



## Tune Up Procedure

### Tune-up procedure

GSM/WCDMA/LTE TEST

Measurement Procedure:

GSMWCDMA/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

#### The conducted power measurement results for GSM900/DCS1800

GSM900	Conducted Power (dBm)			Tune up (dBm)
	Channel 124 (914.80MHz)	Channel 63 (902.60MHz)	Channel 975 (880.20MHz)	
	32.53	32.48	32.48	
DCS1800	Conducted Power (dBm)			Tune up (dBm)
	Channel 885 (1784.80MHz)	Channel 698 (1747.40MHz)	Channel 512 (1710.20MHz)	
	29.54	29.49	29.51	

#### The conducted power measurement results for GPRS

GPRS 900 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculation (dB)	Averaged Power (dBm)			Tune up (dBm)
	880.2 MHz	902.6 MHz	914.8 MHz			880.2 MHz	902.6 MHz	914.8 MHz	
1 Txslot	30.05	29.97	30.09	31.00	-9.03	21.02	20.94	21.06	21.97
2 Txslot	28.58	28.47	28.53	29.00	-6.02	22.56	22.45	22.51	22.98
3 Txslot	26.18	26.08	26.23	27.00	-4.26	21.92	21.82	21.97	22.74
4 Txslot	25.45	25.43	25.55	26.00	-3.01	22.44	22.42	22.54	22.99
GPRS 1800 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculation (dB)	Averaged Power (dBm)			Tune up (dBm)
	1710.2 MHz	1747.4 MHz	1784.8 MHz			1710.2 MHz	1747.4 MHz	1784.8 MHz	
1 Txslot	28.28	28.24	28.18	29.00	-9.03	19.25	19.21	19.15	19.97
2 Txslot	26.24	26.38	26.34	27.00	-6.02	20.22	20.36	20.32	20.98
3 Txslot	23.56	23.57	23.59	24.00	-4.26	19.30	19.31	19.33	19.74
4 Txslot	21.05	21.10	21.02	22.00	-3.01	18.04	18.09	18.01	18.99



Shenzhen LCS Compliance Testing Laboratory Ltd.

Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street, Bao'an District, Shenzhen, Guangdong, China

Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com

Scan code to check authenticity

*The conducted power measurement results for EGPRS*

EGPRS 900 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculation (dB)	Averaged Power (dBm)			Tune up (dBm)
	880.2 MHz	902.6 MHz	914.8 MHz			880.2 MHz	902.6 MHz	914.8 MHz	
1 Txslot	26.09	26.12	26.21	27.00	-9.03	17.06	17.09	17.18	17.97
2 Txslot	25.48	25.43	25.49	26.00	-6.02	19.46	19.41	19.47	19.98
3 Txslot	22.48	22.39	22.42	23.00	-4.26	18.22	18.13	18.16	18.74
4 Txslot	20.71	20.84	20.72	21.00	-3.01	17.70	17.83	17.71	17.99
EGPRS 1800 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculation (dB)	Averaged Power (dBm)			Tune up (dBm)
	1710.2 MHz	1747.4 MHz	1784.8 MHz			1710.2 MHz	1747.4 MHz	1784.8 MHz	
1 Txslot	26.22	26.32	26.30	27.00	-9.03	17.19	17.29	17.27	17.97
2 Txslot	23.67	23.54	23.62	24.00	-6.02	17.65	17.52	17.60	17.98
3 Txslot	21.02	20.97	21.10	22.00	-4.26	16.76	16.71	16.84	17.74
4 Txslot	20.56	20.59	20.54	21.00	-3.01	17.55	17.58	17.53	17.99

*The conducted power measurement results for WCDMA*

Item	band	FDD Band VIII result (dBm)				FDD Band I result (dBm)			
		Test Channel			Tune Up (dBm)	Test Channel			Tune Up (dBm)
	sub-test	2713	2788	2862		9612	9750	9888	
5.2(WCDMA)	\	23.32	23.34	23.35	24.00	23.21	23.24	23.21	24.00
5.2AA (HSDPA)	1	22.17	22.12	22.05	23.00	22.79	22.79	22.76	23.00
	2	21.84	22.00	21.70	22.50	22.73	22.73	22.45	23.00
	3	21.83	21.60	21.66	22.00	22.41	22.61	22.43	23.00
	4	21.63	21.35	21.41	22.00	22.12	22.49	22.39	23.00
5.2B (HSUPA)	1	22.09	22.13	22.11	23.00	22.57	22.56	22.58	23.00
	2	22.18	21.95	21.90	22.50	22.50	22.50	22.36	23.00
	3	22.00	21.87	21.60	22.50	22.57	22.40	22.17	23.00
	4	21.99	21.74	21.50	22.00	22.65	22.29	21.98	23.00
	5	21.70	21.60	21.29	22.00	22.73	22.31	21.89	23.00



