unit	Default	Description
HDOPThreshold	--	0	'0': Disable this function. Other value: Enable set the HDOP threshold

PMTK 357 : PMTK_API_GET_HDOP_THRESHOLD

This command is to get the HDOP threshold.
Keep status after reboot –> No.

Table 2-50: 357 PMTK_API_GET_HDOP_THRESHOLD

Data Field: PMTK357			
Example: $PMTK357*33 **Return:** $PMTK357,0.8*39			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 381 : PMTK_API_SET_PLL

PMTK_API_SET_PLL.
Keep status after reboot –> No.

Table 2-51: 381 PMTK_API_SET_PLL

Data Field: PMTK381,<PLL_status>			
Example: $PMTK381,1*25<CR><LF>			
Field	**Unit**	**Default**	**Description**
PLL_status	--	0	PLL_status: '0', Phase Lock Lopp on/off determine by environment. '1', Phase Lock Lopp are always enable.

PMTK 386 : PMTK_API_SET_STATIC_NAV_THD

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

Keep status after reboot –> No.

Table 2-52: 386 PMTK_API_SET_STATIC_NAV _THD

Data Field: PMTK386, <Speed_threshold>			
Example: $PMTK386,0.4*39<CR><LF>			
Field	Unit	Default	Description
Speed_threshold	m/s	0	0~2 m/s. Default value is 0 m/s. The minimum is 0.1 m/s, the maximum is 2.0 m/s.

PMTK 400 : PMTK_API_Q_FIX_CTL

Query the rate of position fixing activity.
Keep status after reboot –> No.

Table 2-53: 400 PMTK_API_Q_FIX_CTL

Data Field: PMTK400			
Example: $PMTK400*36<CR><LF> Return: $PMTK_DT_FIX_CTL			
Field	Unit	Default	Description
--	--	--	--

PMTK 401 : PMTK_API_Q_DGPS_MODE

Query the DGPS data source mode.
Keep status after reboot –> No.

Table 2-54: 401 PMTK_API_Q_DGPS_MODE

Data Field: PMTK401
Example: $PMTK401*37<CR><LF> Return:

$PMTK_DT_DGPS_MODE			

Field	Unit	Default	Description
--	--	--	--

PMTK 406 : PMTK_API_Q_MIN_SNR

Query the minimum SNR of used satellites.
Keep status after reboot –> No.

Table 2-55: 406 PMTK_API_Q_MIN_SNR

Data Field: PMTK406			
Example: $PMTK406*30<CR><LF> **Return:** $PMTK506,15*19<CR><LF> : The minimum SNR threshold is 15 $PMTK506,0*2D<CR><LF> : The user didn't set the minimum SNR threshold			

Field	Unit	Default	Description
--	--	--	--

PMTK 408 : PMTK_API_Q_DR_LIMIT

Query the number of estimated fix when entering the tunnel.
Keep status after reboot –> No.

Table 2-56: 408 PMTK_API_Q_DR_LIMIT

Data Field: PMTK408			
Example: $PMTK408*3E<CR><LF> **Return:** $PMTK508,0*23<CR><LF> => The user disable the DR estimated fix			

Field	Unit	Default	Description
--	--	--	--

PMTK 411 : PMTK_API_Q_ELEV_MASK

Query satellite elevation mask.
Keep status after reboot –> No.

Table 2-57: 408 PMTK_API_Q_ELEV_MASK

Data Field: PMTK411			
Example: $PMTK411*36<CR><LF> **Return:** $PMTK511,Degree			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 413 : PMTK_API_Q_SBAS_ENABLED

Query the status of SBAS to check if it is enabled or not.
Keep status after reboot –> No.

Table 2-58: 413 PMTK_API_Q_SBAS_ENABLED

Data Field: PMTK413			
Example: $PMTK413*34<CR><LF> **Return:** PMTK_DT_SBAS_ENABLED			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 414 : PMTK_API_Q_NMEA_OUTPUT

Query current NMEA sentence output frequencies.
Keep status after reboot –> No.

Table 2-59: 414 PMTK_API_Q_NMEA_OUTPUT

Data Field: PMTK414			
Example: $PMTK414*33<CR><LF> Return: PMTK_DT_NMEA_OUTPUT			
Field	Unit	Default	Description
--	--	--	--

PMTK 428 : PMTK_API_Q_NMEA_OUTPUT

Query horizontal accuracy mask.
Keep status after reboot –> No.

