SL869 V2 SW User Guide

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Making machines talk.

APPLICABILITY TABLE

PRODUCT
SL869 V2

SW Version
0433.004

SPECIFICATIONS SUBJECT TO CHANGE WITHOUT NOTICE

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Contents

1. Introduction

1.1. Scope

This document describes the serial communications interface between the SL869 V2

GPS/GLONASS, GPS/Beidou receiver module firmware and Host Processor software.

1.2. Audience

This document is intended for public distribution to potential customers who are evaluating the SL869 V2 GPS/GLONASS, GPS/Beidou module. It can also be used by customers who are developing application software for the Host Processor in a device that incorporates the SL869 V2.

1.3. Contact Information, Support

For general contact, technical support, to report documentation errors and to order manuals, contact Telit Technical Support Center (TTSC) at:

TS-EMEA@telit.com
TS-NORTHAMERICA@telit.com
TS-LATINAMERICA@telit.com
TS-APAC@telit.com

Alternatively, use:

http://www.telit.com/en/products/technical-support-center/contact.php

For detailed information about where you can buy the Telit modules or for recommendations on accessories and components visit:

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To register for product news and announcements or for product questions contact Telit Technical Support Center (TTSC).

Our aim is to make this guide as helpful as possible. Keep us informed of your comments and suggestions for improvements.

Telit appreciates feedback from the users of our information.

1.4. Document Organization

This document contains the following chapters:

Chapter 1: "Introduction" provides a scope for this document, target audience, contact and support information, and text conventions.

Chapter 2: "Communication Interface" gives an overview of the serial communications interface and describes general characteristics of input commands and output messages.

Chapter 3: "Commands Description" describes in detail each of the input commands for the SL869 V2.

Chapter 4: "Messages Description" describes in detail each of the output messages produced by the SL869 V2.

Chapter 5: "Document History" provides of the changes made to this User Guide.

1.5. Text Conventions

Danger – This information MUST be followed or catastrophic equipment failure or bodily injury may occur.

Caution or Warning – Alerts the user to important points about integrating the module, if these points are not followed, the module and end user equipment may fail or malfunction.

Tip or Information – Provides advice and suggestions that may be useful when integrating the module.

All dates are in ISO 8601 format, i.e. YYYY-MM-DD.

1.6. Related Documents

- SL869 V2 Product Description, 80433ST10605A
- SL869 V2 Hardware User Guide, 1VV0301124

2. Communication Interface

The serial communication interface between the SL869 V2 receiver module and the Host processor is based on the NMEA-0183 protocol standard specified by the National Marine Electronics Association (NMEA). This is an ASCII-based standard that is widely used in the GPS industry for serial communication with GPS receivers.

2.1. UART

Serial communication with the SL869 V2 is primarily conducted over the UART port, which is assigned to Pins 20 (Tx) and 21 (Rx). There is no hardware flow control. The default port settings are:

- 9600 Baud
- Eight data bits
- No parity bits
- One stop bit

Note that manual user interaction with the SL869 V2 can be achieved using a PC terminal emulator.

2.2. NMEA Characteristics

This subsection highlights characteristics of the NMEA-0183 protocol as they pertain to the SL869 V2 interface.

Start And Termination
An NMEA data packet is transmitted as an ASCII string beginning with a "$" character, but it is terminated with <carriage return> <line feed> character sequence.

Proprietary Packets
Proprietary data packets are allowed by the NMEA protocol standard. They begin with "$" followed by a Manufacturer's Mnemonic Code that is assigned by the NMEA. The SL869 V2 module is based on the MT3333 device from Mediatek Inc, who has been assigned the code "PMTK." Therefore, proprietary packets used by the SL869 V2 begin with the character sequence "$PMTK."

Checksums
The NMEA standard specifies a two-character checksum field that follows a '*" delimiting character placed at the end of the ASCII data string. The checksum is calculated as the 8-bit exclusive-OR (XOR) of all characters in the string, excluding the "$" and "*' delimiters.

Packet Length
The NMEA standard specifies a maximum number of characters for each data packet, 255 bytes.

2.3. Commands

Commands are sent from the Host Processor to the SL869 V2 and have the basic structure illustrated below:

```
[command-ID][PktType][DataField]*[CHK1][CHK2]<cr><lf>
```

Parameters, if present, are delimited by "," characters as per the NMEA protocol. All SL869 V2 commands are proprietary and therefore all command-ID's begin with the "$PMTK" character sequence.