**The conducted power measurement results for WLAN 2.4G**

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune Up (dBm)
			(dBm)	
802.11b	1	2412	16.56	17.00
	7	2442	16.49	17.00
	13	2472	16.57	17.00
802.11g	1	2412	15.87	16.00
	7	2442	15.99	16.00
	13	2472	15.65	16.00
802.11n(20MHz)	1	2412	15.16	16.00
	7	2442	15.84	16.00
	13	2472	15.46	16.00
802.11n(40MHz)	1	2412	14.79	15.00
	7	2442	14.56	15.00
	13	2472	14.43	15.00

**The conducted power measurement results for WLAN 5.2G**

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm) ANT6	Tune Up (dBm)
802.11a	36	5180	12.16	12.50
	40	5200	12.14	12.50
	48	5240	12.12	12.50
802.11n(20MHz)	36	5180	11.89	12.00
	40	5200	11.87	12.00
	48	5240	11.86	12.00
802.11ac(20MHz)	36	5180	12.21	12.50
	40	5200	12.20	12.50
	48	5240	12.17	12.50
802.11n(40MHz)	38	5190	12.09	12.50
	46	5230	12.08	12.50
802.11ac(40MHz)	38	5190	11.99	12.00
	46	5230	11.96	12.00
802.11ac(80MHz)	42	5210	12.31	13.00



**The conducted power measurement results for WLAN 5.8G**

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm) ANT6	Tune Up (dBm)
802.11a	149	5745	10.11	11.00
	157	5785	10.09	11.00
	165	5825	10.08	11.00
802.11n(20MHz)	149	5745	10.89	11.00
	157	5785	10.88	11.00
	165	5825	10.87	11.00
802.11ac(20MHz)	149	5745	10.82	11.00
	157	5785	10.81	11.00
	165	5825	10.79	11.00
802.11n(40MHz)	151	5755	10.67	11.00
	159	5795	10.66	11.00
802.11ac(40MHz)	151	5755	10.68	11.00
	159	5795	10.67	11.00
802.11ac(80MHz)	155	5775	10.48	11.00

**The conducted power measurement results for Bluetooth**

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune Up (dBm)
			(dBm)	
BLE_1M	00	2402	-0.31	0.00
	19	2440	0.16	1.00
	39	2480	0.09	1.00
BLE_2M	00	2402	-0.22	0.00
	19	2440	0.25	1.00
	39	2480	0.19	1.00
GFSK	00	2402	3.47	4.00
$\pi/4$ -DQPSK	00	2402	2.94	3.00
8DPSK	00	2402	2.96	3.00



**The conducted power measurement results for LTE****LTE-BAND1**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 1					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	22.33	23.00
			8RB#0	22.28	23.00
	Mid Range	1	1RB#0	22.42	23.00
			8RB#0	22.49	23.00
	High Range	1	1RB#24	22.40	23.00
			8RB#17	22.43	23.00
20MHz	Low Range	1	1RB#0	22.07	23.00
			18RB#0	22.02	23.00
	Mid Range	1	1RB#0	22.06	23.00
			18RB#0	22.13	23.00
	High Range	1	1RB#99	22.16	23.00
			18RB#82	22.24	23.00



**LTE-BAND3**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 3					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
1.4MHz	Low Range	1	1RB#0	22.54	23.00
	Mid Range	1	1RB#0	22.36	23.00
	High Range	1	1RB#0	22.28	23.00
			5RB#0	22.36	23.00
5MHz	Low Range	1	1RB#0	22.40	23.00
			1RB#24	22.32	23.00
	Mid Range	1	1RB#0	22.34	23.00
			1RB#24	22.36	23.00
	High Range	1	1RB#0	22.26	23.00
			1RB#24	22.18	23.00
20MHz	Low Range	1	1RB#0	22.18	23.00
			1RB#99	22.07	23.00
	Mid Range	1	1RB#0	21.92	23.00
			1RB#99	22.18	23.00
	High Range	1	1RB#0	22.22	23.00
			1RB#99	21.89	23.00
			18RB#0	22.27	23.00



