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MT3333 Platform NMEA Message Specification

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Version History

Date	Version	What is new	Author
2013-05-26	1.00	Original version	Xuewei.dou
2014-06-13	1.01	Add Easy state control	Leilei.yang
2016-01-10	1.02	Update all	Leilei.yang
2017-08-10	1.03	Update all based on ANX5.1	Jie.Hu
2017-08-31	1.04	Modify the descriptions of PMTK220 and add PMTK265	Zhao.wang
2017-10-12	1.05	Update all	Zhao.wang
2018-05-07	1.06	Update NMEA Message	Zhao.wang
2018-05-08	1.07	Update NMEA Message	Zhao.wang

Scope

This document presents details of the frequently used NMEA messages supported by SIMCom GNSS module which based on MT3333 Platform, such as SIM68M/SIM33ELA etc. This document does not provide information about the complete NMEA-0183, user can refer to the related documents for more information.

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Tables

1 Introduction

At present, has been built and is planning the construction of a satellite navigation system apart from United States GPS system, and Russia's GLONASS system, the European Galileo system, Beidou satellite navigation system in China and Japan and Indian regional satellite navigation systems.

The integration of GPS with GLONASS may be considered a major milestone in satellite-based positioning, because it can dramatically improve location accuracy, reliability and speed.

2 NMEA Messages

2.1 General Format of NMEA Messages

NMEA messages use the ASCII character set and have a defined format. Each message begins with a $ (hex 0x24) and end with a carriage return and line feed (hex 0x0D 0x0A, represented as <CR><LF>). Each message consists of one or more fields of ASCII letters and numbers, separated by commas. After the last field, and before the <CR><LF> is a checksum consisting of an asterisk (*, hex 0x2A) followed by two ASCII characters representing the hexadecimal value of the checksum. The checksum is computed as the exclusive OR of all characters between the $ and * characters.

Table 2-1: NMEA output/input message parameters

Parameter	Example	Contents
Start	$GPGGA	Message Identifier. Input messages begin at MID 100.
Payload	<Data>	Message specific data. Refer to a specific message section for <data>...<data> definition.
Checksum	*CKSUM	CKSUM is a two-hex ASCII character. Checksums is required in all input messages.
End	<CR> <LF>	Each message is terminated using Carriage Return (CR) Line Feed (LF) which are \r\n. Because \r\n are not printable ASCII characters, they are omitted from the example strings, but must be sent to terminate the message and cause the receiver to process that input message.

Note:

1. All fields in all proprietary NMEA messages are required, none are optional and are comma delimited.

2. In some numeric fields representing a single data element, leading zeros before a decimal are suppressed. A single "0" character preceding the decimal point is maintained. In compound numeric structures (such as LAT or LONG), leading zeros are suppressed only on the leftmost element. Trailing zeros are not suppressed.

2.2 Standard NMEA Output Messages

Table 2-2: GNSS module Frequently Used NMEA Output Messages

Message	Description	Possible Talker Identifiers
GGA	Time, position and fix type data	GP,GN,GL,BD,GA
GSA	GNSS receiver operating mode, satellites used in the position solution, and DOP values	GP, GL,BD,GA
GSV	Number of GNSS satellites in view satellite ID numbers, elevation, azimuth, & SNR values	GP,GL,BD,GA
RMC	Time, date, position, course and speed data	GP,GN,GL,BD,GA
VTG	Course and speed information relative to the ground	GP,GN,GL,BD,GA

⚠ ***Note：***

1. The prefix "GP" refers to the GPS global navigation system；

2. The prefix "GN" refers to the GNSS global navigation system（All kinds of global navigation systems.）；

3. The prefix "GL" refers to the GLONASS global navigation system；

4. The prefix "GA" refers to the GALILEO global navigation system；

5. ThePrefix "BD" refers to the BEIDOU global navigation system。

A full description of the listed NMEA messages is provided in the following sections.

2.2.1 Message ID GGA: Global Positioning System Fixed Data

Table 2-3: GGA Data Format

Example: $GPGGA,091926.000,3113.3166,N,12121.2682,E,1,09,0.9,36.9,M,7.9,M,,0000*56<CR><LF>			
Name	**Example**	**Unit**	**Description**
Message ID	$GPGGA		GGA protocol header
UTC Time	091926.000		hhmmss.sss
Latitude	3113.3166		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12121.2682		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Position Fix Indicator	1		See Table 2-4
Satellites Used	09		Range 0 to 12
HDOP	0.9		Horizontal Dilution of Precision
MSL Altitude	36.9	meters	
Units	M	meters	
Geoid Separation	7.9	meters	Geoid-to-ellipsoid separation. Ellipsoid altitude = MSL Altitude + Geoid Separation.
Units	M	meters	
Age of Diff. Corr.		sec	Null fields when DGPS is not used
Diff. Ref. Station ID	0000		
Checksum	*56		
<CR><LF>			End of message termination

Table 2-4: Position Fix Indicator

Value	**Description**
0	Fix not available or invalid
1	GPS SPS Mode, fix valid
2	Differential GPS, SPS Mode, fix valid
3-5	Not supported
6	Dead Reckoning Mode, fix valid

Note：

A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met, the solution will be marked as invalid.

2.2.2 Message ID GSA: GNSS DOP and Active Satellites

Table 2-5: GSA Data Format

Example: $GPGSA,A,3,07,02,26,27,09,04,15, , , , , ,1.8,1.0,1.5*33<CR><LF>			
Name	**Example**	**Unit**	**Description**
Message ID	$GPGSA		GSA protocol header
Mode 1	A		See Table 2-7
Mode 2	3		See Table 2-8
Satellite Used [1]	07		SV on Channel 1
Satellite Used [1]	02		SV on Channel 2
....			....
Satellite Used [1]			SV 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		
<CR><LF>			End of message termination

Note:

1.Satellite used in solution.

2.Maximum DOP value reported is 50. When value 50 is reported, the actual DOP may be much larger.

Table 2-6: Mode 1

Value	**Description**
M	Manual – Forced to operate in 2D or 3D mode
A	2D Automatic – Allowed to automatically switch 2D/3D

Table 2-7: Mode 2

Value	**Description**
1	Fix not available
2	2D (<4 SVs used)
3	3D (>3 SVs used)

2.2.3 Message ID GSV: GNSS Satellites in View

Table 2-8: GSV Data Format

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>

Name	Example	Unit	Description
Message ID	$GPGSV		GSV protocol header
Number of Messages [1]	2		Total number of GSV messages to be sent in this group
Message Number[1]	1		Message number in this group of GSV messages
Satellites in View[1]	11		
Satellite ID	26		Channel 1 (Range 1 to 32)
Elevation	68	degrees	Channel 1 (Maximum 90)
Azimuth	023	degrees	Channel 1 (True, Range 0 to 359)
SNR (C/N0)	37	dBHz	Range 0 to 99, null when not tracking
....			....
Satellite ID	29		Channel 4 (Range 1 to 32)
Elevation	33	degrees	Channel 4 (Maximum 90)
Azimuth	253	degrees	Channel 4 (True, Range 0 to 359)
SNR (C/N0)	33	dBHz	Range 0 to 99, null when not tracking
Checksum	*75		
<CR><LF>			End of message termination

Note:

1. Depending on the number of satellites tracked, multiple messages of GSV data may be required. In some software versions, the maximum number of satellites reported as visible is limited to 12, even though more may be visible.

2.2.4 Message ID RMC: Recommended Minimum Specific GNSS Data

Table 2-9: RMC Data Format

Example: $GPRMC,094330.000,A,3113.3156,N,12121.2686,E,0.51,193.93,171210,,,A*68<CR><LF>			
Name	**Example**	**Unit**	**Description**
Message ID	$GPRMC		RMC protocol header
UTC Time	094330.000		hhmmss.sss
Status [1]	A		A=data valid or V=data not valid
Latitude	3113.3156		ddmm.mmmm
N/S Indicator	N		N=north or S=south
Longitude	12121.2686		dddmm.mmmm
E/W Indicator	E		E=east or W=west
Speed Over Ground	0.51	knots	
Course Over Ground	193.93	degrees	True
Date	171210		ddmmyy
Magnetic Variation [2]		degrees	E=east or W=west
East/West Indicator[2]			E=east
Mode	A		A=Autonomous, D=DGPS
Checksum	*68		
<CR><LF>			End of message termination

Note:

1. A valid status is derived from all the parameters set in the software. This includes the minimum number of satellites required, any DOP mask setting, presence of DGPS corrections, etc. If the default or current software setting requires that a factor is met, then if that factor is not met, the solution will be marked as invalid.

