

M&M Electronics, S.A.

Tune-up (dBm) procedure

This is to formally certify that:

The tune up procedures of Smart phone (FCC ID: 2A67L-X7)

The tune up procedures of is not open to end user. The end user is not allowed to perform final tune. All the power and frequency set up were finished at the manufacturer stage.

Tune up procedure shall be over the power range or at specific operating power levels.

Procedure:

1. Set the phone to operational voltage and on one certain channel in a special service mode by means of company proprietary software.
2. The actual power is measured at several power levels.
3. The gain factors of each individual phone are adjusted via the Board-test SW using automatic adjustment arithmetic until the Tune-up Range (dBm) value is met.

It must provide an operational voltage (DC 3.85V by battery) to turn on the device and on one certain channel in service mode by means of company proprietary software. spectrum analyzer(Agilent, N9020A) and Power meter (DARE, RPR3006W)measures the 2.4G/5G device specific RF characteristics. Base station simulator (R&S CMW500) measures the 2G/3G/4G device specific RF characteristics. The maximum power of each individual channels are adjusted until the target value met.

Band GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune- up (dBm)	128	189	251	Tune- up (dBm)	128	189	251
Frequency (MHz)		824.2	836.4	848.8		824.2	836.4	848.8
GSM (GMSK)	33.00	32.77	32.92	32.74	23.97	23.74	23.89	23.71
GPRS(GMSK,1 Tx slot)	33.00	32.76	32.91	32.71	23.97	23.73	23.88	23.68
GPRS(GMSK,2 Tx slot)	31.00	30.74	30.83	30.64	24.98	24.72	24.81	24.62
GPRS(GMSK,3 Tx slot)	29.00	28.80	28.88	28.72	24.74	24.54	24.62	24.46
GPRS(GMSK,4 Tx slot)	27.00	26.58	26.65	26.56	23.99	23.57	23.64	23.55
EGPRS(8PSK,1 Tx slot)	27.00	25.72	26.69	25.96	17.97	16.69	17.66	16.93
EGPRS(8PSK,2 Tx slot)	26.00	25.31	25.53	25.25	19.98	19.29	19.51	19.23
EGPRS(8PSK,3 Tx slot)	23.00	21.97	22.86	22.43	18.74	17.71	18.60	18.17
EGPRS(8PSK,4 Tx	19.50	18.11	19.06	18.59	16.49	15.10	16.05	15.58

slot)								
Band GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	512	661	810	Tune-up (dBm)	512	661	810
Frequency (MHz)		1850.2	1880.0	1909.8		1850.2	1880.0	1909.8
GSM (GMSK)	30.50	30.24	30.05	30.10	21.47	21.21	21.02	21.07
GPRS(GMSK,1 Tx slot)	30.50	30.22	30.04	30.10	21.47	21.19	21.01	21.07
GPRS(GMSK,2 Tx slot)	28.00	27.99	27.72	27.49	21.98	21.97	21.70	21.47
GPRS(GMSK,3 Tx slot)	26.50	26.46	26.18	25.93	22.24	22.20	21.92	21.67
GPRS(GMSK,4 Tx slot)	24.50	24.43	24.15	23.88	21.49	21.42	21.14	20.87
EGPRS(8PSK,1 Tx slot)	27.50	26.92	27.34	25.63	18.47	17.89	18.31	16.60
EGPRS(8PSK,2 Tx slot)	26.00	25.77	25.57	23.55	19.98	19.75	19.55	17.53
EGPRS(8PSK,3 Tx slot)	24.00	23.51	23.78	21.12	19.74	19.25	19.52	16.86
EGPRS(8PSK,4 Tx slot)	20.50	20.43	20.39	17.16	17.49	17.42	17.38	14.15

Note: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 TS) - 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 TS) - 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 TS) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 TS) - 3.01 dB

Band	WCDMA Band 2			
Tx Channel	Tune-up	9262	9400	9538
Frequency (MHz)		1852.4	1880	1907.6
RMC 12.2Kbps	23.50	23.23	22.99	23.10
HSDPA Subtest-1	23.50	23.05	22.70	22.58
HSDPA Subtest-2	23.00	22.62	22.41	22.31
HSDPA Subtest-3	22.50	22.12	22.15	21.95
HSDPA Subtest-4	22.50	22.29	21.93	21.83
HSUPA Subtest-1	23.00	22.87	22.64	22.44
HSUPA Subtest-2	23.00	22.96	22.66	22.51
HSUPA Subtest-3	23.00	22.70	22.54	22.17
HSUPA Subtest-4	23.00	22.76	22.63	22.55
HSUPA Subtest-5	23.00	22.72	22.56	22.35
Band	WCDMA Band 5			
Tx Channel	Tune-up	4132	4182	4233
Frequency (MHz)		826.4	836.4	846.6
RMC12.2K	22.50	22.29	22.19	22.24
HSDPA Sub 1	22.50	22.40	21.94	22.23
HSDPA Sub 2	22.50	22.10	21.72	22.03
HSDPA Sub 3	22.00	21.77	21.44	21.87
HSDPA Sub 4	22.00	21.70	21.22	21.74
HSUPA Sub 1	22.50	22.22	21.66	22.18
HSUPA Sub 2	22.50	22.26	21.93	22.27
HSUPA Sub 3	22.00	21.81	21.51	21.89
HSUPA Sub 4	22.50	22.21	21.63	21.96
HSUPA Sub 5	22.50	22.00	21.54	22.19

