L76-LB&L26-LB&LC86L
GNSS Protocol Specification

GNSS Module Series

Rev. L76-LB&L26-LB&LC86L_GNSS_Protocol_Specification_V1.1

Date: 2020-03-07

Status: Released

Our aim is to provide customers with timely and comprehensive service. For any assistance, please contact our company headquarters:

Quectel Wireless Solutions Co., Ltd.
Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai, China 200233
Tel: +86 21 5108 6236
Email: info@quectel.com

Or our local office. For more information, please visit:
http://quectel.com/support/sales.htm

For technical support, or to report documentation errors, please visit:
http://quectel.com/support/technical.htm
Or email to: support@quectel.com

GENERAL NOTES

COPYRIGHT

About the Document

Revision History

Version	Date	Author	Description
1.0	2019-05-15	Jenn XIANG	Initial
1.1	2020-03-07	Berton PENG/ Ai HONG	1. Added applicable modules L26-LB and LC86L. 2. Deleted the following packet types: ● 300 PMTK_API_SET_FIX_CTL ● 458 PMTK_API_GET_POS_XYZ ● 461 PMTK_API_GET_VEL_XYZ 3. Updated NMEA standard messages according to NMEA V4.10. 4. Updated the following packet types: ● 001 PMTK_ACK ● 225 PMTK_SET_PERIODIC_MODE ● 183 PMTK_LOCUS_QUERY_STATUS

Contents

Table Index

1 Introduction

Quectel L76-LB, L26-LB and LC86L GNSS modules support GPS, GLONASS and BeiDou constellations. Also, they support autonomous GNSS C/A code, SBAS function (including WAAS, EGNOS, MSAS and GAGAN) and AGNSS (EASY™ function). It can be used for positioning and navigation in many vertical markets.

This document describes the NMEA messages supported by L76-LB, L26-LB and LC86L modules, including NMEA standard messages defined in the NMEA 0183 standard and NMEA proprietary messages defined by MTK.

NOTES

1. In addition to NMEA messages illustrated in this document, L76-LB/L26-LB/LC86L can also be controlled and configured through Quectel proprietary commands (SDK commands), including **$PQGLP**, **$PQBAUD**, **$PQ1PPS**, **$PQEPE** and so on. For more details, please refer to ***document [1]***.
2. Please use the commands listed in this document. Quectel assumes no responsibility for other commands that are not listed/mentioned in this document.

1.1. List of Supported NMEA Messages

Table 1: List of Supported NMEA Messages

Syntax	Default	Type	Description
NMEA Standard Messages			
$--RMC	ON	Output	Recommended minimum specific GNSS data
$--VTG	ON	Output	Course over ground and ground speed
$--GGA	ON	Output	Global positioning system fix data
$--GSA	ON	Output	GNSS DOP and active satellites

$--GSV	ON	Output	GNSS satellites in view
$--GLL	ON	Output	Geographic position - latitude and longitude
$GPTXT *(for L26-LB/LC86L only)*	ON	Output	Text transmission showing antenna status.
NMEA Proprietary Messages			
010 PMTK_SYS_MSG	/	Output	System message output automatically after power-up
011 PMTK_TXT_MSG	/	Output	System message output automatically after power-up
001 PMTK_ACK	/	Output	Acknowledgement of PMTK command
101 PMTK_CMD_HOT_START	/	Input	Perform hot start on the module
102 PMTK_CMD_WARM_START	/	Input	Perform warm start on the module
103 PMTK_CMD_COLD_START	/	Input	Perform cold start on the module
104 PMTK_CMD_FULL_COLD_START	/	Input	Perform cold restart on the module
161 PMTK_CMD_STANDBY_MODE	/	Input	Make the module enter standby mode for power saving
183 PMTK_LOCUS_QUERY_STATUS	/	Input	Query LOCUS logging status
184 PMTK_LOCUS_ERASE_FLASH	/	Input	Erase LOCUS logger flash
185 PMTK_LOCUS_STOP_LOGGER	/	Input	Stop or start LOCUS logging data
622 PMTK_Q_LOCUS_DATA	/	Input	Dump LOCUS flash data
220 PMTK_SET_POS_FIX	/	Input	Set position fix interval
223 PMTK_SET_AL_DEE_CFG	/	Input	Set DEE
225 PMTK_SET_PERIODIC_MODE	/	Input	Make the module enter periodic mode for power saving
251 PMTK_SET_NMEA_BAUDRATE	/	Input	Set the baud rate of NMEA port
255 PMTK_SET_SYNC_PPS_NMEA	/	Input	Enable or disable the function of fixing NMEA output time behind PPS
285 PMTK_SET_PPS_CONFIG	/	Input	Set PPS type
286 PMTK_SET_AIC_ENABLED	/	Input	Enable or disable AIC function
301 PMTK_API_SET_DGPS_MODE	/	Input	Set the source mode of DGPS correction data

