

# **Lx0&Lx6&LC86L&LG77L**

# **GNSS Protocol Specification**

**GNSS Module Series**

Version: 2.0

Date: 2021-11-30

Status: Released



At Quectel, our aim is to provide timely and comprehensive services to our customers. If you require any assistance, please contact our headquarters:

**Quectel Wireless Solutions Co., Ltd.**

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: [info@quectel.com](mailto:info@quectel.com)

**Or our local offices. For more information, please visit:**

<http://www.quectel.com/support/sales.htm>.

**For technical support, or to report documentation errors, please visit:**

<http://www.quectel.com/support/technical.htm>.

Or email us at: [support@quectel.com](mailto:support@quectel.com).

## Legal Notices

We offer information as a service to you. The provided information is based on your requirements and we make every effort to ensure its quality. You agree that you are responsible for using independent analysis and evaluation in designing intended products, and we provide reference designs for illustrative purposes only. Before using any hardware, software or service guided by this document, please read this notice carefully. Even though we employ commercially reasonable efforts to provide the best possible experience, you hereby acknowledge and agree that this document and related services hereunder are provided to you on an “as available” basis. We may revise or restate this document from time to time at our sole discretion without any prior notice to you.

## Use and Disclosure Restrictions

### License Agreements

Documents and information provided by us shall be kept confidential, unless specific permission is granted. They shall not be accessed or used for any purpose except as expressly provided herein.

### Copyright

Our and third-party products hereunder may contain copyrighted material. Such copyrighted material shall not be copied, reproduced, distributed, merged, published, translated, or modified without prior written consent. We and the third party have exclusive rights over copyrighted material. No license shall be granted or conveyed under any patents, copyrights, trademarks, or service mark rights. To avoid ambiguities, purchasing in any form cannot be deemed as granting a license other than the normal non-exclusive, royalty-free license to use the material. We reserve the right to take legal action for noncompliance with abovementioned requirements, unauthorized use, or other illegal or malicious use of the material.

## Trademarks

Except as otherwise set forth herein, nothing in this document shall be construed as conferring any rights to use any trademark, trade name or name, abbreviation, or counterfeit product thereof owned by Quectel or any third party in advertising, publicity, or other aspects.

## Third-Party Rights

This document may refer to hardware, software and/or documentation owned by one or more third parties (“third-party materials”). Use of such third-party materials shall be governed by all restrictions and obligations applicable thereto.

We make no warranty or representation, either express or implied, regarding the third-party materials, including but not limited to any implied or statutory, warranties of merchantability or fitness for a particular purpose, quiet enjoyment, system integration, information accuracy, and non-infringement of any third-party intellectual property rights with regard to the licensed technology or use thereof. Nothing herein constitutes a representation or warranty by us to either develop, enhance, modify, distribute, market, sell, offer for sale, or otherwise maintain production of any our products or any other hardware, software, device, tool, information, or product. We moreover disclaim any and all warranties arising from the course of dealing or usage of trade.

## Privacy Policy

To implement module functionality, certain device data are uploaded to Quectel’s or third-party’s servers, including carriers, chipset suppliers or customer-designated servers. Quectel, strictly abiding by the relevant laws and regulations, shall retain, use, disclose or otherwise process relevant data for the purpose of performing the service only or as permitted by applicable laws. Before data interaction with third parties, please be informed of their privacy and data security policy.

## Disclaimer

- a) We acknowledge no liability for any injury or damage arising from the reliance upon the information.
- b) We shall bear no liability resulting from any inaccuracies or omissions, or from the use of the information contained herein.
- c) While we have made every effort to ensure that the functions and features under development are free from errors, it is possible that they could contain errors, inaccuracies, and omissions. Unless otherwise provided by valid agreement, we make no warranties of any kind, either implied or express, and exclude all liability for any loss or damage suffered in connection with the use of features and functions under development, to the maximum extent permitted by law, regardless of whether such loss or damage may have been foreseeable.
- d) We are not responsible for the accessibility, safety, accuracy, availability, legality, or completeness of information, advertising, commercial offers, products, services, and materials on third-party websites and third-party resources.

**Copyright © Quectel Wireless Solutions Co., Ltd. 2021. All rights reserved.**

# About the Document

Document Information	
<b>Title</b>	<b>Lx0&amp;Lx6&amp;LC86L&amp;LG77L GNSS Protocol Specification</b>
<b>Subtitle</b>	GNSS Module Series
<b>Document Type</b>	GNSS Protocol Specification
<b>Document Status</b>	Released

## Revision History

Version	Date	Description
1.0	2019-05-15	Initial
1.1	2020-03-07	<ol style="list-style-type: none"> <li>1. Added applicable modules L26-LB and LC86L</li> <li>2. Deleted the following packet types:                             <ul style="list-style-type: none"> <li>● 300 PMTK_API_SET_FIX_CTL</li> <li>● 458 PMTK_API_GET_POS_XYZ</li> <li>● 461 PMTK_API_GET_VEL_XYZ</li> </ul> </li> <li>3. Updated NMEA standard messages according to NMEA V4.10</li> <li>4. Updated the following packet types:                             <ul style="list-style-type: none"> <li>● 001 PMTK_ACK</li> <li>● 225 PMTK_SET_PERIODIC_MODE</li> <li>● 183 PMTK_LOCUS_QUERY_STATUS</li> </ul> </li> </ol>
2.0	2021-11-30	<ol style="list-style-type: none"> <li>1. Updated the overall structure of the document.</li> <li>2. Added LG77L, L26, L76, L76-L, L86, L96, L70 and L80 as the applicable modules of this document.</li> <li>3. Added GBS and DTM messages (Chapter 2.2.8 and Chapter 2.2.9).</li> <li>4. Updated NMEA Talker ID (Table 2).</li> <li>5. Added a new note for the parameter &lt;Mode&gt; in the Query Result Message returned with PMTK_LOCUS_QUERY_STATUS (Chapter 2.3.9).</li> </ol>

6. Detailed the description for the parameter <Interval> in PMTK\_SET\_POS\_FIX (Chapter 2.3.12).
  7. Added range and default value for the parameter <Ext\_Gap> in PMTK\_SET\_AL\_DEE\_CFG (Chapter 2.3.13).
  8. Added the default value for the parameter <PPSPulseWidth> in PMTK\_SET\_PPS\_CONFIG (Chapter 2.3.18).
  9. Added new notes for PMTK\_API\_SET\_DGPS\_MODE (Chapter 2.3.20).
  10. Added PQ messages (Chapter 2.4).
  11. Deleted the following packet types:
    - 400 PMTK\_API\_Q\_FIX\_CTL
    - 500 PMTK\_DT\_FIX\_CTL
-

## Contents

About the Document.....	3
Contents.....	5
Table Index.....	7
<b>1 Introduction .....</b>	<b>8</b>
<b>2 NMEA Protocol.....</b>	<b>10</b>
2.1. Structure of NMEA Protocol Messages .....	10
2.2. Standard Messages .....	12
2.2.1. RMC .....	12
2.2.2. GGA.....	15
2.2.3. GSV.....	18
2.2.4. GSA.....	19
2.2.5. VTG.....	21
2.2.6. GLL.....	22
2.2.7. TXT.....	24
2.2.8. GBS.....	25
2.2.9. DTM.....	27
2.3. PMTK Messages.....	28
2.3.1. PMTK001 PMTK_ACK.....	28
2.3.2. PMTK010 PMTK_SYS_MSG.....	29
2.3.3. PMTK011 PMTK_TXT_MSG .....	30
2.3.4. PMTK101 PMTK_CMD_HOT_START.....	30
2.3.5. PMTK102 PMTK_CMD_WARM_START .....	31
2.3.6. PMTK103 PMTK_CMD_COLD_START .....	31
2.3.7. PMTK104 PMTK_CMD_FULL_COLD_START .....	32
2.3.8. PMTK161 PMTK_CMD_STANDBY_MODE .....	32
2.3.9. PMTK183 PMTK_LOCUS_QUERY_STATUS.....	33
2.3.10. PMTK184 PMTK_LOCUS_ERASE_FLASH .....	34
2.3.11. PMTK185 PMTK_LOCUS_STOP_LOGGER .....	35
2.3.12. PMTK220 PMTK_SET_POS_FIX.....	36
2.3.13. PMTK223 PMTK_SET_AL_DEE_CFG .....	37
2.3.14. PMTK225 PMTK_SET_PERIODIC_MODE.....	38
2.3.15. PMTK251 PMTK_SET_NMEA_BAUDRATE .....	39
2.3.16. PMTK255 PMTK_SET_SYNC_PPS_NMEA .....	39
2.3.17. PMTK256 PMTK_SET_TIMING_PRODUCT .....	40
2.3.18. PMTK285 PMTK_SET_PPS_CONFIG.....	41
2.3.19. PMTK286 PMTK_SET_AIC_ENABLED .....	41
2.3.20. PMTK301 PMTK_API_SET_DGPS_MODE .....	42
2.3.21. PMTK306 PMTK_API_SET_MIN_SNR.....	43
2.3.22. PMTK311 PMTK_API_SET_ELEV_MASK.....	44
2.3.23. PMTK313 PMTK_API_SET_SBAS_ENABLED .....	44

2.3.24.	PMTK314 PMTK_API_SET_NMEA_OUTPUT.....	45
2.3.25.	PMTK351 PMTK_API_SET_SUPPORT_QZSS_NMEA.....	47
2.3.26.	PMTK352 PMTK_API_SET_STOP_QZSS.....	48
2.3.27.	PMTK353 PMTK_API_SET_GNSS_SEARCH_MODE.....	49
2.3.28.	PMTK386 PMTK_API_SET_STATIC_NAV_THD.....	50
2.3.29.	PMTK401 PMTK_API_Q_DGPS_MODE.....	51
2.3.30.	PMTK413 PMTK_API_Q_SBAS_ENABLED.....	51
2.3.31.	PMTK414 PMTK_API_Q_NMEA_OUTPUT.....	52
2.3.32.	PMTK501 PMTK_DT_DGPS_MODE.....	52
2.3.33.	PMTK513 PMTK_DT_SBAS_ENABLED.....	53
2.3.34.	PMTK514 PMTK_DT_NMEA_OUTPUT.....	53
2.3.35.	PMTK605 PMTK_Q_RELEASE.....	55
2.3.36.	PMTK622 PMTK_Q_LOCUS_DATA.....	55
2.3.37.	PMTK705 PMTK_DT_RELEASE.....	56
2.3.38.	PMTK838 PMTK_TEST_ANTI_SPOOFING.....	56
2.3.39.	PMTK869 PMTK_EASY_ENABLE.....	58
2.3.40.	PMTK875 PMTK_PMTKLSC_STN_OUTPUT.....	59
2.3.41.	PMTK886 PMTK_FR_MODE.....	60
2.3.42.	PMTKSPF.....	61
2.4.	PQ Messages.....	62
2.4.1.	PQBAUD.....	62
2.4.2.	PQEPE.....	63
2.4.3.	PQ1PPS.....	64
2.4.4.	PQFLP.....	66
2.4.5.	PQTX.....	67
2.4.6.	PQECEF.....	68
2.4.7.	ECEFPOSVEL.....	69
2.4.8.	PQODO.....	70
2.4.9.	PQPZ90.....	72
2.4.10.	PQGLP.....	74
2.4.11.	PQVEL.....	75
2.4.12.	PQJAM.....	77
2.4.13.	PQRLM.....	78
2.4.14.	PQGEO.....	80
2.4.15.	PQPREC.....	85
2.4.16.	PQGBS.....	87
<b>3</b>	<b>Appendix A References.....</b>	<b>89</b>
3.1.	Related Documents.....	89
3.2.	Terms and Abbreviations.....	90
<b>4</b>	<b>Appendix B GNSS Numbering.....</b>	<b>93</b>

## Table Index

Table 1: Applicable Modules and Constellations Supported.....	8
Table 2: Structure of NMEA Protocol Messages.....	10
Table 3: NMEA Talker ID .....	11
Table 4: Related Documents .....	89
Table 5: Terms and Abbreviations .....	90
Table 6: GNSS Numbering.....	93



# 1 Introduction

Quectel L70, L80, L26, L76, L76-L, L86, L96, L26-LB, L76-LB, LC86L (A, B, C) and LG77L (A, B, C) are multi-constellation modules. See [Table 1: Applicable Modules and Constellations Supported](#) on the actual constellations supported on each applicable module. Also, they support autonomous GNSS C/A code, SBAS function (including WAAS, EGNOS, MSAS and GAGAN) and AGNSS (EASY™ function). Concurrent tracking of GPS L1 C/A, GLONASS L1, BeiDou B1, QZSS L1, Galileo E1 frequency bands provides fast and accurate acquisition and makes those modules an ideal solution for positioning and navigation in various vertical markets.

