

# L86 GNSS

# Protocol Specification

**GNSS Module Series**

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# About the Document

## History

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1.1	2014-12-19	Connie ZHOU	<ol style="list-style-type: none"> <li>1. Modified the description of DGPS_MODE</li> <li>2. Added parameter for "Fix status" in GGA sentence</li> <li>3. Added parameter for Packet Type 353</li> <li>4. Modified the Notes in Chapter 2.1</li> </ol>
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# 1 Introduction

L86 GNSS module can use both GLONASS and GPS constellation and features accurate acquisition. The module supports autonomous GNSS C/A, SBAS function (including WAAS and EGNOS) and AGPS (EASY function). It can be used in the positioning, navigation and other industries.

Now L86 supports SDK commands which are developed by Quectel. At present the SDK commands contain **\$PQGLP**, **\$PQBAUD**, **\$PQ1PPS**, **\$PQEPE** and so on. For more informations please refer to **document [4]**.

This document describes the software aspects of L86. L86 supports NMEA 0183 standard commands. MTK NMEA extended packet is supported to control and configure L86 GNSS module.

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## 2 Standard NMEA Packet Protocols

L86 supports NMEA 0183 standard messages, and the following table shows the structure of a NMEA 0183 standard message.

**Table 1: Structure of NMEA Message**

Filed	Length (Bytes)	Description
\$	1	Each NMEA message starts with '\$'
Talker ID	1~2	Talker IDs can be 'GP' and 'GN' when the message ID is RMC, GSA or GLL, and Talker IDs can be 'GP' and 'GL' when the message ID is GSV. Otherwise, Talker ID is always 'GP'.
NMEA Message ID	3	NMEA message ID
Data Field	Variable, depends on the NMEA message type	Data fields, delimited by comma ','
*	1	End character of data field
Checksum	2	A hexadecimal number calculated by exclusive OR of all characters between '\$' and '*'
<CR><LF>	2	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

The default output message of L86 has the following seven sentences: RMC, VTG, GGA, GSA, GSV, GLL and GPTXT.



## 2.1. --RMC

RMC–Recommended Minimum Position Data (including position, velocity and time).

Example:

```
$GNRMC,110332.000,A,3150.7822,N,11711.9278,E,0.01,37.48,111214,,,D*43<CR><LF>
```

```
$GPRMC,110950.000,A,3150.7849,N,11711.9292,E,0.01,282.88,111214,,,D*6A<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--RMC	Message ID
UTC Time	Time in format 'hhmmss.sss'
Data Valid	'V'=Invalid 'A'=Valid
Latitude	Latitude in format 'ddmm.mmmm' (degrees and minutes)
N/S	'N'=North 'S'=South
Longitude	Longitude in format 'dddmm.mmmm' (degrees and minutes)
E/W	'E'=East 'W'=West
Speed	Speed over ground in knots
COG	Course over ground in degree
Date	Date in format 'ddmmyy'
Magnetic Variation	Magnetic variation in degree, not being output
E/W	Magnetic variation E/W indicator, not being output
Positioning Mode	'N'=No fix 'A'=Autonomous GNSS fix 'D'=Differential GNSS fix
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

For the details, please refer to the Notes of **Chapter 3.27**.

## 2.2. --VTG

VTG—Track Made Good and Ground Speed.

Example:

```
$GPVTG,227.15,T,,M,0.00,N,0.00,K,A*3E<CR><LF>
```

```
$GNVTG,19.11,T,,M,0.16,N,0.30,K,A*1F<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--VTG	Message ID
COG (T)	Course over ground (true) in degree
T	Fixed field, true
COG (M)	Course over ground (magnetic), not being output
M	Fixed field, magnetic
Speed	Speed over ground in knots
N	Fixed field, knots
Speed	Speed over ground in km/h
K	Fixed field, km/h
Positioning Mode	'N'=No fix 'A'=Autonomous GNSS fix 'D'=Differential GNSS fix
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

For the details, please refer to the Notes of **Chapter 3.27**.

### 2.3. --GGA

GGA–Global Positioning System Fix Data, is the essential fix data which provides 3D location and accuracy data.