In most cases, the SL869 V2 will echo the command back out to the Host Processor after the command has been executed. Commands that are not echoed are indicated in the detailed commands descriptions later in this Guide.

NOTE:

An easy way to send commands to the SL869 V2 manually is to write the command to a text file and use the "send text file" function of the terminal emulator. When doing so, make sure that the <cr><lf> characters are transmitted at the end of the command.

2.4. Messages

Messages are sent from the SL869 V2 to the Host Processor and have the basic structure illustrated below:

```
message-ID,<PktType,data1,…,dataN>*<checksum><cr><lf>
```

Individual data fields are delimited by "," characters. The checksum is provided for purposes of bit error detection by the Host if desired.

The SL869 V2 outputs certain standard messages as defined in the NMEA-0183 protocol standard. The message-ID for standard messages begins with an NMEA message ID: "$GP" indicating GPS, "$GL" indicating GLONASS, "$BD" indicating Beidou, and "$GN" indicating global navigation.

The SL869 V2 also outputs proprietary messages. As with commands, proprietary message-IDs begin with "$PMTK." Note that some proprietary messages are responses to input commands.

3. Commands Description

The table below summarizes the set of commands for the SL869 V2:

Command ID	Packet name	Description
$PMTK000	PMTK_TEST	Test
$PMTK001	PMTK_ACK	Acknowledge of packet
$PMTK010	PMTK_SYS_MSG	Output system status message
$PMTK101	PMTK_CMD_HOT_START	Perform a HOT restart
$PMTK102	PMTK_CMD_WARM_START	Perform a WARM restart
$PMTK103	PMTK_CMD_COLD_START	Perform a COLD start
$PMTK104	PMTK_CMD_FULL_COLD_START	Perform a Full COLD start
$PMTK161	PMTK_CMD_STANDBY_MODE	Enter standby mode
$PMTK120	PMTK_CMD_CLEAR_FLASH_AID	Erasing aiding data stored in the flashmemory
$PMTK127	PMTK_CMD_CLEAR_EPO	Erasing EPO data storageed in the flash memory
$PMTK220	PMTK_SET_POS_FIX	Position fix interval
$PMTK223	PMTK_SET_AL_DEE_CFG	Position fix configuration
$PMTK225	PMTK_SET_PERIODIC_MODE	Periodic power saving mode settings
$PMTK251	PMTK_SET_NMEA_BAUDRATE	Set NMEA baud rate
$PMTK286	PMTK_SET_AIC_CMD	Active interference cancellation function
$PMTK300	PMTK_ API_SET_FIX_CTL	Set fix interval
$PMTK301	PMTK_API_SET_DGPS_MODE	DGPS correction data source mode
$PMTK313	PMTK_API_SET_SBAS_ENABLED	Set SBAS enabled/disabled
$PMTK314	PMTK_API_SET_NMEA_OUTPUT	Set NMEA output
$PMTK330	PMTK_API_SET_DATUM	Set default datum
$PMTK331	PMTK_API_SET_DATUM_ADVANCE	Set user defined datum
$PMTK335	PMTK_API_SET_RTC_TIME	Set RTC UTC time
$PMTK351	PMTK_API_SET_SUPPORT_QZSS_NMEA	Support new NMEA format for QZSS
$PMTK352	PMTK_API_SET_STOP_QZSS	Enable or disable QZSS funcrion
$PMTK353	PMTK_API_SET_GNSS_SEARCH_MODE	NVRAM data is valid
$PMTK355	PMTK_API_QUERY_GNSS_SEARCH_MODE	Beidou, Glonass and Galileo searching setting
$PMTK356	PMTK_API_SET_HDOP_THRESHOLD	Set the HDOP threshold
$PMTK357	PMTK_API_GET_HDOP_THRESHOLD	Get the HDOP threshold