This document describes the software commands that are needed to control and modify the modules configuration. The software commands are NMEA proprietary commands defined by the chipset supplier (PMTK commands) and Quectel (PQ commands). To report GNSS information, the modules support output messages in NMEA 0183 standard protocol.

**Table 1: Applicable Modules and Constellations Supported**

Series	Module	Variant	Constellation
Lx0	L70	L70	GPS + QZSS
	L80	L80	GPS + QZSS
Lx6	L26	L26	GPS + GLONASS + Galileo + BeiDou + QZSS
	L76	L76	GPS + GLONASS + Galileo + BeiDou + QZSS
	L76-L	L76-L	GPS + GLONASS + Galileo + BeiDou + QZSS
	L86	L86	GPS + GLONASS + Galileo + BeiDou + QZSS
	L96	L96	GPS + GLONASS + Galileo + BeiDou + QZSS
	L26-LB	L26-LB	GPS + GLONASS + BeiDou + QZSS
	L76-LB	L76-LB	GPS + GLONASS + BeiDou + QZSS
	LC86L	LC86L	LC86L (A)
LC86L (B)			GPS + GLONASS + BeiDou + QZSS
LC86L (C)			GPS + GLONASS + Galileo + BeiDou + QZSS

---

		LG77L (A)	GPS + GLONASS + BeiDou + QZSS
<b>LG77L</b>	LG77L	LG77L (B)	GPS + GLONASS + BeiDou + QZSS
		LG77L (C)	GPS + GLONASS + Galileo + BeiDou + QZSS

---

**NOTE**

Only use the commands listed in this document. Quectel assumes no responsibility if you use commands that are not listed in this document.

# 2 NMEA Protocol

## 2.1. Structure of NMEA Protocol Messages

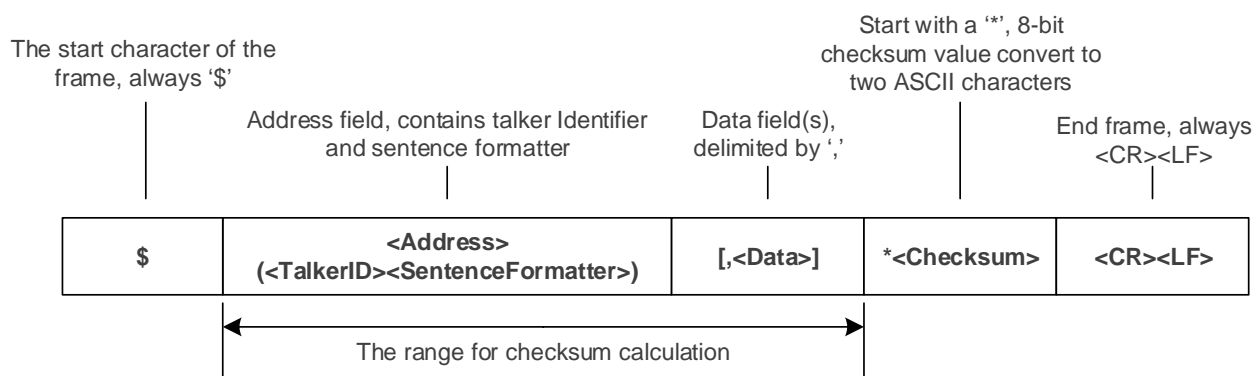


Figure 1: Structure of NMEA Protocol Messages

Table 2: Structure of NMEA Protocol Messages

Field	Description
\$	Start of the sentence (Hex 0x24).
Address	<p><b>In Standard Messages:</b> In NMEA standard messages, this field consists of a two-character talker identifier (TalkerID) and a three-character sentence formatter (SentenceFormatter). The talker identifier serves to define the nature of the data being transmitted. For more information on the TalkerID, see <a href="#">Table 3: NMEA Talker ID</a>.</p> <p>The sentence formatter is used to define data format and type.</p> <p><b>In Proprietary Messages:</b> In NMEA proprietary messages, this field consists of the proprietary character <b>P</b> followed by a three-character Manufacturer's Mnemonic Code, used to identify the TALKER issuing a proprietary sentence, and any additional characters as required.</p>
Data	Data fields, delimited by comma (,). Variable length (depends on the NMEA message type).

	The checksum field follows the checksum delimiter character *.
Checksum	The checksum is the 8-bit exclusive OR of all characters in the sentence, including the comma (,) delimiter, between but not including the \$ and the * delimiters.
<CR><LF>	End of the sentence (Hex 0x0D 0x0A).

**Table 3: NMEA Talker ID**

GNSS Constellation Configuration	TalkerID (NMEA V4.10)
GPS	GP
GLONASS	GL
Galileo	GA
BeiDou	BD
QZSS	QZ
Combination of Multiple Satellite Systems	GN

**NOTE**

On modules listed below, the Talker ID in the following listed messages has been modified to be compatible with the previous protocol versions and the Talker ID in other standard NMEA messages, unless otherwise specified, complies with the rules listed in [Table 3: NMEA Talker ID](#).

Position	Module	Constellation	Unfixed				Fixed					
			RMC	GGA	GSA	GLL	VTG	RMC	GGA	GSA	GLL	VTG
<b>L26</b>		GPS+GLONASS	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
		GPS+BeiDou	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		GPS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
		GPS+GLONASS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
<b>L76</b>		GPS+GLONASS	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
		GPS+BeiDou	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
		GPS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
		GPS+GLONASS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP

<b>L76-L</b>	GPS+GLONASS	GN	GN	GP	GN	GN	GN	GN	GP	GN	GN
	GPS+BeiDou	GN	GN	GP BD	GN	GN	GN	GN	GP BD	GN	GN
	GPS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
	GPS+GLONASS +Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
<b>L86</b>	GPS+GLONASS	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
	GPS+BeiDou	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
	GPS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
	GPS+GLONASS +Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
<b>L96</b>	GPS+GLONASS	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
	GPS+BeiDou	GP	GP	GP	GP	GP	GP	GP	GP	GP	GP
	GPS+Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP
	GPS+GLONASS +Galileo	GP	GP	GP	GP	GP	GN	GP	GN	GN	GP

## 2.2. Standard Messages

This chapter explains the NMEA 0183 V4.10 standard messages supported by the modules.

### 2.2.1. RMC

Recommended Minimum Specific GNSS Data. Time, date, position, course, and speed data provided by a GNSS receiver.

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>RMC,<UTC>,<Status>,<Lat>,<N/S>,<Lon>,<E/W>,<SOG>,<COG>,<Date>,<MagVar>,<MagVarDir>,<ModeInd>,<NavStatus>*<Checksum><CR><LF>
```

## Parameter:

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
RMC	String, 3 characters	-	RMC	Recommended Minimum Specific GNSS Data.
<UTC>	hhmmss.sss	-	080237.000	Position fix UTC. hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Status>	Character	-	A	Positioning system status. A = Data valid V = Invalid D = Differential
<Lat>	ddmm.mmmmmm	-	3149.333190	Latitude. dd: Degrees (00–90) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits) Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction. N = North S = South Note that this field is empty in case of an invalid value.
<Lon>	dddmm.mmmmmm	-	11706.911552	Longitude. ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits) Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction. E = East W = West Note that this field is empty in case of

				an invalid value.
<SOG>	Numeric	Knot	0.00	Speed over ground. Variable length.
<COG>	Numeric	Degree	5.78	Course over ground. Variable length. Maximum value: 359.9.
<Date>	ddmmyy	-	221121	Date. dd: Day of month mm: Month yy: Year
<MagVar>	-	-	-	Magnetic variation. Not supported.
<MagVarDir>	-	-	-	The direction of magnetic variation. Not supported.
<ModeInd>	Character	-	D	Mode indicator. A = Autonomous mode. Satellite system used in non-differential mode in position fix. D = Differential mode. Satellite system used in differential mode in position fix. Corrections from ground stations or Satellite Based Augmentation System (SBAS). E = Estimated (dead reckoning) mode. F = Float RTK. Satellite system used in RTK mode with floating integers. M = Manual input mode. N = No fix. Satellite system not used in position fix, or fix not valid. R = Real Time Kinematic (RTK). Satellite system used in RTK mode with fixed integers.
<NavStatus>	Character	-	V	Navigational status. S = Safe C = Caution U = Unsafe V = Navigational status not valid. Equipment is not providing navigational status indication.
<Checksum>	Hexadecimal	-	*06	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

GPS + GLONASS mode:

```
$GNRMC,080237.000,A,3149.333190,N,11706.911552,E,0.00,5.78,221121,,,D,V*06
```

GPS only mode:

```
$GPRMC,080325.000,A,3149.332234,N,11706.911645,E,0.07,33.95,221121,,,A,V*27
```

**NOTE**

The length of minutes decimal fraction is 4 digits in **<Lat>** and **<Lon>** when the RMC message is supported by L26, L76, L76-L, L86, L96, L70 and L80 modules.

**2.2.2. GGA**

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

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>GGA,<UTC>,<Lat>,<N/S>,<Lon>,<E/W>,<Quality>,<NumSatUsed>,<HDOP>,<Alt>,M,<Sep>,<M>,<DiffAge>,<DiffStation>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
GGA	String, 3 characters	-	GGA	Global Positioning System Fix Data.
<UTC>	hhmmss.sss	-	080237.000	Position fix UTC. hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Lat>	ddmm.mmmmmm	-	3149.333190	Latitude. dd: Degrees (00–90) mm: Minutes (00–59)



				<p>mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits)</p> <p>Note that this field is empty in case of an invalid value.</p>
<N/S>	Character	-	N	<p>Latitude direction.</p> <p>N = North</p> <p>S = South</p> <p>Note that this field is empty in case of an invalid value.</p>
<Lon>	dddmm.mmmmmm	-	11706.911552	<p>Longitude.</p> <p>ddd: Degrees (000–180)</p> <p>mm: Minutes (00–59)</p> <p>mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits)</p> <p>Note that this field is empty in case of an invalid value.</p>
<E/W>	Character	-	E	<p>Longitude direction.</p> <p>E = East</p> <p>W = West</p> <p>Note that this field is empty in case of an invalid value.</p>
<Quality>	Numeric, 1 digit	-	2	<p>GPS quality indicator.</p> <p>0 = Fix not available or invalid.</p> <p>1 = GPS SPS Mode, fix valid.</p> <p>2 = Differential GPS, SPS Mode, or Satellite Based Augmentation System (SBAS), fix valid.</p> <p>3 = GPS PPS Mode, fix valid.</p> <p>4 = Real Time Kinematic (RTK) System used in RTK mode with fixed integers.</p> <p>5 = Float RTK. Satellite system used in RTK mode, floating integers.</p> <p>6 = Estimated (dead reckoning) mode.</p>
<NumSatUsed> <sup>1)</sup>	Numeric, 2 digits	-	15	<p>Number of satellites in use.</p>
<HDOP>	Numeric	-	0.74	<p>Horizontal dilution of precision.</p> <p>Note that this field is empty in case of an invalid value.</p>

<Alt>	Numeric	Meter	53.489	Altitude above mean-sea-level (geoid). Note that this field is empty in case of an invalid value.
M	Character	-	M	-
<Sep>	Numeric	Meter	-0.337	Geoid separation (the difference between the earth ellipsoid surface and the mean-sea-level (geoid) surface defined by the reference datum used in the position solution). Note that this field is empty in case of an invalid value.
M	Character	-	M	-
<DiffAge>	-	-	-	Differential GPS data age. Not supported.
<DiffStation>	-	-	-	Differential reference station ID. Not supported.
<Checksum>	Hexadecimal	-	*5F	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

GPS + GLONASS mode:

```
$GNGGA,080237.000,3149.333190,N,11706.911552,E,2,15,0.74,53.489,M,-0.337,M,,*5F
```

GPS only mode:

```
$GPGGA,080325.000,3149.332234,N,11706.911645,E,1,10,0.88,45.086,M,-0.337,M,,*43
```

**NOTE**

1. The NMEA 0183 specification indicates that the GGA message is GPS specific. However, when the receiver is configured for multi-constellations, the content of GGA message will be generated from the multi-constellation solution.
2. <sup>1)</sup> According to the NMEA 0183 specification, the number of satellites in use is between 00 and 12. However, in the multi-constellation solution, the number of satellites in use may exceed 12.
3. The length of minutes decimal fraction is 4 digits in <Lat> and <Lon> when the GGA message is supported by L26, L76, L76-L, L86, L96, L70 and L80 modules.
4. The length of minutes decimal fraction is 1 digit in <Alt> and <Sep> when the GGA message is supported by L26, L76, L76-L, L86, L96, L70 and L80 modules.

**2.2.3. GSV**

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

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>GSV,<TotalNumSen>,<SenNum>,<TotalNumSat>,<SatID>,<SatElev>,<SatAz>,<SatCN0>[
...],<SignalID>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GP	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
GSV	String, 3 characters	-	GSV	GNSS Satellites in View.
<TotalNumSen>	Numeric	-	4	Total number of sentences. Range: 1–9.
<SenNum>	Numeric	-	1	Sentence number. Range: 1–<TotalNumSen>.
<TotalNumSat>	Numeric	-	13	Total number of satellites in view.
Start of repeat block. Repeat times: 1–4.				
<SatID>	Numeric	-	194	Satellite ID. See <a href="#">Table 6: GNSS Numbering</a> .
<SatElev>	Numeric	Degree	72	Satellite elevation. Range: 0–90.
<SatAz>	Numeric	Degree	074	Satellite azimuth, with true north as the reference plane. Range: 0–359.
<SatCN0>	Numeric	dB-Hz	43	Satellite C/N <sub>0</sub> . Range 00–99. Null when not tracking.
End of repeat block.				
<SignalID>	Numeric	-	1	GNSS signal ID. See <a href="#">Table 6: GNSS Numbering</a> .

<Checksum>	Hexadecimal	-	*5A	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

```

GPS + GLONASS mode:
$GPGSV,4,1,13,194,72,074,43,26,61,222,45,31,61,352,43,32,60,116,47,1*5A
$GPGSV,4,2,13,50,51,161,39,193,49,150,41,22,30,288,41,29,26,082,41,1*5E
$GPGSV,4,3,13,25,23,042,38,03,20,311,38,16,19,215,38,10,09,175,,1*6A
$GPGSV,4,4,13,195,,,,,1*5B
$GLGSV,2,1,06,66,69,316,46,76,62,331,44,65,43,162,37,77,34,255,33,1*70
$GLGSV,2,2,06,67,16,330,40,85,04,074,32,1*77
GPS only mode:
$GPGSV,4,1,14,194,72,074,43,26,61,222,44,31,61,353,43,32,59,117,46,1*57
$GPGSV,4,2,14,50,51,161,38,193,48,150,40,22,30,287,40,29,26,081,38,1*5B
$GPGSV,4,3,14,25,23,042,38,03,21,310,36,16,20,215,36,10,09,175,,1*67
$GPGSV,4,4,14,195,,,,,12,,,20,1*5D
    
```

**NOTE**

**GN** cannot be used for GSV sentences. If satellites of multiple constellations are in view, use separate GSV sentences with the corresponding **<TalkerID>** for each constellation.

**2.2.4. GSA**

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

**Type:**

Output.

**Synopsis:**

```

$<TalkerID>GSA,<Mode>,<FixMode>,<SatID>,...,<SatID>,<PDOP>,<HDOP>,<VDOP><SystemID>*<Checksum><CR><LF>
    
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
GSA	String, 3 characters	-	GSA	GNSS DOP and Active Satellites.
<Mode>	Character	-	A	M = Manual, forced to operate in 2D or 3D mode A = Automatic, allowed to automatically switch to 2D/3D
<FixMode>	Numeric	-	3	1 = Fix not available 2 = 2D 3 = 3D
Start of repeat block. Repeat times: 12.				
<SatID>	Numeric	-	22	ID numbers of satellites used in solution. See <a href="#">Table 6: GNSS Numbering</a> .
End of repeat block.				
<PDOP>	Numeric	-	1.35	Position dilution of precision. Maximum value: 99.0
<HDOP>	Numeric	-	0.74	Horizontal dilution of precision. Maximum value: 99.0
<VDOP>	Numeric	-	1.13	Vertical dilution of precision. Maximum value: 99.0
<SystemID>	Numeric	-	1	GNSS system ID. See <a href="#">Table 6: GNSS Numbering</a> .
<Checksum>	Hexadecimal	-	*0E	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

GPS + GLONASS mode:

```
$GNGSA,A,3,22,29,26,25,03,32,31,16,194,193,,1.35,0.74,1.13,1*0E
```

```
$GNGSA,A,3,66,65,76,67,77,,,,,,,,,1.35,0.74,1.13,2*06
```

GPS only mode:

```
$GPGSA,A,3,26,31,32,193,22,29,25,03,16,194,,1.20,0.88,0.81,1*1D
```

**NOTE**

If less than 12 satellites are used for navigation, the remaining <SatID> fields are left empty. If more than 12 satellites are used for navigation, only the IDs of the first 12 are output.

**2.2.5. VTG**

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

**Type:**

Output.

**Synopsis:**

\$<TalkerID>VTG,<COGT>,T,<COGM>,M,<SOGN>,N,<SOGK>,K,<ModeInd>\*<Checksum><CR><LF>

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
VTG	String, 3 characters	-	VTG	Course Over Ground & Ground Speed.
<COGT>	Numeric	Degrees	5.78	Course over ground, in true north course direction.
T	Character	-	T	Course over ground. (degrees true, fixed field)
<COGM>	Numeric	Degrees	-	Course over ground (magnetic). Not supported.
M	Character	-	M	Course over ground. (degrees magnetic, fixed field)
<SOGN>	Numeric	Knots	0.00	Speed over ground in knots.
N	Character	-	N	Speed over ground (knots, fixed field).
<SOGK>	Numeric	km/h	0.00	Speed over ground in kilometers per hour.
K	Character	-	K	Speed over ground. (kilometers per hour, fixed field)
<ModeInd>	Character	-	D	Mode indicator. A = Autonomous mode. Satellite

				system used in non-differential mode in position fix. D = Differential mode. Satellite system used in differential mode in position fix. Corrections from ground stations or Satellite Based Augmentation System (SBAS). E = Estimated (dead reckoning) mode M = Manual input mode N = No fix. Satellite system not used in position fix, or fix not valid.
<Checksum>	Hexadecimal	-	*2C	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

```
GPS + GLONASS mode:
$GNVTG,5.78,T,,M,0.00,N,0.00,K,D*2C
GPS only mode:
$GPVTG,33.95,T,,M,0.07,N,0.14,K,A*03
```

**2.2.6. GLL**

Geographic Position – Latitude/Longitude. Latitude and longitude of the GNSS receiver position, the time of position fix and status.

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>GLL,<Lat>,<N/S>,<Lon>,<E/W>,<UTC>,<Status>,<ModeInd>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .

GLL	String, 3 characters	-	GLL	Geographic Position Latitude/Longitude.
<Lat>	ddmm.mmmmmm	-	3149.333190	Latitude. dd: Degrees (00–90) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits) Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction. N = North S = South Note that this field is empty in case of an invalid value.
<Lon>	dddmm.mmmmmm	-	11706.911552	Longitude. ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes (variable length, 4 to 6 digits) Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction. E = East W = West Note that this field is empty in case of an invalid value.
<UTC>	hhmmss.sss	-	080237.000	Position UTC. hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Status>	Character	-	A	Positioning system status. V = Invalid A = Autonomous D = Differential
<ModeInd>	Character	-	D	Mode indicator. A = Autonomous mode. Satellite system used in non-differential mode in position fix. D = Differential mode. Satellite system used in differential mode in position fix. Corrections from ground stations or Satellite Based Augmentation System



				(SBAS). E = Estimated (dead reckoning) mode. M = Manual input mode. N = No fix. Satellite system not used in position fix, or fix not valid.
<Checksum>	Hexadecimal	-	*42	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

```
GPS + GLONASS mode:
$GNGLL,3149.333190,N,11706.911552,E,080237.000,A,D*42
GPS only mode:
$GPGLL,3149.332234,N,11706.911645,E,080325.000,A,A*52
```

**NOTE**

The length of minutes decimal fraction is 4 digits in <Lat> and <Lon> when the GLL message is supported by L26, L76, L76-L, L86, L96, L70 and L80 modules.

**2.2.7. TXT**

Text Transmission.

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>TXT,<TotalNumSen>,<SenNum>,<TextID>,<TextMsg>* <Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GP	Talker identifier. Always "GP".
TXT	String, 3 characters	-	TXT	Text Transmission.

<TotalNumSen>	Numeric	-	01	Total number of sentences. Always "01".
<SenNum>	Numeric	-	01	Sentence number. Always "01".
<TextID>	Numeric	-	02	Text identifier, used to identify different text messages. Always "02".
<TextMsg>	String	-	ANTSTATUS=OK	ASCII characters and code delimiters, if needed; up to the maximum permitted sentence length (i.e., up to 61 characters including any code delimiters).
<Checksum>	Hexadecimal	-	*3B	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

```
GPS only or GPS + GLONASS mode:
$GPTXT,01,01,02,ANTSTATUS=OK*3B
```

**NOTE**

This message is supported by L26, L86, L26-LB, L80, LC86L and LG77L modules and the <TalkerID> is always **GP**.

**2.2.8. GBS**

GNSS Satellite Fault Detection. This sentence is used to support Receiver Autonomous Integrity Monitoring (RAIM).

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>GBS,<UTC>,<LatExpErr>,<LonExpErr>,<AltExpErr>,<SatID>,<Probability>,<SatEstBias>,<StdDev>,<SystemID>,<SignalID>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
GBS	String, 3 characters	-	GBS	GNSS Satellite Fault Detection.
<UTC>	hhmmss.sss	-	092142.000	UTC time of the GGA fix associated with this sentence.
<LatExpErr>	Numeric	Meter	3.41	Expected Error in latitude.
<LonExpErr>	Numeric	Meter	3.19	Expected Error in longitude.
<AltExpErr>	Numeric	Meter	13.40	Expected Error in altitude.
<SatID>	Numeric	-	-	ID number of most likely failed satellite.
<Probability>	Numeric	-	-	Probability of missed detection for most likely failed satellite.
<SatEstBias>	Numeric	Meter	-	Estimate of bias in meters on most likely failed satellite.
<StdDev>	Numeric	-	-	Standard deviation of bias estimate.
<SystemID>	Numeric	-	-	GNSS system ID. See <a href="#">Table 6: GNSS Numbering</a> .
<SignalID>	Numeric	-	-	GNSS signal ID. See <a href="#">Table 6: GNSS Numbering</a> .
<Checksum>	Hexadecimal		*68	Checksum.
<CR><LF>	Character			Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

GPS + GLONASS mode:

```
$GNGBS,092142.000,3.41,3.19,13.40,,,,,*68
```

GPS only mode:

```
$GPGBS,092306.000,4.99,4.36,12.16,,,,,*7E
```

**NOTE**

This command is not supported on L70 and L80 modules.

