

EG800Q&EG91xQ Series

RF FTM Application Note

LTE Standard Module Series

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Quectel Wireless Solutions Co., Ltd.

Building 5, Shanghai Business Park Phase III (Area B), No.1016 Tianlin Road, Minhang District, Shanghai 200233, China

Tel: +86 21 5108 6236

Email: info@quectel.com

Or our local offices. For more information, please visit:

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About the Document

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1 Introduction

The document describes the AT commands for transmitting and receiving, and single frequency point measurement for Quectel EG800Q and EG91xQ family (EG915Q series and EG916Q-GL) modules, which can be used to test the modules' transmitting and receiving performances as well as measure the module's single frequency point in FTM (Factory Test Mode).

2 Description of AT Commands

2.1. AT Command Introduction

2.1.1. Definitions

- **<CR>** Carriage return character.
- **<LF>** Line feed character.
- **<...>** Parameter name. Angle brackets do not appear on the command line.
- **[...]** Optional parameter of a command or an optional part of TA information response. Square brackets do not appear on the command line. When an optional parameter is not given in a command, the new value equals its previous value or the default settings, unless otherwise specified.
- **Underline** Default setting of a parameter.

2.1.2. AT Command Syntax

All command lines must start with **AT** or **at** and end with **<CR>**. Information responses and result codes always start and end with a carriage return character and a line feed character: **<CR><LF><response><CR><LF>**. In tables presenting commands and responses throughout this document, only the commands and responses are presented, and **<CR>** and **<LF>** are deliberately omitted.

Table 1: Types of AT Commands

Command Type	Syntax	Description
Test Command	AT+<cmd>=?	Test the existence of the corresponding command and return information about the type, value, or range of its parameter.
Read Command	AT+<cmd>?	Check the current parameter value of the corresponding command.
Write Command	AT+<cmd>=<p1>[,<p2>[,<p3>[...]]]	Set user-definable parameter value.
Execution Command	AT+<cmd>	Return a specific information parameter or perform a specific action.

2.2. Declaration of AT Command Examples

The AT command examples in this document are provided to help you learn about the use of the AT commands introduced herein. The examples, however, should not be taken as Quectel's recommendations or suggestions about how to design a program flow or what status to set the module into. Sometimes multiple examples may be provided for one AT command. However, this does not mean that there is a correlation among these examples, or that they should be executed in a given sequence. The URLs, domain names, IP addresses, usernames/accounts, and passwords (if any) in the AT command examples are provided for illustrative and explanatory purposes only, and they should be modified to reflect your actual usage and specific needs.

2.3. AT Commands for Transmitting and Receiving

2.3.1. AT+QRFTESTMODE Enter/Exit FTM

This command makes the module enter/exit FTM.

AT+QRFTESTMODE Enter/Exit FTM	
Test Command AT+QRFTESTMODE=?	Response +QRFTESTMODE: (list of supported <mode>s) OK
Read Command AT+QRFTESTMODE?	Response +QRFTESTMODE: <mode> OK
Write Command AT+QRFTESTMODE=<mode>	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<mode>	Integer type. Enter/exit FTM. 0 Exit FTM 1 Enter FTM
<err>	Error code. See Chapter 4 for details.

NOTE

After exiting FTM, the module needs to be rebooted for registering on the network normally and performing data services.

2.3.2. AT+QRXFTM Force to Receive in FTM

This command forces the module to receive in FTM and returns the RSSI value of the measured bandwidth. The signal power range output by RF instrument: -60 dBm – -40 dBm.