$PMTK386	PMTK_ API_SET_STATIC_NAV_THD	Set the speed threshold
$PMTK389	PMTK_API_SET_TCXO_DEBUG	Set the TCXO clock
$PMTK400	PMTK_API_Q_FIX_CTL	API query fix control
$PMTK401	PMTK_API_Q_DGPS_MODE	API query DGPS mode
$PMTK413	PMTK_API_Q_SBAS_ENABLED	Query SBAS enabled
$PMTK414	PMTK_API_Q_NMEA_OUTPUT	Query NMEA output
$PMTK430	PMTK_API_Q_DATUM	API query datum
$PMTK431	PMTK_API_Q_DATUM_ADVANCE	API query datum advance
$PMTK500	PMTK_DT_FIX_CTL	Parameters control position fix activity
$PMTK501	PMTK_DT_DGPS_MODE	Set DGPS data source
$PMTK513	PMTK_DT_SBAS_ENABLED	Set SBAS enabled/disabled
$PMTK514	PMTK_DT_NMEA_OUTPUT	Set NMEA output
$PMTK530	PMTK_DT_DATUM	Current datum used
$PMTK605	PMTK_Q_RELEASEE	Query the firmware release information
$PMTK607	PMTK_Q_EPO_INFO	EOP data valid day check
$PMTK667	PMTK_Q_UTC_CORRECTION_DATA	UTC correction data

Unless otherwise noted in the following subsections, commands are echoed by the SL869 V2 after the command is executed.

3.1. $PMTK000 (PMTK_TEST)

Packet Meaning:

Test Packet.

Data Field:

None

Example:

$PMTK000*32<CR><LF>

3.2. $PMTK001 (PMTK_ACK)

Packet Meaning:

Acknowledge Packet

Data Field:

PktType: The packet type the acknowledge responds.

Flag: ‘0’ = Invalid packet.

‘1’ = Unsupported packet type

‘2’ = Valid packet, but action failed

‘3’ = Valid packet, and action succeeded

Example:

$PMTK001,101,0*33<CR><LF>

3.3. $PMTK010 (PMTK_SYS_MSG)

Packet Meaning:

Output system message

Data Field:

Msg: The system message.

‘0’: UNKNOWN

‘1’: STARTUP

:

Example:

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

3.4. $PMTK101 (PMTK_CMD_HOT_START)

Packet Meaning:

Hot Restart: Use all available data in the NV Store.

Data Field:

None

Example:

$PMTK101*32<CR><LF>

3.5. $PMTK102 (PMTK_CMD_WARM_START)

Packet Meaning:

Warm Restart: Don't use Ephemeris at re-start.

Data Field:

None

Example:

$PMTK102*31<CR><LF>

3.6. $PMTK103 (PMTK_CMD_COLD_START)

Packet Meaning:

Cold Restart: Don't use Time, Position, Almanacs and Ephemeris data at re-start.

Data Field:

None

Example:

$PMTK103*30<CR><LF>

3.7. $PMTK104 (PMTK_CMD_FULL_COLD_START)

Packet Meaning:

Full Cold Restart: It's essentially a Cold Restart, but additionally clear system/user configurations at re-start. That is, reset the receiver to the factory status.

Data Field:

None

Example:

$PMTK104*37<CR><LF>

3.8. $PMTK161 (PMTK_CMD_STANDBY_MODE)

Packet Meaning:

Leave and enter standby mode by PMTK command.

Data Field:

PMTK161,Mode

Example:

$PMTK161,1*29<CR><LF>

3.9. $PMTK120 (PMTK_CMD_CLEAR_FLASH_AID)

Packet Meaning:

Erasing aiding data stored in the flash memory.

Data Field:

None

Example:

$PMTK120*31<CR><LF>

3.10. $PMTK127 (PMTK_CMD_CLEAR_EPO)

Packet Meaning:

Erase EPO data stored in the flash memory

Data Field:

None

Example:

$PMTK127*36<CR><LF>

3.11. $PMTK220 (PMTK_SET_POS_FIX)

Packet Meaning:

Position Fix interval

Data Field:

Interval: Position Fix interval [ms]. Must be larger than 200.

Example:

$PMTK220,1000*1F<CR><LF>

3.12. $PMTK223 (PMTK_SET_AL_DEE_CFG)

Packet Meaning:

Data Field:

$PMTK223, SV, SNR, Extension threshold, Extension gap

Default value: SV = 1 [Range 1~4]

Default value: SNR = 30 [Range 25~30]

Default value: Extension threshold = 180000msec [Range 40000~180000]

Default value: Extension gap = 6000msec [Range 0~3600000]

3.13. $PMTK225 (PMTK_SET_PERIODIC_MODE)

Packet Meaning:

Periodic Power Saving mode settings

Data Field:

$PMTK225,Type, Run time, Sleep time, Second run time, Second sleep time

Example:

3.14. $PMTK251 (PMTK_SET_NMEA_BAUDRATE)

Packet Meaning:

Set NMEA port baud rate

Data Field:

Baud rate:

0- default
4800
9600
14400
19200
38400
57600
115200
230400
460800
921600

Example:

$PMTK251,38400*27<CR><LF> / baud rate: 38400

$PMTK251,0*28<CR><LF> / system default setting

3.15. $PMTK286 (PMTK_SET_AIC_CMD)

Packet Meaning:

Enable or Disable active interference cancellation function.