**2.2.9. DTM**

Local geodetic datum and datum offsets from a reference datum. This sentence is used to define the datum to which a position location, and geographic locations in subsequent sentences, is referenced. Latitude, longitude and altitude offsets from the reference datum, and the selection of reference datum, are also provided.

**Type:**

Output.

**Synopsis:**

```
$<TalkerID>DTM,<Datum>,<LatOffset>,<N/S>,<LonOffset>,<E/W>,<AltOffset>,<RefDatum>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
\$	-	-	\$	Each NMEA message starts with \$.
<TalkerID>	String, 2 characters	-	GN	Talker identifier. See <a href="#">Table 3: NMEA Talker ID</a> .
DTM	String, 3 characters	-	DTM	Datum Reference.
<Datum>	String	-	P90	Local datum code: WGS84 = W84 WGS72 = W72 SGS85 = S85 PE90 = P90 User defined = 999 IHO datum code.
<LatOffset>	Numeric	min	0.000053	Offset in Latitude.
<N/S>	character	-	S	Latitude direction. N = North S = South.
<LonOffset>	Numeric	min	0.000067	Offset in Longitude.

<E/W>	character	-	E	Longitude direction. E = East W = West
<AltOffset>	Numeric	m	1.13	Offset in altitude.
<RefDatum>	string	-	W84	WGS84 = W84 WGS72 = W72 SGS85 = S85 PE90 = P90
<Checksum>	Hexadecimal		5A	Checksum.
<CR><LF>	Character			Carriage return and line feed.

**Example:**

Take LG77L (C) for example:

```
$GNDTM,P90,,0.000053,S,0.000067,E,1.13,W84*5A
```

## 2.3. PMTK Messages

This chapter explains the PMTK messages (proprietary NMEA messages defined by the chipset supplier) supported by the modules.

**PMTK Message Format:**

```
$PMTK<PacketType>[,<Data>]*<Checksum><CR><LF>
```

**PacketType:** Three-byte character string, from 000 to 999. An identifier for each PMTK message.

**Data:** Variable length depending on the packet type. Each field is split with ",".

### 2.3.1. PMTK001 PMTK\_ACK

Acknowledges a PMTK command to inform the sender whether the receiver has received the packet.

The following commands will make the GNSS modules restart or change the baud rate, and thus there will be no **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

**Type:**

Output.

**Synopsis:**

```
$PMTK001,<Cmd>,<Flag>[,<para 1>,...,<para N>]*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Cmd>	Numeric	-	The packet type that the acknowledgement responds.
<Flag>	Numeric	-	0 = Invalid packet 1 = Unsupported packet type 2 = Valid packet, but action failed 3 = Valid packet, and action succeeded
[,<para 1>,...,<para N>]	Numeric	-	Extended parameters (Optional).

**Example:**

```
$PMTK001,869,3*37
```

### 2.3.2. PMTK010 PMTK\_SYS\_MSG

Automatically outputs system message when the module is powered up.

**Type:**

Output.

**Synopsis:**

```
$PMTK010,<Message>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Message>	Numeric	-	System message. 000 = Unknown 001 = Startup 002 = Notification for the host aiding EPO 003 = Notification for the transition to normal mode is successfully done

**Example:**

```
$PMTK010,002*2D
```

**2.3.3. PMTK011 PMTK\_TXT\_MSG**

Automatically outputs text message when the modules are powered up.

**Type:**

Output.

**Synopsis:**

```
$PMTK011,<Message>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Message>	String	-	The system's text message.

**Example:**

```
$PMTK011,MTKGPS*08
```

**2.3.4. PMTK101 PMTK\_CMD\_HOT\_START**

Performs a hot start on the modules (using all available data in the NVM). Normally a hot start means the GNSS modules are powered down less than 2 hours with RTC in operation and the ephemeris is still valid. As there is no need for downloading ephemeris, it is the fastest startup method.

**Type:**

Command.

**Synopsis:**

```
$PMTK101*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK101*32
```

### 2.3.5. PMTK102 PMTK\_CMD\_WARM\_START

Performs a warm start on the modules. A warm start means the GNSS modules contains approximate information of time, position and coarse data on satellite positions, but they need to download ephemeris until they can get a fix. Using this message will force a warm restart on the modules without using the ephemeris data in NVM.

**Type:**

Command.

**Synopsis:**

```
$PMTK102*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK102*31
```

### 2.3.6. PMTK103 PMTK\_CMD\_COLD\_START

Performs a cold start on the modules. This message will force a cold restart on the modules without using any prior location information, including time, position, almanacs and ephemeris data.

**Type:**

Command.

**Synopsis:**

```
$PMTK103*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK103*30
```



### 2.3.7. PMTK104 PMTK\_CMD\_FULL\_COLD\_START

Performs a full cold restart on the modules. It additionally clears system and user configurations at restart, that is, resetting the modules to the factory settings. A full cold start means there are no last position information in the modules. The modules need to search for the full time and frequency space, and also all possible satellites before they can get a fix.

**Type:**

Command.

**Synopsis:**

```
$PMTK104*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK104*37
```

### 2.3.8. PMTK161 PMTK\_CMD\_STANDBY\_MODE

Makes the modules enter Standby mode for power saving. Sending any data will make the modules exit Standby mode.

**Type:**

Command.

**Synopsis:**

```
$PMTK161,<Type>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	Always "0".

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK161,0*28
$PMTK001,161,3*36
```

**2.3.9. PMTK183 PMTK\_LOCUS\_QUERY\_STATUS**

Queries the LOCUS logging status.

**Type:**

Query.

**Synopsis:**

```
$PMTK183*  
<Checksum><CR><LF>
```

**Parameter:**

None.

**Result:**

Returns a **PMTK\_ACK** message and the query result.

**Query Result Message Format:**

```
$PMTKLOG,<Serial#>,<Type>,<Mode>,<Content>,<Interval>,<Distance>,<Speed>,<Status>,<Number>,<Percent>*  
<Checksum><CR><LF>
```

The parameters included in the result above are listed as below:

Field	Format	Unit	Description
<Serial#>	Numeric	-	Logging serial number. Range: 0–65535.
<Type>	Numeric	-	Logging type. 0 = Overlap 1 = Stop logging when full
<Mode> <sup>1)</sup>	Character	-	Logging mode. 0x02 = Fix only mode (logging when 3D-fix only) 0x04 = Normal mode (logging per positioning, e.g. 1 s.) Customization mode: 0x08 = Interval mode (logging per pre-set interval, e.g. 15 s.) 0x10 = Distance mode (logging when the distance exceeds the preset value, e.g. 10 m) 0x20 = Speed mode (logging when the speed exceeds the preset

			value, e.g. 10 m/s) Default value is 0x0b: Fix only mode + Interval mode.
<Content>	Numeric	-	Logging contents of configuration.
<Interval>	Numeric	-	Logging interval setting (valid when interval mode is selected).
<Distance>	Numeric	-	Logging distance setting (valid when distance mode is selected).
<Speed>	Numeric	-	Logging speed setting (valid when speed mode is selected).
<Status>	Numeric	-	Logging status. 0 = Logging 1 = Stop logging
<Number>	Numeric	-	Logging number of data record.
<Percent>	Numeric	-	Used percentage of logging capacity (0%–100%).

**Example:**

```
$PMTK183*38
$PMTK001,183,3*3A
$PMTKLOG,0,1,b,31,15,0,0,1,0,0*12
```

**NOTE**

1) The “Fix only mode” is compatible with all other options. The “Interval mode”, “Distance mode” and “Speed mode” are called “Customization mode” and all of them are && condition with “Fix only mode” and “Normal mode“.

**2.3.10. PMTK184 PMTK\_LOCUS\_ERASE\_FLASH**

Erases the LOCUS logger flash.

**Type:**

Command.

**Synopsis:**

```
$PMTK184,<Type>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	1 = Erase all logger internal flash data

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK184,1*22
$PMTK001,184,3*3D
```

### 2.3.11. PMTK185 PMTK\_LOCUS\_STOP\_LOGGER

Stops or starts LOCUS logging data.

**Type:**

Command.

**Synopsis:**

```
$PMTK185,<Status>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Status>	Numeric	-	0 = Start logging 1 = Stop logging

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK185,1*23
$PMTK001,185,3*3C
```

### 2.3.12. PMTK220 PMTK\_SET\_POS\_FIX

Sets position fix interval.

**Type:**

Set.

**Synopsis:**

```
$PMTK220,<Interval>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Interval>	Numeric	ms	Position fix interval. Range: 100–10000. For value ≤ 1000, position fix interval is the value (time) set. For value > 1000 and value ≤ 10000, position fix interval is an integer multiple of 1000 (1000, 2000, ..., 10000). Default value: 1000.

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK220,1000*1F
$PMTK001,220,3,1000*1D
```

**NOTE**

A higher fixed rate requires a higher baud rate, so that the data can be fully output. For example, if the fixed rate is 10 Hz (interval = 100 ms), the baud rate should be 57600 bps or higher.

### 2.3.13. PMTK223 PMTK\_SET\_AL\_DEE\_CFG

Configures DEE. This message sets dynamic ephemeris extension parameters in Periodic mode and should follow **PMTK\_SET\_PERIODIC\_MODE**.

**Type:**

Set.

**Synopsis:**

```
$PMTK223,<SV>,<SNR>,<Ext_Thr>,<Ext_Gap>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<SV>	Numeric	-	Required number of SV which satisfies the SNR condition to trigger dynamic ephemeris extension. Range: 1–4 Default value: 1
<SNR>	Numeric	-	SV signal SNR criteria used to trigger dynamic ephemeris extension. Range: 25–30 Default value: 30
<Ext_Thr>	Numeric	ms	Time duration of dynamic ephemeris extension. Range: 40000–180000 Default value: 180000
<Ext_Gap>	Numeric	ms	The limitation of the interval between neighboring DEE intervals. Range: 0–3600000 Default value: 60000

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK223,1,30,180000,60000*3C
$PMTK001,223,3*33
```

### 2.3.14. PMTK225 PMTK\_SET\_PERIODIC\_MODE

Sets the modules to Periodic mode for power saving.

**Type:**

Set.

**Synopsis:**

```
$PMTK225,<Type>,<Run_Time>,<Sleep_Time>,<Sec_Run_Time>,<Sec_Sleep_Time>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	0 = Back to normal mode (default value) 1 = Periodic backup mode 2 = Periodic standby mode 4 = Perpetual backup mode
<Run_Time>	Numeric	ms	0 = Disable 1000–518400000 = Run time
<Sleep_Time>	Numeric	ms	Range: 1000–518400000
<Sec_Run_Time>	Numeric	ms	0 = Disable 1000–518400000 = Second run time
<Sec_Sleep_Time>	Numeric	ms	Range: 1000–518400000

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
//Periodic standby mode:
$PMTK225,0*2B
$PMTK225,2,3000,12000,18000,72000*15
$PMTK001,225,3*35
```

**NOTE**

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

### 2.3.15. PMTK251 PMTK\_SET\_NMEA\_BAUDRATE

Sets the baud rate of NMEA port. The baud rate will be restored to the default setting when the modules perform full cold restart or enter Standby mode.

**Type:**

Set.

**Synopsis:**

```
$PMTK251,<Baudrate>* <Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Baudrate>	Numeric	bps	The baud rate. 4800 9600 (default value) 14400 19200 38400 57600 115200

**Example:**

```
$PMTK251,38400*27
```

### 2.3.16. PMTK255 PMTK\_SET\_SYNC\_PPS\_NMEA

Enables or disables the function of fixing NMEA output time in PPS function.

**Type:**

Set.

**Synopsis:**

```
$PMTK255,<Enable>* <Checksum><CR><LF>
```



**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK255,0*2C
$PMTK001,255,3*32
```

**2.3.17. PMTK256 PMTK\_SET\_TIMING\_PRODUCT**

Enables or disables timing product mode. The timing product mode is used to enhance the PPS output timing accuracy.

**Type:**

Set.