306 PMTK_API_SET_MIN_SNR	/	Input	Set the minimum SNR of satellites being used
311 PMTK_API_SET_ELEV_MASK	/	Input	Set satellite elevation mask
313 PMTK_API_SET_SBAS_ENABLED	/	Input	Enable or disable searching an SBAS satellite
314 PMTK_API_SET_NMEA_OUTPUT	/	Input	Set NMEA sentence output frequencies
351 PMTK_API_SET_SUPPORT_QZSS_NMEA	/	Input	Enable or disable QZSS NMEA format
352 PMTK_API_SET_STOP_QZSS	/	Input	Enable or disable QZSS function
353 PMTK_API_SET_GNSS_SEARCH_MODE	/	Input	Configure the module to start searching satellite system
386 PMTK_API_SET_STATIC_NAV_THD	/	Input	Set the speed threshold for static navigation
400 PMTK_API_Q_FIX_CTL	/	Input	Query the rate of position fixing activity
401 PMTK_API_Q_DGPS_MODE	/	Input	Query the setting of DGPS mode
413 PMTK_API_Q_SBAS_ENABLED	/	Input	Query the setting of SBAS
414 PMTK_API_Q_NMEA_OUTPUT	/	Input	Query the current NMEA sentence output frequencies
605 PMTK_Q_RELEASE	/	Input	Query the firmware release information
500 PMTK_DT_FIX_CTL	/	Output	The response to PMTK_API_Q_FIX_CTL
501 PMTK_DT_DGPS_MODE	/	Output	The response to PMTK_API_Q_DGPS_MODE
513 PMTK_DT_SBAS_ENABLED	/	Output	The response to PMTK_API_Q_SBAS_ENABLED
514 PMTK_DT_NMEA_OUTPUT	/	Output	The response to PMTK_API_Q_NMEA_OUTPUT
705 PMTK_DT_RELEASE	/	Output	The response to PMTK_Q_RELEASE
838 PMTK_TEST_ANTI_SPOOFING	/	Input	Enable or disable jamming detection function
869 PMTK_EASY_ENABLE	/	Input	Enable or disable EASY™ function
875 PMTK_PMTKLSC_STN_OUTPUT	/	Input	Enable or disable PMTKLSC sentence output and query whether PMTKLSC sentence output is enabled or disabled
886 PMTK_FR_MODE	/	Input	Set the navigation mode

2 NMEA Standard Messages

L76-LB/L26-LB/LC86L module supports output messages defined in NMEA 0183 standard (NMEA standard messages). It supports output of the following types of NMEA standard messages by default:

- RMC
- VTG
- GGA
- GSA
- GSV
- GLL
- TXT (for L26-LB/LC86L only)

2.1. Structure of NMEA Standard Messages

The table below illustrates the structure of a NMEA standard message.

Table 1: Structure of NMEA Standard Messages

Filed	Length (Bytes)	Description
$	1	Each NMEA message starts with “$”
Talker ID	1–2	When the NMEA message ID is RMC/VTG/GGA/GSA/GLL: ● “GP”: when the module works in GPS only mode ● “GN”: when the module works in GPS+BeiDou or GPS+GLONASS mode When the message ID is GSV: ● “GP”: indicate GPS satellites ● “BD”: indicate BeiDou satellites ● “GL”: indicate GLONASS satellites When the message ID is TXT, the talker ID will always be “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”

2.2. Description of NMEA Standard Messages

2.2.1. RMC

RMC, Recommended Minimum Specific GNSS Data. This sentence is transmitted at intervals not exceeding 2 seconds. All data fields must be provided, and null fields can be used only when the data is temporarily unavailable.

Format:

$--RMC,<UTC Time>,<Data Validity>,<Latitude>,<N/S>,<Longitude>,<E/W>,<Speed>,<COG>,<Date>,<Magnetic Variation>,<E/W>,<Positioning Mode>,<Navigational status>*<Checksum><CR><LF>

Example:

GPS+GLONASS mode:
$GNRMC,075925.000,A,3149.2894,N,11706.9251,E,0.01,351.19,200120,,,A*75<CR><LF>
GPS only mode:
$GPRMC,140146.000,A,3150.863861,N,11711.928739,E,0.00,183.85,211019,,,A,V*13<CR><LF>

Parameter:

Field	Description
$	Each NMEA message starts with “$”
--RMC	Message ID
UTC Time	UTC of position fix in “hhmmss.sss” format
Data Validity	“V” = Invalid “A” = Valid

Latitude	Latitude in “ddmm.mmmm” format (degrees and minutes)
N/S	“N” = North “S” = South
Longitude	Longitude in “dddmm.mmmm” format (degrees and minutes)
E/W	“E” = East “W” = West
Speed	Speed over ground in knots
COG	Course over ground in degrees
Date	Date in “ddmmyy” format
Magnetic Variation	Magnetic variation in degrees (will not be output)
E/W	Magnetic variation E/W indicator (will not be output)
Positioning Mode	Positioning system mode indicator: “N” = Not fixed “A” = Autonomous mode “D” = Differential mode
Navigational status	Navigational status: “S” = Safe “C” = Caution “U” = Unsafe “V” = Navigational status not valid, equipment is not providing navigational status indication
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

2.2.2. VTG

VTG, Course Over Ground and Ground Speed. The actual course and speed relative to the ground.

Format:

```
$--VTG,<COG(T)>,<T>,<COG(M)>,<M>,<Speed>,<N>,<Speed>,K,<Positioning Mode>*<Checksum><CR><LF>
```

Example:

```
GPS+GLONASS mode:
$GNVTG,327.60,T,,M,0.02,N,0.03,K,D*27<CR><LF>
GPS only mode:
$GPVTG,183.85,T,,M,0.00,N,0.00,K,A*3A<CR><LF>
```

Parameter:

Field	Description
$	Each NMEA message starts with “$”
--VTG	Message ID
COG(T)	True course over ground in degrees
T	True (fixed field)
COG(M)	Magnetic course over ground (will not be output)
M	Magnetic (fixed field)
Speed	Speed over ground in knots
N	Knots (fixed field)
Speed	Speed over ground in km/h
K	km/h (fixed field)
Positioning Mode	Positioning system mode indicator: “N” = Not fixed “A” = Autonomous mode “D” = Differential mode
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

2.2.3. GGA

GGA, Global Positioning System Fix Data. Time, position and fix related data for a GNSS receiver.