Example:

```
$GPGGA,015606.000,3150.7584,N,11712.0491,E,1,5,2.28,265.0,M,0.0,M,,*65<CR><LF>
```

```
$GNGGA,083354.000,3150.7790,N,11711.9289,E,1,8,2.85,53.2,M,0.0,M,,*4B<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--GGA	Message ID
UTC Time	Time in format 'hhmmss.sss'
Latitude	Latitude in format 'ddmm.mmmm' (degrees and minutes)
N/S	'N'=North 'S'=South
Longitude	Longitude in format 'dddmm.mmmm' (degrees and minutes)
E/W	'E'=East 'W'=West
Fix Status	'0'=Invalid '1'=GNSS fix '2'=DGPS fix '6'=Estimated (dead reckoning) Mode
Number of SV	Number of satellites being used (0~24)
HDOP	Horizontal Dilution of Precision
Altitude	Altitude in meters according to WGS84 ellipsoid
M	Fixed field, meter
Geoid Separation	Height of Geoid (means sea level) above WGS84 ellipsoid, meter

M	Fixed field, meter
DGPS Age	Age of DGPS data in seconds, empty if DGPS is not used
DGPS Station ID	DGPS station ID, empty if DGPS is not used
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

For the details, please refer to the Notes of **Chapter 3.27**.

## 2.4. --GSA

GSA–GNSS DOP and Active Satellites, which provides details on the fix and includes the number of satellites being used in the current solution and the DOP. At most the first 12 satellite IDs are output.

Example:

```
$GPGSA,A,3,25,24,04,12,14,15,,,,,,,,,2.09,1.49,1.47*00<CR><LF>
$GNGSA,A,3,22,14,12,15,31,25,24,04,193,,,,,1.28,0.75,1.03*29<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--GSA	Message ID
Mode	Auto selection of 2D or 3D fix 'M'=Manual, forced to switch 2D/3D mode 'A'=Allowed to automatically switch 2D/3D mode
Fix Status	'1'=No fix '2'=2D fix '3'=3D fix
Satellite Used 1	Satellite used on channel 1
Satellite Used 2	Satellite used on channel 2
Satellite Used 3	Satellite used on channel 3

Satellite Used 4	Satellite used on channel 4
Satellite Used 5	Satellite used on channel 5
Satellite Used 6	Satellite used on channel 6
Satellite Used 7	Satellite used on channel 7
Satellite Used 8	Satellite used on channel 8
Satellite Used 9	Satellite used on channel 9
Satellite Used 10	Satellite used on channel 10
Satellite Used 11	Satellite used on channel 11
Satellite Used 12	Satellite used on channel 12
PDOP	Position Dilution of Precision
HDOP	Horizontal Dilution of Precision
VDOP	Vertical Dilution of Precision
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

If the receiver is fixed by multi-GNSS, it will print two GNGSA sentences. One is for GPS satellite, the other is for GLONASS satellite. For the details, please refer to the Notes in **Chapter 3.27**.

## 2.5. --GSV

GSV–GNSS Satellites in View. One GSV sentence can only provide data for at most 4 satellites, so several sentences might be required for full information. Since GSV includes satellites that are not used as part of the solution, GSV sentence contains more satellites than GGA does.

Example:

```
$GPGSV,4,1,13,22,74,270,17,18,56,162,11,25,53,128,51,14,51,325,49*77<CR><LF>
$GPGSV,4,2,13,42,45,141,39,12,41,067,46,193,37,171,21,31,31,243,16*48<CR><LF>
```

```
$GPGSV,4,3,13,24,23,047,44,04,10,304,19,15,09,097,35,21,05,189,14*74<CR><LF>
$GPGSV,4,4,13,32,01,319,*40<CR><LF>
$GLGSV,2,1,07,72,74,021,49,74,66,010,45,75,51,230,,71,39,128,50*6F<CR><LF>
$GLGSV,2,2,07,65,25,329,33,73,16,031,37,76,01,218,*50<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--GSV	Message ID
Number of Message	Number of messages, total number of GPGSV messages being output (1~3)
Sequence Number	Sequence number of this entry (1~3)
Satellites in View	Total satellites in view
Satellite ID 1	Satellite ID
Elevation 1	Elevation in degree (0~90)
Azimuth 1	Azimuth in degree (0~359)
SNR 1	Signal to Noise Ration in dBHz (0~99), empty if not tracking
Satellite ID 2	Satellite ID
Elevation 2	Elevation in degree (0~90)
Azimuth 2	Azimuth in degree (0~359)
SNR 2	Signal to Noise Ration in dBHz (0~99), empty if not tracking
Satellite ID 3	Satellite ID
Elevation 3	Elevation in degree (0~90)
Azimuth 3	Azimuth in degree (0~359)
SNR 3	Signal to Noise Ration in dBHz (0~99), empty if not tracking
Satellite ID 4	Satellite ID
Elevation 4	Elevation in degree (0~90)
Azimuth 4	Azimuth in degree (0~359)
SNR 4	Signal to Noise Ration in dBHz (0~99), empty if not tracking
*	End character of data field

Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

## NOTES

1. If the receiver is fixed by multi-GNSS, it will print one more sentence (GPGSV) for GPS satellites and one more sentence (GLGSV) for GLONASS satellites. For the details, please refer to the Notes in **Chapter 3.27**.
2. The receiver features built-in RAIM function which filters out low quality satellites. Thus, in most cases, there are more viewed satellites than used ones, and positioning accuracy is greatly improved.

## 2.6. --GLL

GLL—Geographic Latitude and Longitude, which contains position information, time of position fix and status.

Example:

```
$GPGLL,3150.7849,N,11711.9292,E,110950.000,A,D*52<CR><LF>
$GNGLL,3150.7822,N,11711.9278,E,110332.000,A,D*4B<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
--GLL	Message ID
Latitude	Latitude in format 'ddmm.mmmm' (degrees and minutes)
N/S	'N'=North 'S'=South
Longitude	Longitude in format 'dddmm.mmmm' (degrees and minutes)
E/W	'E'=East 'W'=West
UTC Time	Time in format 'hhmmss.sss'
Data Valid	'V'=Invalid 'A'=Valid
Positioning Mode	'N'=No fix 'A'=Autonomous GNSS fix 'D'=Differential GNSS fix

*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

For the details, please refer to the Notes of **Chapter 3.27**.

## 2.7. GPTXT

This message is used to output information.

This sentence is output by default. You can use the SDK command **\$PQTX** to permanently modify and save. For details please refer to **document [4]**.

Example:

```
$GPTXT,01,01,02,ANTSTATUS=OK*3B<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
GPTXT	Message ID
XX	Total number of messages in this transmission. (01~99)
YY	Message number in this transmission. (01~99)
ZZ	Severity of the message '00'=ERROR '01'=WARNING '02'=NOTICE '07'=USER
Text Message	Output information
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'



# 3 MTK NMEA Packet Protocols

This chapter introduces the MTK NMEA packet protocol, which is a set of extension messages of the standard NMEA packet protocol. These messages are used to control and configure L86 GNSS module. The following table shows the structure of a MTK NMEA packet.

**Table 2: Structure of MTK NMEA Packet**

Filed	Length (Bytes)	Description
\$	1	Each NMEA message starts with '\$'
Talker ID	1	'P' for proprietary message
NMEA Data Type	3	Always 'MTK' to indicate MTK proprietary message
Data Filed	Packet Type	3 Packet type, from '000' to '999'
	Packet Data	Variable, depends on the packet type Data fields, delimited by comma ','
*	1	End character of data field
Checksum	2	A hexadecimal number calculated by exclusive OR of all characters between '\$' and '*'
<CR><LF>	2	Each NMEA message ends with 'CR' and 'LF'

## 3.1. Packet Type: 010 PMTK\_SYS\_MSG

This message is used to automatically output system messages through GNSS module.

Data Field:

None

Example:

\$PMTK010,001\*2E<CR><LF>

Field	Description
-------	-------------

\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	010
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
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.2. Packet Type: 011 PMTK\_TXT\_MSG

This message is used to automatically output system messages through GNSS module.

Data Field:

None

Example:

\$PMTK011,MTKGPS\*08<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	011
Message	MTKGPS
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.3. Packet Type: 001 PMTK\_ACK

Acknowledgement of PMTK command. In order to inform the sender whether the receiver has received the packet, an acknowledge packet PMTK\_ACK should return after the receiver receives a packet.

Some commands will cause the GNSS module to restart or change the baud rate. There is no PMTK\_ACK for those commands as listed below.

PMTK\_CMD\_HOT\_START  
PMTK\_CMD\_WARM\_START  
PMTK\_CMD\_COLD\_START  
PMTK\_CMD\_FULL\_COLD\_START  
PMTK\_SET\_NMEA\_BAUDRATE

Data Field:

\$PMTK001,Cmd,Flag

Example:

\$PMTK001,869,3\*37<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	001
Command	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
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.4. Packet Type: 101 PMTK\_CMD\_HOT\_START

This message is used to hot start the GNSS module (use all available data in the NV store). Normally hot start means the GNSS module was powered down less than 3 hours (RTC must be alive) and its

ephemeris is still valid. As there is no need for downloading ephemeris, it is the fastest startup method.

Data Field: None Example: \$PMTK101*32<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	101
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.5. Packet Type: 102 PMTK\_CMD\_WARM\_START

This message is used to warm start the GNSS module. Warm start means the GNSS module has approximate information of time, position and coarse data on satellite positions. But it needs to download ephemeris until it can get a fix. Using this message will force the GNSS warm restarted without using the ephemeris data in NV.

Data Field: None Example: \$PMTK102*31<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	102
*	End character of data field
Checksum	Hexadecimal checksum

<CR><LF>                      Each NMEA message ends with 'CR' and 'LF'