**Synopsis:**

```
$PMTK256,<Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK256,0*2F
$PMTK001,256,3*31
```

### 2.3.18. PMTK285 PMTK\_SET\_PPS\_CONFIG

Sets PPS type.

**Type:**

Set.

**Synopsis:**

```
$PMTK285,<Type>,<PPSPulseWidth>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	0 = Disable 1 = After the first fix (default value) 2 = 3D fix only 3 = 2D/3D fix only 4 = Always
<PPSPulseWidth>	Numeric	ms	Range: 2–998 Default value: 100

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK285,2,100*3E
$PMTK001,285,3*3F
```

**NOTE**

Before you send **PMTK\_SET\_PPS\_CONFIG**, make sure the baud rate is 19200 bps at least.

### 2.3.19. PMTK286 PMTK\_SET\_AIC\_ENABLED

Enables or disables AIC function. It is recommended to send **PMTK\_CMD\_COLD\_START** to force a cold restart on the modules before sending this command.

**Type:**

Set.

**Synopsis:**

```
$PMTK286,<Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK286,1*23
$PMTK001,286,3*3C
```

### 2.3.20. PMTK301 PMTK\_API\_SET\_DGPS\_MODE

Configures the source mode of DGPS correction data.

**Type:**

Set.

**Synopsis:**

```
$PMTK301,<Mode>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Mode>	Numeric	-	DGPS data source mode. 0 = No DGPS source 1 = RTCM 2 = SBAS (includes WAAS/EGNOS/GAGAN/MSAS) Default value: SBAS

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK301,1*2D
$PMTK001,301,3*32
```

**NOTE**

1. Before you send **PMTK\_API\_SET\_DGPS\_MODE** to select RTCM mode, make sure the baud rate is 115200 bps at least.
2. Send **PMTK\_API\_SET\_SBAS\_ENABLED** to enable SBAS searching first before setting SBAS as DGPS mode.

**2.3.21. PMTK306 PMTK\_API\_SET\_MIN\_SNR**

Sets the minimum SNR of satellites in use. If the minimum SNR threshold value is set, the modules would not use the satellite whose SNR is smaller than the shreshold value.

**Type:**

Set.

**Synopsis:**

```
$PMTK306,<MIN_SNR>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<MIN_SNR>	Numeric	-	Minimum SNR threshold of satellites in use. Range: 9–37 Default value: 9

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK306,15*1F
$PMTK001,306,3,15*1D
```

**NOTE**

This command is not supported on L70 and L80.

**2.3.22. PMTK311 PMTK\_API\_SET\_ELEV\_MASK**

Sets satellite elevation mask.

**Type:**

Set.

**Synopsis:**

```
$PMTK311,<Degree>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Degree>	Numeric	Degree	Satellite elevation mask. Range: 0–90

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK311,5*28
$PMTK001,311,3*33
```

**NOTE**

1. 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.
2. This command is not supported on L70 and L80 modules.

**2.3.23. PMTK313 PMTK\_API\_SET\_SBAS\_ENABLED**

Enables or disables SBAS satellite searching. 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.

**Type:**

Set.

**Synopsis:**

```
$PMTK313,<Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable 1 = Enable (default value)

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK313,1*2E
$PMTK001,313,3*31
```

### 2.3.24. PMTK314 PMTK\_API\_SET\_NMEA\_OUTPUT

Sets NMEA sentence output frequencies. There are totally 22 data fields that present output frequency for the 22 supported NMEA sentences individually.

**Type:**

Set.

**Synopsis:**

```
$PMTK314,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,<Res1>,<Res2>,<Res3>,<Res4>,<Res5>,<Res6>,<Res7>,<Res8>,<Res9>,<Res10>,<Res11>,<Res12>,<Res13>,<Res14>,<GBS>,<Res16>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<GLL>	Numeric	-	GLL sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.

<RMC>	Numeric	-	RMC sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<VTG>	Numeric	-	VTG sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GGA>	Numeric	-	GGA sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GSA>	Numeric	-	GSA sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GSV>	Numeric	-	GSV sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<Res1>	Numeric	-	Always “0”.
<Res2>	Numeric	-	Always “0”.
<Res3>	Numeric	-	Always “0”.
<Res4>	Numeric	-	Always “0”.
<Res5>	Numeric	-	Always “0”.
<Res6>	Numeric	-	Always “0”.
<Res7>	Numeric	-	Always “0”.
<Res8>	Numeric	-	Always “0”.
<Res9>	Numeric	-	Always “0”.
<Res10>	Numeric	-	Always “0”.
<Res11>	Numeric	-	Always “0”.
<Res12>	Numeric	-	Always “0”.
<Res13>	Numeric	-	Always “0”.
<Res14>	Numeric	-	Always “0”.

<GBS>	Numeric	-	GBS sentence output frequency. 0 = Disabled or not supported sentence n = Output once every "n" position fix. "n" ranges from 1 to 5.
<Res16>	Numeric	-	Always "0".

**Result:**

Returns a **PAIR\_ACK** message.

**Example:**

```
$PMTK314,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*35
$PMTK001,314,3*36
```

**NOTE**

**\$PMTK314,-1\*ChecksumCR LF** can be used to restore the NMEA sentence output frequency to the system default setting.

**Result:**

Returns a **PAIR\_ACK** message. L26, L76, L76-L, L86, L96, L26-LB, L76-LB, LC86L and LG77L will output RMC, GGA, GSV, GSA, VTG, GLL and GBS messages. L70 and L80 will output RMC, GGA, GSV, GSA, VTG and GLL messages.

**Example:**

```
$PMTK314,-1*04
$PMTK001,314,3*36
```

**2.3.25. PMTK351 PMTK\_API\_SET\_SUPPORT\_QZSS\_NMEA**

Enables or disables QZSS NMEA format.

**Type:**

Set.

**Synopsis:**

```
$PMTK351,<Enable>*ChecksumCR LF
```



**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK351,1*28
$PMTK001,351,3*37
```

**2.3.26. PMTK352 PMTK\_API\_SET\_STOP\_QZSS**

Enables or disables QZSS function.

**Type:**

Set.

**Synopsis:**

```
$PMTK352,<Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Enable (default value) 1 = Disable

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK352,0*2A
$PMTK001,352,3*34
```

### 2.3.27. PMTK353 PMTK\_API\_SET\_GNSS\_SEARCH\_MODE

Configures the modules to start searching satellite system.

**Type:**

Set.

**Synopsis:**

```
$PMTK353,<GPS_Enable>,<GLONASS_Enable>,<GALILEO_Enabled>,<Res>,<BeiDou_Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<GPS_Enable>	Numeric	-	0 = Disable (DO NOT search GPS satellites) 1 or other non-zero values = Search GPS satellites
<GLONASS_Enable>	Numeric	-	0 = Disable (DO NOT search GLONASS satellites) 1 or other non-zero values = search GLONASS satellites
<GALILEO_Enabled>	Numeric	-	0 = Disable (DO NOT search Galileo satellites) 1 or other non-zero values = search Galileo satellites
<Res>	Numeric	-	Always "0".
<BeiDou_Enable>	Numeric	-	0 = Disable (DO NOT search BeiDou satellites) 1 or other non-zero values = Search BeiDou satellites

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
//Search GPS + GLONASS:
$PMTK353,1,1,0,0,0*2B

//Search GPS + BeiDou:
$PMTK353,1,0,0,0,1*2B
$PMTK001,353,3,1,0,0,0,1,49*08
```

**NOTE**

1. This command is not supported on the L70 and L80.
2. GLONASS and BeiDou cannot be enabled at the same time. Galileo and BeiDou cannot be enabled at the same time.
3. GLONASS only, BeiDou only and Galileo only mode is only for testing purpose.

**2.3.28. PMTK386 PMTK\_API\_SET\_STATIC\_NAV\_THD**

Sets 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.

**Type:**

Set.

**Synopsis:**

```
$PMTK386,<Speed_Threshold>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Speed_Threshold>	Numeric	m/s	Speed threshold. Range: 0–2 Default value: 0.4

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK386,0.4*39
$PMTK001,386,3*3D
```

### 2.3.29. PMTK401 PMTK\_API\_Q\_DGPS\_MODE

Queries the setting of DGPS mode. See **PMTK\_API\_SET\_DGPS\_MODE** for the setting of DGPS mode and **PMTK\_DT\_DGPS\_MODE** for the query result.

**Type:**

Query.

**Synopsis:**

```
$PMTK401*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK401*37
```

### 2.3.30. PMTK413 PMTK\_API\_Q\_SBAS\_ENABLED

Queries the setting of SBAS. See **PMTK\_API\_SET\_SBAS\_ENABLED** for SBAS setting and **PMTK\_DT\_SBAS\_ENABLED** for the query result.

**Type:**

Query.

**Synopsis:**

```
$PMTK413*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK413*34
```

### 2.3.31. PMTK414 PMTK\_API\_Q\_NMEA\_OUTPUT

Queries the current NMEA sentence output frequency. See **PMTK\_API\_SET\_NMEA\_OUTPUT** for the frequency setting and **PMTK\_DT\_NMEA\_OUTPUT** for the query result.

**Type:**

Query.

**Synopsis:**

```
$PMTK414*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK414*33
```

### 2.3.32. PMTK501 PMTK\_DT\_DGPS\_MODE

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

**Type:**

Output.

**Synopsis:**

```
$PMTK501,<Mode>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Mode>	Numeric	-	DGPS data source mode. 0 = No DGPS source 1 = RTCM 2 = SBAS

**Example:**

```
$PMTK501,1*2B
```

### 2.3.33. PMTK513 PMTK\_DT\_SBAS\_ENABLED

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

**Type:**

Output.

**Synopsis:**

```
$PMTK513,<Enable>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Enable>	Numeric	-	0 = Disable 1 = Enable

**Example:**

```
$PMTK513,1*28
```

### 2.3.34. PMTK514 PMTK\_DT\_NMEA\_OUTPUT

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

**Type:**

Output.

**Synopsis:**

```
$PMTK514,<GLL>,<RMC>,<VTG>,<GGA>,<GSA>,<GSV>,<Res1>,<Res2>,<Res3>,<Res4>,<Res5>,<Res6>,<Res7>,<Res8>,<Res9>,<Res10>,<Res11>,<Res12>,<Res13>,<Res14>,<GBS>,<Res16>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<GLL>	Numeric	-	GLL sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<RMC>	Numeric	-	RMC sentence output frequency. 0 = Disabled or not supported sentence

			n = Output once every “n” position fix. “n” ranges from 1 to 5.
<VTG>	Numeric	-	VTG sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GGA>	Numeric	-	GGA sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GSA>	Numeric	-	GSA sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<GSV>	Numeric	-	GSV sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<Res1>	Numeric	-	Always “0”.
<Res2>	Numeric	-	Always “0”.
<Res3>	Numeric	-	Always “0”.
<Res4>	Numeric	-	Always “0”.
<Res5>	Numeric	-	Always “0”.
<Res6>	Numeric	-	Always “0”.
<Res7>	Numeric	-	Always “0”.
<Res8>	Numeric	-	Always “0”.
<Res9>	Numeric	-	Always “0”.
<Res10>	Numeric	-	Always “0”.
<Res11>	Numeric	-	Always “0”.
<Res12>	Numeric	-	Always “0”.
<Res13>	Numeric	-	Always “0”.
<Res14>	Numeric	-	Always “0”.
<GBS>	Numeric	-	GBS sentence output frequency. 0 = Disabled or not supported sentence n = Output once every “n” position fix. “n” ranges from 1 to 5.
<Res16>	Numeric	-	Always “0”.

**Example:**

```
$PMTK514,1,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0*32
```

**2.3.35. PMTK605 PMTK\_Q\_RELEASE**

Queries the firmware release information. See **PMTK\_DT\_RELEASE** for the query result.

**Type:**

Query.

**Synopsis:**

```
$PMTK605*<Checksum><CR><LF>
```

**Parameter:**

None.

**Example:**

```
$PMTK605*31
```

**2.3.36. PMTK622 PMTK\_Q\_LOCUS\_DATA**

Dumps LOCUS flash data.

**Type:**

Input.

**Synopsis:**

```
$PMTK622,<Type>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	0 = Dump all the LOCUS data in the flash 1 = Dump the LOCUS data in the current flash sector

**Result:**

Returns a **PMTK\_ACK** message.