2. Does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions relative to true North.

2.2.5 Message ID VTG: Course Over Ground and Ground Speed

Table 2-10: VTG Data Format

Example: $GPVTG,83.37,T,,M,0.00,N,0.0,K,A*32<CR><LF>			
Name	**Example**	**Unit**	**Description**
Message ID	$GPVTG		VTG protocol header
Course	83.37	degrees	Measured heading
Reference	T		True
Course		degrees	Measured heading
Reference	M		Magnetic1 [1]
Speed	0.00	knots	Measured horizontal speed
Units	N		Knots
Speed	0.0	km/hr	Measured horizontal speed
Units	K		Kilometers per hour
Mode	A		A=Autonomous, D=DGPS
Checksum	*32		
<CR><LF>			End of message termination

Note:

1. Does not support magnetic declination. All "course over ground" data are geodetic WGS84 directions.

2.2.6 Message ID GPACCURACY:ACCURACY OF THE LOCATION

This message is accuracy of the location; The smaller the number is, the be better the condition is;

Table 2-11: GPACCURACY Data Format

Example: $GPACCURACY,961.2***04** <CR><LF>

2.3 Proprietary NMEA Messages

2.3.1 Packet Type: 000 PMTK_TEST

Test Packet.

Table 2-12: 000 PMTK_TEST Data Format

DataField: PMTK000			
Example: $PMTK000*32<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.2 Packet Type: 001 PMTK_ACK

Acknowledge of PMTK command.

Table 2-13: 001 PMTK_ACK Data Format

DataField: PMTK001,Cmd,Flag			
Example: $PMTK001,604,3*32<CR><LF>			
Name	**Unit**	**Default**	**Description**
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 succeeded

2.3.3 Packet Type: 010 PMTK_SYS_MSG

Output system message.

Table 2-14: 010 PMTK_SYS_MSG Data Format

DataField: PMTK010,Type			
Example: $PMTK010,001*2E<CR><LF>			
Name	**Unit**	**Default**	**Description**
Type	--	--	The system message type. '0': UNKNOWN '1': STARTUP '2': Notification: Notification for the host aiding EPO '3': Notification: Notification for the transition to Normal mode is successfully done

2.3.4 Packet Type: 011 PMTK_TXT_MSG

Output system text message.

Table 2-15: 011 PMTK_TXT_MSG Format

DataField: PMTK011, msg			
Example: $PMTK011,MTKGPS*08 <CR><LF>			
Name	**Unit**	**Default**	**Description**
msg	--	--	Message of this is MTK GPS

2.3.5 Packet Type: 101 PMTK_CMD_HOT_START

Hot Restart: Use all available data in the NVRAM.

Table 2-16: 101 PMTK_CMD_HOT_START Data Format

DataField: PMTK101			
Example: $PMTK101*32<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.6 Packet Type: 102 PMTK_CMD_WARM_START

Warm Restart: Not using Ephemeris data at start.

Table 2-17: 102 PMTK_CMD_WARM_START Data Format

DataField: PMTK102			
Example: $PMTK102*31<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.7 Packet Type: 103 PMTK_CMD_COLD_START

Cold Restart: Not using the Position, Almanac and Ephemeris data at start.

Table 2-18: 103 PMTK_CMD_COLD_START Data Format

DataField: PMTK103			
Example: $PMTK103*30<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.8 Packet Type: 104 PMTK_CMD_FULL_COLD_START

Full Cold Restart: In addition to Cold start, this command clears the system/user configurations at start. It resets the GNSS module to the factory default.

Table 2-19: 104 PMTK_CMD_FULL_COLD_START Data Format

DataField: PMTK104			
Example: $PMTK104*37<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.9 Packet Type: 120 PMTK_CMD_CLEAR_FLASH_AID

Erase aiding data stored in the flash memory.

Table 2-21: 120 PMTK_CMD_CLEAR_FLASH_AID Data Format

DataField: PMTK120			
Example: $PMTK120*31<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.10 Packet Type: 127 PMTK_CMD_CLEAR_EPO

Erase EPO data stored in the flash memory.

Table 2-2220: 127 PMTK_CMD_CLEAR_EPO Data Format

DataField: PMTK127			
Example: $PMTK127*36<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.11 Packet Type: 161 PMTK_CMD_STANDBY_MODE (NOT supported in AXN3.0)

Enter standby mode (stop mode or sleep mode) for power saving.

Table 2-2321: 161 PMTK_CMD_STANDBY_MODE Data Format

DataField: PMTK161,Type			
Example: $PMTK161,0*28<CR><LF>			
Name	**Unit**	**Default**	**Description**
Type	--	--	Standby type:

			‘0’ = Stop mode, stop NMEA output, the receiver stays at ultra low power state ‘1’ = Sleep mode, stop NMEA output, the receiver stays at full on power state

2.3.12 Packet Type: 183 PMTK_LOCUS_QUERY_STATUS

Query Logging status

Table 2-2422: 183 PMTK_LOCUS_QUERY_STATUS Data Format

DataField: PMTK183,Serial#,Type,Mode,Content,Internal,Distance,Speed,Status,Log number,Percent*CH			
Example: **Input:** $PMTK183*38<CR><LF> **Output**: $PMTKLOG,32,1,b,31,1,0,0,0,8032,100*2F<CR><LF>			
Name	**Unit**	**Default**	**Description**
Serial#	--	--	Logging serial number:0~65535
Type			Logging type 0:Overlap 1: Fullstop
Mode			Logging Mode 0x08:Interval logger
Content			Logging contents of configuration
Internal			Logging interval setting(valid when interval mode is selected)
Distance			Logging distance setting(valid when distance mode is selected)
Speed			Logging speed setting(valid when speed mode is selected)
Status			Logging status 1: Stop Logging 0: Logging
Percent			Logging life used percentage

2.3.13 Packet Type: 184 PMTK_LOCUS_ERASE_FLASH

Erase the logged GNSS data on the flash.

Table 2-2523: 184 PMTK_LOCUS_ERASE_FLASH Data Format

DataField: PMTK184, Type			
Example: **Input:** $PMTK184,1*22<CR><LF> **Output**: $PMTK001,184,3*3D<CR><LF>			
Name	**Unit**	**Default**	**Description**

Type			Erase type 1:erase all logger internal flash data

2.3.14 Packet Type: 185 PMTK_LOCUS_STOP_LOGGER

Stop the data logging.
Keep status after reboot –> Yes.

Table 2-2624: 185 PMTK_LOCUS_STOP_LOGGER Data Format

DataField: PMTK185, Status			
Example: **Input:** $PMTK185,1*23<CR><LF> **Output**: $PMTK001,185,3*3C<CR><LF>			
Name	**Unit**	**Default**	**Description**
Status			Stop logging ‘1’:Stop logging ‘0’:Start logging

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

2.3.15 Packet Type: 186 PMTK_LOCUS_LOG_NOW

Snapshot write log

Table 2-2725: 186 PMTK_LOCUS_LOG_NOW Data Format

DataField: PMTK186, Type			
Example: **Input:** $PMTK186,1*20<CR><LF> **Output**: $PMTK001,186,3*3F<CR><LF>			
Name	**Unit**	**Default**	**Description**
Type			‘1’:means snapshot log data

2.3.16 Packet Type: 187 PMTK_LOCUS_CONFIG

Configure Locus setting by command.
Keep status after reboot –> Yes.

Table 2-2826: 187 PMTK_LOCUS_CONFIG Data Format

DataField: PMTK187, Mode,Setting
Example: **Input:** $PMTK187,1,5*38

Output: $PMTK001,187,3*3E			
Name	**Unit**	**Default**	**Description**
Type			‘1’:means interval data.(1sec=<interval<=12hours)
Setting			New setting instead of the original configuration(e.g. change to 5 seconds interval as the example below)

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

2.3.17 Packet Type: 220 PMTK_SET_POS_FIX

Position Fix Interval
Keep status after reboot –> Yes.

