



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)	
	32.52	32.42	32.44	
DCS1800	Conducted Power (dBm)			Tune up (dBm)
	Channel 885 (1784.80MHz)	Channel 698 (1747.40MHz)	Channel 512 (1710.20MHz)	
	29.63	29.67	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	30.09	30.06	29.94	30.50	-9.03	21.06	21.03	20.91	21.50
2 Txslot	28.53	28.61	28.52	29.00	-6.02	22.51	22.59	22.50	23.00
3 Txslot	26.21	26.22	26.26	26.50	-4.26	21.95	21.96	22.00	22.50
4 Txslot	25.46	25.47	25.42	25.50	-3.01	22.45	22.46	22.41	22.50
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	28.22	28.25	28.29	28.50	-9.03	19.19	19.22	19.26	19.50
2 Txslot	26.36	26.28	26.29	26.50	-6.02	20.34	20.26	20.27	20.50



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Txslot									
3 Txslot	23.62	23.53	23.57	24.00	-4.26	19.36	19.27	19.31	19.50
4 Txslot	20.94	21.02	21.00	21.50	-3.01	17.93	18.01	17.99	18.50

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	26.22	26.15	26.12	26.50	-9.03	17.19	17.12	17.09	17.50
2 Txslot	25.41	25.42	25.52	26.00	-6.02	19.39	19.40	19.50	20.00
3 Txslot	22.39	22.37	22.56	23.00	-4.26	18.13	18.11	18.30	18.50
4 Txslot	20.71	20.84	20.90	21.00	-3.01	17.70	17.83	17.89	18.00
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	26.29	26.34	26.24	26.50	-9.03	17.26	17.31	17.21	17.50
2 Txslot	23.71	23.55	23.58	24.00	-6.02	17.69	17.53	17.56	18.00
3 Txslot	21.02	21.04	21.08	21.50	-4.26	16.76	16.78	16.82	17.00
4 Txslot	20.51	20.59	20.46	21.00	-3.01	17.50	17.58	17.45	18.00

The conducted power measurement results for WCDMA

Item	band	FDD Band VIII result (dBm)			Tune up (dBm)	FDD Band I result (dBm)			Tune up (dBm)
		Test Channel				Test Channel			
	sub-test	2713	2788	2862		9612	9750	9888	
5.2(WCDMA)	\	23.56	23.51	23.48	24.00	23.51	23.58	23.54	24.00
5.2AA (HSDPA)	1	22.10	22.04	22.00	22.50	22.67	22.70	22.66	23.00
	2	22.01	22.02	21.81	22.50	22.29	22.42	22.49	23.00
	3	21.83	21.86	21.43	22.00	22.01	22.38	22.30	22.50
	4	21.70	21.85	21.14	22.00	21.68	22.04	22.14	22.50
5.2B (HSUPA)	1	21.98	21.96	21.95	22.00	22.31	22.34	22.29	22.50
	2	21.78	21.73	21.69	22.00	22.26	22.33	22.36	22.50
	3	21.73	21.62	21.48	22.00	22.09	22.05	22.24	22.50
	4	21.47	21.70	21.51	22.00	21.96	21.76	21.98	22.00
	5	21.55	21.41	21.57	22.00	21.68	21.59	21.80	22.00



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**LTE-BAND1**

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configure	Result (dBm)	Tune up (dBm)
NTNV	Band1	5MHz	QPSK	18025	1RB#0	20.73	21.00
NTNV	Band1	5MHz	QPSK	18025	8RB#0	20.62	21.00
NTNV	Band1	5MHz	QPSK	18300	1RB#0	21.15	22.00
NTNV	Band1	5MHz	QPSK	18300	8RB#0	21.34	22.00
NTNV	Band1	5MHz	QPSK	18575	1RB#24	20.43	21.00
NTNV	Band1	5MHz	QPSK	18575	8RB#17	20.34	21.00
NTNV	Band1	20MHz	QPSK	18100	1RB#0	20.53	21.00
NTNV	Band1	20MHz	QPSK	18100	18RB#0	20.41	21.00
NTNV	Band1	20MHz	QPSK	18300	1RB#0	20.42	21.00
NTNV	Band1	20MHz	QPSK	18300	18RB#0	20.61	21.00
NTNV	Band1	20MHz	QPSK	18500	1RB#99	21.30	22.00
NTNV	Band1	20MHz	QPSK	18500	18RB#82	21.45	22.00