Data Field:

PMTK286,Enable

Enable: Enable or Disable
‘0’ = Disable
‘1’ = Enable

Example:

$PMTK286,1*23<CR><LF>

3.16. $PMTK300 (PMTK_API_SET_FIX_CTL)

Packet Meaning:

Set fix interval

Data Field:

PMTK300,FixiInterval,0,0,0,0

Fix Interval: Position fix interval [msec] [Range: 100~10000]

Example:

$PMTK300,1000,0,0,0,0*2F<CR><LF> Set fix interval 1000msec

$PMTK001,300,3*2C<CR><LF> Return

3.17. $PMTK301 (PMTK_API_SET_DGPS_MODE)

Packet Meaning:

API_Set_DGPS_Mode

DGPS correction data source mode.

Data Field:

PMTK301,Mode

Mode: DGPS data source mode.

‘0’: No DGPS source

‘1’: RTCM

‘2’: WAAS

Example:

$PMTK301,1*2D<CR><LF>

3.18. $PMTK313 (PMTK_API_SET_SBAS_ENABLED)

Packet Meaning:

API_Set_SBAS_Enabled

Enable to search a SBAS satellite or not.

Data Field:

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example:

$PMTK313,1*2E<CR><LF>

3.19. $PMTK314 (PMTK_API_SET_NMEA_OUTPUT)

Packet Meaning:

API_Set_NMEA_Out

Set NMEA sentence output frequencies.

Data Field:

There are totally 19 data fields that present output frequencies for the 19 supported NMEA Sentences individually.

Supported NMEA Sentences

0 NMEA_SEN_GLL, // GPGLL interval - Geographic Position - Latitude longitude

1 NMEA_SEN_RMC, // GPRMC interval - Recommended Minimum Specific GNSS Sentence

2 NMEA_SEN_VTG, // GPVTG interval - Course Over Ground and Ground Speed

3 NMEA_SEN_GGA, // GPGGA interval - GPS Fix Data

4 NMEA_SEN_GSA, // GPGSA interval - GNSS DOPS and Active Satellites

5 NMEA_SEN_GSV, // GPGSV interval - GNSS Satellites in View

17 NMEA_SEN_ZDA, // GPZDA interval – Time & Date

Supported Frequency Setting

0 - Disabled or not supported sentence

1 - Output once every one position fix

2 - Output once every two position fixes

3 - Output once every three position fixes

4 - Output once every four position fixes

5 - Output once every five position fixes

Example:

$PMTK314,1,1,1,1,1,5,0,0,0,0,0,0,0,0,0,0,0,1,0*2D<CR><LF>

This command set GLL output frequency to be outputting once every 1 position fix, and RMC to be outputting once every 1 position fix, and so on.

You can also restore the system default setting via issue:

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

3.20. $PMTK330 (PMTK_API_SET_DATUM)

Packet Meaning:

API_Set_Datum

Set default datum.

Data Field:

PMTK330,Datum

Datum: 0:WGS84
1:TOKYO-M
2:TOKYO-A

Support 219 different datum's.

Example:

$PMTK330,0*2E<CR><LF>

3.21. $PMTK331 (PMTK_API_SET_DATUM_ADVANCE)

Packet Meaning:

Set user defined datum.

Data Field:

PMTK331,majA,eec,dX,dY,dZ

majA: User defined datum semi-major axis [m]

ecc: User defined datumeccentric [m]

dX: User defined datum to WGC84 X axis offset [m]

dY: User defined datum to WGC84 Y axis offset [m]

dZ: User defined datum to WGC84 Z axis offset [m]

Example:

$PMTK331,6377397.155,299.1528128,-148.0,507.0.685.0*16<CR><LF>

3.22. $PMTK335 (PMTK_API_SET_RTC_TIME)

Packet Meaning:

API+Set_RTC_Time

Data Field:

PMTK335,Tear,Month,Day,Hour,Min,Sec

Year: Year

Month: 1~12

Day: 1~31

Hour: 0~23

Min: 0~59

Sec: 0~59

Example:

$PMTK335,2014,1,1,0,0,0,*02<CR><LF>

3.23. $PMTK351 (PMTK_API_SET_SUPPORT_QZSS_NMEA)

Packet Meaning:

The receiver support new NMEA format for QZSS

Data Field:

PMTK351,Enabled

Enabled: ‘0’ Disable

‘1’ Enable

Example:

$PMTK351,0*29<CR><LF> : Disable QZSS NMEA format

$PMTK351,1*28<CR><LF> : Enable QZSS NMEA format

3.24. $PMTK352 (PMTK_API_SET_STOP_QZSS)

Packet Meaning:

Since QZSS is regional positioning service.