**Example:**

```
$PMTK622,1*29
$PMTK001,622,3*36
```

**2.3.37. PMTK705 PMTK\_DT\_RELEASE**

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

**Type:**

Output.

**Synopsis:**

```
$PMTK705,<Rel_String>,<Build_ID>,<Pro_Model>,<SDK_Version>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Rel_String>	Numeric	-	Firmware release version and name.
<Build_ID>	Numeric	-	Build ID for firmware version control.
<Pro_Model>	Numeric	-	Product model for product identification.
<SDK_Version>	Numeric	-	Showing SDK version if the firmware is used for SDK.

**Example:**

```
$PMTK705,AXN_5.1.6_3331_19052100,000A,Quectel-L76LB,1.0*69
```

**2.3.38. PMTK838 PMTK\_TEST\_ANTI\_SPOOFING**

Enables or disables jamming detection function.

**Type:**

Set.

**Synopsis:**

```
$PMTK838,<CmdType>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<CmdType>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message and the query result.

**Query Result Message Format:**

```
$PMTKSPF,<Status>*<Checksum><CR><LF>
```

The parameter included in the result above is listed as below:

Field	Format	Unit	Description
<Status>	Numeric	-	1 = No jamming, healthy status 2 = Warning status 3 = Critical status

**Example:**

```
$PMTK838,1*2C
$PMTK001,838,3,1*2E
//Healthy status:
$PMTKSPF,1*5A
//Warning status:
$PMTKSPF,2*59
//Critical status:
$PMTKSPF,3*58
```

**NOTE**

After jamming detection is enabled, the modules start 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, the module status will change from 1 to 2 and finally 3.
  - 1) 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 modules will attempt to fix position. If position fix still fails after 200 s, the module status will change to 3 finally.
  - 2) 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. This command is only supported on L70 and L80.

**2.3.39. PMTK869 PMTK\_EASY\_ENABLE**

Enables or disables EASY™ function, and it can also get whether EASY™ is enabled or disabled.

**Type:**

Set/Get.

**Synopsis:**

```
$PMTK869,<Type>[,<Enable_CDM>][,<Extension_Day>]*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	0 = Query 1 = Set 2 = Query result
<Enable_CMD>	Numeric	-	0 = Disable 1 = Enable (default value)
<Extension_Day>	Numeric	-	Finished extension days (0–3).

**Result:**

Returns a **PMTK\_ACK** message.

**Example:**

```
$PMTK869,1,1*35
$PMTK869,0*29
$PMTK869,2,0,0*2B
$PMTK001,869,3*37
```

**NOTE**

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

**2.3.40. PMTK875 PMTK\_PMTKLSC\_STN\_OUTPUT**

PMTKLSC sentence is the leap second indication statement. This message enables or disables PMTKLSC sentence output, and it can also query whether PMTKLSC sentence output is enabled or disabled.

**Type:**

Set/Get.

**Synopsis:**

```
$PMTK875,<CmdType>[,<Enabled>]*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<CmdType>	Numeric	-	0 = Query 1 = Set 2 = Query result
<Enabled>	Numeric	-	0 = Disable (default value) 1 = Enable

**Result:**

Returns a **PMTK\_ACK** message and the query result.

**Query Result Message Format:**

```
$PMTKLSC,<Current_Leap_Sec>,<Leap_Indicator>,<Next_Leap_Sec>*<Checksum><CR><LF>
$PMTKLSCB,<Current_Leap_Sec>,<Leap_Indicator>,<Next_Leap_Sec>*<Checksum><CR><LF>
```

The parameters included in the result above is listed as below:

Packet Data	Format	Unit	Description
<Current_Leap_Sec>	Numeric	Second	Current leap second.
<Leap_Indicator>	Numeric	-	Leap indicator. 1 = Updated from broadcast data
<Next_Leap_Sec>	Numeric	Second	Next leap second.

**Example:**

```
$PMTK875,1,1*38
$PMTK001,875,3*3A
$PMTKLSC,18,1,18*43
$PMTKLSCB,0,0,0*00
```

**2.3.41. PMTK886 PMTK\_FR\_MODE**

Sets the navigation mode.

**Type:**

Set.

**Synopsis:**

```
$PMTK886,<CmdType>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<CmdType>	Numeric	-	0 = Normal Mode. For general purposes. 1 = Fitness Mode. For running and walking purposes that the low-speed (<5 m/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.

**Result:**

Returns **PMTK\_ACK** message.

**Example:**

```
$PMTK886,3*2B
$PMTK001,886,3*36
```

**NOTE**

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

Mode	Unit	Altitude Limitation
Normal Mode	m	10000
Fitness Mode	m	10000
Aviation Mode	m	10000
Stationary Mode	m	10000
Balloon Mode	m	80000

**2.3.42. PMTKSPF**

Outputs Jamming status when jamming detection function is enabled.

**Type:**

Output.

**Synopsis:**

```
$PMTKSPF,<Status>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Status>	Numeric	-	Jamming status. 0 = No jamming, healthy status 1 = Warning status 2 = Critical status

**Example:**

```
$PMTKSPF,1*5A
```

## 2.4. PQ Messages

This chapter explains the PQ messages which are defined and developed by Quectel. The configuration parameters saved by PQ commands will still exist in flash even after upgrading the modules' firmware.

### 2.4.1. PQBAUD

Sets NMEA port default baud rate.

**Type:**

Set.

**Synopsis:**

```
$PQBAUD,W,<Baudrate>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Baudrate>	Numeric	bps	NMEA port baud rate: 4800 9600 14400 19200 38400 57600 115200

**Result:**

In case of no errors:

```
$PQBAUD,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQBAUD,W,ERROR*<Checksum><CR><LF>
```

**Example:**

```
//Set NMEA port default baud rate to 115200 bps (the current baud rate is 115200 bps):
```

```
$PQBAUD,W,115200*43
```

```
//Set successfully:
```

```
$PQBAUD,W,OK*40
```

**NOTE**

1. The command takes effect immediately after setting.
2. The parameter is automatically saved.
3. There is no response returned if the baud rate is changed to a different value.

**2.4.2. PQEPE**

Enables/disables PQEPE message output. If enabled, PQEPE message will be automatically output.

**Type:**

Set/Output.

**Synopsis:**

```
//Set Command:
```

```
$PQEPE,W,<Mode>,<Save>*<Checksum><CR><LF>
```

```
//Output Message:
```

```
$PQEPE,<EPE_Hori>,<EPE_Vert>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Mode>	Numeric	-	Enable/disable PQEPE message output. 0 = Disable PQEPE message output (default value) 1 = Enable PQEPE message output



<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart
<EPE_Hori>	Numeric	m	Estimated horizontal position error.
<EPE_Vert>	Numeric	m	Estimated vertical position error.

**Result:**

In case of no errors:

```
$PQEPE,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQEPE,W,ERROR*<Checksum><CR><LF>
```

**Example:**

//Enable PQEPE message output and save parameters into flash:

```
$PQEPE,W,1,1*2A
```

//Set successfully:

```
$PQEPE,W,OK*02
```

//Output Message:

```
$PQEPE,5.3050,3.2000*53
```

**NOTE**

The command takes effect immediately after setting.

**2.4.3. PQ1PPS**

Sets the type and pulse width of 1PPS output.

**Type:**

Set.

**Synopsis:**

```
$PQ1PPS,W,<Type>,<Width>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	Numeric	-	The type of 1PPS output. 0 = Disable 1PPS output 1 = Send 1PPS after the first fix 2 = Send 1PPS after 3D fix (default value) 3 = Send 1PPS after 2D fix 4 = Send 1PPS always
<Width>	Numeric	ms	PPS pulse width. Range: 2–998

**Result:**

In case of no errors:

```
$PQ1PPS,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQ1PPS,W,ERROR*<Checksum><CR><LF>
```

**Example:**

//Set the type of 1PPS output and PPS pulse width:

```
$PQ1PPS,W,4,100*1D
```

//Set successfully:

```
$PQ1PPS,W,OK*30
```

//Disable 1PPS output:

```
$PQ1PPS,W,0,0*18
```

//Set successfully:

```
$PQ1PPS,W,OK*30
```

**NOTE**

1. The command takes effect immediately after setting.
2. The parameters are automatically saved.
3. If <Type> is set as 0, <Width> could be set as 0–998.

### 2.4.4. PQFLP

Sets the module into FLP mode and gets module operation mode.

**Type:**

Set/Get.

**Synopsis:**

```
$PQFLP,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <Type> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Module operation mode. 0 = Normal mode (default value) 1 = FLP mode
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set

In case of no errors:

```
$PQFLP,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQFLP,W,ERROR*<Checksum><CR><LF>
```

2) Get

```
$PQFLP,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Change to FLP mode:
```

```
$PQFLP,W,1,1*20
```

```
//Set successfully:
```

```
$PQFLP,W,OK*08
```

//Get the mode:

```
$PQFLP,R*25
```

//Get successfully, FLP mode is enabled:

```
$PQFLP,R,1*38
```

**NOTE**

1. The command takes effect immediately after setting.
2. This command is supported on L70 and L80 modules only.

### 2.4.5. PQTXT

Enables/disables GPTXT message output.

**Type:**

Set.

**Synopsis:**

```
$PQTXT,W,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Mode>	Numeric	-	Enables/disable GPTXT message output. 0 = Disable GPTXT message output 1 = Enable GPTXT message output
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

In case of no errors:

```
$PQTXT,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQTXT,W,ERROR*<Checksum><CR><LF>
```

**Example:**

```
//Enable GPTXT message output and save the parameter into flash:
$PQTXT,W,1,1*22
//Set successfully:
$PQTXT,W,OK*0A
```

**NOTE**

1. The command takes effect immediately after setting.
2. This command is only supported on the modules which support antenna detection feature.

**2.4.6. PQECEF**

Enables/disables ECEFPOSVEL message output. If enabled, ECEFPOSVEL message is automatically output. It can also get module operation mode.

**Type:**

Set/Get.

**Synopsis:**

```
$PQECEF,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <Type> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Enables/Disable ECEFPOSVEL message output 0 = Disable ECEFPOSVEL message output (default value) 1 = Enable ECEFPOSVEL message output
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQECEF,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQECEF,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQECEF,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

//Enable ECEFPOSVEL message output, and save the parameter into flash:

```
$PQECEF,W,1,1*7F
```

//Set successfully:

```
$PQECEF,W,OK*57
```

//Get the mode:

```
$PQECEF,R*7A
```

//Get successfully, ECEFPOSVEL message output is enabled:

```
$PQECEF,R,1*67
```

**NOTE**

The command takes effect immediately after setting.

**2.4.7. ECEFPOSVEL**

This message is automatically output when **PQECEF** is enabled.

**Type:**

Output.