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band 4	1.4MHz	QPSK	1	0	23.50	23.07	22.88	23.24
			1	2	23.50	23.05	23.01	23.29
			1	5	23.50	23.07	23.06	23.28
			3	0	23.50	22.93	23.10	23.11
			3	1	23.50	22.98	23.00	23.15
			3	2	23.50	22.94	23.07	23.09
			6	0	22.50	21.92	21.98	22.01
		16QAM	1	0	23.50	23.00	22.69	22.50
			1	2	23.50	22.95	22.72	22.50
			1	5	23.50	23.01	22.75	22.61
			3	0	22.50	22.20	22.17	22.43
			3	1	22.50	22.23	22.12	22.41

			3	2	22.50	22.22	22.15	22.41
			6	0	21.50	21.07	21.06	21.20
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band 4	3MHz	QPSK	1	0	23.50	22.72	22.97	22.89
			1	7	23.50	22.75	23.01	22.86
			1	14	23.50	22.70	23.02	22.88
			8	0	22.00	21.74	21.79	21.77
			8	4	22.00	21.78	21.80	21.83
			8	7	22.00	21.76	21.73	21.80
			15	0	22.00	21.73	21.76	21.80
		16QAM	1	0	22.50	22.43	22.13	22.41
			1	7	22.50	22.41	22.14	22.44
			1	14	22.50	22.45	22.16	22.45
			8	0	21.50	21.07	20.88	20.86
			8	4	21.50	21.09	20.92	20.81
			8	7	21.50	21.10	20.96	20.74
			15	0	21.50	20.88	21.06	21.04
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
LTE Band 4	5MHz	QPSK	1	0	23.50	22.75	22.96	22.71
			1	12	23.50	22.66	23.03	22.72
			1	24	23.50	22.70	22.88	22.80
			12	0	22.00	21.79	21.88	21.82
			12	6	22.00	21.74	21.78	21.80
			12	11	22.00	21.79	21.89	21.82
			25	0	22.00	21.79	21.81	21.88
		16QAM	1	0	22.50	21.78	21.46	22.01
			1	12	22.50	21.79	21.58	22.05
			1	24	22.50	21.80	21.46	22.46
			12	0	21.00	20.79	20.72	20.88
			12	6	21.00	20.77	20.84	20.81
			12	11	21.00	20.82	20.77	20.92
			25	0	21.50	20.93	20.95	21.07
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
LTE Band 4	10MHz	QPSK	1	0	23.50	22.86	22.80	23.13
			1	24	23.50	22.79	22.96	23.09
			1	49	23.50	22.81	22.86	23.23
			25	0	22.00	21.83	21.81	21.83
			25	12	22.00	21.82	21.86	21.77
			25	24	22.00	21.92	21.88	21.98
			50	0	22.00	21.86	21.79	21.82
		16QAM	1	0	23.00	22.88	21.88	22.08
			1	24	23.00	22.88	21.91	22.14
			1	49	23.00	22.96	21.92	22.21

			25	0	21.00	20.83	20.92	20.93
			25	12	21.00	20.80	20.98	20.99
			25	24	21.00	20.82	20.90	20.96
			50	0	21.50	20.89	21.05	20.88
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band 4	15MHz	QPSK	1	0	23.50	22.89	22.85	22.69
			1	37	23.50	22.80	22.90	22.69
			1	74	23.50	22.85	22.87	22.79
			36	0	22.00	21.84	21.78	21.76
			36	18	22.00	21.83	21.91	21.86
			36	37	22.00	21.73	21.87	21.83
			75	0	22.00	21.92	21.87	21.86
		16QAM	1	0	23.00	22.93	21.91	22.74
			1	37	23.00	22.87	21.98	22.78
			1	74	23.00	22.96	21.96	22.82
			36	0	21.50	20.91	21.01	20.90
			36	18	21.50	20.91	21.16	20.86
			36	37	21.50	20.92	20.98	20.89
			75	0	21.50	20.99	21.02	20.98
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
LTE Band 4	20MHz	QPSK	1	0	23.50	23.02	22.68	22.78
			1	49	23.50	23.01	22.75	22.75
			1	99	23.50	23.06	22.72	22.89
			50	0	22.00	21.97	21.86	21.79
			50	24	22.00	21.89	21.91	21.85
			50	49	22.00	21.85	21.94	21.82
			100	0	22.00	21.90	21.87	21.86
		16QAM	1	0	22.50	21.62	22.10	22.05
			1	49	22.50	21.62	22.12	21.99
			1	99	22.50	21.55	22.12	22.15
			50	0	21.00	21.00	20.88	20.87
			50	24	21.00	20.99	20.92	20.94
			50	49	21.00	20.92	20.88	20.93
			100	0	21.50	20.99	21.04	20.97

Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20775/2502.5	21100/2535	21425/2567.5
LTE Band 7	5MHz	QPSK	1	0	24.50	22.91	23.19	23.54
			1	12	24.50	22.85	23.18	23.57
			1	24	24.50	22.86	23.26	22.93
			12	0	23.00	21.72	22.18	22.86
			12	6	23.00	21.82	22.34	22.82
			12	11	23.00	21.81	22.36	22.86
			25	0	23.00	21.85	22.26	22.81

		16QAM	1	0	23.00	21.55	22.35	22.91
			1	12	23.00	21.50	22.41	22.84
			1	24	23.00	21.57	22.48	22.87
			12	0	22.00	20.73	21.39	21.85
			12	6	22.00	20.75	21.41	21.83
			12	11	22.00	20.75	21.43	21.84
			25	0	22.50	20.95	21.33	22.12
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20800/2505	21100/2535	21400/2565
LTE Band 7	10MHz	QPSK	1	0	24.50	22.65	23.32	24.09
			1	24	24.50	22.74	23.35	23.84
			1	49	24.50	22.82	23.43	23.46
			25	0	23.00	21.83	22.33	22.90
			25	12	23.00	21.73	22.34	22.91
			25	24	23.00	21.77	22.39	22.88
			50	0	23.00	21.89	22.34	22.80
		16QAM	1	0	23.50	22.91	22.31	22.85
			1	24	23.50	23.01	22.40	22.91
			1	49	23.50	23.01	22.48	22.90
			25	0	22.50	20.74	21.41	22.01
			25	12	22.50	20.84	21.46	21.96
			25	24	22.50	20.83	21.51	22.01
			50	0	22.00	20.94	21.45	21.99
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20825/2507.5	21100/2535	21375/2562.5
LTE Band 7	15MHz	QPSK	1	0	24.50	22.72	23.41	23.68
			1	37	24.50	22.81	23.47	23.85
			1	74	24.50	22.84	23.56	23.19
			36	0	23.00	21.72	22.25	22.79
			36	18	23.00	21.84	22.25	22.78
			36	37	23.00	21.82	22.31	22.86
			75	0	23.00	21.86	22.41	22.86
		16QAM	1	0	24.00	22.87	22.37	23.59
			1	37	24.00	22.95	22.39	23.76
			1	74	24.00	23.05	22.55	23.27
			36	0	22.00	20.95	21.56	21.89
			36	18	22.00	20.91	21.57	21.93
			36	37	22.00	20.94	21.64	21.94
			75	0	22.50	20.87	21.51	22.03
Band	Band Width	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		
			RB Size	RB Offset		20850/2510	21100/2535	21350/2560
LTE Band 7	20MHz	QPSK	1	0	24.50	22.79	22.86	23.74
			1	49	24.50	22.86	23.15	23.94
			1	99	24.50	23.02	23.33	23.88

			50	0	23.00	21.83	22.32	22.72
			50	24	23.00	21.80	22.31	22.78
			50	49	23.00	21.91	22.51	22.80
			100	0	23.00	21.83	22.37	22.74
		16QAM	1	0	23.00	21.75	22.45	22.54
			1	49	23.00	21.60	22.75	22.70
			1	99	23.00	22.30	22.88	22.87
			50	0	22.50	21.00	21.40	21.89
			50	24	22.50	21.09	21.42	21.96
			50	49	22.50	21.12	21.64	22.02
			100	0	22.00	21.02	21.39	21.97

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	16.50	15.71
	6	2437	16.50	16.05
	11	2462	16.50	16.08
802.11g	1	2412	14.00	13.86
	6	2437	14.00	13.89
	11	2462	14.00	13.89
802.11n HT20	1	2412	14.00	13.48
	6	2437	14.00	13.74
	11	2462	14.00	13.83

BR+EDR	Output Power (dBm)				
	Data Rates	Tune-up	Channel		
			0CH	39CH	78CH
	1M	5.000	4.434	4.245	4.092
	2M	6.000	5.615	5.752	5.141
	3M	6.500	5.699	6.044	5.197

BLE	Channel	Tune-up (dBm)	Output Power (dBm)
	0CH	-2.000	-2.196
	19CH	-1.000	-1.899
	39CH	-2.000	-2.637

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