

EC2x&EGxx FTM

AT Commands Manual

LTE Standard Module Series

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About the Document

History

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1 Introduction

The document describes commands which are used to test the receiving and transmitting performance of the following Quectel LTE modules under FTM (Factory Test Mode) so as to facilitate RF calibration.

The document is applicable to the following modules:

- EC2x (including EC25, EC21, EC20 R2.0 and EC20 R2.1)
- EGxx (including EG95, EG91 and EG25-G)

2 Description of FTM AT Commands

2.1. AT Command Syntax

Test Command	AT+<x>=?	Returns the list of parameters and value ranges set by the corresponding Write Command or internal processes.
Read Command	AT+<x>?	Returns the value of the parameter(s).
Write Command	AT+<x>=<...>	Sets the user-definable parameter value.
Execution Command	AT+<x>	Reads non-variable parameters affected by internal processes in the module.

2.2. AT+QRXFTM Force to Receive in FTM

AT+QRXFTM Force to Receive in FTM	
Test command AT+QRXFTM=?	Response OK
Read command AT+QRXFTM?	Response OK
Write command AT+QRXFTM=<mode>,<band>,<channel>,<path>,<LNA>,<BW>	Response +QRXFTM: <agc_val>,<agc_to_pwr> OK If there is any error: ERROR
Reference	

Parameter

<mode>	0 WCDMA receiving performance test 1 LTE receiving performance test
<band>	WCDMA bands:

-
- 0 WCDMA BAND5
 - 1 WCDMA BAND8
 - 2 WCDMA BAND2
 - 3 WCDMA BAND1
 - 4 WCDMA BNAD19
 - 5 WCDMA BNAD11
 - 6 WCDMA BNAD9
 - 7 WCDMA BNAD7
 - 8 WCDMA BNAD6
 - 9 WCDMA BNAD4
 - 10 WCDMA BNAD3

LTE bands:

- 1 LTE BAND1
- 2 LTE BAND2
- 3 LTE BAND3
- 4 LTE BAND4
- 5 LTE BAND5
- 6 LTE BAND7
- 7 LTE BAND8
- 8 LTE BAND9
- 9 LTE BAND10
- 10 LTE BAND11
- 11 LTE BAND12
- 12 LTE BAND13
- 13 LTE BAND17
- 14 LTE BAND18
- 15 LTE BAND19
- 16 LTE BAND20
- 17 LTE BAND25
- 18 LTE BAND26
- 19 LTE BAND28
- 20 LTE BAND34
- 21 LTE BAND38
- 22 LTE BAND39
- 23 LTE BAND40
- 24 LTE BAND41
- 25 LTE BAND14
- 26 LTE BAND66
- 27 LTE BAND71

<channel> Number of WCDMA downlink channels:

WCDMA BAND1	10562~10838
WCDMA BAND2	9662~9938
WCDMA BAND8	2937~3088
WCDMA BAND5	4357~4458

WCDMA BNAD19	712~763
WCDMA BNAD11	3712~3812
WCDMA BNAD9	9237~9387
WCDMA BNAD7	2237~2563
WCDMA BNAD6	4387~4413
WCDMA BNAD4	1537~1738
WCDMA BNAD3	1162~1513

Number of LTE downlink channels:

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 BAND9	3450~3799
LTE BAND10	4150~4749
LTE BAND11	4750~4949
LTE BAND12	5010~5179
LTE BAND13	5180~5279
LTE BAND17	5730~5849
LTE BAND18	5850~5999
LTE BAND19	6000~6149
LTE BAND20	6150~6449
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	40240~41240
LTE BAND14	5280 ~5379
LTE BAND66	66436~67135
LTE BAND71	68596-68935

<path>

- 0 Main antenna path
- 1 Rx-diversity antenna path

<LNA>

Gain level: 0~5. The recommended value is 0.

<BW>

Band width: 0~5. If it is WCDMA band, this value must be set to 0.

- 0 1.4M
 - 1 3M
 - 2 5M
 - 3 10M
 - 4 15M
-

	5	20M
<agc_val>	The result of receiving power range in WCDMA mode: -512~511. The result of receiving power range in LTE mode: -500~-850.	
<agc_to_pwr>	The result of converting <agc_val> to receiving power level in dBm. In WCDMA mode, the range is -50dBm~-100dBm. If the receiving power exceeds -50dBm, <agc_to_pwr> will always be -50dBm. In LTE mode, the range is -50dBm~-85dBm.	