Default is enable QZSS function.

Data Field:

PMTK352,Enabled

Enabled: ‘0’ Enable

‘1’ Disable

Example:

$PMTK352,0*2B<CR><LF> : Enable QZSS function

$PMTK352,1*2A<CR><LF> : Disable QZSS function

3.25. $PMTK353 (PMTK_API_SET_GNSS_SEARCH_MODE)

Packet Meaning:

This command is used to configure the receive to start searching of which satellite system.

Data Field:

PMTK353,GPS_Enable, GLONASS_Enable,GALILEO_Enable,GALILEO_FULL_Enable, BEIDOU_Enable

GPS_Enabled:	‘0’: disable (do not search GPS)
	‘1’: or non-ZERO: search GPS
GLONASS_Enabled:	‘0’: disable (do not search GLONASS)
	‘1’: or non-ZERO: search GPLONASS
GALILEO_Enabled:	‘0’: disable (do not search GALILEO)
	‘1’: or non-ZERO: search GALILEO
GALILEO_FULL_Enabled:	‘0’: disable (do not search GALILEO_FULL mode)
	‘1’: or non-ZERO: search GALILEO
BEIDOU_Enabled:	‘0’: disable (do not search BEIDOU)
	‘1’: or non-ZERO: search BEIDOU

Example:

$PMTK353,0,1,0,0,0*2A : search GLONASS only

$PMTK353,1,0,0,0,0*2A : search GPS only

$PMTK353,1,1,0,0,0*2B : search GPS+GLONASS

$PMTK353,1,1,1,0,0*2A : search GPS+GLONASS+GALILEO

$PMTK353,0,0,0,0,1*2A : search BEIDOU only

$PMTK353,1,0,0,0,1*2A : search GPS+BEIDOU

3.26. $PMTK355 (PMTK_API_QUERY_GNSS_SEARCH_MODE)

Packet Meaning:

This command is to get GLONASS, BEIDOU and GALILEO search setting.

Data Field:

None

Example:

$PMTK355*31

Return $PMTK001,355,3,0,1,0

"$PMTK355,3, GLONASS_Enable,BEIDOU_Enable,GALILEO_Enable"

The BEIDOU search mode is enabled.

3.27. $PMTK356 (PMTK_API_SET_HDOP_THRESHOLD)

Packet Meaning:

This command is to set the HDOP threshold.

Data Field:

PMTK356,HDOPThreshold Set OK!

HDOPThreshold:'0': Disable this function

Other value: Enable set the HDOP Threshold.

Example:

$PMTK356,0.8

Return $PMTK356,0.8 Set OK!*5F

3.28. $PMTK357 (PMTK_API_GET_HDOP_THRESHOLD)

Packet Meaning:

This command is to get the HDOP threshold.

Data Field:

PMTK357,HDOPThreshol

HDOPThreshold:'0': Disable this function

Other value: Enable.

Example:

$PMTK357

Return $PMTK357,0.8*39

3.29. $PMTK386 (PMTK_API_SET_STATIC_NAV_THD)

Packet Meaning:

Data Field:

PMTK356,speed_threshold

Speed_threshold: 0~2m/s

The minimum is 0.1m/s, the maximum is 2.0m/s

Example:

$PMTK386,0.4*19<CR><LF>

Return $PMTK356,0.8 Set OK!*5F

Set the static threshold for static navigation.