Table 2-2927: 220 PMTK_SET_POS_FIX Data Format

DataField: PMTK220, Interval			
Example: $PMTK220,1000*1F<CR><LF>			
Name	**Unit**	**Default**	**Description**
Interval	msec	--	Position fix interval. Range: [100~10000]

Note: If the instruction fails to execute successfully, the setting value is small, the data output is more, and the baud rate is too low to output, so the instruction fails. To execute successfully, you can use the PMTK314 instruction to reduce the output frequency of NMEA statements and execute successfully.

2.3.18 Packet Type: 223 PMTK_SET_AL_DEE_CFG (NOT supported in AXN3.0)

Used for setting periodic mode parameters and is used after PMTK225 command.
Below parameters can be modified by Host command message.
Keep status after reboot –> Yes.

Table 2-3028: 223 PMTK_SET_AL_DEE_CFG Data Format

DataField: PMTK223,SV,SNR,Extension threshold, Extension gap			
Example: $PMTK223,1,32,180000,60000*3E<CR><LF>			
Name	**Unit**	**Default**	**Description**
SV	msec	*1*	Range: [1 ~ 4]
SNR		30	Range: [25 ~ 30]
Extension threshold	msec	180000	Range: [40000 ~ 180000]
Extension gap	msec	60000	Extension gap is the limitation between neighbor DEE. Range: [0 ~ 3600000]

2.3.19 Packet Type: 225 PMTK_SET_PERIODIC_MODE (NOT supported in AXN3.0)

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.

Keep status after reboot -> Yes

Table 2-3129: 225 PMTK_SET_PERIODIC_MODE Data Format

DataField: PMTK225, Type, Run time, Sleep time, Second run time, Second sleep time			
Example: Commands to enter periodic modes. Periodic Backup mode PMTK225,0*2B<CR><LF> PMTK223,1,25,180000,60000*38<CR><LF> PMTK225,1,3000,12000,18000,72000*16<CR><LF> Periodic Standby mode PMTK225,0*2B<CR><LF> PMTK223,1,25,180000,60000*38<CR><LF> PMTK225,2,3000,12000,18000,72000*16<CR><LF> **Example : Commands to enter AlwaysLocate modes** AlwaysLocateTM Standby PMTK225,0*2B<CR><LF> PMTK225,8*23<CR><LF> AlwaysLocateTM Backup PMTK225,0*2B<CR><LF> PMTK225,9*22<CR><LF>			
Name	**Unit**	**Default**	**Description**
Type	--	--	Set operation mode of power saving : ‘0’: Back to normal mode ‘1’ Periodc backup mode ‘2’ Periodic standby mode ‘4’: Perpetual backup mode ‘8’: AlwaysLocateTM standby mode ‘9’: AlwaysLocateTM backup mode
Run time	msec		Duration 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 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 [] 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 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:

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

2.3.20 Packet Type: 250 PMTK_SET_DATA_PORT

Set data port input/output data type and baudrate.
Keep status after reboot –> Yes.

Table 2-3230: 250 PMTK_SET_DATA_PORT Data Format

DataField: PMTK250, InType,OutType,Baudrate			
Example: $PMTK250,1,3,9600*14<CR><LF>			
Name	**Unit**	**Default**	**Description**
InType			Data port input data type '0'= DPORT_IN_NONE (No data input) '1'=DPORT_IN_RTCM (RTCM input) '3'=DPORT_IN_NMEA (MTK NMEA)
OutType			Data port input data type '0'= DPORT_OUT_NONE (No data output) '3'=DPORT_OUT_NMEA (MTK NMEA)
Baudrate			Baudratesetting 4800 9600 14400 19200 38400 57600 115200 460800 921600

2.3.21 Packet Type: 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

Keep status after reboot –> Yes.

Table 2-3331: 251 PMTK_SET_NMEA_BAUDRATE Data Format

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

Note: The option "Allow change of baudrate" at the "NMEA" page in the CoreBuilder should be checked before using this command.

2.3.22 Packet Type: 253 PMTK_SET_OUTPUT_FMT

Set data output format for current port.

Keep status after reboot –> Yes.

Table 2-3432: 253 PMTK_SET_OUTPUT_FMT Data Format

DataField: PMTK253, Flag			
Example: $PMTK253,1*2B<CR><LF>//Change output format from NMEA mode to binary mode			
Name	**Unit**	**Default**	**Description**
Flag			Unsigned 1 byte: 0-NMEA mode 1-Binary mode

Note: When you switch from binary mode to NMEA mode, you will receive a binary ACK after the command is processed. When you switch from NMEA mode to binary mode, NO ACK will be sent.

2.3.23 Packet Type: 255 PMTK_SET_SYNC_PPS_NMEA

Enable or disable fix NMEA output time behind PPS function. (Default off). The latency range of the beginning of UART Tx is between 170 ms and 180ms at MT3339 platform (465 ms~485ms at MT3333 platform) and behind the rising edge of PPS.

Table 2-35: 255 PMTK_SET_SYNC_PPS_NMEA Data Format

DataField: PMTK255, Enabled			
Example: $PMTK255,1*23<CR><LF>			
Name	**Unit**	**Default**	**Description**
Enabled			Enable or disable ‘0’= Disable ‘1’=Enable

Note: Only support in AXN 3.6(8) and 2.3(5) after 2014/4/21.

2.3.24 Packet Type: 256 PMTK_SET_TIMING_PRODUCT(Support after AXN3.8)

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.

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

Table 2-3633: 256 PMTK_SET_TIMING_PRODUCT Data Format

DataField: PMTK256, Enabled			
Example: $PMTK256,1*2E<CR><LF>			
Name	**Unit**	**Default**	**Description**
Enabled			Enable or disable ‘0’=Disable ‘1’=Enable

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

2.3.25 Packet Type: 257 PMTK_SET_TUNNEL_SCENRIO(Support after AXN3.8)

Enable fast TTFF or high accuracy function when out of the tunnel or garage. (Default enabled high accuracy function).

Table 2-3734: 257 PMTK_SET_TUNNEL_SCENRIO Data Format

DataField: PMTK257,Functionality			
Example: $PMTK257,1*2F<CR><LF>			
Name	**Unit**	**Default**	**Description**
Functionality			‘0’=Enable fast TTFF when out of the tunnel of garage ‘1’=Enable high accuracy when out of the tunnel or garage

2.3.26 Packet Type: 262 PMTK_SET_FLP_MODE

Enable or disable GNSS/Fitness Low Power(GLP/FLP) mode.

Table 2-3835: 262 PMTK_SET_FLP_MODE Data Format

DataField: PMTK262, Enabled			
Example: $PMTK262,1*29<CR><LF> (Enable FLP mode for MT3339) $PMTK262,3*2B<CR><LF> (Enable GLP mode for MT3333)			
Name	**Unit**	**Default**	**Description**
Enabled			‘0’= Disbable GLP(FLP) mode ‘1’=Enable FLP mode (for MT3339) ‘3’=Enable GLP mode (for MT3333)

2.3.27 Packet Type: 265 PMTK_SET_NMEA_DECIMAL_PRECISION

Set number of fractional digit in NMEA.

Table 2-3936: 265 PMTK_SET_NMEA_DECIMAL_PRECISION Data Format

DataField: PMTK265,Number			
Example: $PMTK265,1*2E<CR><LF>			
Name	**Unit**	**Default**	**Description**
Number			‘1’= 4 digits ‘2’= 5 digits ‘3’= 6 digits

2.3.28 Packet Type: 285 PMTK_SET_PPS_CONFIG_CMD

Config PPS setting.
Keep status after reboot –> Yes.

Table 2-4037: 285 PMTK_SET_PPS_CONFIG_CMD Data Format

DataField: PMTK285,PPSType,PPSPulseWidth
Example: $PMTK285,2,100*23<CR><LF>

Name	Unit	Default	Description
PPSType	-	-	Availabilty ‘0’= Disable ‘1’=After the first fix ‘2’=3D fix only ‘3’=2D/3D fix only ‘4’= Always
PPSPulseWidth	ms	-	PPS Pulse Width

2.3.29 Packet Type: 286 PMTK_SET_AIC_CMD

Enable or disable active interference cancellation function.