AT+QRXFTM Force to Receive in FTM	
Test Command AT+QRXFTM=?	Response OK
Write Command AT+QRXFTM=<band>,<RX_channel>,<enable>,<RX_power>	Response OK +QRXFTM: <RX_RSSI> If there is any error: ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<band>	String type. The supported bands in LTE. The ranges and corresponding frequency points are shown in the explanation of <RX_channel> .
<RX_channel>	Integer type. The supported range of frequency points of downlink channels. The ranges of frequency points of downlink channels for different bands in LTE are as follows: <div style="display: flex; justify-content: space-between;"> <div style="text-align: left;"> LTE Bands EG800Q-EU: </div> <div style="text-align: left;"> Range of Frequency Points of Downlink Channels </div> </div>

"LTE BAND1"	0–599
"LTE BAND3"	1200–1949
"LTE BAND5"	2400–2649
"LTE BAND7"	2750–3449
"LTE BAND8"	3450–3799
"LTE BAND20"	6150–3799
"LTE BAND28"	9210–9659
EG915Q-NA/EG800Q-NA:	
"LTE BAND2"	600–1159
"LTE BAND4"	1950–2399
"LTE BAND5"	2400–2649
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND66"	66436–67335
EG915Q-AF:	
"LTE BAND2"	600–1159
"LTE BAND4"	1950–2399
"LTE BAND5"	2400–2649
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND14"	5280–5379
"LTE BAND66"	66436–67335
"LTE BAND71"	68586–68935
EG915Q-JP:	
"LTE BAND1"	0–599
"LTE BAND3"	1200–1949
"LTE BAND8"	3450–3799
"LTE BAND18"	5850–5999
"LTE BAND19"	6000–6149
"LTE BAND26"	8690–9039
"LTE BAND28"	9210–9659
EG916Q-GL:	
"LTE BAND1"	0–599
"LTE BAND2"	600–1199
"LTE BAND3"	1200–1949
"LTE BAND4"	1950–2399
"LTE BAND5"	2400–2649
"LTE BAND7"	2750–3449
"LTE BAND8"	3450–3799
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND18"	5850–5999
"LTE BAND19"	6000–6149
"LTE BAND20"	6150–3799

	"LTE BAND25"	8040–8689
	"LTE BAND26"	8690–9039
	"LTE BAND28"	9210–9659
	"LTE BAND34"	36200–36349
	"LTE BAND38"	37750–38249
	"LTE BAND39"	38250–38649
	"LTE BAND40"	38650–39649
	"LTE BAND41"	39650–41589
	"LTE BAND66"	66436–67335
<enable>	String type. Turn on/off RX test in FTM.	
	"on"	Turn on RX test in FTM
	"off"	Turn off RX test in FTM
<RX_power>	Integer type. Expected receiving power in LTE. Range: 40–60. Unit: dBm. It needs to be equal to the absolute value of the signal strength set by the instrument.	
<RX_RSSI>	Integer type. Received signal strength indication. Unit: dBm.	
<err>	Error code. See Chapter 4 for details.	

2.3.3. AT+QRFTEST Force to Transmit in FTM

This command forces the module to transmit in FTM.

AT+QRFTEST Force to Transmit in FTM	
Test Command AT+QRFTEST=?	Response OK
Write Command AT+QRFTEST=<band>,<TX_channel>,<enable>,<TX_power>	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<band>	String type. The supported bands in LTE. The ranges and corresponding frequency points are shown in the explanation of <TX_channel>.
<TX_channel>	Integer type. The supported range of frequency points of uplink channels. The ranges of frequency points of uplink channels for different bands in LTE are as

follows:

LTE Bands Range of Frequency Points of Uplink Channels

EG800Q-EU:

"LTE BAND1"	18000–18599
"LTE BAND3"	19200–19949
"LTE BAND5"	20400–20649
"LTE BAND7"	20750–21449
"LTE BAND8"	21450–21799
"LTE BAND20"	24150–24449
"LTE BAND28"	27210–27659

EG915Q-NA/EG800Q-NA:

"LTE BAND2"	18600–19199
"LTE BAND4"	19950–20399
"LTE BAND5"	20400–20649
"LTE BAND12"	23010–23179
"LTE BAND13"	23180–23279
"LTE BAND66"	131972–132671

EG915Q-AF:

"LTE BAND2"	18600–19199
"LTE BAND4"	19950–20399
"LTE BAND5"	20400–20649
"LTE BAND12"	23010–23179
"LTE BAND13"	23180–23279
"LTE BAND14"	23280–23379
"LTE BAND66"	131972–132671
"LTE BAND71"	133122–133471