**LTE-BAND7**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 7					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	22.21	23.00
			1RB#24	22.23	23.00
	Mid Range	1	1RB#0	23.41	24.00
			1RB#24	23.40	24.00
	High Range	1	1RB#0	22.19	23.00
			1RB#24	22.19	23.00
			8RB#0	22.28	23.00
20MHz	Low Range	1	1RB#0	22.09	23.00
			1RB#99	22.19	23.00
	Mid Range	1	1RB#0	22.61	23.00
			1RB#99	23.17	24.00
	High Range	1	1RB#0	22.07	23.00
			1RB#99	22.09	23.00
			18RB#0	22.20	23.00





**LTE-BAND8**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 8					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
1.4MHz	Low Range	1	1RB#0	24.25	25.00
	Mid Range	1	1RB#0	24.13	25.00
	High Range	1	1RB#0	24.36	25.00
			5RB#0	24.40	25.00
5MHz	Low Range	1	1RB#0	24.11	25.00
			1RB#24	24.21	25.00
	Mid Range	1	1RB#0	24.07	25.00
			1RB#24	24.07	25.00
	High Range	1	1RB#0	24.26	25.00
			1RB#24	24.24	25.00
10MHz	Low Range	1	1RB#0	24.18	25.00
			1RB#49	24.29	25.00
	Mid Range	1	1RB#0	24.28	25.00
			1RB#49	24.20	25.00
	High Range	1	1RB#0	24.38	25.00
			1RB#49	24.22	25.00
			12RB#0	24.37	25.00





**LTE-BAND20**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 20					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	24.93	25.00
			1RB#24	24.90	25.00
	Mid Range	1	1RB#0	24.75	25.00
			1RB#24	24.57	25.00
	High Range	1	1RB#0	24.87	25.00
			1RB#24	24.85	25.00
			8RB#0	24.95	25.00
20MHz	Low Range	1	1RB#0	24.67	25.00
			1RB#99	24.70	25.00
	Mid Range	1	1RB#0	24.72	25.00
			1RB#99	24.45	25.00
	High Range	1	1RB#0	24.55	25.00
			1RB#99	24.55	25.00
			18RB#0	24.72	25.00



**LTE-BAND28**

<b>The Conducted Power Measurement Result for LTE Band</b>					
<b>Test Result for LTE Band 28</b>					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
3MHz	Low Range	1	1RB#0	24.73	25.00
			4RB#0	24.83	25.00
	Mid Range	1	1RB#0	24.64	25.00
			4RB#0	24.57	25.00
	High Range	1	1RB#14	24.71	25.00
			4RB#11	24.70	25.00
5MHz	Low Range	1	1RB#0	24.69	25.00
			8RB#0	24.63	25.00
	Mid Range	1	1RB#0	24.55	25.00
			8RB#0	24.55	25.00
	High Range	1	1RB#24	24.70	25.00
			8RB#17	24.69	25.00
20MHz	Low Range	1	1RB#0	24.51	25.00
			18RB#0	24.39	25.00
	Mid Range	1	1RB#0	24.36	25.00
			18RB#0	24.42	25.00
	High Range	1	1RB#99	24.46	25.00
			18RB#82	24.58	25.00



**LTE-BAND38****The Conducted Power Measurement Result for LTE Band****Test Result for LTE Band 38**

Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	22.89	23.00
			8RB#0	22.88	23.00
	Mid Range	1	1RB#0	22.42	23.00
			8RB#0	22.50	23.00
	High Range	1	1RB#24	22.31	23.00
			8RB#17	22.35	23.00
20MHz	Low Range	1	1RB#0	22.70	23.00
			18RB#0	22.73	23.00
	Mid Range	1	1RB#0	22.26	23.00
			18RB#0	22.44	23.00
	High Range	1	1RB#99	22.17	23.00
			18RB#82	22.27	23.00



**LTE-BAND40**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 40					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
5MHz	Low Range	1	1RB#0	22.06	22.50
			8RB#0	22.15	22.50
	Mid Range	1	1RB#0	21.73	22.50
			8RB#0	21.80	22.50
	High Range	1	1RB#24	21.40	22.50
			8RB#17	21.52	22.50
20MHz	Low Range	1	1RB#0	21.94	22.50
			18RB#0	22.02	22.50
	Mid Range	1	1RB#0	21.66	22.50
			18RB#0	21.85	22.50
	High Range	1	1RB#99	21.35	22.50
			18RB#82	21.46	22.50

**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



Shenzhen LCS Compliance Testing Laboratory Ltd.  
Add: Room 101, 201, Building A and Room 301, Building C, Juji Industrial Park, Yabianxueziwei, Shajing Street,  
Bao'an District, Shenzhen, Guangdong, China  
Tel: +(86) 0755-82591330 | E-mail: webmaster@lcs-cert.com | Web: www.lcs-cert.com  
Scan code to check authenticity