Table 2-4138: 286 PMTK_SET_AIC_CMD Data Format

DataField: PMTK286,Enabled			
Example: $PMTK286,1*23<CR><LF>			
Name	**Unit**	**Default**	**Description**
Enabled	--	--	Enable or disable ‘0’ = Disable ‘1’ = Enable

2.3.30 Packet Type: 299 PMTK_SET_OUTPUT_DEBUG

Enable or disable the debug log output.
Keep status after reboot->yes

Table 2-42: 299 PMTK_SET_OUTPUT_DEBUG

DataField: PMTK299,Enabled			
Example: $PMTK299*2D<CR><LF>			
Name	**Unit**	**Default**	**Description**
Enabled	--	--	Enable or disable ‘0’ = Disable ‘1’ = Enable

2.3.31 Packet Type: 300 PMTK_API_SET_FIX_CTL

Set Fix interval.

Table 2-4339: 300 PMTK_API_SET_FIX_CTL Data Format

DataField: PMTK300,Fixinterval,0,0,0,0

Example: $PMTK300,1000,0,0,0,0*1C<CR><LF> **Return:** $PMTK001,300,3			
Name	**Unit**	**Default**	**Description**
Fixinterval	milliseconds	--	Range: [100 ~ 10000]

2.3.32 Packet Type: 301 PMTK_API_SET_DGPS_MODE

Set DGPS correction data source mode.
Keep status after reboot->Yes

Table 2-4440: 301 PMTK_API_SET_DGPS_MODE Data Format

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

2.3.33 Packet Type: 311 PMTK_API_SET_ELEV_MASK

Set satellite elevation-mask.

Table 2-4541: 311 PMTK_API_SET_ELEV_MASK Data Format

DataField: PMTK311, Degree			
Example: $PMTK311,5*28<CR><LF>			
Name	**Unit**	**Default**	**Description**
-Dgree			-Satellite elevation-mask

Note: Only support in AXN3.8 after 2015/6/17, and AXN2.5 after 2015/10/19.

2.3.34 Packet Type: 313 PMTK_API_SET_SBAS_ENABLED

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

Table 2-4642: 313 PMTK_API_SET_SBAS_ENABLED Data Format

DataField: PMTK313,Enabled			
Example: $PMTK313,1*2E<CR><LF>			
Name	**Unit**	**Default**	**Description**

Enabled	--	--	Enable or disable '0' = Disable '1' = Enable

2.3.35 Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT

Set NMEA sentence output frequencies.
Keep status after reboot->Yes
There are totally **19** data fields that present output frequencies for the **19** supported NMEA sentences individually.

Supported NMEA Sentences:

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 Errors Statistics
17 NMEA_SEN_ZDA, // GPZDA interval – Time & Date
18 NMEA_SEN_MCHN, //PMTKCHN interval – GNSS channel status
19 NMEA_SEN_DTM, //GPDTM interval – Datum reference

Supported Frequency Setting

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*30<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.

2.3.36 Packet Type: 326 PMTK_API_SET_PPS

This packet contain the local millisecond and phase where the PPS should be placed.

Table 2-4743: 326 PMTK_API_SET_PPS Data Format

DataField: PMTK326, PPS_BY_USER,Local_ms,phase			
Example: $PMTK326,1,1345,555*3F<CR><LF>			
Name	**Unit**	**Default**	**Description**
PPS_BY_USER			1:PPS output by user 0:PPS output automatically
Local_ms			Local receiver time tick. Range: 0-4294967295(2^32-1)
Phase			Time phase 0-262143

2.3.37 Packet Type: 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 2-48: 328 PMTK_API_SET_HACC_MASK

DataField: PMTK328,HaccMask*CS<CR><LF>			
Example: $PMTK328,50*12<CR><LF>			
Name	**Unit**	**Default**	**Description**
HaccMask			30-200 : enable hacc mask feature. (Units: meter) -1 : disable hacc mask feature.

2.3.38 Packet Type: 330 PMTK_API_SET_DATUM

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

Table 2-4944: 330 PMTK_API_SET_DATUM Data Format

DataField: PMTK330,Datum			
Example: $PMTK330,0*2E<CR><LF>			
Name	**Unit**	**Default**	**Description**
Datum	--	--	0: WGS84 1: TOKYO-M 2: TOKYO-A Support 219 different datums. The total datums list in the Appendix A.

2.3.39 Packet Type: 331 PMTK_API_SET_DATUM_ADVANCE

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

Table 2-5045: 331 PMTK_API_SET_DATUM_ADVANCE Data Format

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

2.3.40 Packet Type: 335 PMTK_API_SET_RTC_TIME

This command set RTC UTC time. To be noted, the command doesn't update the GPS time which maintained by GPS receiver. After setting, the RTC UTC time finally may be updated by GPS receiver with more accurate time after 60 seconds.

Table 2-5146: 335 PMTK_API_SET_RTC_TIME Data Format

DataField: PMTK335,Year,Month,Day,Hour,Min,Sec			
Example: $PMTK335,2007,1,1,0,0,0*02<CR><LF>			
Name	**Unit**	**Default**	**Description**
Year	--	--	year
Month	--	--	1 ~ 12
Day	--	--	1 ~ 31
Hour	--	--	0 ~ 23
Min	--	--	0 ~ 59
Sec	--	--	0 ~ 59

2.3.41 Packet Type: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

The receiver support new NMEA format for QZSS. The command allow user enable or disable QZSS NMEA format. Default is disable QZSS NMEA format. (use NMEA 0183 V3.01)
Keep status after reboot -> Yes.

Table 2-5247: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA Data Format

DataField: PMTK351,Enabled			
Example: $PMTK351,0*29 : Disable QZSS NMEA format $PMTK351,1*28 : Enable QZSS NMEA format			
Name	**Unit**	**Default**	**Description**
Enabled	--	--	‘0’: Disable QZSS NMEA format ‘1’: Enable QZSS NMEA format

2.3.42 Packet Type: 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 2-5348: 352 PMTK_API_SET_STOP_QZSS Data Format

DataField: PMTK352,Enabled			
Example: $PMTK352,0*2A : Enable QZSS function $PMTK352,1*2B : Disable QZSS function			
Name	**Unit**	**Default**	**Description**
Enabled	--	--	‘0’: Enable QZSS function ‘1’: Disable QZSS function

2.3.43 Packet Type: 353 PMTK_API_SET_GNSS_SEARCH_MODE (NOT supported in AXN3.0 and AXN2.3)

This command is used to configure the receive to start searching of which satellite system.
The setting will be kept available when NVRAM data is valid.
Keep status after reboot –> Yes.

Table 2-5449: 353 PMTK_API_SET_GNSS_SEARCH_MODE Data Format

DataField: PMTK353, GPS_Enable,GLONASS_Enable,GALILEO_Enable,GALILEO_FULL_Enable,BEIDOU_Enable			
Example: $PMTK353,0,1,0,0,0*2A<CR><LF> //Search GLONASS satellites only $PMTK353,1,0,0,0,0*2A<CR><LF> //Search GPS 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,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			
Name	**Unit**	**Default**	**Description**
GPS_Enabled			‘0’:disable(DO NOT search GPS satellites)

			‘1’ or non-ZERO: search GPS satellites
GLONASS_Enabled			‘0’:disable(DO NOT search GLONASS satellites) ‘1’ or non-ZERO: search GLONASS satellites
GALILEO_Enabled			‘0’:disable(DO NOT search GALILEO satellites) ‘1’ or non-ZERO: search GALILEO satellites
GALILEO_FULL_Enabled			‘0’:disable (DO NOT search GALILEO FULL mode satellites) ‘1’ or non-ZERO: search GALILEO satellites
BEIDOU_Enabled			‘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. Please use GPS + GLONASS or GPS + BEIDOU in the real application, GLONASS and BEIDOU cannot be enabled at the same time.

2.3.44 Packet Type: 355 PMTK_API_QUERY_GNSS_SEARCH_MODE(Not supported in MT3339 firmware)

This command is used to get GPS, GLONASS, BEIDOU and GALILEO searching setting.

