

GNSS Low Power Mode

Application Note

GNSS Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2015-08-21	Connie ZHOU	Initial
2.0	2016-05-16	Ziv LIAO	<ol style="list-style-type: none">1. Changed the document name from Fitness_Low_Power_Application_Note to GNSS_Low_Power_Mode_Application_Note2. Added GLP mode

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1 Introduction

Low power mode is an optimized solution for wearable fitness and tracking devices. It provides fitness low power (FLP) mode for Quectel GPS only modules and GNSS low power (GLP) mode for Quectel multi-GNSS modules to reduce power consumption with tiny accuracy trading-off. The low power mode can be easily set by using a specific message.

In low power mode, the module has good route consistence in walking and running scenarios, and can switch dynamic duty operation automatically. It will come back to normal mode in difficult environment to keep good accuracy as well, thus realizing maximum performance with the lowest power consumption.

This document is applicable to Quectel GNSS modules.

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2 Power Consumption

The average current in FLP/GLP mode is down to 5mA/7.3mA in static receiving, which is about 40% of normal mode. The power consumption may increase a little bit in dynamic scenario. The average current in different open sky scenarios in FLP/GLP mode and normal mode is shown in the table below.

Table 1: Average Current in FLP Mode and Normal Mode (L70 Module)

Scenario	In FLP Mode (mA)	In Normal Mode (mA)
Static	5.0	12
Walking	5.4	12
Running	5.5	12
Driving	8.5	12

Table 2: Average Current in GLP Mode and Normal Mode (L76 Module)

Scenario	In GLP Mode (mA)	In Normal Mode (mA)
Static	7.3	18
Walking	9.2	18
Running	9.4	18
Driving	17.6	18

3 Quectel NMEA Packet Protocol

This chapter introduces the Quectel NMEA packet protocol which is a set of extension messages of the standard NMEA packet protocol. These messages are used to control the module to enable or disable FLP/GLP mode. The following table shows the structure of a Quectel NMEA packet.

3.1 Quectel NMEA Packet Format

Preamble	TalkerID	PktType	DataField	*	CHK1	CHK2	CR	LF
----------	----------	---------	-----------	---	------	------	----	----

*The maximum length of each packet is restricted to 255 bytes.

Packet Contents:

- **Preamble:** One byte character: '\$'
- **TalkerID:** Two bytes character string: "PQ"
- **PktType:** 1-10 bytes character string. An identifier used to tell the decoder how to decode the packet.
- **DataField:** The DataField has variable lengths depending on the packet type. A command symbol ';' must be inserted ahead of each data field to help the decoder to process the DataField.
- *****: 1 byte character. The star symbol is used to mark the end of DataField.
- **CHK1,CHK2:** Two bytes character string. CHK1 and CHK2 are the checksum of the data between Preamble and '*'.
- **<CR><LF>:** Each NMEA message ends with 'CR' and 'LF'.

3.2 Packet Type: PQBAUD Set NMEA Port Baudrate

PQBAUD Set NMEA Port Baudrate

Write Command

\$PQBAUD,W,<baudrate>*Checksum
m<CR><LF>

Response

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

If error:

	\$PQBAUD,W,ERROR*Checksum<CR><LF>
Reference	

Parameter

<baudrate>	NMEA port baudrate Could be set to 4800, 9600,14400,19200, 38400, 57600, 115200
------------	--

Example

```
$PQBAUD,W,115200*43 //Set NMEA port baudrate as 115200
$PQBAUD,W,OK*40 //Set successfully
```

NOTES

1. The command will be effective immediately after setting.
2. Parameter is automatically saved.

3.3 Packet Type: PQFLP Set the Module into FLP Mode

PQFLP Set the Module into FLP Mode	
Write Command \$PQFLP,W,<mode>,<save>*Checksum m<CR><LF>	Response \$PQFLP,W,OK*Checksum<CR><LF> If error: \$PQFLP,W,ERROR*Checksum<CR><LF>
Read Command \$PQFLP,R, *Checksum<CR><LF>	Response \$PQFLP,R,<mode>*Checksum<CR><LF>
Reference	

Parameter

<mode>	Module operation mode 0 Normal mode 1 FLP mode
<save>	Save operation 0 Parameter is not saved, ineffective after restart

1 Parameter is saved in flash, effective after restart

Example

```
$PQFLP,W,1,1*20 //Switch to FLP mode
$PQFLP,W,OK*08 //Set successfully

$PQFLP,R*25 //Query the working mode
$PQFLP,R,1*38 //The module is in FLP mode
```

NOTE

The command will be effective immediately after setting.

