

Tune Up Procedure

Tune-up procedure

LTE TEST

Measurement Procedure:

LTE

1.Connect EUT with CMU200(E5515C)/CMW500, through RF cable. Make a call from CMU200(E5515C)/CMW500;

2.Measure the Output Power Average value;

3.Remarks: All Output Power are tested in Average Value specification.

For WIFI/BT

1: Connect to Power meter (NRVD) through RF cable and let the EUT Continuously transmit

2: Measure the Output Power Average value

Manufacturing tolerance

LTE Band 2						
BW:1.4MHz [<RB=1>]						
Channel	Channel 18607		Channel 18900		Channel 19193	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.5	23.0	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 18607		Channel 18900		Channel 19193	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	23.0	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=1>]						
Channel	Channel 18615		Channel 18900		Channel 19185	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.5	22.0	21.5	23.0	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 18615		Channel 18900		Channel 19185	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.5	21.0	20.5	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=1>]						
Channel	Channel 18625		Channel 18900		Channel 19175	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.5	21.0	23.0	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 18625		Channel 18900		Channel 19175	

	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.5	21.5	20.5	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=1>]						
Channel	Channel 18650		Channel 18900		Channel 19150	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.5	22.5	21.5	23.0	22.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 18650		Channel 18900		Channel 19150	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.0	21.5	20.5	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:15MHz [<RB=1>]						
Channel	Channel 18675		Channel 18900		Channel 19125	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	23.0	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:15MHz [<RB=37>, <RB=75>]						
Channel	Channel 18675		Channel 18900		Channel 19125	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	21.0	21.0	21.0	21.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:20MHz [<RB=1>]						
Channel	Channel 18700		Channel 18900		Channel 19100	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.5	21.0	22.5	22.0	23.0	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:20MHz [<RB=50>, <RB=100>]						
Channel	Channel 18700		Channel 18900		Channel 19100	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	21.0	21.0	20.5	22.0	20.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1

LTE Band 4

BW:1.4MHz [<RB=1>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.5	21.0	22.0	21.5	22.0	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	21.5	20.5

Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=1>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.5	20.5	22.0	21.0	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.0	21.0	20.0	21.0	20.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=1>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.5	20.5	22.0	21.0	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	20.5	19.5	21.0	20.0	21.0	20.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=1>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.0	21.0	20.0	22.0	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.0	21.0	20.0	20.5	20.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:15MHz [<RB=1>]						
Channel	Channel 20025		Channel 20175		Channel 20325	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	22.0	21.0	22.0	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:15MHz [<RB=37>, <RB=75>]						
Channel	Channel 20025		Channel 20175		Channel 20325	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	20.5	21.0	21.0	21.0	21.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:20MHz [<RB=1>]						
Channel	Channel 20050		Channel 20175		Channel 20300	

	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.5	22.5	22.0	22.0	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:20MHz [<RB=50>, <RB=100>]						
Channel	Channel 20050		Channel 20175		Channel 20300	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	21.0	20.0	21.0	20.0	21.0	20.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1

LTE Band 5

BW:1.4MHz [<RB=1>]						
Channel	Channel 20407		Channel 20525		Channel 20643	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.5	21.5	23.0	22.0
±(dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 20407		Channel 20525		Channel 20643	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.5	21.5	22.5	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=1>]						
Channel	Channel 20415		Channel 20525		Channel 20635	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	23.0	21.5	22.5	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 20415		Channel 20525		Channel 20635	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	22.0	21.5	21.5	22.5	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=1>]						
Channel	Channel 20425		Channel 20525		Channel 20625	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	23.0	22.0	22.0	22.0	22.5	21.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 20425		Channel 20525		Channel 20625	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	21.5	20.5	21.5	20.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=1>]						
Channel	Channel 20450		Channel 20525		Channel 20600	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM

Target (dBm)	23.0	22.0	22.5	21.5	22.5	22.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20450		Channel 20525		Channel 20600	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	22.0	21.0	21.5	21.0	21.5	21.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1