Table 2-5450: 355 PMTK_API_QUERY_GNSS_SEARCH_MODE Data Format

DataField: PMTK353, GPS_Enable,GLONASS_Enable,GALILEO_Enable,GALILEO_FULL_Enable,BEIDOU_Enable			
Example: $PMTK355*31 Return $PMTK001,353,3,1,0,1,0*35 “$PMTK001,355,3,GPS_Enable,GLON_Enable,BEIDOU_Enable,GALILEO_Enable” The return value in this example means GPS+Beidou searching mode is enabled.			
Name	**Unit**	**Default**	**Description**
-	-	-	-

2.3.45 Packet Type: 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.

Table 2-5551: 356 PMTK_API_SET_HDOP_THRESHOLD Data Format

DataField: PMTK356,HDOPThreshold Set OK!
Example: $PMTK356,0.8 Return $PMTK356,0.8 Set OK!*5F

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

2.3.46 Packet Type: 357 PMTK_API_GET_HDOP_THRESHOLD

This command is to get the HDOP threshold.

Table 2-5652: 357 PMTK_API_GET_HDOP_THRESHOLD Data Format

DataField: PMTK357,HDOPThreshold			
Example: $PMTK357 Return $PMTK357,0.8*39			
Name	**Unit**	**Default**	**Description**
HDOPThreshold			'0':Disable Other value: Enable

2.3.47 Packet Type: 381 PMTK_API_SET_PLL

Set PLL on or off.

Table 2-53: 381 PMTK_API_SET_PLL Data Format

DataField: $PMTK381,PLL status*CS<CR><LF>			
Example: $PMTK381,1*25<CR><LF>			
Name	**Unit**	**Default**	**Description**
PLL status			0 : PLL off 1 : PLL on

2.3.48 Packet Type: 385 PMTK_API_SET_HIGH_SESITIVITY_TRACKING_NO_FIX

Disable/Enable position output in high sensitivity tracking mode.

Table 2-54: 358 PMTK_API_SET_HIGH_SESITIVITY_TRACKING_NO_FIX Data Format

DataField: $PMTK385,Disable_Position_Output*CS<CR><LF>			
Example: $PMTK358,1*21<CR><LF>			
Name	**Unit**	**Default**	**Description**
			0 : Enable 1 : Disable

2.3.49 Packet Type: 386 PMTK_API_SET_STATIC_NAV_THD

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

Table 2-5755: 386 PMTK_API_SET_STATIC_NAV_THD Data Format

DataField: PMTK386, speed_threshold			
Example: $PMTK386,0.4*19<CR><LF>			
Name	**Unit**	**Default**	**Description**
Speed_trhreshold	m/s	--	0~2 The minimun is 0.1 m/s, the max is 2.0 m/s

2.3.50 Packet Type: 399 PMTK_API_SET_FLASH_DATA

Write data to the flash.

Table 2-5856: 399 PMTK_API_SET_FLASH_DATA Data Format

DataField: PMTK399,Address,Length,Data0,Data1,Data2,……			
Example: $PMTK399,1c0,7,30,5c,22,1D,02,04,01*4F<CR><LF>			
Name	**Unit**	**Default**	**Description**
Address			The starting address in hex format(the address is fixed at 0x1C0)
Length			The number of bytes of incoming data fields in hex format(Mad length = 7 bytes)
DataN			Data type in hex format

2.3.51 Packet Type: 400 PMTK_API_Q_FIX_CTL

API_Query_Fix_Ctl, Query Fix Control.

Table 2-5957: 400 PMTK_API_Q_FIX_CTL Data Format

DataField: PMTK400			
Example: $PMTK400*36<CR><LF> **Return:** PMTK_DT_FIX_CTL (See Packet Type: 500)			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.52 Packet Type: 401 PMTK_API_Q_DGPS_MODE

Query DGPS mode.

Table 2-6058: 401 PMTK_API_Q_DGPS_MODE Data Format

DataField: PMTK401			
Example: $PMTK401*37<CR><LF> **Return:** PMTK_DT_DGPS_MODE			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.53 Packet Type: 411 PMTK_API_Q_ELEV_MASK

Query satellite elevation mask.

Table 2-6359: 411 PMTK_API_Q_ELEV_MASK Data Format

DataField: PMTK411			
Example: $PMTK411*36<CR><LF> **Return**: $PMTK511,Degree			
Name	**Unit**	**Default**	**Description**

Note: Only support in AXN3.8 after 2015/6/17, and AXN2.5 after 2015/10/19.

2.3.54 Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

Query the status of SBAS to check if it is enabled or not.

Table 2-6460: 413 PMTK_API_Q_SBAS_ENABLED Data Format

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

2.3.55 Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT

Query current NMEA sentence output frequencies.

Table 2-6561: 414 PMTK_API_Q_NMEA_OUTPUT Data Format

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

Note:

PMTK414 command for query, PMTK514 is response to PMTK414, and PMTK314 is set command.

2.3.56 Packet Type: 428 PMTK_API_Q_HACC_MASK

Query horizontal accuracy mask.

Table 2-62: 428 PMTK_API_Q_HACC_MASK Data Format

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

2.3.57 Packet Type: 430 PMTK_API_Q_DATUM

Query default datum.

Table 2-6663: 430 PMTK_API_Q_DATUM Data Format

DataField: PMTK430			
Example: $PMTK430*35<CR><LF> **Return:** PMTK_DT_DATUM			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.58 Packet Type: 431 PMTK_API_Q_DATUM_ADVANCE

Query user defined datum.

Table 2-6764: 431 PMTK_API_Q_DATUM_ADVANCE Data Format

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

Note:

The execution result depend on firmware version.

2.3.59 Packet Type: 435 PMTK_API_Q_RTC_TIME

Query current RTC UTC time.

Table 2-6865: 435 PMTK_API_Q_RTC_TIME Data Format

DataField: PMTK435			
Example: $PMTK435*30<CR><LF> **Return:** PMTK_API_DT_RTC_TIME			
Name	**Unit**	**Default**	**Description**

2.3.60 Packet Type: 449 PMTK_API_Q_EPH_STATUS

This command is to query the current status of ephemeris downloading.

Table 2-6966: 449 PMTK_API_Q_EPH_STATUS Data Format

DataField: PMTK356,HDOPThreshold Set OK!			
Example: $PMTK449*3B **Return:** $PMTK001,449,3,1*24 : The ephemeris downloading is finished. $PMTK001,449,3,0*25: The ephemeris downloading is not finished yet.			
Name	**Unit**	**Default**	**Description**

2.3.61 Packet Type: 458 PMTK_API_GET_POS_XYZ

Returns the WGS84 ECEF XYZ Cartesian position vector(metres) with an estimated 1-sigma accuracy.

Table 2-7067: 458 PMTK_API_GET_POS_XYZ Data Format

DataField: PMTK458			
Example: $PMTK458*3B<CR><LF> **Return:** PMTK_DT_POS_XYZ			
Name	**Unit**	**Default**	**Description**

2.3.62 Packet Type: 461 PMTK_API_GET_VEL_XYZ

Returns the WGS84 ECEF XYZ Cartesian velocity vector(m/s) with an estimated 1-sigma accuracy.

Table 2-7168: 461 PMTK_API_GET_VEL_XYZ Data Format

DataField: PMTK461			
Example: $PMTK461*31<CR><LF> **Return:** PMTK_DT_VEL_XYZ			
Name	**Unit**	**Default**	**Description**

2.3.63 Packet Type: 499 PMTK_API_GET_FLASH_DATA

Read the flash memory.

Table 2-7269: 499 PMTK_API_GET_FLASH_DATA Data Format

DataField: PMTK499,Address,Length			
Example: $PMTK499,1C0,7*43<CR><LF> **Return:** PMTK_DT_FLASH_DATA			
Name	**Unit**	**Default**	**Description**
Address			the starting address in hex format.(The address is fixed at 0x1C0)
Length			The number of bytes requested in hex format(Max length is 7 bytes)

2.3.64 Packet Type: 500 PMTK_DT_FIX_CTL

These parameters show the rate of position fixing activity.