### 3.6. Packet Type: 103 PMTK\_CMD\_COLD\_START

This message is used to cold start the GNSS module. Using this message will force the GNSS cold restarted without using any prior location information, including time, position, almanacs and ephemeris data.

Data Field:

None

Example:

\$PMTK103\*30<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	103
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.7. Packet Type: 104 PMTK\_CMD\_FULL\_COLD\_START

This message is essentially a cold restart, but additionally clears system and user configurations at re-start. That is, reset the GNSS module to the factory status. Full cold start means the GNSS module has no information on last location. It needs to search the full time and frequency space, and also all possible satellite numbers before it can get a fix.

Data Field:

None

Example:

\$PMTK104\*37<CR><LF>

Field	Description
-------	-------------

\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	104
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.8. Packet Type: 161 PMTK\_CMD\_STANDBY\_MODE

This message is used to enter standby mode for power saving.

Data Field:  
\$PMTK161,Type  
Example:  
\$PMTK161,0\*28<CR><LF>  
Response:  
\$PMTK001,161,3\*36<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	161
Type	'0'=Stop mode
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.9. Packet Type: 183 PMTK\_LOCUS\_QUERY\_STATUS

This message is used to query LOCUS logging status.

Data Field:  
None  
Example:  
\$PMTK183\*38<CR><LF>  
Response:  
\$PMTK001,183,3\*3A<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	183
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

Return:

Example:  
\$PMTKLOG,456,0,11,31,2,0,0,0,3769,46\*48<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	LOG
Serial#	Logging serial number: 0~65535
Type	Logging type—0: Overlap, 1: Fullstop
Mode	Logging mode—0 x 08: Interval logger
Content	Logging contents of configuration
Interval	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

Number	Logging number of data record
Percent	Logging life used percentage (0%~100%)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.10. Packet Type: 184 PMTK\_LOCUS\_ERASE\_FLASH

This message is used to erase logger flash.

Data Field:  
\$PMTK184,Type  
Example:  
\$PMTK184,1\*22<CR><LF>  
Response:  
\$PMTK001,184,3\*3D<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	184
Type	'1'=Erase all logger internal flash data
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.11. Packet Type: 185 PMTK\_LOCUS\_STOP\_LOGGER

This message is used to stop or start logging data.



Data Field:  
\$PMTK185,Stutas  
Example:  
\$PMTK185,1\*23<CR><LF>  
Response:  
\$PMTK001,185,3\*3C<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	185
Status	'0'=Start logging '1'=Stop logging
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.12. Packet Type: 622 PMTK\_Q\_LOCUS\_DATA

This message is used to dump locus flash data.

Data Field:  
\$PMTK622,Type  
Example:  
\$PMTK622,1\*29<CR><LF>  
Response:  
\$PMTK001,622,3\*36<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	622
Type	'1'=Dump partial in used flash data
*	End character of data field

Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.13. Packet Type: 220 PMTK\_SET\_POS\_FIX

This message is used to set position fix interval.

Data Field:  
\$PMTK220, Interval  
Example:  
\$PMTK220,1000\*1F<CR><LF>  
Response:  
\$PMTK001,220,3\*30<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	220
Interval	Position fix interval [msec]. [Range: 100~10000]
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.14. Packet Type: 223 PMTK\_SET\_AL\_DEE\_CFG

This message is used to config DEE.

Data Field:  
\$PMTK223,SV,SNR,Extension  
threshold,Extension gap  
Example:  
\$PMTK223,1,30,180000,60000\*3C<CR><LF>

Response:  
\$PMTK001,223,3\*33<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	223
SV	Range: 1~4 (Default value: 1)
SNR	Range: 25~30 (Default value: 30)
Extension Threshold	Range: 40000~180000 (Default value: 180000)
Extension Gap	Range: 0~3600000 (Default value: 60000)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.15. Packet Type: 225 PMTK\_SET\_PERIODIC\_MODE

This message is used to enter periodic mode for power saving.

Data Field:  
\$PMTK225,Type,Run time,Sleep time,Second run time,Second sleep time

Example:  
\$PMTK225,8\*23<CR><LF>

Response:  
\$PMTK001,225,3\*35<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	225
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	'0': Disable >='1000': Enable (Range: 1000~518400000)