3.30. $PMTK389 (PMTK_API_SET_TCXO_DEBUG)

Packet Meaning:

Set the switch of showing TCXO clock drift at every fix

Data Field:

PMTK389,on_off

0=off

1=on

(turn on $PMTK589 output at every fix)

Example:

$PMTK389,1*2D<CR><LF>

3.31. $PMTK400 (PMTK_API_Q_FIX_CTL)

Packet Meaning:

API_Query_Fix_Ctrl

Data Field:

None

Return:

PMTK_DT_FIX_CTL

Example:

$PMTK400*36<CR><LF>

3.32. $PMTK401 (PMTK_API_Q_DGPS_MODE)

Packet Meaning:

API_Query_DGPS_Mode

Data Field:

None

Return:

PMTK_DT_DGPS_MODE

Example

$PMTK401*37<CR><LF>

3.33. $PMTK413 (PMTK_API_Q_SBAS_ENABLED)

Packet Meaning:

API_Query_SBAS_Enabled

Data Field:

None

Return:

PMTK_DT_SBAS_ENABLED

Example:

$PMTK413*34<CR><LF>

3.34. $PMTK414 (PMTK_API_Q_NMEA_OUTPUT)

Packet Meaning:

API_Query_NMEA_Out

Query current NMEA sentence output frequencies.

Data Field:

None

Return:

PMTK_DT_NMEA_OUTPUT

Example:

$PMTK414*33<CR><LF>

3.35. $PMTK430 (PMTK_API_Q_DATUM)

Packet Meaning:

API_Query_Datum

Query default datum

Data Field:

None

Return:

PMTK_DT_DATUM

Example:

$PMTK430*35<CR><LF>

3.36. $PMTK431 (PMTK_API_Q_DATUM_ADVANCE)

Packet Meaning:

API_Query_Datum _Advance

Query user sefined datum

Data Field:

None

Return:

PMTK_DT_DATUM

Example:

$PMTK431*34<CR><LF>

3.37. $PMTK500 (PMTK_DT_FIX_CTL)

Packet Meaning:

These parameters control the rate od position fixing activity.

Data Field:

Fixinterval: Position fix interval (msec)

Example:

$PMTK500,1000,0,0,0,0*1A<CR><LF>

3.38. $PMTK501 (PMTK_DT_DGPS_MODE)

Packet Meaning

DGPS Data Source Mode

Data Field:

Mode: DGPS data source mode

'0': No DGPS source

'1': RTCM

'2': WAAS

Example:

$PMTK501,1*2B<CR><LF>

3.39. $PMTK513 (PMTK_DT_SBAS_ENABLED)

Packet Meaning:

Enable to search a SBAS satellite or not.

Data Field:

Enabled: Enable or disable

'0' = Disable

'1' = Enable

Example:

$PMTK513,1*28<CR><LF>

3.40. $PMTK514 (PMTK_DT_NMEA_OUTPUT)

Packet Meaning:

NMEA sentence output frequency setting

Data Field:

There are totally 19 data fields that present output frequencies for the 19 supported NMEA Sentences individually.

Please refer to PMTK_API_SET_NMEA_OUTPUT for the Supported NMEA Sentences and Frequency Setting.

Example:

$PMTK514,1,1,1,1,1,5,1,1,1,1,1,1,0,1,1,1,1*2A<CR><LF>

3.41. $PMTK530 (PMTK_DT_DATUM)

Packet Meaning:

Current datum used.

Data Field:

PMTK530,Datum

Datum: 0: WGS84

1: TOKYO-M

2:TOKYO-A

Example:

$PMTK530,0*28<CR><LF>

3.42. $PMTK605 (PMTK_Q_RELEASE)

Packet Meaning:

Query the firmware release information.

Data Field:

None

Return:

PMTK_DT_RELEASE

Example:

$PMTK605*31<CR><LF>

3.43. $PMTK607 (PMTK_Q_EPO_INFO)

Packet Meaning:

EPO Data Valid day checkQuery the firmware release information.

Data Field:

$PMTK607

Example:

$PMTK607*33<CR><LF>

3.44. $PMTK667 (PMTK_Q_UTC_CORRECTION_DATA)

Packet Meaning:

UTC correction data.

