

# LG69T (AM) GNSS Protocol Specification

**GNSS Module Series**

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# About the Document

## Document Information

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# 1 Introduction

Quectel LG69T (AM) GNSS module supports GPS, Galileo, and BeiDou constellation. Concurrent tracking of GPS L1 C/A, GPS L5, Galileo E1, Galileo E5a, BeiDou B1 and BeiDou B2a frequency bands provides fast and accurate acquisition and makes this module 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 module configuration. The software commands are NMEA proprietary commands defined by Quectel (PQTM commands). To report GNSS information, the module supports output messages in NMEA 0183 standard protocol format.

**NOTE**

Only use the commands listed in this document. Quectel assumes no responsibility if other commands are used.

# 2 NMEA Protocol

## 2.1. Structure of NMEA Protocol Messages

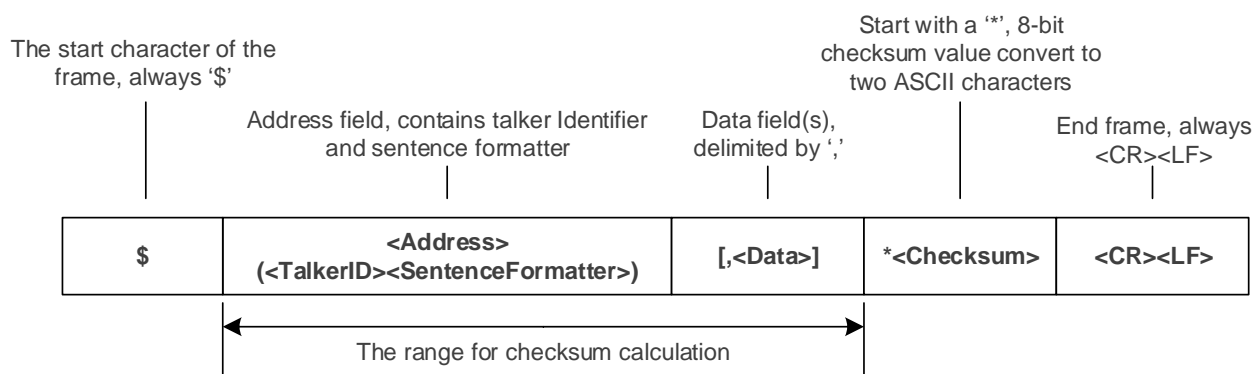


Figure 1: Structure of NMEA Protocol Messages

Table 1: 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 2: 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 2: NMEA Talker ID**

GNSS Constellation Configuration	TalkerID (NMEA V4.11)
GPS	GP
Galileo	GA
BeiDou	GB
Combination of Multiple Satellite Systems.	GN

## 2.2. Standard Messages

This chapter explains the NMEA 0183 V4.11 standard messages supported by LG69T (AM).

### 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>,<ModelInd>,<NavStatus>*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
RMC	String, 3 characters	-	RMC	Recommended Minimum Specific

				GNSS Data.
<UTC>	hhmmss.sss	-	071403.000	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.mmmmmmm	-	3149.3044284	Latitude: dd: Degrees (00–90) mm: Minutes (00–59) mmmmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction: N = North S = South
<Lon>	dddmm.mmmmmmm	-	11706.9136063	Longitude: ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction: E = East W = West
<SOG>	Numeric	Knot	0.037	Speed over ground. Variable length.
<COG>	Numeric	Degree	-	Course over ground. Variable length. Maximum value: 359.9. Note that this field is empty in case of an invalid value.
<Date>	ddmmyy	-	230620	Date: dd: Day of month mm: Month yy: Year
<MagVar>	-	-	-	Magnetic variation. Not supported.