Table 2-60: 428 PMTK_API_Q_HACC_MASK

Data Field: PMTK428			
Example: $PMTK428*3C<CR><LF> Return: PMTK_DT_HACC_MASK			
Field	Unit	Default	Description
--	--	--	--

PMTK 430 : PMTK_API_Q_DATUM

Query default datum.
Keep status after reboot –> No.

Table 2-61: 430 PMTK_API_Q_DATUM

Data Field: PMTK430
Example: $PMTK430*35<CR><LF> Return: PMTK_DT_DATUM

Field	Unit	Default	Description
--	--	--	--

PMTK 431 : PMTK_API_Q_DATUM_ADVANCE

Query user defined datum.
Keep status after reboot –> No.

Table 2-62: 431 PMTK_API_Q_DATUM_ADVANCE

Data Field: PMTK431			
Example: $PMTK431*34<CR><LF> Return: PMTK_DT_DATUM			
Field	Unit	Default	Description
--	--	--	--

PMTK 435 : PMTK_API_Q_RTC_TIME

Query current RTC UTC time.
Keep status after reboot –> No.

Table 2-63: 435 PMTK_API_Q_RTC_TIME

Data Field: PMTK435			
Example: $PMTK435*30<CR><LF> Return: PMTK_DT_RTC_TIME			
Field	Unit	Default	Description
--	--	--	--

PMTK 436 : PMTK_API_Q_HIGH_SENSITIVITY_TRACKING _NO_FIX

Query user defined datum.
Keep status after reboot –> No.

Table 2-64: 436 PMTK_API_Q_HIGH_SENSITIVITY_TRACKING_NO_FIX

Data Field: PMTK436			
Example: $PMTK436*33<CR><LF> **Return:** PMTK_DT_HIGH_SENSITIVITY_TRACKING_NO_FIX			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 447 : PMTK_API_Q_STATIC_NAVI_THD

Query the static navigation speed threshold.
Keep status after reboot –> No.

Table 2-65: 447 PMTK_API_Q_STATIC_NAVI_THD

Data Field: PMTK447			
Example: $PMTK447*35<CR><LF> **Return:** PMTK_DT_STATIC_NAVI_THD			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 449 : PMTK_API_Q_EPH_STATUS

This command is to query the current status of ephemeris downloading.
Keep status after reboot –> No.

Table 2-66: 449 PMTK_API_Q_EPH_STATUS

Data Field: PMTK449			
Example: $PMTK449*3B<CR><LF> **Return:** $PMTK001,449,3,1*24 : The ephemeris downloading is finished. $PMTK001,449,3,0*25 : The ephemeris downloading is not finished yet.			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 458 : PMTK_API_GET_POS_XYZ

Returns the WGS84 ECEF XYZ Cartesian Position vector (metres) with an estimated 1-sigma accuracy.
Keep status after reboot –> No.

Table 2-67: 458 PMTK_API_GET_POS_XYZ

Data Field: PMTK458			
Example: $PMTK458*3B<CR><LF> **Return:** PMTK_DT_POS_XYZ			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 461 : PMTK_API_GET_VEL_XYZ

Returns the WGS84 ECEF XYZ Cartesian velocity vector (m/s) with an estimated 1-sigma accuracy.
Keep status after reboot –> No.

Table 2-68: 461 PMTK_API_GET_VEL_XYZ

Data Field: PMTK461

Example:
$PMTK461*31<CR><LF>
Return:
PMTK_DT_VEL_XYZ

Field	Unit	Default	Description
--	--	--	--

PMTK 500 : PMTK_DT_FIX_CTL

These parameters show the rate of position fixing activity.
Keep status after reboot –> No.

Table 2-69: 500 PMTK_DT_FIX_CTL

Data Field: PMTK500,<FixInterval>,<Duration>,<RunInterval>,<HAcc>,<VAcc>			
Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>			

Field	Unit	Default	Description
FixInterval	msec	--	Position fix interval. (msec). [Range: 100 ~ 10000]
Duration	msec	--	Duration to fix for (or attempt to fix for) before switching from running mode back to a minimum power sleep mode.
RunInterval	msec	--	Interval to come out of a minimum power sleep mode and start running in order to get a new position fix.
HAcc	m	--	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.
VAcc	m	--	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.