Data Field:

$PMTK667,A0,A1,dtLS,Tot,WNt,WNLSF,DN,dt,SF*CS <CR><LF>

Name	Unit	Description
PMTK667		Reference UTC correction
A0	Seconds	UTC parameter A0
A1	Seconds	UTC parameter A1
dtLS	Seconds	UTC time difference due to leap seconds before event
Tot	Seconds	UTC reference time of week
WNt	Weeks	UTC reference week number
WNLSF	Weeks	UTC week number when net leap second event occurs
DN	Days	UTC day of week when net leap second event occurs
dtLSF	Seconds	UTC time difference due to leap seconds after event
CS		Checksum

Example:

$PMTK667,1.881_06,0606_m0138,0000*52<CR><LF>

Return:

$PMTK667,0,0,16,507904,237,237,3,17*08<CR><LF>

4. Messages Description

The table below summarizes the messages that are output periodically by the SL869 V2:

Message ID	Description
$--GGA	NMEA: GNSS fix data. Time, position and fix related data for GNSS receiver.
$--GSA	NMEA: GNSS Dilution of Precision (DOP) and active satellites
$--GSV	NMEA: GNSS satellites in view.
$--RMC	NMEA: Recommended minimum specific GNSS data
$--VTG	NMEA: Course and speed information relative to the ground.

Typically the “GP” message ID reports GPS, “GL” message ID reports GLONASS satellites, “BD” message ID reports BEIDOU satellites, “GN” message ID reports multiple GNSS satellites.

All messages in the above table are output once per second. There are multiple GSA and GSV messages output each second.

In addition to periodic messages, the SL869 V2 outputs a single $GPTXT message at start-up.

4.1. --GGA

This message contains time, position, and fix status data.

Format:

```
$--GGA,<Timestamp>,<Lat>,<N/S>,<Long>,<E/W>,<GPSQual>,<Sats>,
<HDOP>,<Alt>,M,<GEOSep>,M,<DGPSAge>,<DGPSRef>
*<checksum><cr><lf>
```

Parameter	Format	Description
Timestamp	hhmmss.sss	UTC time of position fix (HoursMinutesSeconds.Millisecs)
Lat	DDMM.MMMM	Latitude (DegreesMinutes.FractionalMinute)
N/S	'N' or 'S'	Latitude direction (North or South)
Lon	DDDMM.MMMM	Longitude (DegreesMinutes.FractionalMinute)
E/W	'E' or 'W'	Longitude direction (East or West)
GPSQual	Decimal, 1 digit	0 – Invalid 1 – Valid GNSS fix 2 – Valid differential GNSS fix
Sats	ss – Decimal, 2 digits	Number of GNSS satellites in use
HDOP	HH.H	Horizontal Dilution of Precision, maximum of 99.0
Alt	+/-AAA.AA	Height above WGS-84 ellipsoid in meters, maximum of 999.99
GEOSep	+/-aa.a	Difference between mean sea level (MSL) altitude and WGS-84 ellipsoid, in meters. Leading '-' indicates MSL below ellipsoid surface.
DGPSAge		Age of RTCM Type 1 or 9 corrections. Not populated.
DGPSRef		Differential reference station ID. Not populated.

Example:

```
$GPGGA,194829.000,3309.1073,N,09638.0012,W,1,15,0.7,182.64,M,
-24.2,M,,*59
```

4.2. --GSA

This message reports Dilution of Precision (DOP) values and the PRN codes of the active satellites used in the position fix.

Format:
`$--GSA,<Mode1>,<Mode2>,[<SatPRN1>],...,[<SatPRNn>],<PDOP>,<HDOP>,<VDOP>*<checksum><cr><lf>`

Parameter	Format	Description
Mode1	"M" or "A"	M – Manual, forced to operate in 3D mode A – Automatic, allowed to switch between 2D and 3D mode
Mode2	Decimal, 1 digit	1 – No fix available 1 – 2D fix 2 – 3D fix
SatPRN1… SatPRNn	Decimal, 2 digits	List of GPS satellite PRN codes, or list of GLONASS satellite PRN codes, used in the position fix.
PDOP	PP.P	Position Dilution of Precision, maximum of 99.0
HDOP	HH.H	Horizontal Dilution of Precision, maximum of 99.0
VDOP	VV.V	Vertical Dilution of Precision, maximum of 99.0

Example:
```
$GNGSA,A,3,25,11,01,18,12,32,31,22,14,30,,,1.2,0.7,0.9*28
$GNGSA,A,3,65,66,76,75,72,,,,,,,,1.2,0.7,0.9*24
```

4.3. --GSV

This message reports the azimuth, elevation, and signal-to-noise (SNR) values for all satellites in view. These messages are output each second, one having the "GP" message ID and containing the visible GPS satellites, the other having the "GL" message ID and containing the visible GLONASS satellites, "BD" message ID and containing the visible BEIDOU satellites.

Each message is transmitted as multiple sentences, with four satellites maximum per sentence, and each sentence having the format below.