<MagVarDir>	-	-	-	The direction of magnetic variation. Not supported.
<ModeInd>	Character	-	A	<p>Mode indicator:</p> <p>A = Autonomous mode. Satellite system used in non-differential mode in position fix.</p> <p>D = Differential mode. Satellite system used in differential mode in position fix. Corrections from ground stations or Satellite Based Augmentation System (SBAS).</p> <p>E = Estimated (dead reckoning) mode.</p> <p>F = Float RTK. Satellite system used in RTK mode with floating integers.</p> <p>M = Manual input mode.</p> <p>N = No fix. Satellite system not used in position fix, or fix not valid.</p> <p>R = Real Time Kinematic (RTK). Satellite system used in RTK mode with fixed integers.</p>
<NavStatus>	Character	-	V	<p>Navigational status. Not supported. Always "V" (Navigational status not valid). (NMEA V4.11)</p>
<Checksum>	Hexadecimal	-	*2F	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNRMC,071403.000,A,3149.3044284,N,11706.9136063,E,0.037,,230620,,,A,V*2F
```

**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
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
GGA	String, 3 characters	-	GGA	Global Positioning System Fix Data.
<UTC>	hhmmss.sss	-	083947.000	Position fix UTC: hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Lat>	ddmm.mmmmmmm	-	3149.3222721	Latitude: dd: Degrees (00–90) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction: N = North S = South
<Lon>	dddmm.mmmmmmm	-	11706.9133530	Longitude: ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction: E = East W = West
<Quality>	Numeric, 1 digit	-	1	GPS quality indicator: 0 = Fix not available or invalid 1 = GPS SPS Mode, fix valid 2 = Differential GPS, SPS Mode, or Satellite Based Augmentation System (SBAS), fix valid 3 = GPS PPS Mode, fix valid

				4 = Real Time Kinematic (RTK). System used in RTK mode with fixed integers 5 = Float RTK. Satellite system used in RTK mode, floating integers 6 = Estimated (dead reckoning) mode
<NumSatUsed> <sup>1)</sup>	Numeric, 2 digits	-	06	Number of satellites in use.
<HDOP>	Numeric	-	14.319	Horizontal dilution of precision.
<Alt>	Numeric	Meter	55.7897	Altitude above mean-sea-level (geoid).
M	Character	-	M	-
<Sep>	Numeric	Meter	-0.3370	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).
M	Character	-	M	-
<DiffAge>	-	-	-	Differential GPS data age. Not supported.
<DiffStation>	-	-	-	Differential reference station ID. Not supported.
<Checksum>	Hexadecimal	-	*55	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNGGA,083947.000,3149.3222721,N,11706.9133530,E,1,06,14.319,55.7897,M,-0.3370,M,,*55
```

**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.

**2.2.3. GNS**

GNSS Fix Data. Fix data for single or combined satellite navigation systems (GNSS).

**Type:**

Output.

**Synopsis:**

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

**Parameter:**

Field	Format	Unit	Example	Description
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
GNS	String, 3 characters	-	GNS	GNSS Fix Data.
<UTC>	hhmmss.sss	-	044227.000	Position UTC: hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Lat>	ddmm.mmmmmmm	-	3149.3319989	Latitude: dd: Degrees (00–90) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction: N = North S = South
<Lon>	dddmm.mmmmmmm	-	11706.9120458	Longitude: ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction: E = East

				W = West
<ModeInd> <sup>1)</sup>	Character	-	ANAAN	<p>Mode indicator:</p> <p>A = Autonomous mode. Satellite system used in non-differential mode in position fix.</p> <p>D = Differential mode. Satellite system used in differential mode in position fix. Corrections from ground stations or Satellite Based Augmentation System (SBAS).</p> <p>E = Estimated (dead reckoning) mode.</p> <p>F = Float RTK. Satellite system used in RTK mode with floating integers.</p> <p>M = Manual input mode.</p> <p>N = No fix. Satellite system not used in position fix, or fix not valid.</p> <p>R = Real Time Kinematic (RTK). Satellite system used in RTK mode with fixed integers.</p>
<NumSatUsed>	Numeric	-	16	Total number of satellites in use. Range: 00–99.
<HDOP>	Numeric	-	0.815	Horizontal dilution of precision. Maximum value: 99.0.
<Alt>	Numeric	Meter	56.5767	Antenna altitude above the mean sea level (geoid).
<Sep>	Numeric	Meter	-0.3371	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).
<DiffAge>	-	-	-	Age of differential GPS data. Not supported.
<DiffStation>	-	-	-	Differential reference station ID. Not supported.
<NavStatus>	Character	-	-	<p>Navigational status indicator. Not supported.</p> <p>Always “V” (Navigational status not valid).</p>

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

**Example:**

```
$GNGNS,044227.000,3149.3319989,N,11706.9120458,E,ANAAN,16,0.815,56.5767,-0.3371,,,V*79
```

**NOTE**

<sup>1)</sup> <ModelInd> is a field type of variable length. The first character indicates the use of GPS satellites, the second character indicates the use of GLONASS satellites, the third character indicates the use of Galileo satellites, the fourth character indicates the use of BeiDou satellites, and the fifth character indicates the use of QZSS satellites.