PMTK 501 : PMTK_DT_DGPS_MODE

Response the DGPS data source mode.
Keep status after reboot –> No.

Table 2-70: 501 PMTK_DT_DGPS_MODE

Data Field: PMTK501,<Mode>			
Example: $PMTK501,1*2B<CR><LF>			
Field	Unit	Default	Description
Mode	--	--	DGPS data source mode '0': No DGPS source '1': RTCM '2': WAAS '3': GSM '4': WCDMA '5': CDMA2K

PMTK 506 : PMTK_DT_MIN_SNR

Query Min SNR.
Minimum Signal-to-Noise ratio (dBHz) required for a satellite measurement to be flagged as being present and capable of being used in the present solution.
Keep status after reboot –> No.

Table 2-71: 506 PMTK_DT_MIN_SNR

Data Field: PMTK506,<MIN>			
Example: $PMTK506,30*1E<CR><LF>			
Field	Unit	Default	Description
MIN	dBHz	--	Minimum signal-to-noise ratio for a measurement to be included in the solution. [0 to 60].

PMTK 508 : PMTK_DT_DR_LIMIT

Query Dead-Reckoning limit.
Limit of the number of forward predictive Dead-Reckoning navigation solution updates (seconds) following the last valid GPS fix.
Keep status after reboot –> No.

Table 2-72: 508 PMTK_DT_DR_LIMIT

Data Field: PMTK508,<Limit>			
Example: $PMTK508,5*26<CR><LF>			
Field	**Unit**	**Default**	**Description**
Limit	Seconds	--	Limit of DR updates after last valid fix. [0 to 500].

PMTK 511 : PMTK_DT_ELEV_MASK

Elevation Mask the minimum satellite elevation angle for the satellites to be included in the navigation solution.
Keep status after reboot –> No.

Table 2-73: 511 PMTK_DT_ELEV_MASK

Data Field: PMTK511,<Mask>			
Example: $PMTK511,5*2E<CR><LF>			
Field	**Unit**	**Default**	**Description**
Mask	Degrees	--	Elevation Mask. [-89 to 89].

PMTK 513 : PMTK_DT_SBAS_ENABLED

Enable or disable searching for SBAS satellites.
Keep status after reboot –> No.

Table 2-74: 513 PMTK_DT_SBAS_ENABLED

Data Field: PMTK513,<Enabled>			
Example: $PMTK513,1*28<CR><LF>			
Field	**Unit**	**Default**	**Description**
Enabled	--	--	'0'= Disable '1' = Enable

PMTK 514 : PMTK_DT_NMEA_OUTPUT

The NMEA sentence output frequency configuration.
Keep status after reboot –> No.

Table 2-75: 514 PMTK_DT_NMEA_OUTPUT

Data Field: PMTK514,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,<Reserved>,<...>,<Reserved>			
Example: $PMTK514,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1,1,1,1*37<CR><LF>			
Field	**Unit**	**Default**	**Description**
1 GLL	--	--	GLL interval - Geographic Position - Latitude longitude
2 RMC	--	--	RMC interval - Recommended Minimum Specific GNSS Sentence
3 VTG	--	--	VTG interval - Course Over Ground and Ground Spee
4 GGA	--	--	GGA interval - GPS Fix Data
5 GSA	--	--	GSA interval - GNSS DOPS and Active Satellites
6 GSV	--	--	GSV interval - GNSS Satellites in View
7 Reserved	--	--	
......	--	--	
20 Reserved	--	--	

PMTK 527 : PMTK_DT_STATIC_NAVI_THD

The static navigation speed threshold.
Keep status after reboot –> No.

Table 2-76: 527 PMTK_DT_STATIC_NAVI_THD

Data Field: PMTK527,<Speed_threshold>			
Example: $PMTK527,0.4*34 <CR><LF>			
Field	**Unit**	**Default**	**Description**

| Speed_threshold | -- | -- | Current static navigation speed threshold. |

PMTK 528 : PMTK_DT_HACC_MASK

Current horizontal accuracy mask.
Keep status after reboot –> No.

Table 2-77: 528 PMTK_DT_HACC_MASK

Data Field: PMTK528,<Mask>			
Example: $PMTK528,50.00*3A<CR><LF>			
Field	Unit	Default	Description
Mask	--	--	The current horizontal accuracy mask.