EG915Q-JP:

"LTE BAND1"	18000–18599
"LTE BAND3"	19200–19949
"LTE BAND8"	21450–21799
"LTE BAND18"	23850–23999
"LTE BAND19"	24000–24149
"LTE BAND26"	26690–27039
"LTE BAND28"	27210–27659

EG916Q-GL:

"LTE BAND1"	18000–18599
"LTE BAND2"	18600–19199
"LTE BAND3"	19200–19949
"LTE BAND4"	19950–20399
"LTE BAND5"	20400–20649
"LTE BAND7"	20750–21449
"LTE BAND8"	21450–21799
"LTE BAND12"	23010–23179
"LTE BAND13"	23180–23279

	"LTE BAND18"	23850–23999
	"LTE BAND19"	24000–24149
	"LTE BAND20"	24150–24449
	"LTE BAND25"	26040–26689
	"LTE BAND26"	26690–27039
	"LTE BAND28"	27210–27659
	"LTE BAND34"	36200–36349
	"LTE BAND38"	37750–38249
	"LTE BAND39"	38250–38649
	"LTE BAND40"	38650–39649
	"LTE BAND41"	39650–41589
	"LTE BAND66"	131972–132671
<enable>	String type. Turn on/off TX test in FTM.	
	"on"	Turn on TX test in FTM
	"off"	Turn off TX test in FTM
<TX_power>	Integer type. Transmit power gain index in LTE. Range: 0–100, saturated around 75.	
<err>	Error code. See Chapter 4 for details.	

2.3.4. AT+QRFTESTPWR Force to Transmit in FTM

This command forces the module to transmit in FTM. The input parameter is **<band>**, and the intermediate frequency point of the corresponding **<band>** is sent by default.

AT+QRFTESTPWR Force to Transmit in FTM	
Test Command AT+QRFTESTPWR=?	Response +QRFTESTPWR: (list of supported <band> s) OK
Read Command AT+QRFTESTPWR?	Response +QRFTESTPWR: <state>
Write Command AT+QRFTESTPWR=<band>	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<band>	String type. The supported bands in LTE. The ranges and corresponding frequency points are as follows:
LTE Bands	Frequency Points of Uplink Channels
EG800Q-EU:	
"LTE BAND1"	18300
"LTE BAND3"	19575
"LTE BAND5"	20525
"LTE BAND7"	21100
"LTE BAND8"	21625
"LTE BAND20"	24300
"LTE BAND28"	27435
EG915Q-NA/EG800Q-NA:	
"LTE BAND2"	18900
"LTE BAND4"	20175
"LTE BAND5"	20525
"LTE BAND12"	23095
"LTE BAND13"	23230
"LTE BAND66"	132322
EG915Q-AF:	
"LTE BAND2"	18900
"LTE BAND4"	20175
"LTE BAND5"	20525
"LTE BAND12"	23095
"LTE BAND13"	23230
"LTE BAND14"	23330
"LTE BAND66"	132322
"LTE BAND71"	133297
EG915Q-JP:	
"LTE BAND1"	18300
"LTE BAND3"	19575
"LTE BAND8"	21625
"LTE BAND18"	23925
"LTE BAND19"	24075
"LTE BAND26"	26865
"LTE BAND28"	27435
EG916Q-GL:	
"LTE BAND1"	18300
"LTE BAND2"	18900
"LTE BAND3"	19575
"LTE BAND4"	20175
"LTE BAND5"	20525
"LTE BAND7"	21100

	"LTE BAND8"	21625
	"LTE BAND12"	23095
	"LTE BAND13"	23230
	"LTE BAND18"	23925
	"LTE BAND19"	24075
	"LTE BAND20"	24300
	"LTE BAND25"	26365
	"LTE BAND26"	26865
	"LTE BAND28"	27435
	"LTE BAND34"	36275
	"LTE BAND38"	38000
	"LTE BAND39"	38450
	"LTE BAND40"	39150
	"LTE BAND41"	40620
	"LTE BAND66"	132322
<state>	String type. The current state of forced transmitting.	
	"none band"	No forced transmitting
	"LTE BANDx"	The band being forced to transmitting
<err>	Error code. See Chapter 4 for details.	