Table 2-7170: 500 PMTK_DT_FIX_CTL Data Format

DataField: $PMTK500,FixInterval,Duration,RunInterval,HAcc,VAcc*CS<CR><LF>			
Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>			
Name	**Unit**	**Default**	**Description**
FixInterval	msec	--	Position fix interval 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 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.

Note:

The execution result depend on firmware version.

2.3.65 Packet Type: 501 PMTK_DT_DGPS_MODE

DGPS Data Source Mode

Table 2-7371: 501 PMTK_DT_DGPS_MODE Data Format

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

2.3.66 Packet Type: 513 PMTK_DT_SBAS_ENABLED

Enable or disable searching for SBAS satellites.

Table 2-7472: 513 PMTK_DT_SBAS_ENABLED Data Format

DataField: PMTK513,Enabled			
Example: $PMTK513,1*28<CR><LF>			
Name	**Unit**	**Default**	**Description**
Enabled	--	--	Enable or disable ‘0’ = Disable ‘1’ = Enable

Note:

The execution result depend on firmware version.

2.3.67 Packet Type: 514 PMTK_DT_NMEA_OUTPUT

This is a response to PMTK414, which return current NMEA sentence output frequency setting.

Table 2-7473: 514 PMTK_DT_NMEA_OUTPUT Data Format

DataField: PMTK514			
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>			
Name	**Unit**	**Default**	**Description**
			There are totally **20** data fields that present output frequencies for the **20** supported NMEA sentences individually. Please refer to PMTK_API_SET_NMEA_OUTPUT for the Supported NMEA Sentences and Frequency Setting.

2.3.68 Packet Type: 528 PMTK_DT_HACC_MASK

Current horizontal accuracy mask

Table 2-74: 528 PMTK_DT_HACC_MASK Data Format

DataField: PMTK528,mask*CS <CR><LF>
Example: $PMTK528,50.00*3A<CR><LF>

2.3.69 Packet Type: 530 PMTK_DT_DATUM

Current datum used.

Table 2-7575: 530 PMTK_DT_DATUM Data Format

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

Note:

The execution result depend on firmware version.

2.3.70 Packet Type: 535 PMTK_API_DT_RTC_TIME

This packet carries current RTC UTC time.

Table 2-7676: 535 PMTK_API_DT_RTC_TIME Data Format

DataField: PMTK535,Year,Month,Day,Hour,Min,Sec			
Example: $PMTK534,2007,1,1,0,0,0*04<CR><LF>			
Name	**Unit**	**Default**	**Description**
Year			Year
Month			1~12
Day			1~31
Hour			0~23
Min			0~59
Sec			0~59

2.3.71 Packet Type: 536 PMTK_DT_HIGH_SENSITIVITY_TRACKING_NO_FIX

This packet carries setting of position output disabled/enabled in high sensitivity tracking mode.

Table 2-77: 605 PMTK_DT_HIGH_SENSITIVITY_TRACKING_NO_FIX Data Format

DataField: $PMTK536,disable_position_output*CS<CR><LF>			
Example: $PMTK536,1*2F<CR><LF>			
Name	**Unit**	**Default**	**Description**
	--	--	0 : Enable 1 : Disable

2.3.72 Packet Type: 599 PMTK_DT_FLASH_DATA

The data in the flash memory.

Table 2-7778: 599 PMTK_DT_FLASH_DATA Data Format

DataField: There are totally ‘length+2’ data fields that present the followings: 1.Starting address in hex format 2.Length in hex format 3~n: Data bytes in hex format			
Example: $PMTK599,1C,7,30,5C,22,1D,02,04,01*58<CR><LF>			
Name	**Unit**	**Default**	**Description**

2.3.73 Packet Type: 602 PMTK_Q_DATA_PORT

Read data port input/output data type and baundrate.

Table 2-7879: 602 PMTK_Q_DATA_PORT Data Format

DataField: PMTK602			
Example: $PMTK602*36<CR><LF> **Return:** PMTK_DT_DATA_PORT			
Name	**Unit**	**Default**	**Description**

2.3.74 Packet Type: 605 PMTK_Q_RELEASE

Query the firmware release information.

Table 2-7980: 605 PMTK_Q_RELEASE Data Format

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

2.3.75 Packet Type: 607 PMTK_Q_EPO_INFO

Query the EPO data status stored in the GPS chip.

Table 2-8081: 607 PMTK_Q_EPO_INFO Data Format

DataField: PMTK607			
Example: $PMTK607*33<CR><LF> **Return:** PMTK_DT_EPO_INFO			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.76 Packet Type: 622 PMTK_Q_LOCUS_DATA

Use Locus tool to retrieve the logging data from the NVRAM.

Table 2-8182: 622 PMTK_Q_LOCUS_DATA Data Format

DataField: PMTK622,type			
Example: Input: $PMTK622,0*28 //Dump full LOCUS flash data Input: $PMTK622,1*29 //Dump partial in used LOCUS flash data			
Name	**Unit**	**Default**	**Description**
type			0- Dump full LOCUS flash data 1- Dump partial in used LOCUS flash data
DataField: PMTK622,type,offset,size*hh			
Example: Input: $PMTK622,2,3,2*2B //Skip sector 1,2,3.Dump sector4 and sector5 LOCUS flash data.			
Name	**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])

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

2.3.77 Packet Type: 660 PMTK_Q_AVAILABLE_SV_EPH

Support PMTK660 which report valid Ephemeris SV:

(a) Host -> module: A PMTK660 command to request the EPH info, together with a time interval parameter (for example, 1800sec).

(b) module -> Host: Reply 32-bit flags of 32SV to indicate which EPHs will be available after the specified time interval.

Table 2-8283: 660 PMTK_Q_AVAILABLE_SV_EPH Data Format

DataField: PMTK660, Time interval			
Example: Indicate which EPHs will be available after 1800 seconds $PMTK660,1800*17<CR><LF> **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.			
Name	**Unit**	**Default**	**Description**
Time interval	sec	--	Set the time interval for MT3329 to reply 32-bit flags of 32SV. The Time interval > 0 and <= 7200 (2 hours).

2.3.78 Packet Type: 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.

Table 2-8384: 661 PMTK_Q_AVAILABLE_SV_ALM Data Format

DataField: PMTK661,Time interval			
Example: Indicate which Almanac will be available after 30 days $PMTK661,30*1C<CR><LF> **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.			
Name	**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)

2.3.79 Packet Type: 667 PMTK_Q_UTC_CORRECTION_DATA

Get UTC correction data.

Table 2-8485: 667 PMTK_Q_UTC_CORRECTION_DATA Data Format

DataField: PMTK001,667,3,A0,A1,dtLS,Tot,WNt,WNLSF,DN,dtLSF*CS<CR><LF>			
Example: $PMTK667 **Return:** If UTC correnction data are available, the receiver returns $PMTK001,667,3,0,0,16,507904,237,237,3,17*0A If UTC correnction data are not available, the receiver returns $PMTK001,667,2*36			
Name	**Unit**	**Default**	**Description**
PMTK667			Reference UTC correction
Action flag			'3' means UTC correction data are available '2' means UTC correction data are not available
A0	(Seconds)/(2^-30)		UTC parameter A0
A1	(seconds/second)/(2^-50)		UTC parameter A1
dtLS	seconds		UTC time difference due to leap seconds before event
Tot	seconds		UTC reference time of week

WNt	weeks		UTC reference week number
WNLSF	weeks		UTC week number when next leap second event occurs
DN	days		UTC day of week when next leap second event occurs
dtLSF	seconds		UTC time difference due to leap seconds after event
CS			Checksum

2.3.80 Packet Type: 668 PMTK_Q_GPS_KEP

Get GPS ephemeris data in kepler format.