3.4 Packet Type: PQGLP Set the Module into GLP Mode

PQGLP Set the Module into GLP Mode

Write Command	Response
\$PQGLP,W,<mode>,<save>*ChkSum<CR><LF>	\$PQGLP,W,OK*ChkSum<CR><LF>
	If error: \$PQGLP,W,ERROR*ChkSum<CR><LF>
Read Command	Response
\$PQGLP,R*ChkSum<CR><LF>	\$PQGLP,R,<mode>*ChkSum<CR><LF>
Reference	

Parameter

<mode>	Module operation mode
	0 Normal mode
	1 GLP mode
<save>	Save operation
	0 Parameter is not saved, ineffective after restart
	1 Parameter is saved in flash, effective after restart

Example

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

```
$PQGLP,R*24 // Query the working mode  
$PQGLP,R,1*39 // The module is in GLP mode
```

NOTE

The command will be effective immediately after setting.

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4 Enter into or Exit from Low Power Mode

4.1 Enter into/Exit from FLP Mode

You can follow the steps below to enter into or exit from the FLP mode:

1. Download the firmware that supports FLP mode to the module.
2. Set NMEA port baudrate to 115200. Command **\$PQBAUD,W,115200*43** can be used to set the baud rate into 115200. When the module responds **\$PQBAUD,W,OK*40**, the command is executed successfully.
3. Set the module into FLP mode. Command **\$PQFLP,W,1,1*20** is used to set the module into FLP mode. When the module responds **\$PQFLP,W,OK*08**, the command is executed successfully.
4. Wait for at least 5 minutes to allow the module to completely enter into FLP mode.
5. Make the module exit from FLP mode. Command **\$PQFLP,W,0,1*21** is used to make the module exit from FLP mode. When **\$PQFLP,W,OK*08** is returned, it means the module has exited from FLP mode successfully.

4.2 Enter into/Exit from GLP Mode

You can follow the steps below to enter into or exit from the GLP mode:

1. Download the firmware that supports GLP mode to the module.
2. Set NMEA port baudrate to 115200. Command **\$PQBAUD,W,115200*43** can be used to set the baud rate into 115200. When the module responds **\$PQBAUD,W,OK*40**, the command is executed successfully.
3. Set the module into GLP mode. Command **\$PQGLP,W,1,1*21** is used to set the module into GLP mode. When the module responds **\$PQGLP,W,OK*09**, the command is executed successfully.
4. Wait for at least 5 minutes to allow the module to completely enter into GLP mode;

5. Make the module exit from GLP mode. Command **\$PQGLP,W,0,0*21** is used to make the module exit from GLP mode. When **\$PQGLP,W,OK*09** is returned, it means the module has exited from GLP mode successfully.

NOTES

1. It is recommended that some necessary commands are set before the module enters into low power mode. If you need to send commands, please exit from low power mode first.
2. When the module enters into low power mode, 1PPS function will not be supported.
3. When the GPS only module enters into FLP mode, EASY function will be disabled. You can send command to enable EASY function after the module exits from the FLP mode.
4. When the low power mode is enabled, the SBAS will be affected.
5. High dynamic performance will have a little impact on low power mode.
6. The module supports 4800bps~115200bps baud rate and 1Hz-10Hz frequency. It is recommended that 115200bps baud rate and 1HZ frequency are set before the module enters into low power mode.
7. The modules will automatically come back to the normal mode in difficult environment to keep good accuracy.