2.4. AT Commands for Measuring Single Frequency Point

2.4.1. AT+QRFSNW Search Network in FTM

This command searches network for a specified frequency point in FTM.

AT+QRFSNW Search Network in FTM	
Test Command AT+QRFSNW=?	Response OK
Write Command AT+QRFSNW=<band>,<RxEarfcn>,<CellId>,<Crnti>,<TX_power>	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configurations are not saved.

Parameter

<band> String type. The supported bands in LTE. The ranges and corresponding frequency points are shown in the explanation of **<RxEarfcn>**.

<RxEarfcn> Integer type. The supported range of frequency points of downlink channels. The ranges of frequency points of downlink channels for different bands in LTE are as follows:

LTE Bands Range of Frequency Points of Downlink Channels

EG800Q-EU:

"LTE BAND1"	0–599
"LTE BAND3"	1200–1949
"LTE BAND5"	2400–2649
"LTE BAND7"	2750–3449
"LTE BAND8"	3450–3799
"LTE BAND20"	6150–3799
"LTE BAND28"	9210–9659

EG915Q-NA/EG800Q-NA:

"LTE BAND2"	600–1159
"LTE BAND4"	1950–2399
"LTE BAND5"	2400–2649
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND66"	66436–67335

EG915Q-AF:

"LTE BAND2"	600–1159
"LTE BAND4"	1950–2399
"LTE BAND5"	2400–2649
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND14"	5280–5379
"LTE BAND66"	66436–67335
"LTE BAND71"	68586–68935

EG915Q-JP:

"LTE BAND1"	0–599
"LTE BAND3"	1200–1949
"LTE BAND8"	3450–3799
"LTE BAND18"	5850–5999
"LTE BAND19"	6000–6149
"LTE BAND26"	8690–9039
"LTE BAND28"	9210–9659

EG916Q-GL:

"LTE BAND1"	0–599
"LTE BAND2"	600–1199
"LTE BAND3"	1200–1949
"LTE BAND4"	1950–2399

"LTE BAND5"	2400–2649
"LTE BAND7"	2750–3449
"LTE BAND8"	3450–3799
"LTE BAND12"	5010–5179
"LTE BAND13"	5180–5279
"LTE BAND18"	5850–5999
"LTE BAND19"	6000–6149
"LTE BAND20"	6150–3799
"LTE BAND25"	8040–8689
"LTE BAND26"	8690–9039
"LTE BAND28"	9210–9659
"LTE BAND34"	36200–36349
"LTE BAND38"	37750–38249
"LTE BAND39"	38250–38649
"LTE BAND40"	38650–39649
"LTE BAND41"	39650–41589
"LTE BAND66"	66436–67335
<CellId>	Integer type. Specify the cell ID for the network. Range: 0–503.
<Crnti>	Integer type. Specify the CRNTI of the network. Range: 0–65535.
<TX_power>	Integer type. LTE transmit power. Range: -80 – -40. Unit: dBm.
<err>	Error code. See Chapter 4 for details.

2.4.2. AT+QRFGTS Get Network Searching Status in FTM

This command gets the network searching status of the module in FTM.

AT+QRFGTS Get Network Searching Status in FTM	
Test Command AT+QRFGTS=?	Response OK
Read Command AT+QRFGTS?	Response OK +QRFGTS: <status> If there is any error: ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<status>	String type. The returned status of the device. 6 In search 8 Search success Others Search fail
<err>	Error code. See Chapter 4 for details.

2.4.3. AT+QRFTRIG Trigger Single Frequency Point Measurement in FTM

This command triggers single frequency point measurement in FTM.

AT+QRFTRIG Trigger Single Frequency Point Measurement in FTM	
Test Command AT+QRFTRIG=?	Response OK
Execution Command AT+QRFTRIG	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<err>	Error code. See Chapter 4 for details.
--------------------	---

2.4.4. AT+QRFBT Get RSSI in FTM

This command gets the RSSI for the module in FTM.