LTE-BAND3

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configure	Result (dBm)	Tune up (dBm)
NTNV	Band3	1.4MHz	QPSK	19207	1RB#0	20.32	21.00
NTNV	Band3	1.4MHz	QPSK	19943	1RB#0	20.09	21.00
NTNV	Band3	1.4MHz	QPSK	19575	1RB#0	20.86	21.00
NTNV	Band3	1.4MHz	QPSK	19575	5RB#0	20.96	21.00
NTNV	Band3	5MHz	QPSK	19225	1RB#0	20.36	21.00
NTNV	Band3	5MHz	QPSK	19225	1RB#24	20.52	21.00
NTNV	Band3	5MHz	QPSK	19925	1RB#0	20.45	21.00
NTNV	Band3	5MHz	QPSK	19925	1RB#24	20.01	21.00
NTNV	Band3	5MHz	QPSK	19575	1RB#0	21.01	22.00
NTNV	Band3	5MHz	QPSK	19575	1RB#24	20.78	21.00
NTNV	Band3	5MHz	QPSK	19575	8RB#0	20.99	21.00
NTNV	Band3	20MHz	QPSK	19300	1RB#0	20.33	21.00
NTNV	Band3	20MHz	QPSK	19300	1RB#99	21.28	22.00
NTNV	Band3	20MHz	QPSK	19850	1RB#0	20.65	21.00
NTNV	Band3	20MHz	QPSK	19850	1RB#99	20.10	21.00
NTNV	Band3	20MHz	QPSK	19575	1RB#0	21.67	22.00
NTNV	Band3	20MHz	QPSK	19575	1RB#99	20.79	21.00



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NTNV	Band3	20MHz	QPSK	19575	18RB#0	21.43	22.00
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LTE-BAND7

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configure	Result (dBm)	Tune up (dBm)
NTNV	Band7	5MHz	QPSK	20775	1RB#0	20.09	21.00
NTNV	Band7	5MHz	QPSK	20775	1RB#24	19.70	20.00
NTNV	Band7	5MHz	QPSK	21425	1RB#0	20.19	21.00
NTNV	Band7	5MHz	QPSK	21425	1RB#24	20.81	21.00
NTNV	Band7	5MHz	QPSK	21100	1RB#0	21.14	22.00
NTNV	Band7	5MHz	QPSK	21100	1RB#24	21.01	22.00
NTNV	Band7	5MHz	QPSK	21100	8RB#0	21.13	22.00
NTNV	Band7	20MHz	QPSK	20850	1RB#0	19.96	20.00
NTNV	Band7	20MHz	QPSK	20850	1RB#99	19.71	20.00
NTNV	Band7	20MHz	QPSK	21350	1RB#0	19.55	20.00
NTNV	Band7	20MHz	QPSK	21350	1RB#99	20.54	21.00
NTNV	Band7	20MHz	QPSK	21100	1RB#0	21.58	22.00
NTNV	Band7	20MHz	QPSK	21100	1RB#99	21.06	22.00
NTNV	Band7	20MHz	QPSK	21100	18RB#0	21.73	22.00