**Synopsis:**

```
$ECEFPOSVEL,<Time>,<X>,<Y>,<Z>,<V_X>,<V_Y>,<V_Z>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Time>	Numeric	-	UTC from the internal real-time clock.
<X>	Numeric	-	The value of X axis in ECEFPOSVEL message.
<Y>	Numeric	-	The value of Y axis in ECEFPOSVEL message.
<Z>	Numeric	-	The value of Z axis in ECEFPOSVEL message.
<V_X>	Numeric	-	Velocity component of X axis in ECEFPOSVEL message.
<V_Y>	Numeric	-	Velocity component of Y axis in ECEFPOSVEL message.
<V_Z>	Numeric	-	Velocity component of Z axis in ECEFPOSVEL message.

**Example:**

```
$ECEFPOSVEL,052743.000,-1526672.867459,6191083.982801,143008.780911,0,0,0*14
```

**2.4.8. PQODO**

Starts/stops odometer reading. This message can also get whether the odometer reading is started and query the distance value.

**Type:**

Set/Get/Query.

**Synopsis:**

```
$PQODO,<Type>,<Mode>,<Initial_Distance>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command Q = Query Command When <Type> is <b>R</b> or <b>Q</b> , other parameters can be omitted.
<Mode>	Numeric	-	Start or stop odometer reading. 0 = Stop odometer reading and remember the distance value (default value) 1 = Start odometer reading and initialize the distance according to the <b>&lt;Initial_Distance&gt;</b>

<Initial_Distance>	Numeric	m	Set the initial distance. Range: 0-1e09. When <b>&lt;Mode&gt;</b> is 1, this parameter can be omitted, and its default value is 0. When <b>&lt;Mode&gt;</b> is 0, this parameter must be omitted.
--------------------	---------	---	---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------

**Result:**

1) Set:

In case of no errors:

```
$PQODO,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQODO,W,ERROR*<Checksum><CR><LF>
```

2) Get:

In case of no errors:

```
$PQODO,R,<Mode>*<Checksum><CR><LF>
```

In case of any error:

```
$PQODO,R,ERROR*<Checksum><CR><LF>
```

3) Query:

In case of no errors:

```
$PQODO,Q,<Distance>*<Checksum><CR><LF>
```

In case of any error:

```
$PQODO,Q,ERROR*<Checksum><CR><LF>
```

Parameter included in the query result:

Field	Format	Unit	Description
<Distance>	Numeric	m	Current distance.



**Example:**

```
//Start odometer reading, and initial distance is 0 m:
$PQODO,W,1*23
//Set successfully:
$PQODO,W,OK*16
//Start odometer reading, and initial distance is 1,000,000 m:
$PQODO,W,1,1000000*3E
//Set successfully:
$PQODO,W,OK*16
//Get the mode:
$PQODO,R*3B
//Get successfully, odometer reading has already been started:
$PQODO,R,1*26

//Query the distance value:
$PQODO,Q*38
//Current distance value is returned:
$PQODO,Q,123.45*0B
```

**NOTE**

1. The command takes effect immediately after setting.
2. After module is restarted, the **PQODO** Set Command must be executed again to re-start odometer reading.
3. The command is not supported in Backup mode.

**2.4.9. PQPZ90**

Enables/disables switching from WGS84 to PZ-90.11. It can also get whether switching from WGS84 to PZ-90.11 is enabled.

**Type:**

Set/Get.

**Synopsis:**

```
$PQPZ90,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <Type> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Enable/Disable switching from WGS84 to PZ-90.11. 0 = Disable switching from WGS84 to PZ-90.11 (default value) 1 = Enable switching from WGS84 to PZ-90.11
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQPZ90,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQPZ90,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQPZ90,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Enable switching from WGS84 to PZ-90.11, and save the parameter into flash:
```

```
$PQPZ90,W,1,1*79
```

```
//Set successfully:
```

```
$PQPZ90,W,OK*51
```

```
//Get the mode:
```

```
$PQPZ90,R*7C
```

```
//Get successfully, switching from WGS84 to PZ-90.11 is enabled:
```

```
$PQPZ90,R,0*60
```

**NOTE**

1. The command takes effect immediately after setting **<Save>** to 0. However, when **<Save>** is set to 1, it takes effect only after restart for versions earlier than L76NR03A01S (on L76 module), L76LNR02A01S (on L76-L module), L86NR02A01S (on L86 module) and L26NR02A01S (on L26 module).
2. If switching from WGS84 to PZ-90.11 is enabled and takes effect, the coordinate values in RMC and GGA sentences will be switched to PZ-90.11 after fixing. Also, a DTM sentence will be displayed to identify the datum used.

**2.4.10. PQGLP**

Sets the module to GLP mode and gets whether the GLP mode is enabled.

**Type:**

Set/Get.

**Synopsis:**

```
$PQGLP,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <Type> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Module operation mode. 0 = Normal mode (default value) 1 = GLP mode
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQGLP,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQGLP,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQGLP,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Change to GLP mode:
$PQGLP,W,1,1*21
//Set successfully:
$PQGLP,W,OK*09

//Get the mode:
$PQGLP,R*24
//Get successfully. GLP mode is enabled:
$PQGLP,R,1*39
```

**NOTE**

1. The command takes effect immediately after setting.
2. This command is not supported on L70 and L80.

**2.4.11. PQVEL**

Enables/disables PQVEL message output. If enabled, PQVEL message will be automatically output. It can also get whether PQVEL message output is enabled.

**Type:**

Set/Get/Output.

**Synopsis:**

```
//Set/Get command:
$PQVEL,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
//Output message:
$PQVEL,<North_Vel>,<East_Vel>,<Down_Vel>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command

				When <b>&lt;Type&gt;</b> is <b>R</b> , other parameters can be omitted.
<b>&lt;Mode&gt;</b>	Numeric	-		Enable/disable PQVEL message output. 0 = Disable (default value) 1 = Enable
<b>&lt;Save&gt;</b>	Numeric	-		Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart
<b>&lt;North_Vel&gt;</b>	Numeric	m/s		North velocity.
<b>&lt;East_Vel&gt;</b>	Numeric	m/s		East velocity.
<b>&lt;Down_Vel&gt;</b>	Numeric	m/s		Down velocity.

**Result:**

1) Set:

In case of no errors:

```
$PQVEL,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQVEL,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQVEL,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Set message output:
$PQVEL,W,1,1*25
//Set successfully:
$PQVEL,W,OK*0D

//Get the mode:
$PQVEL,R*20
//The mode is enabled:
$PQVEL,R,1*3D

//Output Message:
$PQVEL,1.000000,2.000000,-0.000000*42
```

**NOTE**

The command takes effect immediately after setting.

**2.4.12. PQJAM**

Enables/disables jamming detection function. It can also get whether jamming detection function is enabled.

**Type:**

Set/Get.

**Synopsis:**

```
$PQJAM,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <b>&lt;Type&gt;</b> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Enable/disable jamming detection function. 0 = Disable jamming detection function (default value) 1 = Enable jamming detection function
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and will is invalid restart (default value) 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQJAM,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQJAM,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQJAM,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Enable jamming detection function:
```

```
$PQJAM,W,1,1*3C
```

```
//Set successfully:
```

```
$PQJAM,W,OK*14
```

```
//Get operation mode:
```

```
$PQJAM,R*39
```

```
//Get successfully:
```

```
$PQJAM,R,1*24
```

**NOTE**

1. The command takes effect immediately after setting.
2. The command is not supported in Backup mode.

**2.4.13. PQRLM**

Enables/disables the return link message output. It can also receive distress signal.

**Type:**

Set/Get/Output.

**Synopsis:**

```
//Set/Get Command:
```

```
$PQRLM,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

```
//Output Message:
```

```
$PQRLM,<BeaconID>,<Gps_Sec>,<Msg_Code>,<Para>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <b>&lt;Type&gt;</b> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Enable/disable return link message output. 0 = Disable (default value) 1 = Enable
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart
<BeaconID>	Numeric	-	Beacon ID of RLM.
<Gps_Sec>	Numeric	-	The GPS second when receiving RLM.
<Msg_Code>	Numeric	-	Message code.
<Para>	Numeric	-	The data parameters provided by RLS. Short message contains 4 hex characters and long message contains 24 hex characters.

**Result:**

1) Set:

In case of no errors:

```
$PQRLM,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQRLM,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQRLM,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

//Enable return link message output:

```
$PQRLM,W,1,1*29
```

//Set successfully:

```
$PQRLM,W,OK*01
```



```
//Get the mode:
$PQRLM,R*2C
//Get successfully:
$PQRLM,R,1*31

//Output Message:
$PQRLM,0a0a0a0a0a0a0a0a8,955065733,1,8aa1*3E
$PQRLM,050505050505052,955065709,15,5555555555555555
```

**NOTE**

1. The command takes effect immediately after setting.
2. This command is not supported on the following modules:
  - L70
  - L80
  - L26-LB
  - L76-LB
  - LC86L (A, B)
  - LG77L (A, B)

**2.4.14. PQGEO**

Configures parameters of Geo-fence. It can also get Geo-fence setting and query the Geo-fence ID status of current position.

**Type:**

Set/Get/Query/Output.

**Synopsis:**

```
//Set/Get/Query Command:
$PQGEO,<Type>,<GEO_ID>,<Mode>,<Shape>,<Lat0>,<Lon0>,<Lat1/Radius>,<Lon1>,<Lat2>,<Lon2>,<Lat3>,<Lon3>*<Checksum><CR><LF>
//Output Message:
$PQGEO,<GEO_ID>,<Action>,<FixStatus>,<UTC&Time>,<Lat>,<Lon>,<MSL_Alt>,<SOG>,<COG>,<Fix Mode>,<Res1>,<HDOP>,<PDOP>,<VDOP>,<Res2>,<GPS_SV>,<GPS_SatUsed>,*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command Q = Query Command When <Type> is <b>R</b> or <b>Q</b> , other parameters can be omitted except <GEO_ID>.
<GEO_ID>	Numeric	-	Geo-fence ID. Range: 0-9
<Mode>	Numeric	-	URC Report mode. 0 = Disable URC to be reported when entering or leave the Geo-fence 1 = Enable URC to be reported when entering the Geo-fence 2 = Enable URC to be reported when leaving the Geo-fence 3 = Enable URC to be reported when entering or leaving the Geo-fence If <Mode> is 0, the parameters after <Mode> can be omitted.
<Shape>	Numeric	-	Fence shape. 0 = Circularity with center and radius 1 = Circularity with center and one point on the circle 2 = Triangle 3 = Quadrangle
<Lat0>	±dd.dddddd	Degree	The latitude of a point which is defined as the center of the Geo-fence circular region or the first point. Range: -90.000000–90.000000 (variable length, 4 to 6 digits)
<Lon0>	±ddd.dddddd	Degree	The longitude of a point which is defined as the center of the Geo-fence circular region or the first point. Range: -180.000000–180.000000 (variable length, 4 to 6 digits)
<Lat1/Radius>	±dd.dddddd	Meter/ Degree	When <Shape> is 0, this parameter is radius. Range: 0-6000000.0 When <Shape> is other values, this parameter is latitude1. Range: -90.000000–90.000000 (variable length, 4 to 6 digits) If <Shape> is 0, the parameters after <Lat1/radius> must be omitted.
<Lon1>	±ddd.dddddd	Degree	The longitude of the second point. Range: -180.000000–180.000000 (variable length, 4 to

			6 digits) If <b>&lt;Shape&gt;</b> is 1, the parameters after <b>&lt;Lon1&gt;</b> must be omitted.
<b>&lt;Lat2&gt;</b>	±dd.dddddd	Degree	The latitude of the third point. Range: -90.000000–90.000000 (variable length, 4 to 6 digits)
<b>&lt;Lon2&gt;</b>	±ddd.dddddd,	Degree	The longitude of the third point. Range: -180.000000–180.000000 (variable length, 4 to 6 digits) If <b>&lt;Shape&gt;</b> is 2, the parameters after <b>&lt;Lon2&gt;</b> must be omitted.
<b>&lt;Lat3&gt;</b>	±dd.dddddd	Degree	The latitude of fourth point. Range: -90.000000–90.000000 (variable length, 4 to 6 digits)
<b>&lt;Lon3&gt;</b>	±ddd.dddddd	Degree	The longitude of fourth point. Range: -180.000000–180.000000 (variable length, 4 to 6 digits)
<b>&lt;Status&gt;</b>	Numeric	-	The status of current position. 0 = Unknown position 1 = Inside the Geo-fence 2 = Outside the Geo-fence
<b>&lt;GEO_ID&gt;</b>	Numeric	-	Geo-fence ID. Range: 0–9
<b>&lt;Action&gt;</b>	Numeric	-	The current action of the module. 1 = Entering the Geo-fence 2 = Leaving the Geo-fence
<b>&lt;FixStatus&gt;</b>	Numeric	-	Fix status. 0 = No fix 1 = 2D fix 2 = 3D fix
<b>&lt;UTC&amp;Time&gt;</b>	DyyMMddThh mmss.sss	-	UTC time. D: char 'D', refers to date yy: current year–2000 MM: 1–12 dd: 1–31 T: char 'T', refers to time hh: 0–23 mm: 0–59 ss.sss: 00.000–59.9999
<b>&lt;Lat&gt;</b>	±dd.dddddd	Degree	The latitude of current position. Range: -90.000000–90.000000
<b>&lt;Lon&gt;</b>	±ddd.dddddd	Degree	The longitude of current position. Range: -180.000000–180.000000

<MSL_Alt>	Numeric	Meter	Mean sea level (MSL) altitude.
<SOG>	Numeric	km/h	Speed over ground.
<COG>	Numeric	Degree	Course over ground. Range: 0–360.00
<FixMode>	Numeric	Degree	Fix mode. 0 = No fix 1 = Estimated mode 2 = Position fixed 3 = Position fixed in DGPS mode
<Res1>	Numeric	-	Reserved1.
<HDOP>	Numeric	-	Horizontal dilution of precision.
<PDOP>	Numeric	-	Position dilution of precision.
<VDOP>	Numeric	-	Vertical dilution of precision.
<Res2>	Numeric	-	Reserved2.
<GPS_SV>	Numeric	-	GPS satellites in view.
<GPS_SatUsed>	Numeric	-	GPS satellites used.

**Result:**

1) Set:

In case of no errors:

```
$PQGEO,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQGEO,W,ERROR*<Checksum><CR><LF>
```

2) Get:

In case of no errors:

```
$PQGEO,R,<GEO_ID>,<Mode>,<Shape>,<Lat0>,<Lon0>,<Lat1/Radius>,<Lon1>,<Lat2>,<Lon2>,<Lat3>,<Lon3>*<Checksum><CR><LF>
```

In case of any error:

```
$PQGEO,R,ERROR*<Checksum><CR><LF>
```

3) Query:

In case of no errors:

```
$PQGEO,Q,<GEO_ID>,<Status>*<Checksum><CR><LF>
```

In case of any error:

```
$PQGEO,Q,ERROR*<Checksum><CR><LF>
```

### Example:

```
//Enable the Gen-fence 0 to report when entering the circularity with center and radius:
$PQGEO,W,0,1,0,31.85913,117.1933,500.0*26
//Set successfully:
$PQGEO,W,OK*1F
//Disable the Gen-fence 4 to report when entering or leaving the circularity with center and one point on
the circle:
$PQGEO,W,4,3,1,31.91133,117.1129,31.994856,117.070281*1C
//Set successfully:
$PQGEO,W,OK*1F
//Set the Geo-fence 3 not report when entering or leaving the Geo-fence:
$PQGEO,W,3,0*34
//Set successfully:
$PQGEO,W,OK*1F

//Get the Geo-fence 0 settings:
$PQGEO,R,0*2E
//Get successfully:
$PQGEO,R,0,1,0,31.859130,117.193300,500.0*13
//Get the Geo-fence 4 settings:
$PQGEO,R,4*2A
//Get successfully:
$PQGEO,R,4,3,1,31.911330,117.112900,31.994856,117.070281*29

//Query the Geo-fence 0 status of current position:
$PQGEO,Q,0*2D
//Query successfully:
$PQGEO,Q,0,1*30
//Query the Geo-fence 4 status of current position:
$PQGEO,Q,4*29
//Query successfully:
```

```
$PQGEO,Q,4,2*37
```

//Output Message:

```
$PQGEO,0,1,2,D150506T070127.000,31.856038,117.197110,49.4,14.92,0.18,2,,1.11,2.95,2.74,,14,9*5
D
```

**NOTE**

1. If **<Mode>** is 0 and no parameters follow **<Mode>**, this command can delete the Geo-fence.
2. If **<Mode>** is 1 (or 2), when the module enters (or leaves) the Geo-fence, the pin 17 (RESERVED) level will change from high to low; when the module leaves (or enters) the Geo-fence, the pin 17 (RESERVED) level will change from low to high or keep unchanged. If **<Mode>** is 0 or 3, the pin 17 (RESERVED) level will always keep high. Geo-fence function is only supported on L76 module and the **<GEO\_ID>** must be 0.
3. **\$PQGEO,R,10\*1F** command can query parameters of all Geo-fences.
4. The command takes effect immediately after setting, and the parameters will be automatically saved into flash.
5. Input the latitude and longitude in sequence in clockwise or counter-clockwise order.

### 2.4.15. PQPREC

Configures the parameter (latitude/longitude/altitude) in NMEA sentences through setting the number of digits after the decimal point.

**Type:**

Set/Get.

**Synopsis:**

```
$PQPREC,<Type>,<Lat_Bits>,<Lon_Bits>[,<Alt_Bits>],<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <b>&lt;Type&gt;</b> is <b>R</b> , other parameters can be omitted.
<Lat_Bits>	Numeric	-	The number of digits after the decimal point of latitude in NMEA sentences. Range: 4–6 Default value: 4
<Lon_Bits>	Numeric	-	The number of digits after the decimal point of longitude in

			NMEA sentences. Range: 4–6 Default value: 4
<Alt_Bits>	Numeric	-	The number of digits after the decimal point of altitude and geoidal separation in NMEA sentences. This parameter can be omitted. Range: 1–3 Default value: 1
<Save>	Numeric	-	Saving operation. 0 = Configuration is not saved, and is invalid after restart 1 = Configuration is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQPREC,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQPREC,W,ERROR*<Checksum><CR><LF>
```

2) Get:

```
$PQPREC,R,<Lat_Bits>,<Lon_Bits>,<Alt_Bits>*<Checksum><CR><LF>
```

**Example:**

```
//Set the number of digits after the decimal point of latitude and longitude to 5, and altitude to 2, then save the parameter into flash:
```

```
$PQPREC,W,5,5,2,1*7D
```

```
//Set successfully:
```

```
$PQPREC,W,OK*56
```

```
//The following parameters in bold are variables:
```

```
$xxRMC,030037.000,A,3150.77801,N,11711.95112,E,0.00,37.74,070816,,A*xx
```

```
$xxGGA,030037.000,3150.77801,N,11711.95112,E,1,6,1.66,96.54,M,0.01,M,,*xx
```

```
$xxGLL,3150.77801,N,11711.95112,E,030037.000,A,A*xx
```

```
//Get parameter precision setting in NMEA sentences:
```

```
$PQPREC,R*7B
```

```
//Get successfully:
```

```
$PQPREC,R,5,5,2*65
```

**NOTE**

1. The command takes effect immediately after setting.
2. This command is not supported on L70 and L80.

### 2.4.16. PQGBS

The message enables/disables the output of GBS sentence which is used to support receiver autonomous integrity monitoring (RAIM).

**Type:**

Set/Get.

**Synopsis:**

```
$PQGBS,<Type>,<Mode>,<Save>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<Type>	String	-	W = Set Command R = Get Command When <b>&lt;Type&gt;</b> is <b>R</b> , other parameters can be omitted.
<Mode>	Numeric	-	Enable/disable GBS sentence output. 0 = Disable GBS sentence output 1 = Enable GBS sentence output
<Save>	Numeric	-	Saving operation. 0 = Parameter is not saved, and is invalid after restart 1 = Parameter is saved in flash, and is valid after restart

**Result:**

1) Set:

In case of no errors:

```
$PQGBS,W,OK*<Checksum><CR><LF>
```

In case of any error:

```
$PQGBS,W,ERROR*<Checksum><CR><LF>
```



2) Get:

```
$PQGBS,R,<Mode>*<Checksum><CR><LF>
```

**Example:**

```
//Enable GBS sentence output and save into flash:
```

```
$PQGBS,W,1,1*2C
```

```
//Set successfully:
```

```
$PQGBS,W,OK*04
```

```
//Get the mode:
```

```
$PQGBS,R*29
```

```
//Get successfully. GBS sentence output is enabled:
```

```
$PQGBS,R,1*34
```

**NOTE**

3. The command takes effect immediately after setting.
4. This command is not supported on L70 and L80.

# 3 Appendix A References

## 3.1. Related Documents

Table 4: Related Documents

Document Name
[1] <a href="#">Quectel L26 EVB User Guide</a>
[2] <a href="#">Quectel L26 Hardware Design</a>
[3] Quectel_L26_Reference_Design
[4] <a href="#">Quectel L76 Series EVB User Guide</a>
[5] <a href="#">Quectel L76&amp;L76-L Hardware Design</a>
[6] Quectel_L76_Series_Reference_Design
[7] <a href="#">Quectel L80&amp;L80-R&amp;L86&amp;LC86L EVB User Guide</a>
[8] <a href="#">Quectel L86 Hardware Design</a>
[9] Quectel_L80&L86&LC86L_Reference_Design
[10] <a href="#">Quectel L96 EVB User Guide</a>
[11] <a href="#">Quectel L96 Hardware Design</a>
[12] Quectel_L96_Reference_Design
[13] <a href="#">Quectel L26-LB EVB User Guide</a>
[14] <a href="#">Quectel L26-LB Hardware Design</a>
[15] Quectel_L26-LB_Reference_Design
[16] <a href="#">Quectel L76-LB Hardware Design</a>

- [17] [Quectel\\_L76-LB\\_Reference\\_Design](#)
- [18] [Quectel\\_LC86L\\_Hardware\\_Design](#)
- [19] [Quectel\\_LG77L\\_EVB\\_User\\_Guide](#)
- [20] [Quectel\\_LG77L\\_Hardware\\_Design](#)
- [21] [Quectel\\_LG77L\\_Reference\\_Design](#)
- [22] [Quectel\\_GNSS\\_Low\\_Power\\_Mode\\_Application\\_Note](#)

### 3.2. Terms and Abbreviations

**Table 5: Terms and Abbreviations**

Abbreviation	Description
1PPS	1 Pulse Per Second
2D	2 Dimension
3D	3 Dimension
ACK	Acknowledgement
AGNSS	Assisted GNSS
AIC	Active Interference Cancellation
DEE	Dynamic Ephemeris Extension
DGPS	Differential Global Positioning System
DOP	Dilution of Precision
EASY™	Embedded Assist System
ECEF	Earth-centered, Earth-fixed
EGNOS	European Geostationary Navigation Overlay Service
EPE	Estimated Position Error
EPO	Extended Prediction Orbit

---

FLP	Fitness Low Power
GAGAN	GPS-aided GEO Augmented Navigation
GBS	GNSS Satellite Fault Detection
GGA	Global Positioning System Fix Data
GLL	Geographic Position – Latitude/Longitude
GLONASS	Global Navigation Satellite System (The Russian GNSS)
GLP	GNSS Low Power
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
MSL	Mean Sea Level
NMEA	National Marine Electronics Association
NVM	Non-volatile Memory
ODO	Odometer
PDOP	Position Dilution of Precision
PMTK	Proprietary Protocol of MTK
PPS	Pulse Per Second
PZ90	Parametry Zemli 1990
QZSS	Quasi-Zenith Satellite System
RAIM	Receiver Autonomous Integrity Monitoring
RLM	Return Link Message
RMC	Recommended Minimum Specific GNSS Data

---

---

RTC	Real-time Clock
RTCM	Radio Technical Commission for Maritime Services
RTK	Real-Time Kinematic
SBAS	Satellite-Based Augmentation System
SNR	Signal-to-noise Ratio
SV	Satellites in View
TXT	Text Transmission
URC	Unsolicited Result Code
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

---

# 4 Appendix B GNSS Numbering

**Table 6: GNSS Numbering**

GNSS Type	System ID	Satellite ID	Signal ID
GPS	1	1–32	1 = L1 C/A
GLONASS	2	65–99	1 = G1 C/A
Galileo	3	1–36	6 = L1
BeiDou	4	1–36	1 = B1I
QZSS	5	193–202	1 = L1 C/A
SBAS	-	33–64	-