AT+QRFBT Get RSSI in FTM	
Test Command AT+QRFBT=?	Response OK
Read Command AT+QRFBT?	Response OK +QRFBT: <RSSI> If there is any error:

	ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<RSSI>	Float type. Signal strength. Range: -80.00 – -40.00. Unit: dBm.
<err>	Error code. See Chapter 4 for details.

2.4.5. AT+QRFEND End Single Frequency Point Measurement in FTM

This command ends a single frequency point measurement for the module in FTM.

AT+QRFEND End Single Frequency Point Measurement in FTM	
Test Command AT+QRFEND=?	Response OK
Execution Command AT+QRFEND	Response OK Or ERROR If the error is related to ME functionality: +CME ERROR: <err>
Maximum Response Time	300 ms
Characteristics	This command takes effect immediately; The configuration is not saved.

Parameter

<err>	Error code. See Chapter 4 for details.
-------	---

3 Examples

3.1. Force to Receive in FTM

```
//RX test process in LTE.
AT+QRFTESTMODE? //Query whether the module is currently in FTM.
+QRFTESTMODE: 0

OK
AT+QRFTESTMODE=1 //Enter FTM.
OK
AT+QXFTM="LTE BAND3",1600,"on",40 //Test downlink frequency points 1600 for LTE BAND3.
OK

+QXFTM: -40
AT+QXFTM="LTE BAND3",1600,"off",40 //Turn off RX test.
OK
AT+QRFTESTMODE=0 //Exit FTM.
OK
```

3.2. Force to Transmit in FTM

```
//TX test process in LTE.
AT+QRFTESTMODE? //Query whether the module is currently in FTM.
+QRFTESTMODE: 0

OK
AT+QRFTESTMODE=1 //Enter FTM.
OK
AT+QRFTEST="LTE BAND8",21460,"on",80 //Test uplink frequency points 21460 for LTE BAND8.
OK
AT+QRFTEST="LTE BAND8",21460,"off",80 //Turn off TX test.
OK
AT+QRFTESTPWR? //Query the current forced transmitting state.
+QRFTESTPWR: "none band"
```

OK

AT+QRFTESTPWR="LTE BAND8"

//Test uplink frequency points 21625 for LTE BAND8.

ALL IS UP

OK

AT+QRFTESTPWR?

//Query the current forced transmitting state.

+QRFTESTPWR: "LTE BAND8"

OK

AT+QRFTESTMODE=0

//Exit FTM.

OK

3.3. Measure Single Frequency Point

AT+QRFTESTMODE?

//Query whether the module is currently in FTM.

+QRFTESTMODE: 0

OK

AT+QRFTESTMODE=1

//Enter FTM.

OK

AT+QRFNSW="LTE BAND5",2525,1,10,-40//Search network for a specified frequency point in FTM.

OK

AT+QRFSGTS?

//Get network searching status.

OK

+QRFSGTS: 8

AT+QRFTRIG

//Trigger single frequency point measurement in FTM.

OK

AT+QRFBT?

//Query RSSI.

OK

+QRFBT: -39.51

AT+QRFEND

//End the single frequency point measurement.

OK

4 Error Codes

<err> indicates the error related to ME exception. For details about the **<err>** parameter values, see the following table.

Table 2: Error Codes

<err>	Error Code	Description
3	CME_OPERATION_NOT_ALLOW	The operation is not allowed.
4	CME_OPERATION_NOT_SUPPORT	The operation is not supported.
23	CME_MEMORY_FAILURE	Memory failure.
50	CME_INCORRECT_PARAM	Incorrect parameter.

5 Appendix References

Table 3: Terms and Abbreviations

Abbreviation	Description
BT	Bler Test
CRNTI	Cell Radio Network Temporary Identifier
FTM	Factory Test Mode
GTS	Get Test Status
LTE	Long Term Evolution
RF	Radio Frequency
RSSI	Received Signal Strength Indication
RX	Receive
SNW	Search Network
TRIG	Trigger
TX	Transmit