L80 GPS

Protocol Specification

GPS Module Series

Rev. L80_GPS_Protocol_Specification_V1.4

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Response: $PMTK001,285,3*3F<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	285
Type	‘0’=Disable ‘1’=After the first fix ‘2’=3D fix only ‘3’=2D/3D fix only ‘4’=Always
PPSPulseWidth	2~998 (Unit: ms)
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.20. Packet Type: 286 PMTK_SET_AIC_ENABLED

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

Data Field: $PMTK286,Enable Example: $PMTK286,0*22<CR><LF> Response: $PMTK001,286,3*3C<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	286
Enable	‘0’=Disable ‘1’=Enable

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

3.21. Packet Type: 301 PMTK_API_SET_DGPS_MODE

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

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

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

3.22. Packet Type: 313 PMTK_API_SET_SBAS_ENABLED

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

points.

Data Field: $PMTK313,Enable Example: $PMTK313,1*2E<CR><LF> Response: $PMTK001,313,3*31<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	313
Enable	‘0’=Disable ‘1’=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.23. Packet Type: 314 PMTK_API_SET_NMEA_OUTPUT

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

Supported Frequency Settings:

0–Disabled or not supported sentence
1–Output once every one position fix
2–Output once every two position fixes
3–Output once every three position fixes
4–Output once every four position fixes
5–Output once every five position fixes

Data Field: None Example: The module only output RMC once every one position fix.

$PMTK314,0,1,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0*29<CR><LF> Response: $PMTK001,314,3*36<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message
Packet Type	314
0 GLL	GLL interval–Geographic Position, Latitude and Longitude
1 RMC	RMC interval–Recommended Minimum Specific GPS Sentence
2 VTG	VTG interval–Course Over Ground and Ground Speed
3 GGA	GGA interval–GPS Fix Data
4 GSA	GSA interval–GPS DOPS and Active Satellites
5 GSV	GSV interval–GPS Satellites in View
6 Reserved	GRS interval–GPS Range Residuals
7 Reserved	GST interval–GPS Pseudorange Error Statistics
8 Reserved	Always 0
9 Reserved	Always 0
10 Reserved	Always 0
11 Reserved	Always 0
12 Reserved	Always 0
13 Reserved	Always 0
14 Reserved	Always 0
15 Reserved	Always 0
16 Reserved	Always 0
17 ZDA	ZDA interval–Time and Date
18 Reserved	PMTKCHN interval–GPS Channel Status

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

To restore the system default setting, use below message:

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

Field	Description
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	314
Restore	Always -1
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.24. Packet Type: 351 PMTK_API_SET_SUPPORT_QZSS_NMEA

The receiver support new NMEA format for QZSS. The command allow user enable or disable QZSS NMEA format. Default is disable QZSS NMEA format.

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

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

Packet Type	351
QZSS_Enable	‘0’=Disable ‘1’=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.25. Packet Type: 352 PMTK_API_SET_STOP_QZSS

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

Data Field: $PMTK352,Enable Example: $PMTK352,0*2A<CR><LF> Response: $PMTK001,352,3*34<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	352
QZSS_Enable	‘0’=Enable ‘1’=Disable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.26. Packet Type: 356 PMTK_API_SET_HDOP_THRESHOLD

This command is to set HDOP threshold. If the HDOP value is larger than this threshold value, the

position will not be fixed.

Data Field: $PMTK356, HDOP Threshold Example: $PMTK356,0.9*39<CR><LF> Response: $PMTK356,0.9 Set OK!*5E<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message
Packet Type	356
HDOP Threshold	'0': Disable this function. Other value: Enable set the HDOP threshold.
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

3.27. Packet Type: 386 PMTK_API_SET_STATIC_NAV_THD

This message is used to set the speed threshold for static navigation. If the actual speed is below the threshold, output position will keep the same and output speed will be zero. If threshold value is set to 0, this function is disabled.

Data Field: $PMTK386,Speed_threshold Example: $PMTK386,0.3*3E<CR><LF> Response: $PMTK001,386,3*3D<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message

Packet Type	386
Speed_threshold	0~2m/s
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.28. Packet Type: 400 PMTK_API_Q_FIX_CTL

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

Refer to PMTK_API_SET_FIX_CTL for setting the rate.

Refer to PMTK_DT_FIX_CTL for the result of the query.

Data Field: None Example: $PMTK400*36<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	400
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.29. Packet Type: 401 PMTK_API_Q_DGPS_MODE

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

Refer to PMTK_API_SET_DGPS_MODE for setting the DGPS mode.

Refer to PMTK_DT_DGPS_MODE for the result of the query.

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

3.30. Packet Type: 413 PMTK_API_Q_SBAS_ENABLED

This message is used to query the setting of SBAS.

Refer to PMTK_API_SET_SBAS_ENABLE for SBAS setting.

Refer to PMTK_DT_SBAS_ENABLED for the result of the query.

Data Field: None Example: $PMTK413*34<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message
Packet Type	413
*	End character of data field
Checksum	Hexadecimal checksum

<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.31. Packet Type: 414 PMTK_API_Q_NMEA_OUTPUT

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

Refer to PMTK_API_SET_NMEA_OUTPUT for the frequencies setting.

Refer to PMTK_DT_NMEA_OUTPUT for the result of the query.

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

3.32. Packet Type: 605 PMTK_Q_RELEASE

This message is used to query the firmware release information.

Refer to PMTK_DT_RELEASE for the result of the query.

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

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

3.33. Packet Type: 500 PMTK_DT_FIX_CTL

This message is the response to PMTK_API_Q_FIX_CTL.