Sleep Time	(Range: 1000~518400000)
Second Run Time	'0': Disable >='1000': Enable (Range: 1000~518400000)
Second Sleep Time	(Range: 1000~518400000)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

The unit of run time or sleep time is msec, the second run time should be larger than the first run time when the first run time is non-zero value.

### 3.16. Packet Type: 251 PMTK\_SET\_NMEA\_BAUDRATE

This message is used to set NMEA port baud rate. Using PMTK251 command to setup baud rate setting, the setting will be back to default value in the condition: Full cold start command is issued.

Data Field:  
\$PMTK251,Baudrate

Example:  
\$PMTK251,38400\*27<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	251
Baud Rate	Baud rate setting: 9600–default setting 4800

	9600
	14400
	19200
	38400
	57600
	115200
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.17. Packet Type: 255 PMTK\_SET\_SYNC\_PPS\_NMEA

This message is used to enable or disable fix NMEA output time behind PPS function. (Default off)

Data Field:  
\$PMTK255,Enable  
Example:  
\$PMTK255,0\*2C<CR><LF>  
Response:  
\$PMTK001,255,3\*32<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	255
Enable	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.18. Packet Type: 256 PMTK\_SET\_TIMING\_PRODUCT

This message is used to enable or disable timing product mode. (Default off)

Data Field:  
\$PMTK256,Enable  
Example:  
\$PMTK256,0\*2F<CR><LF>  
Response:  
\$PMTK001,256,3\*31<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	256
Enable	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.19. Packet Type: 285 PMTK\_SET\_PPS\_CONFIG

This message is used to set PPS type.

Data Field:  
\$PMTK285,Type,PPSPulseWidth  
Example:  
\$PMTK285,4,100\*38<CR><LF>  
Response:  
\$PMTK001,285,3\*3F<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message

Packet Type	285
Type	'0'=Disable '1'=After the first fix '2'=3D fix only '3'=2D/3D fix only '4'=Always
PPSPulseWidth	2~998 (Unit: ms)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.20. Packet Type: 286 PMTK\_SET\_AIC\_ENABLED

This message is used to enable or disable AIC function. It is suggested to set cold start command first and then PMTK command.

Data Field:  
\$PMTK286,Enable  
Example:  
\$PMTK286,0\*22<CR><LF>  
Response:  
\$PMTK001,286,3\*3C<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	286
Enable	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.21. Packet Type: 301 PMTK\_API\_SET\_DGPS\_MODE

This message is used to configure the source mode of DGPS correction data.

Data Field:  
\$PMTK301,Mode  
Example:  
\$PMTK301,2\*2E<CR><LF>  
Response:  
\$PMTK001,301,3\*32<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	301
Mode	DGPS data source mode. '0'=No DGPS source '1'=RTCM '2'=SBAS (Including WAAS/EGNOS/GAGAN/MSAS)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.22. Packet Type: 311 PMTK\_API\_SET\_ELEV\_MASK

This message is used to set satellite elevation mask.

Data Field:  
\$PMTK311,Type  
Example:  
\$PMTK311,5\*28<CR><LF>  
Response:  
\$PMTK001,311,3\*33<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'



PMTK	MTK proprietary message
Packet Type	311
Satellite Elevation Mask	(Range: 0~90°)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

**NOTE**

The satellite elevation mask is recommended to be set not more than 10 degrees. As with the increase of satellite elevation mask, the number of satellites involved in positioning will decrease.

### 3.23. Packet Type: 313 PMTK\_API\_SET\_SBAS\_ENABLED

This message is used to enable or disable to search a SBAS satellite. SBAS (Satellite-Based Augmentation Systems) is a system that supports wide-area or regional augmentation through geostationary satellite broadcast messages. The geostationary satellite broadcast GNSS integrity and correction data with the assistance of multiple ground stations which are located at accurately-surveyed points.

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

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	313
Enable	'0'=Disable '1'=Enable
*	End character of data field

Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.24. Packet Type: 314 PMTK\_API\_SET\_NMEA\_OUTPUT

This message is used to set NMEA sentence output frequencies. There are totally 19 data fields that present output frequencies for the 19 supported NMEA sentences individually.

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

Data Field:

None

Example:

The module only output RMC once every one position fix.