LTE-BAND8

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configure	Result (dBm)	Tune up (dBm)
NTNV	Band8	1.4MHz	QPSK	21457	1RB#0	23.93	24.00
NTNV	Band8	1.4MHz	QPSK	21793	1RB#0	23.45	24.00
NTNV	Band8	1.4MHz	QPSK	21625	1RB#0	23.90	24.00
NTNV	Band8	1.4MHz	QPSK	21625	5RB#0	23.96	24.00
NTNV	Band8	5MHz	QPSK	21475	1RB#0	23.89	24.00
NTNV	Band8	5MHz	QPSK	21475	1RB#24	23.90	24.00
NTNV	Band8	5MHz	QPSK	21775	1RB#0	23.40	24.00
NTNV	Band8	5MHz	QPSK	21775	1RB#24	23.30	24.00
NTNV	Band8	5MHz	QPSK	21625	1RB#0	23.90	24.00
NTNV	Band8	5MHz	QPSK	21625	1RB#24	23.77	24.00
NTNV	Band8	5MHz	QPSK	21625	8RB#0	23.85	24.00
NTNV	Band8	10MHz	QPSK	21500	1RB#0	23.89	24.00
NTNV	Band8	10MHz	QPSK	21500	1RB#49	23.90	24.00
NTNV	Band8	10MHz	QPSK	21750	1RB#0	23.68	24.00



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NTNV	Band8	10MHz	QPSK	21750	1RB#49	23.38	24.00
NTNV	Band8	10MHz	QPSK	21625	1RB#0	23.93	24.00
NTNV	Band8	10MHz	QPSK	21625	1RB#49	23.71	24.00
NTNV	Band8	10MHz	QPSK	21625	12RB#0	23.93	24.00

LTE-BAND20

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configure	Result (dBm)	Tune up (dBm)
NTNV	Band20	5MHz	QPSK	24175	1RB#0	24.03	24.50
NTNV	Band20	5MHz	QPSK	24175	1RB#24	24.08	24.50
NTNV	Band20	5MHz	QPSK	24425	1RB#0	24.25	24.50
NTNV	Band20	5MHz	QPSK	24425	1RB#24	24.20	24.50
NTNV	Band20	5MHz	QPSK	24300	1RB#0	24.18	24.50
NTNV	Band20	5MHz	QPSK	24300	1RB#24	24.21	24.50
NTNV	Band20	5MHz	QPSK	24300	8RB#0	24.12	24.50
NTNV	Band20	20MHz	QPSK	24250	1RB#0	24.00	24.50
NTNV	Band20	20MHz	QPSK	24250	1RB#99	24.20	24.50
NTNV	Band20	20MHz	QPSK	24350	1RB#0	24.07	24.50
NTNV	Band20	20MHz	QPSK	24350	1RB#99	24.15	24.50
NTNV	Band20	20MHz	QPSK	24300	1RB#0	23.92	24.50
NTNV	Band20	20MHz	QPSK	24300	1RB#99	24.18	24.50
NTNV	Band20	20MHz	QPSK	24300	18RB#0	23.99	24.50



**LTE-BAND28-1**

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Tune up (dBm)
NTNV	Band28(703-733)	3MHz	QPSK	27225	1RB#0	23.60	24.00
NTNV	Band28(703-733)	3MHz	QPSK	27225	4RB#0	23.65	24.00
NTNV	Band28(703-733)	3MHz	QPSK	27360	1RB#0	23.73	24.00
NTNV	Band28(703-733)	3MHz	QPSK	27360	4RB#0	23.60	24.00
NTNV	Band28(703-733)	3MHz	QPSK	27495	1RB#14	23.54	24.00
NTNV	Band28(703-733)	3MHz	QPSK	27495	4RB#11	23.54	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27235	1RB#0	23.49	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27235	8RB#0	23.49	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27360	1RB#0	23.60	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27360	8RB#0	23.52	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27485	1RB#24	23.52	24.00
NTNV	Band28(703-733)	5MHz	QPSK	27485	8RB#17	23.59	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27310	1RB#0	23.58	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27310	18RB#0	23.51	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27360	1RB#0	23.61	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27360	18RB#0	23.61	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27410	1RB#99	23.42	24.00
NTNV	Band28(703-733)	20MHz	QPSK	27410	18RB#82	23.39	24.00



