GNSS SDK

Commands Manual

GNSS Module Series

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About the Document

History

Revision	Date	Author	Description
1.0	2017-07-01	Chunmao Li	Initial
1.1	2017-07-10	Chunmao Li	Added the current supported SDK commands in Table 1.
1.2	2017-07-15	Chunmao Li	1. Added the following new commands: PQECEF, PQODO, PQPZ90, PQGLP, PQVEL. 2. Added L76 and L76-L in Table 1. 3. Added the Chapter 3: Appendix References.
1.3	2017-07-21	Chunmao Li	1. Added L26 in Table 1. 2. Improved the function of PQODO to enable initial distance setting.

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Table Index

1 Introduction

ZF GNSS modules support SDK commands which are defined and developed by ZF. This document describes these SDK commands. The configuration parameters saved by SDK commands will still exist in flash even after upgrading the modules' firmware.

This document is applicable to ZFL70, L76, L76-L, L80, L86, and L26 modules. Their supported SDK commands are shown in the table below:

Table 1: Current Supported SDK Commands

SDK Commands	Description	L70	L80	L76	L76-L	L86	L26
PQBAUD	Change NMEA Port Default Baudrate	Y	Y	Y	Y	Y	Y
PQEPE	Enable/Disable PQEPE Sentence Output	Y	Y	Y	Y	Y	Y
PQ1PPS	Set the Type and Pulse Width of 1PPS's Output	Y	Y	Y	Y	Y	Y
PQFLP	Set the Module into FLP(Fitness Low Power) Mode	Y	Y	N	N	N	N
PQTXT	Enable/Disable GPTXT Sentence Output	N	Y	N	N	Y	Y
PQECEF	Enable/Disable ECEFPOSVEL Sentence Output	N	N	Y	Y	N	Y
PQODO	Start/Stop Odometer Reading	N	N	Y	Y	N	Y
PQPZ90	Enable/Disable Switching from WGS84 to PZ-90.11	N	N	Y	Y	N	Y
PQGLP	Set the Module into GLP (GNSS Low Power) Mode	N	N	Y	Y	N	Y
PQVEL	Enable/Disable 3 Ways Velocity Sentence Output	N	N	Y	Y	N	Y

NOTES

1. Y means supported; N means not supported.
2. For more details about the usage of **$PQFLP** and **$PQGLP** commands, please refer to ***document [1]***.

2 ZF 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 and configure ZF L70, L76, L76-L, L80, L86, and L26 modules.

The structure of ZF NMEA packet is shown as below:

2.1. ZF 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 DataFileld has variable lengths depending on the packet type.

A command symbol ',' must be inserted ahead of each data filed to help the decoder 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 check sum of the data between Preamble and '*'.

CR,LF: Two bytes binary data.
The two bytes are used to identify the end of a packet.

2.2. PQBAUD Change NMEA Port Default Baudrate

PQBAUD Change NMEA Port Default Baudrate	
Write Command **$PQBAUD,W,<baudrate>*Checksum<CR><LF>**	Response **$PQBAUD,W,OK*Checksum<CR><LF>** If error **$PQBAUD,W,ERROR*Checksum<CR><LF>**
Reference	

Parameter

<baudrate>	NMEA port baudrate. 9600 by default; could be set to 4800, 14400, 19200, 38400, 57600 and 115200

Example

```
$PQBAUD,W,115200*43    //Change NMEA port default baudrate to 115200
$PQBAUD,W,OK*40        //Set OK
```

NOTES

1. The command will be effective immediately after setting.
2. Parameter is automatically saved.
3. If you change the baudrate, then there is no response returned in the current baudrate.

2.3. PQEPE Enable/Disable PQEPE Sentence Output

The packet enables/disables output of the URC including EPE data, that is, estimated horizontal and vertical position errors.

