



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)	
	32.60	32.55	32.51	
DCS1800	Conducted Power (dBm)			Tune up (dBm)
	Channel 885 (1784.80MHz)	Channel 698 (1747.40MHz)	Channel 512 (1710.20MHz)	
	29.57	29.53	29.57	

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	29.97	30.07	30.11	31.00	-9.03	20.94	21.04	21.08	21.97
2 Txslot	28.59	28.51	28.46	29.00	-6.02	22.57	22.49	22.44	22.98
3 Txslot	26.16	26.10	26.28	27.00	-4.26	21.90	21.84	22.02	22.74
4 Txslot	25.51	25.39	25.64	26.00	-3.01	22.50	22.38	22.63	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	28.30	28.29	28.24	29.00	-9.03	19.27	19.26	19.21	19.97
2 Txslot	26.14	26.35	26.28	27.00	-6.02	20.12	20.33	20.26	20.98



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Txslot									
3 Txslot	23.49	23.59	23.63	24.00	-4.26	19.23	19.33	19.37	19.74
4 Txslot	21.07	21.17	21.08	22.00	-3.01	18.06	18.16	18.07	18.99

The conducted power measurement results for EGPRS

EGPRS 900 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculatio n (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	26.14	26.07	26.17	27.00	-9.03	17.11	17.04	17.14	17.97
2 Txslot	25.44	25.38	25.53	26.00	-6.02	19.42	19.36	19.51	19.98
3 Txslot	22.51	22.41	22.37	23.00	-4.26	18.25	18.15	18.11	18.74
4 Txslot	20.70	20.91	20.71	21.00	-3.01	17.69	17.90	17.70	17.99
EGPRS 1800 (GMSK)	Measured Power (dBm)			Tune up (dBm)	Calculatio n (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	26.31	26.40	26.39	27.00	-9.03	17.28	17.37	17.36	17.97
2 Txslot	23.75	23.54	23.65	24.00	-6.02	17.73	17.52	17.63	17.98
3 Txslot	20.94	21.01	21.02	22.00	-4.26	16.68	16.75	16.76	17.74
4 Txslot	20.48	20.58	20.55	21.00	-3.01	17.47	17.57	17.54	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)	\	23.30	23.35	23.29	24.00	23.19	23.11	23.12	24.00
5.2AA (HSDPA)	1	22.11	22.15	22.10	23.00	22.83	22.91	22.87	23.00
	2	21.99	21.95	21.93	22.00	22.45	22.76	22.82	23.00
	3	21.86	21.70	21.81	22.00	22.16	22.41	22.75	23.00
	4	21.76	21.46	21.60	22.00	21.89	22.23	22.70	23.00
5.2B (HSUPA)	1	22.14	22.17	22.11	23.00	22.59	22.63	22.57	23.00
	2	22.08	22.02	22.13	23.00	22.41	22.73	22.27	23.00
	3	21.79	21.93	21.85	22.00	22.43	22.59	22.26	23.00
	4	21.59	21.80	21.84	22.00	22.26	22.38	22.12	23.00
	5	21.46	21.69	21.77	22.00	22.15	22.27	22.02	23.00



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

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune Up (dBm)
			(dBm)	
802.11b	1	2412	14.16	14.50
	7	2442	13.31	14.50
	13	2472	12.58	14.50
802.11g	1	2412	12.66	13.00
	7	2442	12.09	13.00
	13	2472	12.05	13.00
802.11n(20MHz)	1	2412	12.79	13.00
	7	2442	11.92	13.00
	13	2472	11.98	13.00
802.11n(40MHz)	1	2412	11.24	11.50
	7	2442	10.63	11.50
	13	2472	10.57	11.50

The conducted power measurement results for WLAN 5.2G

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)	Tune Up (dBm)
802.11a	36	5180	11.55	12.00
	40	5200	11.53	12.00
	48	5240	11.52	12.00
802.11n(20MHz)	36	5180	11.67	12.00
	40	5200	11.65	12.00
	48	5240	11.62	12.00
802.11ac(20MHz)	36	5180	11.59	12.00
	40	5200	11.57	12.00
	48	5240	11.55	12.00
802.11n(40MHz)	38	5190	11.58	12.00
	46	5230	11.55	12.00
802.11ac(40MHz)	38	5190	11.30	12.00
	46	5230	11.26	12.00
802.11ac(80MHz)	42	5210	11.44	12.00



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

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)	Tune Up (dBm)
802.11a	149	5745	11.11	12.00
	157	5785	10.94	12.00
	165	5825	11.02	12.00
802.11n(20MHz)	149	5745	10.63	11.00
	157	5785	10.55	11.00
	165	5825	10.46	11.00
802.11ac(20MHz)	149	5745	10.84	11.00
	157	5785	10.71	11.00
	165	5825	10.77	11.00
802.11n(40MHz)	151	5755	10.52	11.00
	159	5795	10.42	11.00
802.11ac(40MHz)	151	5755	10.43	11.00
	159	5795	10.38	11.00
802.11ac(80MHz)	155	5775	10.69	11.00

The conducted power measurement results for Bluetooth

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune Up (dBm)
			(dBm)	
BLE_1M	00	2402	3.26	4.00
	19	2440	3.47	4.00
	39	2480	3.39	4.00
BLE_2M	00	2402	1.75	2.00
	19	2440	1.25	2.00
	39	2480	0.41	1.00

Condition	Mode	Packet Type	Conducted Output Power (dBm)	Tune Up (dBm)
NTNV	GFSK	DH5	-1.51	-1.00
NTNV	Pi/4DQPSK	2DH5	-2.03	-2.00
NTNV	8DPSK	3DH5	-2.07	-2.00