Table 2-8586: 668 PMTK_Q_GPS_KEP Data Format

DataField: PMTK668,PRN			
Example: $PMTK668,3*25<CR><LF> **Return:** If ephemeris data of specified satellite is available, the receiver returns $PMTK668,PRN,WeekNo,URAI,IDOT,IODE,Toc,af2,af1,af0,IODC,Crs,dn,M0,Cuc,e,Cus,SqrtA,Toe, Omega0,Cis,i0,Crc,w,OmegaDot,Tgd,SVHealth*CS			
Name	**Unit**	**Default**	**Description**
PMTK668			PMTK command ID
PRN			SVID of satellite
WeekNo			Reference week number[weeks]
URAI			Figure of Merit—Defines URA
IDOT			Rate of inclination angle[rad/s]
IODE			Issue of data counter
Toc			Reference time of week[s]
Af2			SV clock correction polynomial coefficient[s/s/s]
Af1			SV clock correction polynomial coefficient[s/s]
Af0			SV clock correction polynomial coefficient[s]
IODC			Issue of data counter
Crs			Ampof sin harmonic corr term orbit radius[m]
dn			Delta n mean motion diff from computed value[rad/s]
M0			Mean anomaly at reference time[rad]
Cuc			Amplitude of cos harm corr term arg of latitude[rad]
e			Eccemtricity
Cus			Amplitude of sin harm corr term arg of latitude[rad]
SqrtA			Square root of the semi-major axis
Toe			Reference time of week[Ephemeris terms][s]
Cic			Amplitude of cos harm corr term ange of inclination[rad]

Omega0			Longitude of ascending node of orbit plane[rad]
Cis			Amplitude of sin harm corr term ang of inclination[rad]
I0			Inclination angle at reference time[rad]
Crc			Amplitude of cos harm corr term orbit radius[rad]
w			Argument of perigee[rad]
OmegaDot			Rate of right ascention[rad/s]
Tgd			Group delay[s]
SVHealth			The 5 LSBs of the NAV data's health status from the ephemeris.
CS			Checksum

Note: Please use the factor scale(refer to ICD-GPS-200c, page 96) to calculate the actual value.

2.3.81 Packet Type: 669 PMTK_Q_BDS_KEP

Get BDS ephemeris data in kepler format.

Table 2-8687: 669 PMTK_Q_BDS_KEP Data Format

DataField: PMTK669,PRN			
Example: $PMTK669,3*25<CR><LF> **Return:** If ephemeris data of specified satellite is available, the receiver returns $PMTK668,PRN,WeekNo,URAI,IDOT,IODE,Toc,af2,af1,af0,IODC,Crs,dn,M0,Cuc,e,Cus,SqrtA,Toe, Omega0,Cis,i0,Crc,w,OmegaDot,Tgd,SVHealth*CS			
Name	**Unit**	**Default**	**Description**
PMTK669			PMTK command ID
PRN			SVID of satellite
WeekNo			Reference week number[weeks]
URAI			Figure of Merit—Defines URA
IDOT			Rate of inclination angle[rad/s]
IODE			Issue of data counter
Toc			Reference time of week[s]
Af2			SV clock correction polynomial coefficient[s/s/s]
Af1			SV clock correction polynomial coefficient[s/s]
Af0			SV clock correction polynomial coefficient[s]
IODC			Issue of data counter
Crs			Ampof sin harmonic corr term orbit radius[m]
dn			Delta n mean motion diff from computed value[rad/s]
M0			Mean anomaly at reference time[rad]
Cuc			Amplitude of cos harm corr term arg of latitude[rad]
e			Eccemtricity

Cus			Amplitude of sin harm corr term arg of latitude[rad]
SqrtA			Square root of the semi-major axis
Toe			Reference time of week[Ephemeris terms][s]
Cic			Amplitude of cos harm corr term ange of inclination[rad]
Omega0			Longitude of ascending node of orbit plane[rad]
Cis			Amplitude of sin harm corr term ang of inclination[rad]
I0			Inclination angle at reference time[rad]
Crc			Amplitude of cos harm corr term orbit radius[rad]
w			Argument of perigee[rad]
OmegaDot			Rate of right ascention[rad/s]
Tgd			Group delay[s]
SVHealth			The 5 LSBs of the NAV data's health status from the ephemeris.
CS			Checksum

Note: Note: please use the factor scale(refer to BeiDou Navigation Satellite System Signal In Space Interface Control Document) to calculate the actual value.

2.3.82 Packet Type: 670 PMTK_Q_GPS_IONO

Query ionospheric parameters.

Table 2-8788: 705 PMTK_DT_RELEASE Data Format

DataField: $PMTK001,670,3,$\alpha_0$, α_1, α_2, α_3,β_0, β_1, β_2, β_3*CS<CR><LF>			
Example: $PMTK670*33<CR><LF> **Return:** If ionospheric paremeters are available, the receiver returns $PMTK001,670,3,19,3,-2,-1,63,10,-3,-4*15 If ionospheric paremeters are not available, the receiver returns $PMTK001,670,2*30			
Name	**Unit**	**Default**	**Description**
α_0	seconds	--	IONO parameter α_0
α_1	Sec/semi-corcle	--	IONO parameter α_1
α_2	Sec/(semi-circle)^2	--	IONO parameter α_2
α_3	Sec/(semi-circle)^3	--	IONO parameter α_3
β 0	seconds	--	IONO parameter β 0
β 1	Sec/semi-corcle	--	IONO parameter β 1
β 2	Sec/(semi-circle)^2	--	IONO parameter β 2
β 3	Sec/(semi-circle)^3	--	IONO parameter β 3

2.3.83 Packet Type: 702 PMTK_DT_DATA_PORT

Display Data port input/output data type and baud rate.

Table 2-8889: 702 PMTK_DT_DATA_PORT Data Format

DataField: $PMTK702,InType,OutType,Baud*CS<CR><LF>			
Example: $PMTK702,1,1,9600*14<CR><LF>			
Name	**Unit**	**Default**	**Description**
InType	--	--	Data port input data type '0'= DPORT_IN_NONE '1'= DPORT_IN_RTCM '2'= DPORT_IN_NA
OutType	--	--	Data port input data type '0'= DPORT_OUT_NONE '1'= DPORT_OUT_DEBUG
Baud	--	--	Baudrate setting 4800 9600 19200 38400 57600 115200

2.3.84 Packet Type: 705 PMTK_DT_RELEASE

Firmware release information.

Table 2-8990: 705 PMTK_DT_RELEASE Data Format

DataField: PMTK705,ReleaseStr,Build_ID,Product_Model,(SDK_Version,)			
Example: $PMTK705,AXN_0.2,1234,ABCD,*14<CR><LF>			
Name	**Unit**	**Default**	**Description**
ReleaseStr	--	--	Firmware release name and version: 3318 : Mcore_x.x 3329 : 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

2.3.85 Packet Type: 707 PMTK_DT_EPO_INFO

EPO data status stored in GPS chip.

Table 2-9091: 707 PMTK_DT_EPO_INFO Data Format

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

2.3.86 Packet Type: 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 2-9192: 740 PMTK_DT_UTC Data Format

DataField: PMTK740,YYYY,MM,DD,hh,mm,ss*CS<CR><LF>			
Example: The packet indicates that the current UTC time 2010/Feb/10 09:00:58. $PMTK740,2010,2,10,9,0,58*05<CR><LF>			
Name	**Unit**	**Range**	**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
cs			8-bit accumulative checksum of all bytes in-between the $ and * characters in hexadecimal

2.3.87 Packet Type: 721 PMTK_DT_SV_EPO

The packet contains GPS EPO data for a single satellite.
Table 2-9293: 721 PMTK_DT_SV_EPO Data Format

DataField: $PMTK721,SatID,W[0],…,W[17]*CS<CR><LF>
Example: The packet contains EPO data of satellite PRN 17. $PMTK721,11,6a043d2f,d52e00,0d2f1a3d,…,…,……..*CS<CR><LF>

Name	Unit	Range	Description
SatID	---	1~32	Satellite PRN number [Represented in HEX characters] for the EPO data to follow
W[0] ~ W[17]	---	---	words [LSB first] of one EPO segment data (total 72 bytes)
cs			8-bit accumulative checksum of all bytes in-between the $ and * characters in hexadecimal

2.3.88 Packet Type: 741 PMTK_DT_POS

According to the few hardware design that did not keep VBAT power to keep NVRAM data, it would cause GPS always get COLD Start when power on device and then get the long time fixed and poor accuracy. MTK designed the command to assist customer to resolve above issue. User could perform the command to inject the last fixed position information into this GPS device to have faster TTFF. The reference time information in this PMTK command represents when do you recorded this location from the GPS. Please send PMTK740 to inject time before sending PMTK741.
The packet contains reference location for the GPS receiver. To have faster TTFF, the accuracy of the location shall be better than 30km.
Keep status after reboot -> Yes.