PMTK 530 : PMTK_DT_DATUM

Current datum used.
Keep status after reboot –> No.

Table 2-78: 530 PMTK_DT_DATUM

Data Field: PMTK530,<Datum>			
Example: $PMTK530,0*28<CR><LF>			
Field	Unit	Default	Description
Datum	--	--	0: WGS84 1: TOKYO-M 2: TOKYO-A

PMTK 536 : PMTK_DT_HIGH_SENSITIVITY_TRACKING _NO_FIX

This packet carries setting of position output disabled/enabled in high sensitivity tracking mode.
Keep status after reboot –> No.

Table 2-79: 536 PMTK_DT_HIGH_SENSITIVITY_TRACKING_NO_FIX

Data Field: PMTK536,<Disable_Position_Output>			
Example: $PMTK536,1*2F<CR><LF>			
Field	**Unit**	**Default**	**Description**
Disable_Position_ Output	--	--	'0': Enable '1': Disable

PMTK 558 : PMTK_DT_POS_XYZ

The WGS84 ECEF XYZ Cartesian Position vector (Metres) with an estimated 1-sigma accuracy.
Keep status after reboot –> No.

Table 2-80: 558 PMTK_DT_POS_XYZ

Data Field: PMTK558,<X>,<Y>,<Z>,<Acc>			
Example: $PMTK558,-2984524.0,4966958.3,2656485.3,3.0*17<CR><LF>			
Field	**Unit**	**Default**	**Description**
X	Metres	--	WGS84 ECEF X Cartesian position.
Y	Metres	--	WGS84 ECEF Y Cartesian position.
Z	Metres	--	WGS84 ECEF Z Cartesian position.
Acc	Metres	--	3-dimensional position space 1-sigma accuracy estimate.

PMTK 561 : PMTK_DT_VEL_XYZ

The WGS84 ECEF XYZ Cartesian Position vector (Metres) with an estimated 1-sigma accuracy.
Keep status after reboot –> No.

Table 2-81: 561 PMTK_DT_VEL_XYZ

Data Field: PMTK561,<X>,<Y>,<Z>,<Acc>

Example: $PMTK561,0.19,-0.07,-0.11,0.49*32<CR><LF>			
Field	**Unit**	**Default**	**Description**
X	m/s	--	WGS84 ECEF X Cartesian velocity vector.
Y	m/s	--	WGS84 ECEF Y Cartesian velocity vector.
Z	m/s	--	WGS84 ECEF Z Cartesian velocity vector.
Acc	m/s	--	3-dimensional speed 1-sigma accuracy.

PMTK 605 : PMTK_Q_RELEASE

Query the firmware release information.
Keep status after reboot –> No.

Table 2-82: 605 PMTK_Q_RELEASE

Data Field: PMTK605			
Example: $PMTK605*31<CR><LF> **Return:** PMTK_DT_RELEASE			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 607 : PMTK_Q_EPO_INFO

Query the EPO data status stored in the GPS chip.
Keep status after reboot –> No.

Table 2-83: 607 PMTK_Q_EPO_INFO

Data Field: PMTK607			
Example: $PMTK607*33<CR><LF>			
Field	**Unit**	**Default**	**Description**

--	--	--	--

PMTK 622 : PMTK_Q_LOCUS_DATA

Use Locus tool to retrieve the logging data from the NVRAM.
Keep status after reboot –> No.

Table 2-84: 622 PMTK_Q_LOCUS_DATA

Data Field: PMTK622,<type>[,<offset>,<size>]			
Example: Input: $PMTK622,0*28 //Dump full LOCUS flash data Input: $PMTK622,1*29 //Dump partial in used LOCUS flash data Input: $PMTK622,2,3,2*2B //Skip sector 1,2,3. Dump sector4 and sector5 LOCUS flash data			
Field	**Unit**	**Default**	**Description**
type	--	--	2-Dump specified sectors' LOCUS flash data
offset	--	--	The start address for dump (0<=offset<32, the unit is sector[4KB])
size	--	--	The dump length (0<=size<=32, the unit is sector[4KB])

PMTK 660 : PMTK_Q_AVAILABLE_SV_EPH

Support PMTK660 which report valid Ephemeris SV.
(a) Host -> MT3329: A PMTK660 command to request the EPH info, together with a time interval parameter (for example, 1800sec).
(b) MT3329 -> Host: Reply 32-bit flags of 32SV to indicate which EPHs will be available after the specified time interval.
Keep status after reboot –> No.