Format:

```
$--GSV,<GSVAmount>,<GSVNumber>,<TotSats>,[<Sat1PRN>,<Sat1Elev>,
<Sat1Azim>,<Sat1C/N0>], ...[<SatNPRN>,<SatNElev>,<SatNAzim>,
<SatNC/N0>]*<checksum><cr><lf>
```

Parameter	Format	Description
GSVAmount	Decimal, 1 digit	Total amount of GSV sentences in this message, maximum of 4
GSVNumber	Decimal, 1 digit	Number of the specific GSV sentence within the message
TotSats	nn – Decimal, 2 digits	Total number of GPS or GLONASS satellites in view
Sat1PRN	ss – Decimal, 2 digits	PRN of first satellite.
Sat1Elev	ee – Decimal, 2 digits	Elevation of first satellite in degrees, 0 to 90
Sat1Azim	aaa – Decimal, 3 digits	Azimuth of first satellite in degrees, 0 to 359
Sat1C/N0	cc – Decimal, 2 digits	Carrier to Noise ration of first satellite in dB-Hz
…		
SatNPRN	ss – Decimal, 2 digits	PRN of Nth satellite (maximum N is 4)
SatNElev	ee – Decimal, 2 digits	Elevation of Nth satellite in degrees, 0 to 90
SatNAzim	aaa – Decimal, 3 digits	Azimuth of Nth satellite in degrees, 0 to 359
SatNC/N0	cc – Decimal, 2 digits	Carrier to Noise ration of Nth satellite in dB-Hz

Example:

```
$GPGSV,3,1,11,01,23,257,26,11,10,239,,14,30,079,23,16,27,175,23*7F
$GPGSV,3,2,11,20,37,311,33,22,14,146,28,23,12,294,31,25,13,040,37*7B
$GPGSV,3,3,11,30,51,156,31,31,60,026,37,32,65,305,24,,,,*48
$GLGSV,2,1,06,66,77,110,32,76,49,021,31,65,22,140,25,67,45,333,25*69
$GLGSV,2,2,06,78,18,227,,77,65,257,17,,,,,,,,*67
```

4.4. --RMC

This message contains position, velocity, and time and date information for the current fix.

Format:
`$--RMC,<Timestamp>,<Status>,<Lat>,<N/S>,<Long>,<E/W>,<Speed>,<Course>,<Date>,<MagVar>,<MagVarDir>,<Mode>*<checksum><cr><lf>`

Parameter	Format	Description
Timestamp	hhmmss.sss	UTC time of position fix (HoursMinutesSeconds.Millisecs)
Status	"A" or "V"	A – Data valid V – Navigation warning
Lat	DDMM.MMMM	Latitude (DegreesMinutes.FractionalMinute)
N/S	'N' or 'S'	Latitude direction (North or South)
Lon	DDDMM.MMMM	Longitude (DegreesMinutes.FractionalMinute)
E/W	'E' or 'W'	Longitude direction (East or West)
Speed	sss.s	Speed over ground in knots, maximum 999.9
Course	ccc.c	Course over ground, degrees True, 0 to 359.9
Date	DDMMYY	Day of month (1 to 31), Month (1 to 12), and Year
MagVar		Magnetic variation. Not populated.
MagVarDir		Magnetic variation direction (E or W). Not populated.
Mode	'A', 'D' or 'N'	Position system mode indicator A – Autonomous mode D – Differential mode N – Position data not valid

Example:
`$GPRMC,225124.000,A,3309.1077,N,09638.0032,W,0.0,0.0,180113,,,A*79`

4.5. --VTG

This message contains the values for the following example:

Format:
`$--VTG,<Message ID>,<Course>,<Reference>,<Course>,<Reference>,`
`<Speed>,<Units>, <Speed>,<Units>,<Mode>,*<checksum><cr><lf>`

Parameter	Format	Description
Message ID	$GPVTG	VTG protocol header
Course	309.62	Measure heading
Reference	T	True
Course		Measure heading
Reference	M	Magnetic
Speed	0.13	Measure holizontal speed
Units	N	Knots
Speed	0.2	Measure holizontal speed
Units	K	Kilimeter per hour
Mode	A	A – Autonomous D – Differential E – DR
Checksum	*23	

Example:
`$GPVTG,309.62,T,,M,0.13,N,0.2,K.A,*23`

5. Document History

Revision	Date	Changes
0	2014-01-20	Initial release
1	2014-02-04	Changed the FW version, added relative new commands.