NOTES

1. The receiving performance test of GSM bands is not supported currently.
2. The result of **AT+QRXFTM** is an instantaneous value.
3. In LTE mode: **<agc_to_pwr>=<agc_val>/10**
4. The number of downlink channels under LTE BAND41 and 100M is 40240~41240.
5. This command requires advanced factory test mode, and it is recommended to exit from the mode after completing the test of this command.
6. For LTE/WCDMA modes, it is recommended to use the CW (Continuous Wave) signal for receiving performance test and set the frequency of the CW signal to 500KHz offset from the central frequency of the receiving test.

Example

```

AT+QRFTESTMODE=1           //Enter into FTM.
OK
AT+QRXFTM=0,3,10713,0,0,0 //Test downlink frequency10713 (WCDMA BAND1).
+QRXFTM: -176,-65

OK
AT+ QRFTESTMODE =0        //Exit from FTM.
OK

```

2.2.1. Instrument Setting

Signal sources that transmit continuous waves can be used as the downlink CW signals. If CMW500 is used as a signal source, the following settings can be applied:

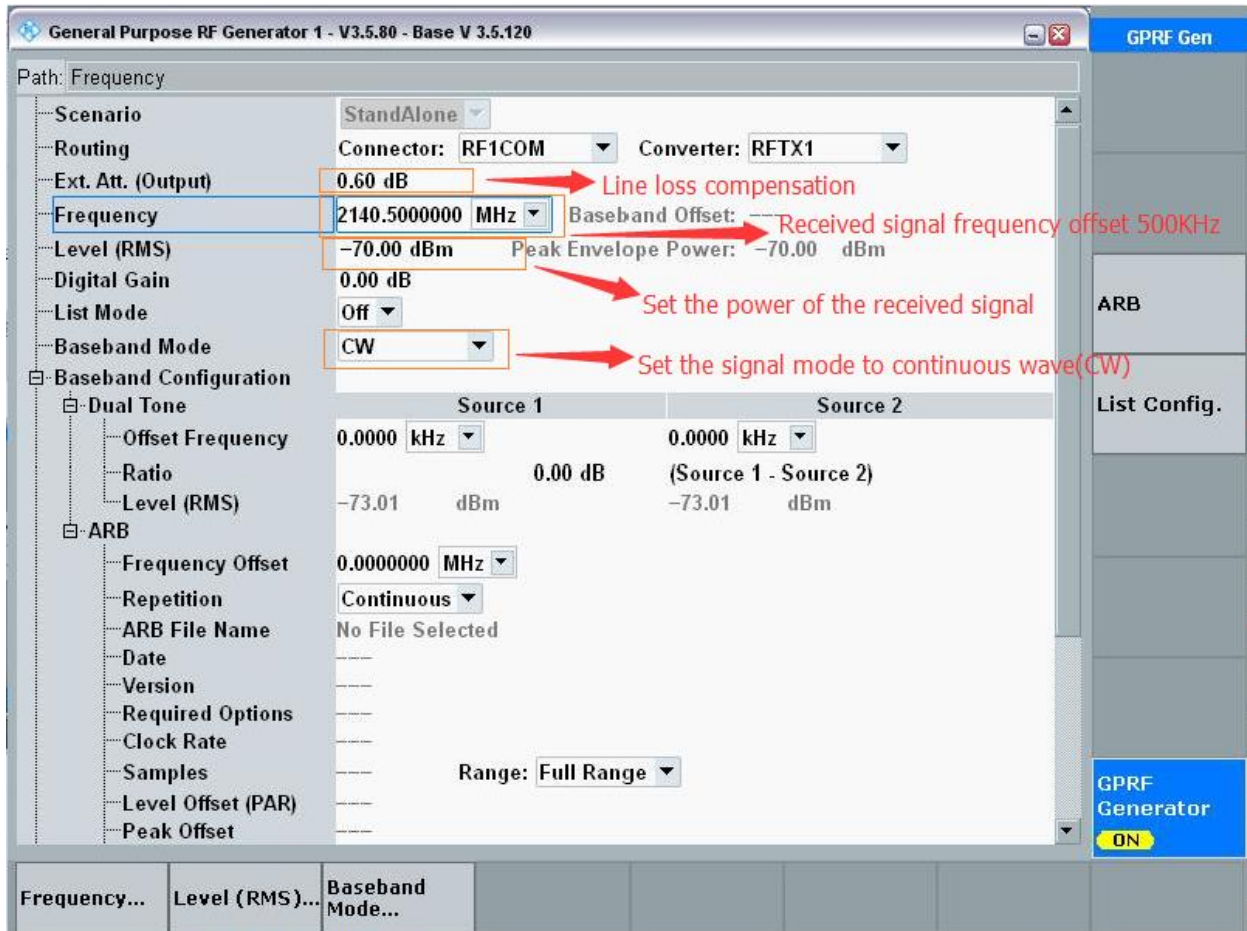


Figure 1: Recommended CMW500 Settings

2.3. AT+QRFTEST Force to Transmit in FTM

AT+QRFTEST Force to Transmit in FTM	
Test command AT+QRFTEST=?	Response OK
Write command In GSM: AT+QRFTEST =<band>,<channel>,<tx_enable>,<tx_burst>,<rgi>	Response OK
In WCDMA: AT+QRFTEST=<band>,<channel>,<tx_enable>,<tx_pdm_adj>,<waveform>	If there is any error: +CME ERROR: <err>
In LTE:	