Table 2-85: 660 PMTK_Q_AVAILABLE_SV_EPH

Data Field: PMTK660,<Time Interval>
Example: $PMTK660,1800*17<CR><LF>   Indicate which EPHs will be available after 1800 seconds   **Return:** $PMTK001,660,3,40449464*17<CR><LF>

Note：			
The Hex 40449464 means 0100 0000 0100 0100 1001 0100 0110 0100 and the Valid SV's numbers are 3, 6, 7, 11,13, 16, 19, 23, 31			

Field	Unit	Default	Description
Time interval	Second	--	Set the time interval for MT3329 to reply 32-bit flags of 32SV. Note that the Time interval > 0 and <= 7200 (2 hours).

PMTK 661 : PMTK_Q_AVAILABLE_SV_ALM

Support PMTK661 which report valid Almanac SV.
(a) Host -> MT3329: A PMTK661 command to request the Almanac info, together with a time interval parameter (for example, 30 days).
(b) MT3329 -> Host: Reply 32-bit flags of 32SV to indicate which Almanac will be available after the specified time interval.
Keep status after reboot –> No.

Table 2-86: 661 PMTK_Q_AVAILABLE_SV_ALM

Data Field: PMTK661,<Time Interval>			
Example: $PMTK661,30*1C<CR><LF> Indicate which Almanac will be available after 30 days **Return:** $PMTK001,661,3,fec0bfff*49<CR><LF> **Note：** The Hex fec0bfff means 11111110110000001011111111111111 and the Valid SV's numbers are 1,2,3,4,5,6,7,8,9,10,11,12,13,14,16,23,24,26,27,28,29,30,31,32.			

Field	Unit	Default	Description
Time Interval	Day	--	Set the time interval for MT3329 to reply 32-bit flags of 32SV. Note that the Time interval > 0 and <= 365 (1 year for maximum)

PMTK 705 : PMTK_DT_RELEASE

Firmware release information.
Keep status after reboot –> No.

Table 2-87: 705 PMTK_DT_RELEASE

Data Field: PMTK705,<ReleaseStr>,<Build_ID>,<Product_Model>,<SDK_Version>			
Example: $PMTK705,AXN_0.2,1234,ABCD,*14<CR><LF>			

Field	Unit	Default	Description
ReleaseStr	--	--	Firmware release name and version 3333 : AXN_x.x
Build_ID	--	--	Build ID set in CoreBuilder for firmware version control
Product_Model	--	--	Product Model set in CoreBuilder for product identification
SDK_Version	--	--	Showing SDK version if the firmware is used for SDK

PMTK 707 : PMTK_DT_EPO_INFO

EPO data status stored in GPS chip.
Keep status after reboot –> No.

Table 2-88: 707 PMTK_DT_EPO_INFO

Data Field: PMTK707,<Set>,<FWN>,<FTOW>,<LWN>,<LTOW>,<FCWN>,<FCTOW>,<LCWN>,<LCTOW>			
Example: $PMTK707,56,1468,172800,1470,151200,1468,259200,1468,259200*1F<CR><LF>			

Field	Unit	Default	Description
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

PMTK 713 : PMTK_DT_LOC

Receiver location information, includes latitude, longitude, height and accuracy.

Keep status after reboot –> No.

Table 2-89: 713 PMTK_DT_LOC

Data Field: PMTK713,<Lat>,<Lon>,<Hght>,<AccMaj>,<AccMin>,<Bear>,<AccVert>			
Example: $PMTK713,24.772816,121.022636,175.0,50.0,50.0,0.0,100.0*0D			
Field	**Unit**	**Default**	**Description**
Lat	degree	--	Receiver Latitude in degrees
Lon	degree	--	Receiver Longitude in degrees
Hght	meter	--	Receiver Height in meters
AccMaj	m	--	semi-major RMS accuracy
AccMin	m	--	seim-minor RMS accuracy
Bear	degree	--	Bearing in degrees
AccVert	m	--	Vertical RMS accuracy

PMTK 740 : PMTK_DT_UTC

The packet contains current UTC 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.