Format:

$--GGA,<UTC Time>,<Latitude>,<N/S>,<Longitude>,<E/W>,<Fix Status>,<Number of satellites in use>,<HDOP>,<Altitude>,<M>,<Geoid Separation>,<M>,<DGPS Age>,<DGPS Station ID>*<Checksum><CR><LF>

Example:

GPS+GLONASS mode:
$GNGGA,080301.000,3149.2890,N,11706.9248,E,2,19,0.63,88.1,M,-0.3,M,,*53<CR><LF>
GPS only mode:
$GPGGA,140145.000,3150.863861,N,11711.928739,E,1,11,0.79,175.165,M,0.009,M,,*53<CR><LF>

Parameter:

Field	Description
$	Each NMEA message starts with “$”
--GGA	Message ID
UTC Time	UTC of position fix in “hhmmss.sss” format
Latitude	Latitude in “ddmm.mmmm” format (degrees and minutes)
N/S	“N” = North “S” = South
Longitude	Longitude in “dddmm.mmmm” format (degrees and minutes)
E/W	“E” = East “W” = West
Fix Status	“0” = Invalid “1” = GNSS fix “2” = DGPS fix
Number of satellites in use	Number of satellites being used (0–12)
HDOP	Horizontal dilution of precision
Altitude	Height above mean sea level in meters
M	Meter (fixed filed)
Geoid Separation	Geoidal separation in meters
M	Meter (fixed filed)
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”

2.2.4. GSA

GSA, GNSS DOP and Active Satellites. GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA sentence and DOP values.

Format:

$--GSA,<Mode>,<Fix Status>,<Satellite Used 1>,<Satellite Used 2>,<Satellite Used 3>,<Satellite Used 4>,<Satellite Used 5>,<Satellite Used 6>,<Satellite Used 7>,<Satellite Used 8>,<Satellite Used 9>,<Satellite Used 10>,<Satellite Used 11>,<Satellite Used 12>,<PDOP>,<HDOP>,<VDOP>,<GNSS System ID>*<Checksum><CR><LF>

Example:

GPS+GLONASS mode:
$GNGSA,A,3,04,01,23,195,09,11,08,193,194,,,,1.32,1.02,0.84,1*31
GPS only mode:
$GPGSA,A,3,27,29,26,31,23,14,194,22,193,21,32,,1.43,0.79,1.20,1*1D<CR><LF>

Parameter:

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	ID numbers of satellites used in solution
Satellite Used 2	ID numbers of satellites used in solution

Satellite Used 3	ID numbers of satellites used in solution
Satellite Used 4	ID numbers of satellites used in solution
Satellite Used 5	ID numbers of satellites used in solution
Satellite Used 6	ID numbers of satellites used in solution
Satellite Used 7	ID numbers of satellites used in solution
Satellite Used 8	ID numbers of satellites used in solution
Satellite Used 9	ID numbers of satellites used in solution
Satellite Used 10	ID numbers of satellites used in solution
Satellite Used 11	ID numbers of satellites used in solution
Satellite Used 12	ID numbers of satellites used in solution
PDOP	Position dilution of precision
HDOP	Horizontal dilution of precision
VDOP	Vertical dilution of precision
GNSS System ID	GNSS System ID: “1” = GP “2” = GL “3” = GA “4” = BD
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

2.2.5. GSV

GSV, GNSS Satellites in View. The GSV sentence provides the number of satellites (SV) in view, satellite ID numbers, elevation, azimuth, and SNR value. The GSV sentence contains four satellites maximum per transmission. The total number of sentences being transmitted and the sentence number being transmitted are indicated in the first two fields.

Format:

$--GSV,<Number of Message>,<Sequence Number>,<Satellites in View>,<Satellite ID 1>,<Elevation 1>,<Azimuth 1>,<SNR 1>,<Satellite ID 2>,<Elevation 2>,<Azimuth 2>,<SNR 2>,<Satellite ID 3>,<Elevation 3>,<Azimuth 3>,<SNR 3>,<Satellite ID 4>,<Elevation 4>,<Azimuth 4>,<SNR 4>,<Signal ID>*<Checksum><CR><LF>

Example:

GPS+GLONASS mode:
$GPGSV,4,1,16,16,66,349,25,195,57,127,44,27,56,178,45,04,53,292,30,0*53<CR><LF>
$GPGSV,4,2,16,26,50,034,18,23,45,297,35,42,42,134,34,31,36,097,48,0*65<CR><LF>
$GPGSV,4,3,16,08,27,200,44,09,25,314,19,14,16,159,41,193,15,173,43,0*5D<CR><LF>
$GPGSV,4,4,16,21,13,075,,03,08,242,39,22,04,223,44,194,,,23,0*6E<CR><LF>
$GLGSV,3,1,10,75,46,023,20,85,44,084,34,76,33,315,21,66,32,296,31,1*75<CR><LF>
$GLGSV,3,2,10,65,28,221,43,86,26,155,51,74,21,068,29,84,13,030,27,1*75<CR><LF>
$GLGSV,3,3,10,67,02,338,27,72,02,187,47,1*7D<CR><LF>
GPS only mode:
$GPGSV,5,1,17,16,68,281,17,26,66,010,46,194,65,053,43,195,50,126,17,0*61<CR><LF>
$GPGSV,5,2,17,31,45,074,47,14,40,153,27,23,31,313,48,27,31,181,33,0*65<CR><LF>
$GPGSV,5,3,17,44,23,247,,193,21,172,17,03,19,263,25,22,15,242,29,0*5F<CR><LF>
$GPGSV,5,4,17,29,14,040,45,32,13,151,26,21,06,099,34,09,03,322,20,0*62<CR><LF>
$GPGSV,5,5,17,08,02,200,,0*5B<CR><LF>

Parameter:

Field	Description
$	Each NMEA message starts with “$”
--GSV	Message ID
Number of Message	Number of messages
Sequence Number	Sequence number of this entry
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 ratio 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 ratio 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 ratio 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 ratio in dBHz (0–99), empty if not tracking
Signal ID	Signal ID: “0” = All signals
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

2.2.6. GLL

GLL, Geographic Position – Latitude/Longitude. Latitude and longitude of vessel position, time of position fix and status.