**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	22.26	23.00
			8RB#0	22.03	23.00
	Mid Range	1	1RB#0	21.99	23.00
			8RB#0	21.99	23.00
	High Range	1	1RB#24	21.71	23.00
			8RB#17	21.71	23.00
20MHz	Low Range	1	1RB#0	22.21	23.00
			18RB#0	22.07	23.00
	Mid Range	1	1RB#0	22.13	23.00
			18RB#0	22.11	23.00
	High Range	1	1RB#99	21.81	23.00
			18RB#82	21.70	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	22.44	23.00
	Mid Range	1	1RB#0	22.26	23.00
	High Range	1	1RB#0	22.48	23.00
			5RB#0	22.44	23.00
5MHz	Low Range	1	1RB#0	22.43	23.00
			1RB#24	22.33	23.00
	Mid Range	1	1RB#0	22.40	23.00
			1RB#24	22.44	23.00
	High Range	1	1RB#0	22.42	23.00
			1RB#24	22.48	23.00
20MHz	Low Range	1	1RB#0	22.53	23.00
			1RB#99	22.69	23.00
	Mid Range	1	1RB#0	22.76	23.00
			1RB#99	22.45	23.00
	High Range	1	1RB#0	22.66	23.00
			1RB#99	22.57	23.00
			18RB#0	22.32	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	22.04	23.00
			1RB#24	22.03	23.00
	Mid Range	1	1RB#0	22.25	23.00
			1RB#24	22.15	23.00
	High Range	1	1RB#0	21.93	23.00
			1RB#24	21.97	23.00
			8RB#0	21.79	23.00
20MHz	Low Range	1	1RB#0	22.16	23.00
			1RB#99	22.10	23.00
	Mid Range	1	1RB#0	22.41	23.00
			1RB#99	22.17	23.00
	High Range	1	1RB#0	21.98	23.00
			1RB#99	22.13	23.00
			18RB#0	21.88	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	23.32	24.00
	Mid Range	1	1RB#0	22.84	24.00
	High Range	1	1RB#0	23.11	24.00
			5RB#0	23.16	24.00
5MHz	Low Range	1	1RB#0	23.20	24.00
			1RB#24	23.13	24.00
	Mid Range	1	1RB#0	22.96	24.00
			1RB#24	22.62	24.00
	High Range	1	1RB#0	23.15	24.00
			1RB#24	23.14	24.00
10MHz	Low Range	1	1RB#0	23.16	24.00
			1RB#49	23.16	24.00
	Mid Range	1	1RB#0	23.17	24.00
			1RB#49	22.90	24.00
	High Range	1	1RB#0	23.21	24.00
			1RB#49	23.12	24.00
			12RB#0	23.12	24.00



**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	23.27	24.00
			1RB#24	23.23	24.00
	Mid Range	1	1RB#0	22.89	24.00
			1RB#24	23.05	24.00
	High Range	1	1RB#0	23.05	24.00
			1RB#24	23.03	24.00
			8RB#0	22.94	24.00
20MHz	Low Range	1	1RB#0	23.25	24.00
			1RB#99	23.04	24.00
	Mid Range	1	1RB#0	23.10	24.00
			1RB#99	22.99	24.00
	High Range	1	1RB#0	23.17	24.00
			1RB#99	23.10	24.00
			18RB#0	23.14	24.00



**LTE-BAND28**

The Conducted Power Measurement Result for LTE Band					
Test Result for LTE Band 28					
Channel Bandwidth	Channel	RB Allocation		Average Power (dBm, QPSK)	Tune Up (dBm)
		RB Size	RB Offset		
3MHz	Low Range	1	1RB#0	23.01	24.00
			4RB#0	23.10	24.00
	Mid Range	1	1RB#0	23.12	24.00
			4RB#0	23.01	24.00
	High Range	1	1RB#14	23.01	24.00
			4RB#11	23.11	24.00
5MHz	Low Range	1	1RB#0	23.19	24.00
			8RB#0	23.00	24.00
	Mid Range	1	1RB#0	23.06	24.00
			8RB#0	23.14	24.00
	High Range	1	1RB#24	23.10	24.00
			8RB#17	23.09	24.00
20MHz	Low Range	1	1RB#0	23.27	24.00
			18RB#0	23.09	24.00
	Mid Range	1	1RB#0	23.05	24.00
			18RB#0	23.09	24.00
	High Range	1	1RB#99	22.99	24.00
			18RB#82	22.89	24.00



**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	22.07	23.00
			8RB#0	22.18	23.00
	Mid Range	1	1RB#0	22.25	23.00
			8RB#0	22.23	23.00
	High Range	1	1RB#24	22.12	23.00
			8RB#17	22.19	23.00
20MHz	Low Range	1	1RB#0	21.89	23.00
			18RB#0	22.21	23.00
	Mid Range	1	1RB#0	22.24	23.00
			18RB#0	22.28	23.00
	High Range	1	1RB#99	22.00	23.00
			18RB#82	22.07	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	21.98	23.00
			8RB#0	22.04	23.00
	Mid Range	1	1RB#0	21.67	23.00
			8RB#0	21.62	23.00
	High Range	1	1RB#24	21.71	23.00
			8RB#17	21.61	23.00
20MHz	Low Range	1	1RB#0	21.90	23.00
			18RB#0	21.97	23.00
	Mid Range	1	1RB#0	21.83	23.00
			18RB#0	21.79	23.00
	High Range	1	1RB#99	21.51	23.00
			18RB#82	21.79	23.00





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