Keep status after reboot –> Yes.

Table 2-90: 740 PMTK_DT_UTC

Data Field: PMTK740,<YYYY>,<MM>,<DD>,<hh>,<mm>,<ss>			
Example: $PMTK740,2010,2,10,9,0,58*05<CR><LF> The packet indicates that the current：2010/02/10 09:00:58.			
Field	**Unit**	**Default**	**Description**
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

PMTK 810 : PMTK_TEST_ALL

Enter MP test mode and set test item and SV id。

Keep status after reboot –> No.
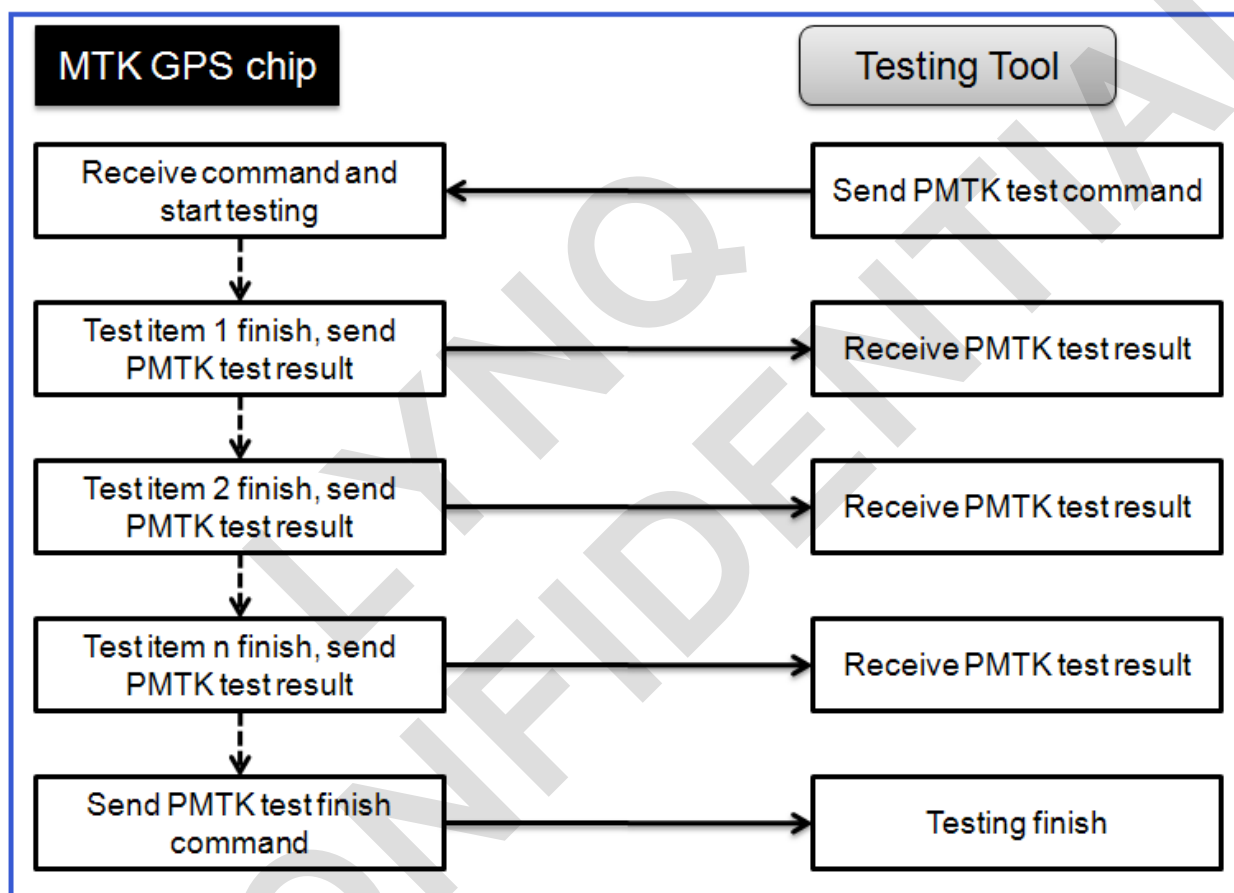
Table 2-91: 810 PMTK_TEST_ALL

Data Field: PMTK810,<Bitmap>,<SV>			
Example: $PMTK810,0003,1D*4D<CR><LF> This command only tests TEST_INFO and TEST_ACQ test items. The specific SV id is PRN29.			
Field	**Field**	**Field**	**Field**
Bitmap	--	--	The first data field means the test items.