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**LTE-BAND28-2**

Condition	Band	Channel Bandwidth	Modulation	Channel	RB Configuration	Result (dBm)	Limit (dBm)
NTNV	Band28(718-748)	3MHz	QPSK	27375	1RB#0	23.71	24.00
NTNV	Band28(718-748)	3MHz	QPSK	27375	4RB#0	23.59	24.00
NTNV	Band28(718-748)	3MHz	QPSK	27510	1RB#0	23.57	24.00
NTNV	Band28(718-748)	3MHz	QPSK	27510	4RB#0	23.55	24.00
NTNV	Band28(718-748)	3MHz	QPSK	27645	1RB#14	23.54	24.00
NTNV	Band28(718-748)	3MHz	QPSK	27645	4RB#11	23.61	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27385	1RB#0	23.62	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27385	8RB#0	23.53	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27510	1RB#0	23.47	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27510	8RB#0	23.60	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27635	1RB#24	23.56	24.00
NTNV	Band28(718-748)	5MHz	QPSK	27635	8RB#17	23.45	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27460	1RB#0	23.65	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27460	18RB#0	23.60	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27510	1RB#0	23.46	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27510	18RB#0	23.59	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27560	1RB#99	23.48	24.00
NTNV	Band28(718-748)	20MHz	QPSK	27560	18RB#82	23.36	24.00



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

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune up (dBm)	Test Rate Data
			(dBm)		
802.11b	1	2412	11.77	12.00	1 Mbps
	7	2442	10.99	11.00	1 Mbps
	13	2472	10.55	11.00	1 Mbps
802.11g	1	2412	10.55	11.00	6 Mbps
	7	2442	9.99	10.00	6 Mbps
	13	2472	10.00	10.50	6 Mbps
802.11n(20MHz)	1	2412	10.01	10.50	6.5 Mbps
	7	2442	9.94	10.00	6.5 Mbps
	13	2472	10.01	10.50	6.5 Mbps
802.11n(40MHz)	3	2422	8.61	9.00	13 Mbps
	7	2442	8.16	8.50	13 Mbps
	11	2462	7.94	8.00	13 Mbps

The conducted power measurement results for WLAN 5.2G

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)	Tune up (dBm)
802.11a	36	5180	6.66	7.00
	40	5200	6.65	7.00
	48	5240	6.63	7.00
802.11n(20MHz)	36	5180	6.92	7.00
	40	5200	6.90	7.00
	48	5240	6.89	7.00
802.11ac(20MHz)	36	5180	6.88	7.00
	40	5200	6.85	7.00
	48	5240	6.83	7.00
802.11n(40MHz)	38	5190	7.30	7.50
	46	5230	7.26	7.50
802.11ac(40MHz)	38	5190	6.94	7.00
	46	5230	6.91	7.00
802.11ac(80MHz)	42	5210	7.32	7.50



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

Mode	Channel	Frequency (MHz)	Conducted Output Power(dBm)	Tune up (dBm)
802.11a	149	5745	6.16	6.50
	157	5785	6.12	6.50
	165	5825	6.10	6.50
802.11n(20MHz)	149	5745	6.03	6.50
	157	5785	6.01	6.50
	165	5825	6.00	6.50
802.11ac(20MHz)	149	5745	5.98	6.00
	157	5785	5.95	6.00
	165	5825	5.92	6.00
802.11n(40MHz)	151	5755	6.46	6.50
	159	5795	6.41	6.50
802.11ac(40MHz)	151	5755	6.43	6.50
	159	5795	6.39	6.50
802.11ac(80MHz)	155	5775	6.79	7.00

The conducted power measurement results for BluetoothV5.2

Mode	Channel	Frequency (MHz)	Conducted Output Power	Tune up (dBm)
			(dBm)	
BLE_1M	00	2402	-1.02	-1.00
	19	2440	-2.00	-1.50
	39	2480	-1.72	-1.50
BLE_2M	00	2402	-1.78	-1.50
	19	2440	-2.78	-2.50
	39	2480	-2.52	-2.50
GFSK	00	2402	0.49	0.50
	78	2480	0.57	1.00
$\pi/4$ -DQPSK	00	2402	-1.42	-1.00
	78	2480	-0.88	-0.50
8DPSK	00	2402	0.14	0.50
	78	2480	-0.08	0.00





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