LTE Band 12

BW:1.4MHz [<RB=1>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	24.0	23.5	24.0	24.0	24.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:1.4MHz [<RB=3>, <RB=6>]						
Channel	Channel 19957		Channel 20175		Channel 20393	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	24.0	24.0	24.0	23.5	23.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=1>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	24.0	23.5	24.0	23.5	24.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:3MHz [<RB=8>, <RB=15>]						
Channel	Channel 19965		Channel 20175		Channel 20385	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	23.0	23.5	23.0	24.0	23.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=1>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	24.0	24.0	23.5	23.5	23.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:5MHz [<RB=12>, <RB=25>]						
Channel	Channel 19975		Channel 20175		Channel 20375	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	22.5	23.5	22.5	23.5	22.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=1>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	23.5	24.0	24.0	24.0	24.5

Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1
BW:10MHz [<RB=25>, <RB=50>]						
Channel	Channel 20000		Channel 20175		Channel 20350	
	QPSK	16QAM	QPSK	16QAM	QPSK	16QAM
Target (dBm)	24.0	22.5	23.5	23.0	23.5	23.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1	-3/+1

WiFi 2.4G

802.11b (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	20.0	20.5	20.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11g (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	11.5	15.0	16.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n HT20 (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	13.5	15.0	16.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n HT40 (Average)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	12.5	16.5	12.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1

WiFi 5.2G

802.11a (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.5	13.0	12.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n(20MHz) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	12.0	12.5	12.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n(40MHz) (Average)			
Channel	Channel 38	Channel 46	
Target (dBm)	12.5	12.5	
Tolerance (dB)	-3/+1	-3/+1	
802.11ac(20MHz) (Average)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	13.0	13.0	12.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11ac(40MHz) (Average)			

Channel	Channel 38	Channel 46
Target (dBm)	12.5	12.5
Tolerance (dB)	-3/+1	-3/+1

WLAN 5.3G

IEEE 802.11a (Average)			
Channel	Channel 52	Channel 56	Channel 64
Target (dBm)	12.5	12.5	12.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1
IEEE 802.11n HT20 (Average)			
Channel	Channel 52	Channel 56	Channel 64
Target (dBm)	12.0	12.0	12.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1
IEEE 802.11n HT40 (Average)			
Channel	Channel 52	Channel 56	
Target (dBm)	9.5	9.5	
Tolerance (dB)	-3/+1	-3/+1	
IEEE 802.11acVHT20 (Average)			
Channel	Channel 64	Channel 54	Channel 62
Target (dBm)	13.0	12.5	12.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
IEEE 802.11ac VHT40 (Average)			
Channel	Channel 54	Channel 62	
Target (dBm)	11.0	10.5	
Tolerance (dB)	-3/+1	-3/+1	

WiFi 5.8G

802.11a (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	6.5	10.5	8.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n(20MHz) (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	7.0	9.0	7.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11n(40MHz) (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	13.5	12.5	
Tolerance (dB)	-3/+1	-3/+1	
802.11ac(20MHz) (Average)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	7.0	9.0	7.5

Tolerance (dB)	-3/+1	-3/+1	-3/+1
802.11ac(40MHz) (Average)			
Channel	Channel 151	Channel 159	
Target (dBm)	13.0	13.5	
Tolerance (dB)	-3/+1	-3/+1	

Bluetooth V4.2

BLE-GFSK (Average)			
Channel	Channel 0	Channel 19	Channel 39
Target (dBm)	0.5	0.0	0.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1
GFSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5.0	4.5	4.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1
$\pi/4$DQPSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5.0	5.0	5.0
Tolerance (dB)	-3/+1	-3/+1	-3/+1
$\pi/4$DQPSK (Average)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	5.5	5.5	5.5
Tolerance (dB)	-3/+1	-3/+1	-3/+1

Tune Up Procedure

1. RX Gain Calibration
 - a. Put DUT in test mode
 - b. Put DUT in BCH mode
 - c. Put DUT in selected channel band
 - d. Total gain chain calibration at center ARFCN
 - e. Frequency Ripple calibration
 - f. Complete RX_AGC Gain table

2. TX Power Calibration
 - a. Put DUT in test mode
 - b. Put DUT in BCH mode
 - c. Put DUT in selected channel band
 - d. Total gain chain calibration at center ARFCN
 - e. Frequency Ripple calibration
 - f. Complete TX_APC Gain table

3. AFC calibration
 - a. Put DUT in test mode
 - b. Put DUT in selected channel mode
 - c. Calibration AFC at center ARFCN
 - d. Complete AFC result table