			Each bit of test item field means one test item. List these test items below. Supported Test Items Bit0 TEST_INFO // Include f/w version, NMEA type and NMEA output rate Bit1 TEST_ACQ // the time of acquiring the specific SV Bit2 TEST_BITSYNC // the time of bit sync Bit3 TEST_SIGNAL // Include phase error, TCXO clock/drift and CNR mean/sigma Bit4 -15 (Reserved)
SV	--	--	The second means the SV id. The value of SV id is between 1 and 20 in Hex format. The value of Glonass SVID is Frequency ID which is between C9 and D6 in Hex format. **Note:** Glonass frequency id representation -7 = C9 -6 = CA -5 = CB -4 = CC -3 = CD -2 = DE -1 = CF 0 = D0 1 = D1 2 = D2 3 = D3 4 = D4 5 = D5 6 = D6

PMTK 811 : PMTK_TEST_STOP

Testing tool could send this command to GPS receiver to leave MP test mode.
Keep status after reboot –> No.

Table 2-92: 811 PMTK_TEST_STOP

Data Field: PMTK811
Example: $PMTK811*3A<CR><LF>

Field	Unit	Default	Description
--	--	--	--

PMTK 812 : PMTK_TEST_FINISH

GPS receiver will send out this PMTK packet to show that MP testing has finished.
Keep status after reboot –> No.

Table 2-93: 812 PMTK_TEST_FINISH

Data Field: PMTK812			
Example: $PMTK812*39<CR><LF>			
Field	**Unit**	**Default**	**Description**
--	--	--	--

PMTK 813 : PMTK_TEST_ALL_ACQ

The result of TEST_ACQ item.
Keep status after reboot –> No.

Table 2-94: 813 PMTK_TEST_ALL_ACQ

Data Field: PMTK813,<SV>,<Acq Time>			
Example: $PMTK813,29,2*01<CR><LF> The target device acquires SV29 within 2 seconds			
Field	**Unit**	**Default**	**Description**
SV	--	--	
Acq Time	Second		

PMTK 814 : PMTK_TEST_ALL_BITSYNC

The result of TEST_BITSYNC item.

Keep status after reboot –> No.

Table 2-95: 814 PMTK_TEST_ALL_BITSYNC

Data Field: PMTK814,<SV>,<BitSync Time>			
Example: $PMTK814,29,1*05<CR><LF> Regard to SV29, the target device reach bit sync state within 1 second.			
Field	**Unit**	**Default**	**Description**
SV	--	--	
BitSync Time	--	--	BitSync Time

PMTK 815 : PMTK_TEST_ALL_SIGNAL

The result of TEST_SIGNAL item.
Keep status after reboot –> No.

Table 2-96: 815 PMTK_TEST_ALL_SIGNAL

Data Field: PMTK815,<SV>,<Testing Time>,<Phase>,<TCXO Offset>,<TCXO Drift>,<CNR Mean>,<CNR Sigma>			
Example: $PMTK815,29,16,98,10000,30,4100,0*18<CR><LF> Regard to SV29, take 16 seconds to test and the result is … Phase Error：0.98 TCXO offset/drift(Hz)：10/0.03 CNR mean/sigma：41/0			
Field	**Unit**	**Default**	**Description**
SV	--	--	
Testing Time	sec	--	Testing Time
Phase	0.01	--	Phase
TCXO Offset	0.001	--	
TCXO Drift	0.001	--	
CNR Mean	0.01	--	

CNR Sigma	0.01	--	

PMTK 837 : PMTK_TEST_JAMMING

Jamming scan test command.
Keep status after reboot –> No

Table 2-97: 837 PMTK_TEST_JAMMING

Data Field: PMTK837,<JamScanType>,<JamScanNum>			
Example: $PMTK837,0,50*0B<CR><LF> GPS jamming scan test 50 times $PMTK837,1,50*0A<CR><LF> GLONASS jamming scan test 50 times $PMTK837,2,50*09<CR><LF> BEIDOU jamming scan test 50 times			
Field	**Unit**	**Default**	**Description**
JamScanType	--	--	'0' enable GPS jamming scan '1' enable GLONASS jamming scan '2' enable BEIDOU jamming scan
JamScanNum	--	--	Jamming scan test times.