**2.2.4. 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
<TalkerID>	String, 2 characters	-	\$GP	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
GSV	String, 3 characters	-	GSV	GNSS Satellites in View.
<TotalNumSen>	Numeric	-	1	Total number of sentences. Range: 1–9.
<SenNum>	Numeric	-	1	Sentence number. Range: 1–TotalNumSen.
<TotalNumSat>	Numeric	-	3	Total number of satellites in view. Maximum value: 32.



Start of repeat block. Repeat times: 1–4.				
<SatID>	Numeric	-	12	Satellite ID. See <a href="#">Table 4: GNSS Numbering</a> .
<SatElev>	Numeric	Degree	24	Satellite elevation. Range: 00–90.
<SatAz>	Numeric	Degree	310	Satellite azimuth, with true north as the reference plane. Range: 000–359.
<SatCN0>	Numeric	dB-Hz	43	Satellite C/No. Range 00–99. Null when not tracking.
End of repeat block.				
<SignalID>	Numeric	-	1	GNSS signal ID. See <a href="#">Table 4: GNSS Numbering</a> .
<Checksum>	Hexadecimal	-	*6A	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GPGSV,1,1,3,2,39,296,42,5,22,219,45,12,24,310,43,1*6A
$GPGSV,1,1,3,2,39,296,,5,22,219,,12,24,310,,*5B
$GAGSV,1,1,3,201,30,280,44,221,29,220,44,226,47,317,37,7*44
$GAGSV,1,1,3,201,30,280,23,221,29,220,29,226,47,317,30,1*4F
```

**2.2.5. GSA**

GNSS DOP and Active Satellites. GNSS receiver operating mode, satellites used in the navigation solution reported by the GGA or GNS 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
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: 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	-	5	ID numbers of satellites used in solution. See <a href="#">Table 4: GNSS Numbering</a> .
End of repeat block.				
<PDOP>	Numeric	-	3.418	Position dilution of precision. Maximum value: 99.0.
<HDOP>	Numeric	-	2.866	Horizontal dilution of precision. Maximum value: 99.0.
<VDOP>	Numeric	-	1.864	Vertical dilution of precision. Maximum value: 99.0.
<SystemID>	Numeric	-	1	GNSS system ID. See <a href="#">Table 4: GNSS Numbering</a> .
<Checksum>	Hexadecimal	-	*3A	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNGSA,A,3,2,5,12,,,,,,,,,3.418,2.866,1.864,1*3A
$GNGSA,A,3,105,110,113,122,126,,,,,,,,,3.418,2.866,1.864,4*08
```

**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.

**2.2.6. 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
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID</a> .
VTG	String, 3 characters	-	VTG	Course Over Ground & Ground Speed.
<COGT>	Numeric	Degrees	-	Course over ground, in true north course direction. Not supported.
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	0.008	Speed over ground in knots.
N	Character	-	N	Speed over ground (knots, fixed field).
<SOGK>	Numeric	km/h	0.015	Speed over ground in kilometers per hour.
K	Character	-	K	Speed over ground. (kilometers per hour, fixed field)
<ModeInd>	Character	-	A	Positioning system 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	-	-	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNVTG,T,M,0.008,N,0.015,K,A*31
```

**2.2.7. 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
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID</a> .
GLL	String, 3 characters	-	GLL	Geographic Position – Latitude/Longitude.
<Lat>	ddmm.mmmmmmm	-	3149.3319989	Latitude: dd: Degrees (00–90) mm: Minutes (00–59) mmmmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<N/S>	Character	-	N	Latitude direction: N = North S = South
<Lon>	dddmm.mmmmmmm	-	11706.9120458	Longitude: ddd: Degrees (000–180) mm: Minutes (00–59) mmmmmmmm: Decimal fraction of minutes Note that this field is empty in case of an invalid value.
<E/W>	Character	-	E	Longitude direction: E = East W = West

<UTC>	hhmmss.sss	-	044227.000	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	-	A	Positioning system 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	-	*4D	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNGLL,3149.3319989,N,11706.9120458,E,044227.000,A,A*4D
```

## 2.3. Attitude Messages

### 2.3.1. VEL

Reports carrier velocity results.