Format:

```
$--GLL,<Latitude>,<N/S>,<Longitude>,<E/W>,<UTC Time>,<Data Validity>,<Positioning Mode>*<Checksum><CR><LF>
```

Example:

```
GPS+GLONASS mode:
$GNGLL,3149.287981,N,11706.928870,E,083902.000,A,D*4D<CR><LF>
GPS only mode:
$GPGLL,3150.863861,N,11711.928739,E,140145.000,A,A*50<CR><LF>
```

Parameter:

Field	Description
$	Each NMEA message starts with “$”
--GLL	Message ID
Latitude	Latitude in “ddmm.mmmm” format (degrees and minutes)
N/S	“N” = North “S” = South
Longitude	Longitude in “dddmm.mmmm” format (degrees and minutes)
E/W	“E” = East “W” = West
UTC Time	UTC of position fix in “hhmmss.sss” format
Data Validity	“V” = Invalid “A” = Valid
Positioning Mode	“N” = Not fixed “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”

2.2.7. GPTXT

This message is uesd to output antenna status information.

Format:

```
$GPTXT,<XX>,<YY>,<ZZ>,<Text  message>*<Checksum><CR><LF>
```

Example:

```
$GPTXT,01,01,02,ANTSTATUS=SHORT*6D<CR><LF>
```

Parameter:

Field	Description
$	Each NMEA message starts with “$”

GPTXT	Message ID
XX	Total number of message 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 showing the status of antenna: “ANTSTATUS=OK” = the antenna is well connected “ANTSTATUS=OPEN” = the antenna circuit is open. “ANTSTATUS=SHORT” = the antenna is short-circuited
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

NOTE

The message is supported by L26-LB and LC86L only.

3 NMEA Proprietary Messages

3.1. Structure of NMEA Proprietary Messages

Table 2: Structure of NMEA Proprietary Messages

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

3.2. Description of NMEA Proprietary Messages

3.2.1. Packet Type: 010 PMTK_SYS_MSG

This is a system message that will be automatically output when the module is powered up.

Format:
$PMTK010,<Message>*<Checksum><CR><LF>
Example:
$PMTK010,002*2D<CR><LF>

Packet Data	Description
Message	System message “0” = Unknown “1” = Startup “2” = Notification for the host aiding EPO “3” = Notification for the transition to normal mode is successfully done

3.2.2. Packet Type: 011 PMTK_TXT_MSG

This is a text message that will be automatically output when the module is powered up.

Format:
$PMTK011,<Message>*<Checksum><CR><LF>
Example:
$PMTK011,MTKGPS*08<CR><LF>

Packet Data	Description
Message	MTKGPS

3.2.3. Packet Type: 001 PMTK_ACK

Acknowledgement of a PMTK command. In order to inform the sender whether the receiver has received the packet, an acknowledgement packet PMTK_ACK would be returned.

The following commands will cause the GNSS module to restart or change the baud rate, and thus there will be no acknowledgement packet (PMTK_ACK) for those commands.

- PMTK_CMD_HOT_START
- PMTK_CMD_WARM_START
- PMTK_CMD_COLD_START
- PMTK_CMD_FULL_COLD_START
- PMTK_SET_NMEA_BAUDRATE

Format:
$PMTK001,<Cmd>,<Flag>[,<para 1>,…,<para N>]*<Checksum><CR><LF>
Example:
$PMTK001,869,3*37<CR><LF>

Packet Data	Description
Cmd	The packet type that the acknowledgement responds

Flag	“0” = Invalid packet “1” = Unsupported packet type “2” = Valid packet, but action failed “3” = Valid packet, and action succeeded
[,<para 1>,…,<para N>]	Extended parameters. Optional.

3.2.4. Packet Type: 101 PMTK_CMD_HOT_START

This message is used to perform a hot start on the module (use all available data in the NVM). Normally a hot start means the GNSS module is powered down less than 2 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.

Format:
$PMTK101*<Checksum><CR><LF>
Example:
$PMTK101*32<CR><LF>

Packet Data	Description
None	/

3.2.5. Packet Type: 102 PMTK_CMD_WARM_START

This message is used to perform a warm start on the module. A 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 a warm restart on the module without using the ephemeris data in NVM.

Format:
$PMTK102*<Checksum><CR><LF>
Example:
$PMTK102*31<CR><LF>

Packet Data	Description
None	/

3.2.6. Packet Type: 103 PMTK_CMD_COLD_START

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

Format: $PMTK103*<Checksum><CR><LF> Example: $PMTK103*30<CR><LF>	
Packet Data	**Description**
None	/

3.2.7. Packet Type: 104 PMTK_CMD_FULL_COLD_START

This message is essentially used to perform a cold restart on the module. It additionally clears system and user configurations at restart, that is, reset the module to the factory settings. A full cold start means the 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.

Format: $PMTK104*<Checksum><CR><LF> Example: $PMTK104*37<CR><LF>	
Packet Data	**Description**
None	/

3.2.8. Packet Type: 161 PMTK_CMD_STANDBY_MODE

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

Format: $PMTK161,<Type>*<Checksum><CR><LF> Example: $PMTK161,0*28<CR><LF>	
Packet Data	**Description**
Type	“0” = Standby mode

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,161,3*36<CR><LF>

3.2.9. Packet Type: 183 PMTK_LOCUS_QUERY_STATUS

This message is used to query the LOCUS logging status.