AT+QRFTEST=<band>,<channel>,<tx
_enable>,<tx_gain_index>,<wavefor
m>

Reference

Parameter

<band>	
	"GSM850"
	"GSM900"
	"GSM1800"
	"GSM1900"
	"WCDMA BAND1"
	"WCDMA BAND2"
	"WCDMA BAND3"
	"WCDMA BAND4"
	"WCDMA BAND5"
	"WCDMA BAND6"
	"WCDMA BAND7"
	"WCDMA BAND8"
	"WCDMA BAND9"
	"WCDMA BAND19"
	"LTE BAND1"
	"LTE BAND2"
	"LTE BAND3"
	"LTE BAND4"
	"LTE BAND5"
	"LTE BAND7"
	"LTE BAND8"
	"LTE BAND9"
	"LTE BAND10"
	"LTE BAND11"
	"LTE BAND12"
	"LTE BAND13"
	"LTE BAND14"
	"LTE BAND17"
	"LTE BAND18"
	"LTE BAND19"
	"LTE BAND20"
	"LTE BAND25"
	"LTE BAND26"
	"LTE BAND28"
	"LTE BAND34"
	"LTE BAND38"

	“LTE BAND39”
	“LTE BAND40”
	“LTE BAND41”
	“LTE BAND66”
	“LTE BAND71”
<channel>	Number of GSM uplink channels:
	GSM850 128~251
	GSM900 0~124,975~1023
	GSM1800 512~885
	GSM1900 512~810
	Number of WCDMA uplink channels:
	WCDMA BAND1 9612~9888
	WCDMA BAND2 9262~9538
	WCDMA BAND3 937~1288
	WCDMA BAND4 1312~1513
	WCDMA BAND5 4132~4233
	WCDMA BAND6 4162~4188
	WCDMA BAND7 2012~2338
	WCDMA BAND8 2712~2863
	WCDMA BAND9 8762~8912
	WCDMA BAND19 312~363
	Number of LTE uplink channels:
	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 BAND9 21800-22149
	LTE BAND10 22150-22749
	LTE BAND11 22750-22949
	LTE BAND12 23010-23179
	LTE BAND13 23180-23279
	LTE BAND14 23280-23379
	LTE BAND17 23730-23849
	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 36200-35349
	LTE BAND38 37750-38249

	LTE BAND39	38250-38649
	LTE BAND40	38650-39649
	LTE BAND41	40240-41240
	LTE BAND66	131972-132671
	LTE BAND71	133122-133471
<tx_enable>	“ON”	Enable RF transmitting
	“OFF”	Disable RF transmitting
<tx_burst>	Transmitting burst. The default value is 0.	
<waveform>	Waveform. The value is 1 in WCDMA/LTE modes.	
<rgi>	The range of GSM transmitting power is 0~3000.	
<tx_pdm_adj>	The range of WCDMA transmitting power is 0~100.	
<tx_gain_index>	The range of LTE transmitting power is 0~100.	

NOTES

1. The number of downlink channels under LTE BAND41 and 100M is 40240~41240.
2. This command requires advanced factory test mode, and it is recommended to exit from the mode after completing the test of this command.
3. <tx_pdm_adj>/<tx_gain_index> is the index value of UE output power, not the specific power value. The output power value corresponding to the modified index value is determined by RF calibration.

<tx_pdm_adj>/<tx_gain_index>	UE Output Power Value
46	About 0dBm
54	About 10.2dBm
62	About 20dBm
70	About 28dBm

The Table is for reference only. The actual output power of UE vary with the RF calibration of the module.

4. Please do not test the bands that the modules do not support, otherwise the modules will crash.

Example

```

AT+QRFTESTMODE=1 //Enable RF test mode
OK
AT+QRFTEST= "LTE BAND3",19300,"ON",50,1 //Enable RF transmitter on 19300 channel of LTE
band 3 with transmit gain index of 50
OK
AT+QRFTESTMODE=0 //Exit from FTM
OK

```