```
$PMTK314,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*29<CR><LF>
```

Response:

```
$PMTK001,314,3*36<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	314
0 GLL	GLL interval–Geographic Position, Latitude and Longitude
1 RMC	RMC interval–Recommended Minimum Specific GNSS Sentence
2 VTG	VTG interval–Course Over Ground and Ground Speed
3 GGA	GGA interval–GPS Fix Data
4 GSA	GSA interval–GNSS DOPS and Active Satellites

5 GSV	GSV interval–GNSS Satellites in View
6 GRS	GRS interval–GNSS Range Residuals
7 GST	GST interval–GNSS Pseudorange Error Statistics
8 Reserved	Always 0
9 Reserved	Always 0
10 Reserved	Always 0
11 Reserved	Always 0
12 Reserved	Always 0
13 Reserved	Always 0
14 Reserved	Always 0
15 Reserved	Always 0
16 Reserved	Always 0
17 ZDA	ZDA interval–Time and Date
18 MCHN	PMTKCHN interval–GNSS channel status
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

To restore the system default setting, use below message:

Example:

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

Field	Description
\$	Each NMEA message starts with ‘\$’
PMTK	MTK proprietary message
Packet Type	314
Restore	Always -1

*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.25. 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.

Data Field:  
\$PMTK351,Enable  
Example:  
\$PMTK351,1\*28<CR><LF>  
Response:  
\$PMTK001,351,3\*37<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	351
QZSS_Enable	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.26. Packet Type: 352 PMTK\_API\_SET\_STOP\_QZSS

QZSS is regional positioning service. This command is used to enable or disable QZSS function. Default is enabled.

Data Field:  
\$PMTK352,Enable

Example:

```
$PMTK352,0*2A<CR><LF>
```

Response:

```
$PMTK001,352,3*34<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	352
QZSS_Enable	'0'=Enable '1'=Disable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.27. Packet Type: 353 PMTK\_API\_SET\_GNSS\_SEARCH\_MODE

This command is used to configure the receiver to start searching satellite system.

Data Field:

```
$PMTK353,GPS_Enable,GLONASS_Enable,GALILEO_Enable,GALILEO_FULL_Enable,BEIDOU_Enable
```

Example:

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

Response:

```
$PMTK001,353,3,1,1,0,0,0,3*36<CR><LF>
```

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	353
GPS_Enable	'0'=Disable (DO NOT search GPS satellites) '1' or non-ZERO: search GPS satellites
GLONASS_Enable	'0'=Disable (DO NOT search GLONASS satellites)

	'1'or non-ZERO: search GLONASS satellites
GALILEO_Enable	'0'=Disable (DO NOT search Galileo satellites) '1'or non-ZERO: search Galileo satellites
GALILEO_FULL_Enable	'0'=Disable (DO NOT search Galileo full mode satellites) '1'or non-ZERO: search Galileo satellites
BEIDOU_Enable	'0'=Disable '1'or non-ZERO: search BeiDou satellites
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

#### NOTES

1. If the receiver is fixed by GPS only, it will print GPRMC, GPVTG, GPGGA, GPGSA, GPGSV, GPGLL and GPTXT.
2. If the receiver is fixed by GPS only, and can also search QZSS satellite, it will print GPRMC, GPVTG, GPGGA, GPGSA, QZQSA, GPGSV, QZGSV, GPGLL and GPTXT.
3. If the receiver is fixed by GLONASS only, it will print GNRMC, GPVTG, GPGGA, GNGSA, GPGSV, GLGSV, GNGLL and GPTXT.
4. If the receiver is fixed by multi-GNSS, it will print GNRMC, GPVTG, GPGGA, GNGSA, GPGSV, GLGSV, GNGLL and GPTXT.
5. In the state of no satellite positioning, it will print initial state of NMEA, such as GPRMC, GPVTG, GPGGA, GPGSA, GPGSV, GPGLL and GPTXT. The time before satellite positioning after cold start, warm start or hot start belongs to this situation.
6. We use GPS+GLONASS or one of them. At present Galileo and BeiDou are not supported yet.

### 3.28. Packet Type: 386 PMTK\_API\_SET\_STATIC\_NAV\_THD

This message is used to 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.

Data Field:

\$PMTK386,Speed\_threshold

Example:

\$PMTK386,0.3\*3E<CR><LF>

Response:  
\$PMTK001,386,3\*3D<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	386
Speed_threshold	0~2m/s
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.29. Packet Type: 400 PMTK\_API\_Q\_FIX\_CTL

This message is used to query the rate of position fixing activity.

Refer to PMTK\_API\_SET\_FIX\_CTL for setting the rate.

Refer to PMTK\_DT\_FIX\_CTL for the result of the query.

Data Field:  
None  
Example:  
\$PMTK400\*36<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	400
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.30. Packet Type: 401 PMTK\_API\_Q\_DGPS\_MODE

This message is used to query the setting of DGPS mode.

Refer to PMTK\_API\_SET\_DGPS\_MODE for setting the DGPS mode.

Refer to PMTK\_DT\_DGPS\_MODE for the result of the query.

Data Field: None Example: \$PMTK401*37<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	401
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.31. Packet Type: 413 PMTK\_API\_Q\_SBAS\_ENABLED

This message is used to query the setting of SBAS.

Refer to PMTK\_API\_SET\_SBAS\_ENABLE for SBAS setting.

Refer to PMTK\_DT\_SBAS\_ENABLED for the result of the query.

Data Field: None Example: \$PMTK413*34<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'



PMTK	MTK proprietary message
Packet Type	413
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.32. Packet Type: 414 PMTK\_API\_Q\_NMEA\_OUTPUT

This message is used to query the current NMEA sentence output frequencies.

Refer to PMTK\_API\_SET\_NMEA\_OUTPUT for the frequencies setting.

Refer to PMTK\_DT\_NMEA\_OUTPUT for the result of the query.

Data Field: None Example: \$PMTK414*33<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	414
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.33. Packet Type: 605 PMTK\_Q\_RELEASE

This message is used to query the firmware release information.

Refer to PMTK\_DT\_RELEASE for the result of the query.

Data Field:  
None  
Example:  
\$PMTK605\*31<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	605
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.34. Packet Type: 500 PMTK\_DT\_FIX\_CTL

This message is the response to PMTK\_API\_Q\_FIX\_CTL.

Data Field:  
\$PMTK500,Fix interval  
Example:  
\$PMTK500,1000,0,0,0,0\*1A<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	500
Fix Interval	Position fix interval [msec]. [Range: 100~10000]
Reserved	Always 0
Reserved	Always 0
Reserved	Always 0
Reserved	Always 0

*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.35. Packet Type: 501 PMTK\_DT\_DGPS\_MODE

This message is the response to PMTK\_API\_Q\_DGPS\_MODE.

Data Field: \$PMTK513,Enable Example: \$PMTK513,1*28<CR><LF>	
Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	501
Mode	DGPS data source mode. '0'=No DGPS source '1'=RTCM '2'=SBAS
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.36. Packet Type: 513 PMTK\_DT\_SBAS\_ENABLED

This message is the response to PMTK\_API\_Q\_SBAS\_ENABLED.

Data Field: \$PMTK513,Enable Example: \$PMTK513,1*28<CR><LF>	
---	--

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	513
Enable	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.37. Packet Type: 514 PMTK\_DT\_NMEA\_OUTPUT

This message is the response to PMTK\_API\_Q\_NMEA\_OUTPUT.

Data Field:

None

Example:

\$PMTK514,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0\*2E<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	514
0 GLL	GLL interval–Geographic Position, Latitude and Longitude
1 RMC	RMC interval–Recommended Minimum Specific GNSS Sentence
2 VTG	VTG interval–Course Over Ground and Ground Speed
3 GGA	GGA interval–GPS Fix Data
4 GSA	GSA interval–GNSS DOPS and Active Satellites
5 GSV	GSV interval–GNSS Satellites in View

6 GRS	GRS interval–GNSS Range Residuals
7 GST	GST interval–GNSS Pseudorange Error Statistics
8 Reserved	
9 Reserved	
10 Reserved	
11 Reserved	
12 Reserved	
13 Reserved	
14 Reserved	
15 Reserved	
16 Reserved	
17 ZDA	ZDA interval–Time and Date
18 MCHN	PMTKCHN interval–GNSS Channel Status
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