Format: $PMTK183*<Checksum><CR><LF> Example: $PMTK183*38<CR><LF>	
Packet Data	**Description**
None	/

Response:

Format: $PMTKLOG,<Serial#>,<Type>,<Mode>,<Content>,<Interval>,<Distance>,<Speed>,<Status>,<Number>,<Percent>*<Checksum><CR><LF> Example: $PMTKLOG,456,0,b,31,2,0,0,0,3769,46*2A<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” = Stop logging when full
Mode	Logging mode: “0x02” = Fix only mode (logging when 3D-fix only) “0x04” = Normal mode (logging per positioning, e.g. 1 sec.) Customization mode: “0x08” = Interval mode (logging per pre-setting interval, e.g. 15 secs) “0x10” = Distance mode logger (by distance, e.g. 10m/s) “0x20” = Speed mode (by speed, e.g. 10m/s) Notes: 1. The “Fix only mode” is compatible with all other options. 2. The “Interval”, “Distance” and “Speed” are called “Customization mode” in this table, and all of them are && condition with other configurations. 3. Default value is 0x0b: Fix only + Interval.

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 “0” = Logging “1” = Stop logging
Number	Logging number of data record
Percent	Used percentage of logging capacity (0%–100%)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with “CR” and “LF”

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,183,3*3A<CR><LF>

3.2.10. Packet Type: 184 PMTK_LOCUS_ERASE_FLASH

This message is used to erase the LOCUS logger flash.

Format:
$PMTK184,<Type>*<Checksum><CR><LF>
Example:
$PMTK184,1*22<CR><LF>

Packet Data	Description
Type	“1” = Erase all logger internal flash data

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:

$PMTK001,184,3*3D<CR><LF>

3.2.11. Packet Type: 185 PMTK_LOCUS_STOP_LOGGER

This message is used to stop or start LOCUS logging data.

Format: $PMTK185,<Status>*<Checksum><CR><LF> Example: $PMTK185,1*23<CR><LF>	
Packet Data	**Description**
Status	“0” = Start logging “1” = Stop logging

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,185,3*3C<CR><LF>

3.2.12. Packet Type: 622 PMTK_Q_LOCUS_DATA

This message is used to dump LOCUS flash data.

Format: $PMTK622,<Type>*<Checksum><CR><LF> Example: $PMTK622,1*29<CR><LF>	
Packet Data	**Description**
Type	“0” = Dump all the LOCUS data in the flash “1” = Dump the LOCUS data in the current flash sector

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,622,3*36<CR><LF>

3.2.13. Packet Type: 220 PMTK_SET_POS_FIX

This message is used to set position fix interval.

Format: $PMTK220,<Interval>*<Checksum><CR><LF> Example: $PMTK220,1000*1F<CR><LF>	
Packet Data	**Description**
Interval	Position fix interval Unit: millisecond Range: 100–10000

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,220,3*30<CR><LF>

3.2.14. Packet Type: 223 PMTK_SET_AL_DEE_CFG

This message is used to configure DEE.

Format: $PMTK223,<SV>,<SNR>,<Extension Threshold>,<Extension Gap>*<Checksum><CR><LF> Example: $PMTK223,1,30,180000,60000*3C<CR><LF>	
Packet Data	**Description**
SV	Required number of SV which satisfy the SNR condition to trigger dynamic ephemeris extension. Range: 1–4 Default value: 1
SNR	SV signal SNR criteria used to trigger dynamic ephemeris extension. Range: 25–30 Default value: 30
Extension Threshold	Time duration of dynamic ephemeris extension. Unit: millisecond Range: 40000–180000 Default value: 180000
Extension Gap	The limitation of the interval between neighboring DEE intervals. Unit: millisecond

	Range: 0–3600000 Default value: 60000

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,223,3*33<CR><LF>

3.2.15. Packet Type: 225 PMTK_SET_PERIODIC_MODE

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

Format:
$PMTK225,<Type>,<Run Time>,<Sleep Time>,<Second Run Time>,<Second Sleep Time>*<Checksum><CR><LF>
Example:
Periodic Backup mode
PMTK225,0*2B<CR><LF>
PMTK225,1,3000,12000,18000,72000*16<CR><LF>
Periodic Standby mode
PMTK225,0*2B<CR><LF>
PMTK225,2,3000,12000,18000,72000*16<CR><LF>

Packet Data	Description
Type	“0” = Back to normal mode “1” = Periodic backup mode “2” = Periodic standby mode “4” = Perpetual backup mode
Run Time	“0” = Disable “1000–518400000” = Run time in millisecond
Sleep Time	Range: 1000–518400000 Unit: millisecond
Second Run Time	“0” = Disable “1000–518400000” = Second run time in millisecond
Second Sleep Time	Range: 1000–518400000 Unit: millisecond

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:

$PMTK001,225,3*35<CR><LF>

NOTE

The second run time should be longer than the first run time when the first run time is a non-zero value.

3.2.16. Packet Type: 251 PMTK_SET_NMEA_BAUDRATE

This message is used to set the baud rate of NMEA port. The baud rate will be restored back to the default setting when full cold start command is issued.

Format: $PMTK251,<Baudrate>*<Checksum><CR><LF> Example: $PMTK251,38400*27<CR><LF>	
Packet Data	**Description**
Baudrate	Baud rate (bps): “9600” (default) “4800” “9600” “14400” “19200” “38400” “57600” “115200”

3.2.17. Packet Type: 255 PMTK_SET_SYNC_PPS_NMEA

This message is used to enable or disable the function of fixing NMEA output time behind PPS.

Format: $PMTK255,<Enable>*<Checksum><CR><LF> Example: $PMTK255,0*2C<CR><LF>	
Packet Data	**Description**
Enable	“0” = Disable (default) “1” = Enable

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,255,3*32<CR><LF>

3.2.18. Packet Type: 256 PMTK_SET_TIMING_PRODUCT

This message is used to enable or disable timing product mode. The timing product mode is used to enhance the PPS output timing accuracy, achieving accuracy tolerance of ±15 ns.

Format: $PMTK256,<Enable>*<Checksum><CR><LF> Example: $PMTK256,0*2F<CR><LF>	
Field	**Description**
Enable	“0” = Disable (default) “1” = Enable

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,256,3*31<CR><LF>

3.2.19. Packet Type: 285 PMTK_SET_PPS_CONFIG

This message is used to set PPS type.