**Type:**

Output

**Synopsis:**

```
$<TalkerID>VEL,<UTC>,<Vel3D_Ind>,<N_Vel>,<E_Vel>,<D_Vel>,*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
VEL	String, 3 characters	-	VEL	Reporting carrier velocity results.
<UTC>	hhmmss.sss	-	044227.000	Position fix UTC: hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<Vel3D_Ind>	Numeric	-	1	3D velocity indicator. 0 = Invalid. 1 = Valid.
<N_Vel>	Numeric	m/s	0.001	North direction velocity.
<E_Vel>	Numeric	m/s	0.004	East direction velocity.
<D_Vel>	Numeric	m/s	-0.027	Down direction velocity.
<Checksum>	Hexadecimal	-	*51	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNVEL,044227.000,1,0.001,0.004,-0.027*51
```

**2.3.2. STD**

Reports carrier position, velocity, and attitude standard deviations.

**Type:**

Output

**Synopsis:**

```
$<TalkerID>STD,<UTC>,<PosInd>,<STD_Lat>,<STD_Lon>,<STD_Alt>,<STD_N_Vel>,<STD_E_Vel>,<STD_D_Vel>,<STD_Roll>,<STD_Pitch>,<STD_COG>,*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Example	Description
<TalkerID>	String, 2 characters	-	\$GN	Talker identifier. See <a href="#">Table 2: NMEA Talker ID.</a>
STD	String, 3 characters	-	STD	Reporting carrier position, velocity, and attitude standard deviations.
<UTC>	hhmmss.sss	-	044227.000	Position fix UTC: hh: Hours (00–23) mm: Minutes (00–59) ss: Seconds (00–59) sss: Decimal fraction of seconds
<PosInd>	Numeric	-	1	Position indicator. 0 = Fix not available or invalid 1 = GNSS SPS Mode, fix valid 2 = Differential GNSS, SPS Mode, fix valid 4 = Real Time Kinematic. System used in RTK mode with fixed integers 5 = Float RTK. Satellite system used in RTK mode, floating integers
<STD_Lat>	Numeric	Meter	0.654	Standard deviation of latitude error.
<STD_Lon>	Numeric	Meter	0.308	Standard deviation of longitude error.
<STD_Alt>	Numeric	Meter	1.358	Standard deviation of altitude error.
<STD_N_Vel>	Numeric	m/s	0.032	Standard deviation of north direction velocity error.
<STD_E_Vel>	Numeric	m/s	0.014	Standard deviation of east direction velocity error.
<STD_D_Vel>	Numeric	m/s	0.068	Standard deviation of down direction velocity error.
<STD_Roll>	Numeric	Degree	-	Standard deviation of roll over ground. Not supported.
<STD_Pitch>	Numeric	Degree	-	Standard deviation of pitch over ground. Not supported.
<STD_COG>	Numeric	Degree	403.303	Standard deviation of course over ground. Note that this field is empty in case of an invalid value.

<Checksum>	Hexadecimal	-	*6E	Checksum.
<CR><LF>	Character	-	-	Carriage return and line feed.

**Example:**

```
$GNSTD,044227.000,1,0.654,0.308,1.358,0.032,0.014,0.068,,,403.303*6E
```

## 2.4. PQTM Messages

This chapter explains the PQTM messages (proprietary NMEA messages defined by Quectel) supported by LG69T (AM).

### 2.4.1. PQTMCOLD

Performs a cold start.

**Type:**

Command.

**Synopsis:**

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

**Parameter:**

None.

**Result:**

Cold start initialization and GNSS engine restart.

**Example:**

```
$PQTMCOLD*1C
```

### 2.4.2. PQTMWARM

Performs a warm start.

**Type:**

Command.



**Synopsis:**

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

**Parameter:**

None.

**Result:**

Warm start initialization and GNSS engine restart.

**Example:**

```
$PQTMWARM*11
```

**2.4.3. PQTMHOT**

Performs a hot start.

**Type:**

Command.

**Synopsis:**

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

**Parameter:**

None.

**Result:**

Hot start initialization and GNSS engine restart.

**Example:**

```
$PQTMHOT*4B
```

**2.4.4. PQTMSRR**

Executes a system reset. The GNSS firmware will be rebooted.

**Type:**

Command

**Synopsis:**

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

**Parameter:**

None.

**Result:**

The GNSS firmware is rebooted and no message is sent as a reply.

**Example:**