### 3.38. Packet Type: 705 PMTK\_DT\_RELEASE

This message is the response to PMTK\_Q\_RELEASE.

Data Field:

\$PMTK705, Release string, Build ID, Product Model (,SDK Version)

Example:

\$PMTK705,AXN\_3.8\_3333\_16071300,0002,Quectel-L86,1.0\*02<CR><LF>

Field	Description
\$	Each NMEA message starts with ‘\$’
PMTK	MTK proprietary message

Packet Type	705
Release String	Firmware release name and version 3318: Mcore_x.x 3329: AXN_x.x 3339: AXN_x.x 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 (Optional)	Showing SDK version if the firmware is used for SDK
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.39. Packet Type: 838 PMTK\_TEST\_ANTI\_SPOOFING

This message is used to enable or disable jamming detection function.

Data Field:  
\$PMTK838,CmdType  
Example:  
\$PMTK838,1\*2C<CR><LF>  
Response:  
\$PMTK001,838,3,1\*2E<CR><LF>  
Return:  
\$PMTKSPF,1\*5A => No jamming, healthy status.  
\$PMTKSPF,2\*59 => Warning status.  
\$PMTKSPF,3\*58 => Critical status.

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	838
CmdType	'0'= Disable jamming detection function. '1'= Enable jamming detection function.

*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

## NOTES

After jamming detection is enabled, the module starts to detect whether there is jamming.

1. If there is no jamming, "\$PMTKSPF,1\*5A" will be reported to indicate healthy status (status 1).
2. If there is continuous jamming, then the module status will change from 1 to 2 and finally 3.

- In the case of not being positioned

After jamming detection is enabled, the module status will be 1 at the very beginning, and then change to 2 when jamming is detected. During the process, the module will attempt to fix position. Two hundred seconds later, if it still fails in positioning, the module status will change to 3 finally.

- In the case of being positioned

After jamming detection is enabled, the module status will be 1 at the very beginning. When jamming is detected, the module status will change to 2 and then 3 consecutively.

### 3.40. Packet Type: 869 PMTK\_EASY\_ENABLE

This message is used to enable or disable EASY function, and it also can be used to query if EASY is enabled or disabled.

Data Field:

\$PMTK869,CmdType[, Enabled]

Example:

\$PMTK869,1,1\*35<CR><LF>

Response:

\$PMTK001,869,3\*37<CR><LF>

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	869
CmdType	'0'=Query '1'=Set '2'=Result for Query operation

Enabled	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

## NOTES

1. If EASY is disabled, the receiver returns:  
\$PMTK869,2,0,0\*2B<CR><LF>
2. If EASY is enabled and not finished yet, the receiver may return:  
\$PMTK869,2,1,0\*2A<CR><LF>
3. If EASY is enabled and finished after 1 day, the receiver may return:  
\$PMTK869,2,1,1\*2B<CR><LF>
4. If EASY is enabled and finished after 2 days, the receiver may return:  
\$PMTK869,2,1,2\*28<CR><LF>
5. If EASY is enabled and finished after 3 days, the receiver may return:  
\$PMTK869,2,1,3\*29<CR><LF>

### 3.41. Packet Type: 875 PMTK\_PMTKLSC\_STN\_OUTPUT

This message is used to enable or disable PMTKLSC Sentence output. Query if PMTKLSC Sentence output enabled or disabled.

Data Field:

\$PMTK875,CmdType[,Enabled]

Example:

\$PMTK875,1,1\*38<CR><LF>: Enable PMTKLSC and PMTKLSCB Sentence output

Response:

\$PMTKLSC,Parameter1,Parameter2,Parameter3\*CS

\$PMTKLSB,Parameter1,Parameter2,Parameter3\*CS

Where Parameter1: current leap second

Parameter2: leap indicator, 1 means updated from broadcast data

Parameter3: next leap second

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message



Packet Type	875
CmdType	'0'=Query '1'=Set '2'=Result for Query operation
Enabled	'0'=Disable '1'=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

### 3.42. Packet Type: 886 PMTK\_FR\_MODE

This message is used to set navigation mode.

Data Field:  
\$PMTK886,CmdType  
Example:  
\$PMTK886,3\*2B<CR><LF>  
Response:  
\$PMTK001,886,3\*36

Field	Description
\$	Each NMEA message starts with '\$'
PMTK	MTK proprietary message
Packet Type	886
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.
*	End character of data field
Checksum	Hexadecimal checksum

<CR><LF>

Each NMEA message ends with 'CR' and 'LF'

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# 4 Default Configurations

**Table 3: Default Configurations**

Item	Default
NMEA Port Baud Rate	9600bps
Datum	WGS84
Rate of Position Fixing	1Hz
DGPS Mode	SBAS
SBAS	Enabled
NMEA Output Messages	RMC, VTG, GGA, GSA, GSV, GLL and GPTXT
AIC	On
EASY™	On

# 5 Appendix A References

**Table 4: Related Documents**

SN	Document Name	Remark
[1]	Quectel_L86_Hardware_Design	L86 Hardware Design
[2]	Quectel_L86_EVB_User Guide	L86 EVB User Guide
[3]	Quectel_L86_Reference_Design	L86 Reference Design
[4]	Quectel_GNSS_SDK_Commands_Manual	GNSS SDK Commands Manual

**Table 5: Terms and Abbreviations**

Abbreviation	Description
AGPS	Assisted Global Positioning System
AIC	Active Interference Cancellation
CS	Commercial Sample
DGPS	Differential Global Positioning System
EASY	Embedded Assist System
GGA	NMEA: Global Positioning System Fix Data
GLL	NMEA: Geographic Latitude and Longitude
GLONASS	Global Navigation Satellite System (The Russian GNSS)
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSA	NMEA: GNSS DOP and Active Satellites
GSV	NMEA: GNSS Satellites in View

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HDOP	Horizontal Dilution of Precision
NMEA	National Marine Electronics Association
PDOP	Position Dilution of Precision
PPS	Pulse Per Second
PMTK	Private Protocol of MTK
RMC	NMEA: Recommended Minimum Position Data
SBAS	Satellite-Based Augmentation System
UTC	Universal Time Coordinated
VDOP	Vertical Dilution of Precision
VTG	NMEA: Track Made Good and Ground Speed
WAAS	Wide Area Augmentation System

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