Format: $PMTK285,<Type>,<PPSPulseWidth>*<Checksum><CR><LF> Example: $PMTK285,4,100*38<CR><LF>	
Packet Data	**Description**
Type	“0” = Disable “1” = After the first fix “2” = 3D fix only “3” = 2D/3D fix only “4” = Always

PPSPulseWidth	2–998 (Unit: ms)

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,285,3*3F<CR><LF>

3.2.20. Packet Type: 286 PMTK_SET_AIC_ENABLED

This message is used to enable or disable AIC function. It is recommended to set the cold start command first and then send this command.

Format:
$PMTK286,<Enable>*<Checksum><CR><LF>
Example:
$PMTK286,0*22<CR><LF>

Packet Data	Description
Enable	“0” = Disable “1” = Enable

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,286,3*3C<CR><LF>

3.2.21. Packet Type: 301 PMTK_API_SET_DGPS_MODE

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

Format:
$PMTK301,<Mode>*<Checksum><CR><LF>
Example:
$PMTK301,2*2E<CR><LF>

Packet Data	Description
Mode	DGPS data source mode. “0” = No DGPS source “1” = RTCM

	“2” = SBAS (Includes WAAS/EGNOS/GAGAN/MSAS)

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,301,3*32<CR><LF>

3.2.22. Packet Type: 306 PMTK_API_SET_MIN_SNR

This message is used to set the minimum SNR of satellites being used. If the minimum SNR threshold value is set, the module would not use the satellite whose SNR is smaller than the shreshold value.

Format:
$PMTK306,<MIN_SNR>*<Checksum><CR><LF>
Example:
$PMTK306,15*1F<CR><LF>

Packet Data	Description
MIN_SNR	Minimum SNR threshold of satellites being used. Range: 9–37

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>[,<MIN_SNR>]*<Checksum><CR><LF>
Example:
$PMTK001,306,3,15*1D<CR><LF>

Packet Data	Description
Cmd	The packet type that the acknowledgement responds
Flag	“0” = Invalid packet “1” = Unsupported packet type “2” = Valid packet, but action failed “3” = Valid packet, and action succeeded
MIN_SNR	Minimum SNR threshold of satellites being used. Range: 9–37

3.2.23. Packet Type: 311 PMTK_API_SET_ELEV_MASK

This message is used to set satellite elevation mask.

Format: $PMTK311,<Satellite Elevation Mask>*<Checksum><CR><LF> Example: $PMTK311,5*28<CR><LF>	
Packet Data	**Description**
Satellite Elevation Mask	Range: 0–90 Unit: degree

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,311,3*33<CR><LF>

NOTE

The satellite elevation mask is recommended to be no more than 10 degrees. With the increase of satellite elevation mask, the number of satellites involved in positioning will decrease.

3.2.24. Packet Type: 313 PMTK_API_SET_SBAS_ENABLED

This message is used to enable or disable searching an SBAS satellite. SBAS supports wide-area or regional augmentation through geostationary satellite broadcast messages. The geostationary satellite broadcasts GNSS integrity and correction data with the assistance of multiple ground stations which are located at accurately-surveyed points.

Format: $PMTK313,Enable*<Checksum><CR><LF> Example: $PMTK313,1*2E<CR><LF>	
Packet Data	**Description**
Enable	“0” = Disable “1” = Enable

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,313,3*31<CR><LF>

3.2.25. Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT

This message is used to set NMEA sentence output frequencies. There are totally 22 data fields that present output frequencies for the 22 supported NMEA sentences individually.

Format: $PMTK314,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*<Checksum><CR><LF> Example: The module only outputs NMEA sentence RMC once every one position fix. $PMTK314,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*35<CR><LF>	
Packet Data	**Description**
GLL	GLL sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
RMC	RMC sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
VTG	VTG sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
GGA	GGA sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
GSA	GSA sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
GSV	GSV sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5.
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”

Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,314,3*36<CR><LF>

The following message can be used to restore the system default settings.

Format:
$PMTK314,<Restore>*<Checksum><CR><LF>
Example:
$PMTK314,-1*04<CR><LF>

Packet Data	Description
Restore	Always “-1”

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,314,3*36<CR><LF>

3.2.26. Packet Type: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

The command is used to enable or disable QZSS NMEA format.

Format: $PMTK351,<QZSS_Enable>*<Checksum><CR><LF> Example: $PMTK351,1*28<CR><LF>	
Packet Data	**Description**
QZSS_Enable	“0” = Disable (default) “1” = Enable

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,351,3*37<CR><LF>

3.2.27. Packet Type: 352 PMTK_API_SET_STOP_QZSS

This command is used to enable or disable QZSS function.

Format: $PMTK352,<QZSS_Enable>*<Checksum><CR><LF> Example: $PMTK352,0*2A<CR><LF>	
Packet Data	**Description**
QZSS_Enable	“0” = Enable (default) “1” = Disable

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,352,3*34<CR><LF>

3.2.28. Packet Type: 353 PMTK_API_SET_GNSS_SEARCH_MODE

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

Format:
$PMTK353,<GPS_Enable>,<GLONASS_Enable>,0,0,<BEIDOU_Enable>*<Checksum><CR><LF>
Example:
Search GPS+GLONASS:
$PMTK353,1,1,0,0,0*2B<CR><LF>
Search GPS+BeiDou:
$PMTK353,1,0,0,0,1*2B<CR><LF>

Packet Data	Description
GPS_Enable	“0” = Disable (DO NOT search GPS satellites) “1” or other non-zero values = Search GPS satellites
GLONASS_Enable	“0” = disable (DO NOT search GLONASS satellites) “1” or other non-zero values = search GLONASS satellites
Reserved	Keep as “0”
Reserved	Keep as “0”
BEIDOU_Enable	“0” = Disable (DO NOT search BeiDou satellites) “1” or other non-zero values = Search BeiDou satellites

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,353,3,1,0,0,0,1,49*08<CR><LF>

NOTE

L76-LB/L26-LB/LC86L is capable of accessing GPS, BeiDou and GLONASS systems. Either of the following three options are supported:

- GPS only
- GPS + GLONASS

- GPS + BeiDou

3.2.29. 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, the output position will remain the same and the output speed will be zero. If the threshold value is set to 0, this function is disabled.