PQEPE Enable/Disable PQEPE Sentence Output	
Write Command **$PQEPE,W,<mode>,<save>*Checksum<CR><LF>**	Response **$PQEPE,W,OK*Checksum<CR><LF>** If error **$PQEPE,W,ERROR*Checksum<CR><LF>**
URC Message	**$PQEPE,<EPE_hori>,<EPE_vert>*Checksum<CR><LF>**

	Parameter **<EPE_hori>** Estimated horizontal position error **<EPE_vert>** Estimated vertical position error Example **$PQEPE,5.3050,3.2000*53**
Reference	

Parameter

<mode>	Operation 0 Disable the URC including EPE data 1 Enable the URC including EPE data
<save>	Save operation 0 Parameter is not saved, ineffective after restart 1 Parameter is saved in flash, effective after restart

Example

```
$PQEPE,W,1,1*2A          //Enable the URC including EPE data, and save parameter in flash
$PQEPE,W,OK*02           //Set OK
```

NOTE

The command will be effective immediately after setting.

2.4. PQ1PPS Set the Type and Pulse Width of 1PPS's Output

PQ1PPS Set the Type and Pulse Width of 1PPS's Output	
Write Command **$PQ1PPS,W,<type>,<width>*Checksum<CR><LF>**	Response **$PQ1PPS,W,OK*Checksum<CR><LF>** If error **$PQ1PPS,W,ERROR*Checksum<CR><LF>**
Reference	

Parameter

<type>	The type of 1PPS's output 0 Disable 1PPS output 1 Send 1PPS after the first fix 2 Send 1PPS after 3D fix 3 Send 1PPS after 2D fix 4 Send 1PPS always
<width>	PPS pulse width in millisecond Range: 2-998

Example

```
$PQ1PPS,W,4,100*1D      //Set the type of 1PPS's output and PPS pulse width
$PQ1PPS,W,OK*30         //Set OK
$PQ1PPS,W,0,0*18        //Disable 1PPS output
$PQ1PPS,W,OK*30         //Set OK
```

NOTES

1. The command will be effective immediately after setting.
2. Parameter is automatically saved.
3. If **<type>** is set as 0, **<width>** could be set as 0, 1, 2-998.

2.5. PQFLP Set the Module into FLP Mode

PQFLP Set the Module into FLP Mode	
Write Command **$PQFLP,W,<mode>,<save>*Checksum<CR><LF>**	Response **$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	//Change to FLP mode
$PQFLP,W,OK*08	//Set OK
$PQFLP,R*25	//Read mode
$PQFLP,R,1*38	//Read OK, FLP mode enabled

NOTE

The command will be effective immediately after setting.

2.6. PQTXT Enable/Disable GPTXT Sentence Output

PQTXT Enable/Disable GPTXT Sentence Output	
Write Command **$PQTXT,W,<mode>,<save>*Checksum <CR><LF>**	Response **$PQTXT,W,OK*Checksum<CR><LF>** If error **$PQTXT,W,ERROR*Checksum<CR><LF>**
URC Message	**$GPTXT,01,01,02,<status>*Checksum<CR><LF>** Parameter **<status>** Status of antenna **ANTSTATUS=OK**: antenna is well connected **ANTSTATUS=OPEN**: antenna has been disconnected **ANTSTATUS=SHORT**: antenna is short-circuited Example **$GPTXT,01,01,02,ANTSTATUS=OK*3B**
Reference	

Parameter

<mode>	Operation 0 Disable GPTXT sentence output 1 Enable GPTXT sentence output
<save>	Save operation 0 Parameter is not saved, ineffective after restart 1 Parameter is saved in flash, effective after restart

Example

$PQTXT,W,1,1*22	//Enable GPTXT sentence output and save parameter in flash
$PQTXT,W,OK*0A	//Set OK

NOTE

The command will be effective immediately after setting.

2.7. PQECEF Enable/Disable ECEFPOSVEL Sentence Output

PQECEF Enable/Disable ECEFPOSVEL Sentence Output	
Write Command **$PQECEF,W,<mode>,<save>*ChkSum<CR><LF>**	Response **$PQECEF,W,OK*ChkSum<CR><LF>** If error **$PQECEF,W,ERROR*ChkSum<CR><LF>**
Read Command **$PQECEF,R*ChkSum<CR><LF>**	Response **$PQECEF,R,<mode>*ChkSum<CR><LF>**
URC Message	**$ECEFPOSVEL,<time>,<x>,<y>,<z>,<v_x>,<v_y>,<v_z>*ChkSum<CR><LF>** Parameter **<time>** UTC from the internal real-time clock **<x>** the value of X axis in ECEF **<y>** the value of Y axis in ECEF **<z>** the value of Z axis in ECEF **<v_x>** velocity component of X axis in ECEF **<v_y>** velocity component of Y axis in ECEF **<v_z>** velocity component of Z axis in ECEF