PMTK 838 : PMTK_TEST_JAMMING_DETECTION

Jamming detection test command.
Keep status after reboot –> No.

Table 2-98: 838 PMTK_TEST_JAMMING_DETECTION

Data Field: PMTK838,<CmdType>
Example: $PMTK838,1*2C<CR><LF>   Enable the jamming detection message output
Return: $PMTKSPF,1*5A => No jamming, healthy status. $PMTKSPF,2*59 => Warning status. $PMTKSPF,3*58 => Critical status.

Field	Unit	Default	Description
CmdType	--	--	'0' disable jamming detection message output. '1' enable jamming detection message output.

PMTK 869 : PMTK_EASY_ENABLE

Enable or disable EASY function. Query if EASY is enabled or disabled.
Keep status after reboot –> Yes.

Table 2-99: 869 PMTK_EASY_ENABLE

Data Field: PMTK869,<CmdType>,[Enable],[Extension Day]
Example: To enable EASY, use $PMTK869,1,1*35<CR><LF> To disable EASY, use $PMTK869,1,0*34<CR><LF> To query if EASY is enabled or disabled, use $PMTK869,0*29<CR><LF> If EASY is disabled, the receiver returns $PMTK869,2,0,0*2B<CR><LF> If EASY is enabled and is not finished yet, the receiver may returns $PMTK869,2,1,0*2A<CR><LF> If EASY is enabled and is finished 1-day extension, the receiver may returns $PMTK869,2,1,1*2B<CR><LF> If EASY is enabled and is finished 2-day extension, the receiver may returns $PMTK869,2,1,2*28<CR><LF> If EASY is enabled and is finished 3-day extension, the receiver may returns $PMTK869,2,1,3*29<CR><LF>

Field	Unit	Default	Description
CmdType	--	--	'0': Query '1': Set '2': Result for Query operation
Enable	--	--	'0': Disable '1': Enable
Extension Day	--	--	Finished extension day.

PMTK 875 : PTMK_PMTKLSC_STN_OUTPUT

Enable or disable PMTKLSC Sentence output. Query if PMTKLSC Sentence output enabled or disabled.

Keep status after reboot –> Yes.

Table 2-100: 875 PTMK_PMTKLSC_STN_OUTPUT

Data Field: PMTK875,<CmdType>,[Enable]			
Example: $PMTK875,1,1*38<CR><LF> : Enable PMTKLSC and PMTKLSCB Sentence output $PMTK875,1,0*39<CR><LF> : Disable PMTKLSC and PMTKLSCB Sentence output **Return:** $PMTKLSC, Parameter1, Parameter2, Parameter3*CS $PMTKLSCB, Parameter1, Parameter2, Parameter3*CS where Parameter 1 : current leap second Parameter 2 : leap indicator, 1 means updated from broadcast data Parameter 3 : next leap second			
Field	**Unit**	**Default**	**Description**
CmdType	--	--	'0': Query '1': Set '2': Result for Query operation
Enable	--	--	'0': Disable '1': Enable

PMTK 886 : PMTK_FR_MODE

Set navigation mode.
Keep status after reboot –> No.

Table 2-101: 886 PMTK_FR_MODE

Data Field: PMTK886,<CmdType>
Example: $PMTK886,0*28<CR><LF> : Enter normal mode. $PMTK886,1*29<CR><LF> : Enter fitness mode. $PMTK886,2*2A<CR><LF> : Enter aviation mode. $PMTK886,3*2B<CR><LF> : Enter balloon mode. $PMTK886,4*2C<CR><LF> : Enter stationary mode.

Return:			
$PMTK001,886,3*36<CR><LF>			

Field	Unit	Default	Description
CmdType	--	0	'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.

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 mode	**10000 m**
Fitness mode	**10000 m**
Aviation mode	**10000 m**
Stationary mode	**10000 m**
Balloon mode	**80000 m**

Appendix A: 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	Tamzamia
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	Guuinea-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, Antarctia
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 (Slcily)
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-Herzegoivna
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)	Czechoslavakia
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	Czechoslavakia (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	Brazial
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	Tristam 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
223	PZ-90 v11	GLONASS