Table 2-9394: 741 PMTK_DT_POS Data Format

DataField: $PMTK741,Lat,Long,Alt,YYYY,MM,DD,hh,mm,ss *CS<CR><LF>			
Example: The packet indicates that GPS receiver is at latitude 24.772816 degrees, longitude 121.022636 degrees, and altitude 160m at UTC 2016/1/1 12:00:00. If GPS receiver was powered on at UTC 2016/1/2 12:00:00, you could send the following command to inject the location information to GPS receiver. $PMTK741,24.772816,121.022636,160,2016,01,01,12,00,00*17			
Name	**Unit**	**Range**	**Description**
Lat	degree	-90.0 ~ 90.0	WGS84 geodetic latitude. NOTE: suggest to express this value in floating-point with 6 decimal points Minus: south; Plus: north
Long	degree	-180.0 ~ 180.0	WGS84 geodetic longitude. NOTE: suggest to express this value in floating-point with 6 decimal points Minus: west; Plus: east
Alt	m	---	WGS84 ellipsoidal altitude.
YYYY	year	> 1980	Reference UTC time: year in 4 digits
MM	month	1 - 12	Reference UTC time: month
DD	day	1 - 31	Reference UTC time: day
hh	hour	0 - 23	Reference UTC time: hour
mm	minute	0 - 59	Reference UTC time: minute

ss	second	0 - 59	Reference UTC time: second
cs			8-bit accumulative checksum of all bytes in-between the $ and * characters in hexadecimal

Note:

GPS chip will check value range for the following parameters:
Lat: -90.0 ~ 90.0,
Long: -180.0 ~ 180.0

2.3.89 Packet Type: 810 PMTK_TEST_ALL

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

Table 2-9495: 810 PMTK_TEST_ALL Data Format

DataField: $PMTK810,Bitmap,SVID*CS<CR><LF>			
Example: $PMTK810,0003,1D*4D<CR><LF> This command only tests TEST_INFO and TEST_ACQ test items.The specific SV id is PRN29.			
Name	**Unit**	**Range**	**Description**
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)
SVID	--	1~20	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

2.3.90 Packet Type: 811 PMTK_TEST_STOP

Testing tool could send this command to GPS receiver to leave MP test mode.

Table 2-9596: 811 PMTK_TEST_STOP Data Format

DataField: PMTK811			
Example: $PMTK811*3A<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

2.3.91 Packet Type: 812 PMTK_TEST_FINISH

GPS receiver will send out this PMTK packet to show that MP testing has finished.

Table 2-9697: 812 PMTK_TEST_FINISH Format

DataField: PMTK812			
Example: $PMTK812*39<CR><LF>			
Name	**Unit**	**Default**	**Description**
--	--	--	--

Note:

The execution result depend on firmware version.

2.3.92 Packet Type: 813 PMTK_TEST_ALL_ACQ

The result of TEST_ACQ item.

Table 2-9798: 813 PMTK_TEST_ALL_ACQ Format

DataField: $PMTK813,<SVid>,<Acq Time>*<CheckSum><CR><LF>			
Example: $PMTK813,29,2*01<CR><LF> The target device acquires SV29 within 2 seconds.			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
Acq Time	sec		

Note:

The execution result depend on firmware version.

2.3.93 Packet Type: 814 PMTK_TEST_ALL_BITSYNC

The result of TEST_BITSYNC item.

Table 2-9899: 814 PMTK_TEST_ALL_BITSYNC Format

DataField: PMTK814,<SVid>,<BitSync Time>			
Example: Regard to SV29, the target device reach bit sync state within 1 second. $PMTK814,29,1*05<CR><LF>			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
BitSync Time	sec		the target device reach bit sync state within

Note:

The execution result depend on firmware version.

2.3.94 Packet Type: 815 PMTK_TEST_ALL_SIGNAL

The result of TEST_SIGNAL item.

Table 2-99100: 815 PMTK_TEST_ALL_SIGNAL Format

DataField: $PMTK815,<SVid>,<Testing Time>,<Phase>,<TCXO Offset>,<TCXO Drift>,<CNR mean>,<CNR sigma>*<CheckSum><CR><LF>			
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			
Name	**Unit**	**Range**	**Description**
SVid	--	--	
Testing Time	sec	--	test Duration
Phase	0.01	--	Phase Error
TCXO Offset	0.001	--	
TCXO Drift	0.001	--	
CNR mean	0.01	--	
CNR sigma	0.01	--	

Note:

The execution result depend on firmware version.

2.3.95 Packet Type: 837 PMTK_TEST_JAMMING (NOT supported in AXN3.0)

Jamming scan test command.

Table 2-100101: 837 PMTK_TEST_JAMMING Data Format

DataField: 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			
Name	**Unit**	**Range**	**Description**
JamScanType	--	--	'0' : Enable GPS jamming scan '1' : Enable GLONASS jamming scan '2' : Enable BEIDOU jamming scan
JamScanNum	--	--	Jamming scan test times.

2.3.96 Packet Type: 838 PMTK_TEST_JAMMING_DETECTION

Jamming detection test command.

Table 2-102: 838PMTK_TEST_JAMMING_DETECTION Data Format

DataField: PMTK838, Cmdtype*CS <CR><LF>			
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*5A => Critical status.			
Name	**Unit**	**Range**	**Description**
Cmdtype			"0" Disable jamming detection message output. "1" Enable jamming detection message output.

2.3.97 Packet Type: 869 PMTK_EASY_ENABLE

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

Table 2-101103: 869 PMTK_EASY_ENABLE Format

DataField: PMTK869, CmdType, [Enable], [Extension Day]			
Example: To enable EASY, use $PMTK869,1,1*35<CR><LF> To disable EASY, use $PMTK869,1,0*36<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*37<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>			
Name	**Unit**	**Range**	**Description**
CmdType	--	--	Set or query 0: Query 1: Set 2: Result for query operation
Enabled	--	--	Enable or disable 0: Disable 1: Enable
Extension Day			Finished extension day

.

2.3.98 Packet Type: 875 PMTK_PMTKLSC_STN_OUTPUT

Enable or disable PMTKLSC Sentence output.Query if PMTKLSC Sentence output enabled or disabled.
Keep status after reboot -> Yes.

Table 2-102104: 875 PMTK_PMTKLSC_STN_OUTPUT Data Format

DataField: $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			
Name	**Unit**	**Range**	**Description**
CmdType	--	--	Set or query 0: Query 1: Set 2: Result for query operation
Enable	--	--	Enable or disable ‘0’: Disable ‘1’: Enable

2.3.99 Packet Type: 886 PMTK_FR_MODE

Set navigation mode

Table 2-103105: 886 PMTK_FR_MODE Data Format

DataField: $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>			
Name	**Unit**	**Range**	**Description**
CmdType	--	--	‘0’: Normal mode: For general purpose ‘1’: Fitness mode: For running and walking purpose that the low-speed (< 5m/s) movement will have more effect on the position calculation. ‘2’: Aviation mode: For high-dynamic purpose that the large-acceleration movement will have more effect on the position calculation. ‘3’: Balloon mode: For high-altitude balloon purpose that the vertical movement will have more effect on the position calculation. ‘4’:Stationary mode: For stationary applications that zero dynamics is assumed.

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
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

Appendix B: Related documents

(1). NMEA-0183 Standard For Interfacing Marine Electronic Devices

(2). MTK NMEA Packet User Manual(**Revision: 2.03**)

(3). MTK_NMEA_Packet_3

Appendix C: Term abbreviation

Table 1-1: Term abbreviation

Term	Definition
1PPS	1 pulse per second
ABP	Almanac Based Position
ACK	Acknowledge
DGPS	Differential Global Positioning System
NMEA	National Marine Electronics Association
OSP	One Socket Protocol
SBAS	Satellite Based Augmentation System
SDK	Software Development Kit
SRAM	Static Random Access Memory
SW	Software
SVs	Satellites
PDOP	Position Dilution of Precision
HDOP	Horizontal Dilution of Precision
VDOP	Vertical Dilution of Precision

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