	Example **$ECEFPOSVEL,052743.000,-1526672.867459,6191083.982801,143008.780911,0,0,0*14**
Reference	

Parameter

<mode>	Operation 0 Disable ECEFPOSVEL sentence output 1 Enable ECEFPOSVEL sentence output
<save>	Save operation 0 Parameter is not saved, ineffective after restart 1 Parameter is saved in flash, effective after restart

Example

```
$PQECEF,W,1,1*7F    // Enable ECEFPOSVEL sentence output, and save parameter in flash
$PQECEF,W,OK*57     // Set OK
$PQECEF,R*7A        // Read mode
$PQECEF,R,1*67      // Read OK, ECEFPOSVEL sentence output enabled
```

NOTE

The command will be effective immediately after setting.

2.8. PQODO Start/Stop Odometer Reading

PQODO	**Start/Stop Odometer Reading**
Write Command **$PQODO,W,<mode>[,<initial distance>]*ChkSum<CR><LF>**	Response **$PQODO,W,OK*ChkSum<CR><LF>** If error **$PQODO,W,ERROR*ChkSum<CR><LF>**
Read Command **$PQODO,R*ChkSum<CR><LF>**	Response **$PQODO,R,<mode>*ChkSum<CR><LF>** If error **$PQODO,R,ERROR*ChkSum<CR><LF>**
Query Command **$PQODO,Q*ChkSum<CR><LF>**	Response **$PQODO,Q,<distance>*ChkSum<CR><LF>**

	If error **$PQODO,Q,ERROR*ChkSum<CR><LF>**
Reference	

Parameter

<mode>	Start or stop odometer reading 0 Stop odometer reading and remember the distance value. 1 Start odometer reading and initialize the distance according to the <initial distance>.
<initial distance>	Set the initial distance, range [0,1e09], unit: meter. When <mode> is 1, this parameter can be omitted, and its default value is 0. When <mode> is 0, this parameter must be omitted.
<distance>	Current distance. Unit: meter.

Example

$PQODO,W,1*23	// Start odometer reading, and initial distance is 0m.
$PQODO,W,OK*16	// Set OK
$PQODO,W,1,1000000*3E	// Start odometer reading, and initial distance is 1,000,000m.
$PQODO,W,OK*16	// Set OK
$PQODO,R*3B	// Read mode
$PQODO,R,1*26	// Read OK, odometer reading has already been started
$PQODO,Q*38	// Query the distance value
$PQODO,Q,123.45*0B	// Current distance value returned

NOTES

1. The command will be effective immediately after setting.
2. After module is restarted, the **$PQODO** write command must be executed again to re-start odometer reading.

2.9. PQPZ90 Enable/Disable Switching from WGS84 to PZ-90.11

PQPZ90	**Enable/Disable Switching from WGS84 to PZ-90.11**
Write Command **$PQPZ90,W,<mode>,<save>*ChkSum<CR><LF>**	Response **$PQPZ90,W,OK*ChkSum<CR><LF>** If error

	$PQPZ90,W,ERROR*ChkSum<CR><LF>
Read Command **$PQPZ90,R*ChkSum<CR><LF>**	Response **$PQPZ90,R,<mode>*ChkSum<CR><LF>**
URC Message	**$GNDTM,P90,x,xx.xxxx,x,xx.xxxx,x,xxx,W84*hh<CR><LF>** Parameter definition is available in Table 4.
Reference	Appendix 3.3

Parameter

<mode>	Operation 0 Disable switching from WGS84 to PZ-90.11 1 Enable switching from WGS84 to PZ-90.11
<save>	Save operation 0 Parameter is not saved, ineffective after restart 1 Parameter is saved in flash, effective after restart

Example

```
$PQPZ90,W,1,1*79    // Enable switching from WGS84 to PZ-90.11, and save parameter into flash
$PQPZ90,W,OK*51     // Set OK
$PQPZ90,R*7C        // Read mode
$PQPZ90,R,0*60      // Read OK, switching from WGS84 to PZ-90.11 enabled
```

NOTES

1. The command will be effective immediately after setting <save> to 0. However, when <save> is set to 1, it will be effective only after restart.
2. If switching from WGS84 to PZ-90.11 is enabled and effective, 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.