```
$PQTMSRR*4B
```

**2.4.5. PQTMCFGPORT**

Sets or gets the UART port configuration.

**Type:**

Set/get.

**Synopsis:**

```
$PQTMCFGPORT,<RW>,<PortType>,<ProtocolType>[,<BaudRate>]*<Checksum><CR><LF>
```

**Parameter:**

Field	Format	Unit	Description
<RW>	Decimal, 1 digit	-	0 = Read current configuration 1 = Configure the communication port
<PortType>	Decimal, 1 digit	-	0 = UART1 1 = UART2
<ProtocolType>	Decimal	-	Bit 0 = NMEA command input Bit 1 = NMEA message output Bit 2 = RTCM output
<BaudRate>	Decimal	bps	The baud rate of UART port. 115200 230400 460800 (default) 921600

**Example:**

```
$PQTMCFGPORT,0,0*43
```

```
$PQTMPORT,0,0,3,460800*38
$PQTMCFGPORT,1,0,1,460800*79
$PQTMCFGPORTOK*47
```

**NOTE**

If <RW>=0, the parameters after <PortType> will be omitted. If <RW>=1, the parameters after <PortType> shall be specified.

### 2.4.6. PQTMSAVEPAR

Saves configurations of GNSS commands into NVM.

**Type:**

Command

**Synopsis:**

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

**Parameter:**

None.

**Result:**

- In case of no errors, the returned message is:

```
$PQTMSAVEPAROK*5E
```

- In case of any error, the returned message is:

```
$PQTMSAVEPARERROR*02
```

**Example:**

```
$PQTMSAVEPAR*5A
$PQTMSAVEPAROK*5E
```

### 2.4.7. PQTMRESTOREPAR

Restores all configurations to default values.

**Type:**

Command

**Synopsis:**

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

**Parameter:**

None.

**Result:**

- In case of no errors, the returned message is:

```
$PQTMRESTOREPAROK*17
```

- In case of any error, the returned message is:

```
$PQTMRESTOREPARERROR*4B
```

**Example:**

```
$PQTMRESTOREPAR*13  
$PQTMRESTOREPAROK*17
```

# 3 Appendix A References

**Table 3: Terms and Abbreviations**

Abbreviation	Description
2D	2 Dimension
3D	3 Dimension
BeiDou	BeiDou Navigation Satellite System
COG	Course over Ground
COGM	Course over Ground (in Magnetic North Course Direction)
COGT	Course over Ground (in True North Course Direction)
DGPS	Differential Global Positioning System
DOP	Dilution of Precision
Galileo	Galileo Satellite Navigation System (EU)
GGA	Global Positioning System Fix Data
GLL	Geographic Position - Latitude and Longitude
GLONASS	Global Navigation Satellite System (Russian)
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input/Output
GPS	Global Positioning System
GSA	GNSS DOP and Active Satellites
GSV	GNSS Satellites in View
HDOP	Horizontal Dilution of Precision
IRNSS	Indian Regional Navigation Satellite System

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NavIC	Navigation with Indian Constellation
NMEA	National Marine Electronics Association
NVM	Non-Volatile Memory
PDOP	Position Dilution of Precision
PPS	Pulse Per Second
QZSS	Quasi-Zenith Satellite System
RMC	Recommended Minimum Specific GNSS Data
RTK	Real-Time Kinematic
SBAS	Satellite-Based Augmentation System
SNR	Signal to Noise Ratio
SPS	Standard Positioning Service
UTC	Universal Time Coordinated
VDOP	Vertical Dilution of Precision
VEL	Velocity
VTG	Course Over Ground & Ground Speed
WGS84	World Geodetic System 1984

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# 4 Appendix B GNSS Numbering

Table 4: GNSS Numbering

GNSS Type	System ID	Satellite ID	Signal ID
GPS	1	1–32	1 = L1 C/A 8 = L5-Q
Galileo	3	201–236	1 = E5a 6 = E1
BeiDou	4	101–136	1 = B1I 5 = B2a

# 5 Appendix C Default Configurations

**Table 5: Default Configurations**

Item	Default Configuration
NMEA port baud rate	460800 bps
Datum	WGS84
Rate of position fixing	1 Hz
DGPS mode	OFF
NMEA output messages	RMC, GGA, GNS, GSV, GSA, VTG and GLL
GNSS Configuration	GPS + Galileo + BeiDou