Format:
$PMTK386,<Speed_threshold>*<Checksum><CR><LF>
Example:
$PMTK386,0.3*3E<CR><LF>

Packet Data	Description
Speed_threshold	Range: 0–2 Unit: m/s

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,386,3*3D<CR><LF>

3.2.30. Packet Type: 400 PMTK_API_Q_FIX_CTL

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

Please refer to PMTK_API_SET_FIX_CTL for the setting of position fixing rate and PMTK_DT_FIX_CTL for the result of the query.

Format:
$PMTK400*<Checksum><CR><LF>
Example:
$PMTK400*36<CR><LF>

Packet Data	Description
None	/

3.2.31. Packet Type: 401 PMTK_API_Q_DGPS_MODE

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

Please refer to PMTK_API_SET_DGPS_MODE for the setting of DGPS mode and PMTK_DT_DGPS_MODE for the result of the query.

Format: $PMTK401*<Checksum><CR><LF> Example: $PMTK401*37<CR><LF>	
Packet Data	**Description**
None	/

3.2.32. Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

This message is used to query the setting of SBAS.

Please refer to PMTK_API_SET_SBAS_ENABLE for SBAS setting and PMTK_DT_SBAS_ENABLED for the result of the query.

Format: $PMTK413*<Checksum><CR><LF> Example: $PMTK413*34<CR><LF>	
Packet Data	**Description**
None	/

3.2.33. Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT

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

Please refer to PMTK_API_SET_NMEA_OUTPUT for the frequency setting and PMTK_DT_NMEA_OUTPUT for the result of the query.

Format: $PMTK414*<Checksum><CR><LF> Example: $PMTK414*33<CR><LF>

Packet Data	Description
None	/

3.2.34. Packet Type: 605 PMTK_Q_RELEASE

This message is used to query the firmware release information. Please refer to PMTK_DT_RELEASE for the result of the query.

Format: $PMTK605*<Checksum><CR><LF> Example: $PMTK605*31<CR><LF>	
Packet Data	**Description**
None	/

3.2.35. Packet Type: 500 PMTK_DT_FIX_CTL

This message is the response to PMTK_API_Q_FIX_CTL.

Format: $PMTK500,<Fix Interval>,0,0,0,0*<Checksum><CR><LF> Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>	
Packet Data	**Description**
Fix Interval	Position fix interval Range: 100–10000 Unit: millisecond
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”

3.2.36. Packet Type: 501 PMTK_DT_DGPS_MODE

This message is the response to PMTK_API_Q_DGPS_MODE.

Format: $PMTK501,<Mode>*<Checksum><CR><LF> Example: $PMTK501,1*2B<CR><LF>	
Packet Data	**Description**
Mode	DGPS data source mode “0” = No DGPS source “1” = RTCM “2” = SBAS

3.2.37. Packet Type: 513 PMTK_DT_SBAS_ENABLED

This message is the response to PMTK_API_Q_SBAS_ENABLED.

Format: $PMTK513,<Enable>*<Checksum><CR><LF> Example: $PMTK513,1*28<CR><LF>	
Packet Data	**Description**
Enable	“0” = Disable “1” = Enable

3.2.38. Packet Type: 514 PMTK_DT_NMEA_OUTPUT

This message is the response to PMTK_API_Q_NMEA_OUTPUT.

Format: $PMTK514,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*<Checksum> <CR><LF> Example: $PMTK514,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*32<CR><LF>	
Packet Data	**Description**
GLL	GLL sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
RMC	RMC sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
VTG	VTG sentence output frequency:

	“0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
GGA	GGA sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
GSA	GSA sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
GSV	GSV sentence output frequency: “0” = Disabled or not supported sentence “n” = Output once every “n” position fix. “n” ranges from 1 to 5
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
Reserved	Always “0”
19 Reserved	Always “0”
20 Reserved	Always “0”
21 Reserved	Always “0”

3.2.39. Packet Type: 705 PMTK_DT_RELEASE

This message is the response to PMTK_Q_RELEASE.

Format: $PMTK705,<Release string>,<Build ID>,<Product Model>,<SDK Version>*<Checksum><CR><LF> Example: $PMTK705,AXN_5.1.6_3331_19052100,000A,Quectel-L76LB,1.0*69<CR><LF>	
Packet Data	**Description**
Release String	Firmware release version and name 3318: Mcore_x.x 3331: AXN_x.x 3339: AXN_x.x 3333: AXN_x.x 3337: AXN_x.x
Build ID	Build ID for firmware version control
Product Model	Product model for product identification
SDK Version	Showing SDK version if the firmware is used for SDK

3.2.40. Packet Type: 838 PMTK_TEST_ANTI_SPOOFING

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

Format: $PMTK838,<CmdType>*<Checksum><CR><LF> Example: $PMTK838,1*2C<CR><LF>	
Packet Data	**Description**
CmdType	“0” = Disable jamming detection function (default) “1” = Enable jamming detection function

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>,<CmdType>*<Checksum><CR><LF> Example: $PMTK001,838,3,1*2E<CR><LF>	
Packet Data	**Description**
Cmd	The packet type that the acknowledgement responds
Flag	“0” = Invalid packet “1” = Unsupported packet type

	“2” = Valid packet, but action failed “3” = Valid packet, and action succeeded
CmdType	“0” = Disable jamming detection function “1” = Enable jamming detection function

Response:

Format:
$PMTKSPF,<Status>*<Checksum><CR><LF>
Example:
Healthy status:
$PMTKSPF,1*5A<CR><LF>
Warning status:
$PMTKSPF,2*59<CR><LF>
Critical status:
$PMTKSPF,3*58<CR><LF>

Packet Data	Description
Status	“1” = No jamming, healthy status “2” = Warning status “3” = Critical status

NOTE

After jamming detection is enabled, the module starts to detect whether there is any 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. If it still fails in positioning after 200s, 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.