2.10. PQGLP Set the Module into GLP Mode

PQGLP	**Set the Module into GLP Mode**
Write Command **$PQGLP,W,<mode>,<save>*ChkSum<CR><LF>**	Response **$PQGLP,W,OK*ChkSum<CR><LF>**

	If error **$PQGLP,W,ERROR*ChkSum<CR><LF>**
Read Command **$PQGLP,R*ChkSum<CR><LF>**	Response **$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          // Change to GLP mode
$PQGLP,W,OK*09           // Set OK

$PQGLP,R*24              // Read mode
$PQGLP,R,1*39            // Read OK, GLP mode enabled
```

NOTE

The command will be effective immediately after setting.

2.11. PQVEL Enable/Disable 3 Ways Velocity Sentence Output

PQVEL	Enable/Disable 3 Ways Velocity Sentence Output
Write Command **$PQVEL,W,<mode>,<save>*ChkSum<CR><LF>**	Response **$PQVEL,W,OK*ChkSum<CR><LF>** If error **$PQVEL,W,ERROR*ChkSum<CR><LF>**
Read Command **$PQVEL,R*ChkSum<CR><LF>**	Response **$PQVEL,R,<mode>*ChkSum<CR><LF>**
URC Message	**$PQVEL,<north_vel>,<east_vel>,<down_vel>*ChkSum<CR><LF>**

	Parameter **<north_vel>** North velocity **<east_vel>** East velocity **<down_vel>** Down velocity Example **$PQVEL,1.000000,2.000000,-0.000000*42**
Reference	

Parameter

<mode>	Enable/disable 3 ways velocity sentence output 0 Disable 1 Enable
<save>	Save operation 0 Parameter is not saved, ineffective after restart 1 Parameter is saved in flash, effective after restart

Example

```
$PQVEL,W,1,1*25          // Enable 3 ways velocity sentence output
$PQVEL,W,OK*0D           // Set OK

$PQVEL,R*20              // Read mode
$PQVEL,R,1*3D            // Read OK, 3 ways velocity sentence output enabled
```

NOTE

The command will be effective immediately after setting.

3 Appendix References

3.1. Related Documents

Table 2: Related Documents

SN	Document Name	Remark
[1]	ZF_GNSS_Low_Power_Mode_Application_Note	GNSS Low Power Mode Application Note

3.2. Terms and Abbreviations

Table 3: Terms and Abbreviations

Abbreviation	Description
1PPS	1 Pulse Per Second
ECEF	Earth-Centered, Earth-Fixed
EPE	Estimated Position Error
FLP	Fitness Low Power
GGA	Global Positioning System Fixed Data
GLP	GNSS Low Power
GNSS	Global Navigation Satellite System
NMEA	National Marine Electronics Association
ODO	Odometer
PZ90	Parametry Zemli 1990

RMC	Recommended Minimum Specific GNSS Data
URC	Unsolicited Result Code
VEL	Velocity

3.3. Datum Sentence Definition

The datum sentence definition for $GNDTM,xxx,x,xx.xxxx,x,xx.xxxx,x,xxx,xxx*hh<CR><LF> is illustrated below:

Table 4: Datum Sentence Definition

Field	Meaning
1	Local datum code (xxx): W84 – WGS84 W72 – WGS72 S85 – SGS85 P90 – PZ-90
2	Local datum sub code (x)
3	Latitude offset in minutes (xx.xxxx)
4	Latitude offset mark (N: +, S: -) (x)
5	Longitude offset in minutes (xx.xxxx)
6	Longitude offset mark (E: +, W: -) (x)
7	Altitude offset in meters.
8	Datum (xxx): W84 – WGS84 W72 – WGS72 S85 – SGS85 P90 – PZ-90
9	Checksum