Data Field: $PMTK500,Fix interval Example: $PMTK500,1000,0,0,0,0*1A<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	500
Fix Interval	Position fix interval [msec]. [Range: 100~10000]
Reserved	Always 0
Reserved	Always 0
Reserved	Always 0
Reserved	Always 0
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.34. Packet Type: 501 PMTK_DT_DGPS_MODE

This message is the response to PMTK_API_Q_DGPS_MODE.

Data Field: $PMTK501,Mode Example: $PMTK501,1*2B<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message
Packet Type	501
Mode	DGPS data source mode. '0'=No DGPS source '1'=RTCM '2'=SBAS
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with 'CR' and 'LF'

3.35. Packet Type: 513 PMTK_DT_SBAS_ENABLED

This message is the response to PMTK_API_Q_SBAS_ENABLED.

Data Field: $PMTK513,Enable Example: $PMTK513,1*28<CR><LF>	
Field	**Description**
$	Each NMEA message starts with '$'
PMTK	MTK proprietary message
Packet Type	513

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

3.36. Packet Type: 514 PMTK_DT_NMEA_OUTPUT

This message is the response to PMTK_API_Q_NMEA_OUTPUT.

Data Field: None Example: $PMTK514,1,1,1,1,1,1,0,0,0,0,0,0,0,0,0,0,0,0,0*2E<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	514
0 GLL	GLL interval–Geographic Position, Latitude and Longitude
1 RMC	RMC interval–Recommended Minimum Specific GPS Sentence
2 VTG	VTG interval–Course Over Ground and Ground Speed
3 GGA	GGA interval–GPS Fix Data
4 GSA	GSA interval–GPS DOPS and Active Satellites
5 GSV	GSV interval–GPS Satellites in View
6 Reserved	GRS interval–GPS Range Residuals
7 Reserved	GST interval–GPS Pseudorange Error Statistics
8 Reserved	
9 Reserved	

10 Reserved	
11 Reserved	
12 Reserved	
13 Reserved	
14 Reserved	
15 Reserved	
16 Reserved	
17 ZDA	ZDA interval–Time and Date
18 Reserved	Always 0
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.37. Packet Type: 705 PMTK_DT_RELEASE

This message is the response to PMTK_Q_RELEASE.

Data Field: $PMTK705, Release string, Build ID, Product Model (,SDK Version) Example: $PMTK705,AXN_2.5_3339_15080600,0004,QUECTEL-L80,1.0*0C<CR><LF>	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	705
Release String	Firmware release name and version 3318: Mcore_x.x 3329: AXN_x.x 3339: AXN_x.x

Build ID	Build ID set in CoreBuilder for firmware version control
Product Model	Product Model set in CoreBuilder for product identification
SDK Version (Optional)	Showing SDK version if the firmware is used for SDK
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.38. Packet Type: 869 PMTK_EASY_ENABLE

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

Data Field:
$PMTK869,CmdType[,Enabled]
Example:
$PMTK869,1,1*35<CR><LF>
Response:
$PMTK001,869,3*37<CR><LF>

Field	Description
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	869
CmdType	‘0’=Query ‘1’=Set ‘2’=Result for Query operation
Enabled	‘0’=Disable ‘1’=Enable
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

3.39. Packet Type: 875 PMTK_PMTKLSC_STN_OUTPUT

This message is used to enable or disable PMTKLSC Sentence ouput. And it also can be used to query if PMTKLSC Sentence ouput enabled or disabled.

Data Field:
$PMTK875,CmdType[,Enabled]
Example:
$PMTK875,1,1*38<CR><LF>: Enable PMTKLSC Sentence output
Response:
$PMTKLSC,Parameter1,Parameter2,Parameter3*CS
Where Parameter1: current leap second
Parameter2: leap indicator, 1 means updated from broadcast data
Parameter3: next leap second

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

3.40. Packet Type: 886 PMTK_FR_MODE

This message is used to set navigation mode.

Data Field:
$PMTK886,CmdType
Example:
$PMTK886,3*2B<CR><LF>

Response: $PMTK001,886,3*36	
Field	**Description**
$	Each NMEA message starts with ‘$’
PMTK	MTK proprietary message
Packet Type	886
CmdType	‘0’=Normal mode: For general purpose ‘1’=Fitness mode: For running and walking purpose that the low-speed (<5m/s) movement will have more effect on the position calculation. ‘2’=Aviation mode: For high-dynamic purpose that the large-acceleration movement will have more effect on the position calculation. ‘3’=Balloon mode: For high-altitude balloon purpose that the vertical movement will have more effect on the position calculation.
*	End character of data field
Checksum	Hexadecimal checksum
<CR><LF>	Each NMEA message ends with ‘CR’ and ‘LF’

4 Default Configurations

Table 3: Default Configurations

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

5 Appendix A References

Table 4: Related Documents

SN	Document Name	Remark
[1]	Quectel_L80_Hardware_Design	L80 Hardware Design
[2]	Quectel_L80_EVB_User Guide	L80 EVB User Guide
[3]	Quectel_L80_Reference_Design	L80 Reference Design
[4]	Quectel_GNSS_SDK_Commands_Manual	GNSS SDK Commands Manual

Table 5: Terms and Abbreviations

Abbreviation	Description
AGPS	Assisted Global Positioning System
AIC	Active Interference Cancellation
DGPS	Differential Global Positioning System
EASY	Embedded Assist System
GGA	NMEA: Global Positioning System Fix Data
GLL	NMEA: Geographic Latitude and Longitude
GPS	Global Navigation Satellite System
GSA	NMEA: GPS DOP and Active Satellites
GSV	NMEA: GPS Satellites in View
HDOP	Horizontal Dilution of Precision
NMEA	National Marine Electronics Association
PDOP	Position Dilution of Precision

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