3.2.41. Packet Type: 869 PMTK_EASY_ENABLE

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

Format:
$PMTK869,<CmdType>[,<Enabled>][Extension Day]*<Checksum><CR><LF>
Example:
$PMTK869,1,1*35<CR><LF>
$PMTK869,0*29<CR><LF>
$PMTK869,2,0,0*2B<CR><LF>

Packet Data	Description
CmdType	“0” = Query “1” = Set “2” = Result of query operation
Enabled (optional)	“0” = Disable “1” = Enable
Extension Day	Finished extension days (0–3)

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,869,3*37<CR><LF>

NOTES

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

3.2.42. Packet Type: 875 PMTK_PMTKLSC_STN_OUTPUT

PMTKLSC sentence is the leap second indication statement. This message is used to enable or disable PMTKLSC sentence output, and it can also be used to query whether PMTKLSC sentence output is enabled or disabled.

Format: $PMTK875,<CmdType>[,<Enabled>]*<Checksum><CR><LF> Example: $PMTK875,1,1*38<CR><LF>	
Packet Data	**Description**
CmdType	“0” = Query “1” = Set “2” = Result for query operation
Enabled (optional)	“0” = Disable “1” = Enable

Acknowledgement:

Format: $PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF> Example: $PMTK001,875,3*3A<CR><LF>

Response of Query Command:

Format: $PMTKLSC,<Parameter1>,<Parameter2>,<Parameter3>*checksum<CR><LF> $PMTKLSCB,<Parameter1>,<Parameter2>,<Parameter3>*checksum<CR><LF> Example: $PMTKLSC,18,1,18*43<CR><LF> $PMTKLSCB,0,0,0*00<CR><LF>	
Packet Data	**Description**
Parameter1	Current leap second
Parameter2	Leap indicator “1” = Updated from broadcast data
Parameter3	Next leap second

3.2.43. Packet Type: 886 PMTK_FR_MODE

This message is used to set the navigation mode.

Format: $PMTK886,<CmdType>*<Checksum><CR><LF> Example: $PMTK886,3*2B<CR><LF>

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

Acknowledgement:

Format:
$PMTK001,<Cmd>,<Flag>*<Checksum><CR><LF>
Example:
$PMTK001,886,3*36<CR><LF>

NOTE

Each mode has its altitude limitation. Please choose an appropriate mode base on the altitude limitations listed below, otherwise the position calculation will be incorrect.

Mode	Altitude Limitation (m)
Normal Mode	10000
Fitness Mode	10000
Aviation Mode	10000
Stationary Mode	1000
Balloon Mode	80000

4 Default Configurations

Table 3: Default Configurations

Item	Default
NMEA Port Baud Rate	9600 bps
Datum	WGS84
Rate of Position Fixing	1 Hz
DGPS Mode	SBAS
SBAS Enable	Enabled
NMEA Output Messages	● **L76-LB:** GGA, RMC, GSA, GSV, VTG and GLL ● **L26-LB:** GGA, RMC, GSA, GSV, VTG, GLL and TXT ● **LC86L:** GGA, RMC, GSA, GSV, VTG, GLL and TXT
AIC	Enabled
EASY™	Enabled
GNSS Configuration [1)]	● GPS + GLONASS ● GPS + BeiDou

NOTE

[1)] For more specific information on the default GNSS constellation and the corresponding firmware version, please contact Quectel Technical Support.

5 Appendix A References

Table 4: Related Documents

SN	Document Name	Remark
[1]	Quectel_GNSS_SDK_Commands_Manual	GNSS SDK Commands Manual
[2]	Quectel_L76-LB_Hardware_Design	L76-LB Hardware Design
[3]	Quectel_L26-LB_Hardware_Design	L26-LB Hardware Design
[4]	Quectel_LC86L_Hardware_Design	LC86L Hardware Design

Table 5: Terms and Abbreviations

Abbreviation	Description
AGNSS	Assisted GNSS
AIC	Active Interference Cancellation
DEE	Dynamic Ephemeris Extension
DOP	Dilution of Precision
DGPS	Differential Global Positioning System
EASY™	Embedded Assist System
EGNOS	European Geostationary Navigation Overlay Service
EPO	Extended Prediction Orbit
GAGAN	GPS-aided GEO Augmented Navigation
GGA	Global Positioning System Fix Data
GLL	Geographic Position – Latitude/Longitude
GNSS	Global Navigation Satellite System

GPS	Global Positioning System
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
HDOP	Horizontal Dilution of Precision
MSAS	Multi-functional Satellite Augmentation System
NMEA	National Marine Electronics Association
NVM	Non-volatile Memory
PDOP	Position Dilution of Precision
PPS	Pulse Per Second
PMTK	Proprietary Protocol of MTK
QZSS	Quasi-Zenith Satellite System
RMC	Recommended Minimum Specific GNSS Data
RTC	Real-time Clock
RTCM	Radio Technical Commission for Maritime Services
SBAS	Satellite-Based Augmentation System
SNR	Signal-to-noise Ratio
SV	Satellites in View
UTC	Coordinated Universal Time
VDOP	Vertical Dilution of Precision
VTG	Course Over Ground and Ground Speed
WAAS	Wide Area Augmentation System
WGS84	World Geodetic System 1984