

8 CONDUCTED RF OUPUT POWER

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8.1 GSM Output Power

GSM-Full Power-Ant.0									
GSM850 Band	Burst Average Power(dBm)			Tune-up Power(dBm)	Division Factors	Frame-Averaged power			Tune-up Power(dBm)
Channel	128	190	251			128	190	251	
GPRS (GMSK, 1-Slot)	28.82	28.80	28.77	29.50	9.19	19.63	19.61	19.58	20.31
GPRS (GMSK, 2-Slots)	28.01	27.98	27.99	28.50	6.13	21.88	21.85	21.86	22.37
GPRS (GMSK, 3-Slots)	26.18	26.15	26.20	27.00	4.42	21.76	21.73	21.78	22.58
GPRS (GMSK, 4-Slots)	25.03	25.04	25.05	26.00	3.18	21.85	21.86	21.87	22.82
EGPRS (8PSK, 1-Slot)	27.52	26.56	27.64	28.00	9.19	18.33	17.37	18.45	18.81
EGPRS (8PSK, 2-Slots)	26.64	26.61	26.67	27.00	6.13	20.51	20.48	20.54	20.87
EGPRS (8PSK, 3-Slots)	24.55	24.58	24.58	25.00	4.42	20.13	20.16	20.16	20.58
EGPRS (8PSK, 4-Slots)	23.25	23.56	23.40	24.00	3.18	20.07	20.38	20.22	20.82
GSM1900 Band	Burst Average Power(dBm)			Tune-up Power(dBm)	Division Factors	Frame-Averaged			Tune-up Power(dBm)
Channel	512	661	810			512	661	810	
GPRS (GMSK, 1-Slot)	25.45	25.43	25.56	26.00	9.19	16.26	16.24	16.37	16.81
GPRS (GMSK, 2-Slots)	24.70	24.69	24.85	25.00	6.13	18.57	18.56	18.72	18.87
GPRS (GMSK, 3-Slots)	22.97	22.95	22.93	23.00	4.42	18.55	18.53	18.51	18.58
GPRS (GMSK, 4-Slots)	21.88	21.90	22.12	22.50	3.18	18.70	18.72	18.94	19.32
EGPRS (8PSK, 1-Slot)	26.44	26.52	26.28	27.00	9.19	17.25	17.33	17.09	17.81
EGPRS (8PSK, 2-Slots)	25.21	25.33	25.14	26.00	6.13	19.08	19.20	19.01	19.87
EGPRS (8PSK, 3-Slots)	23.10	23.13	23.12	25.00	4.42	18.68	18.71	18.70	20.58
EGPRS (8PSK, 4-Slots)	22.00	21.93	21.96	23.00	3.18	18.82	18.75	18.78	19.82

8.2 WCDMA Output Power

WCDMA-Full Power-Ant.0				
Band	Band 2			Tune-up Limit Power(dBm)
Channel	9262	9400	9538	
Frequency	1852.40	1880.00	1907.60	
AMR 12.2Kbps	22.79	22.87	22.85	23.00
RMC 12.2Kbps	22.89	22.95	22.88	23.00
HSDPA Subtest-1	21.82	21.93	21.98	22.00
HSDPA Subtest-2	21.99	21.93	21.74	22.00
HSDPA Subtest-3	21.30	21.42	21.45	21.50
HSDPA Subtest-4	21.40	19.99	21.40	21.50
HSUPA Subtest-1	19.93	19.99	19.72	20.00
HSUPA Subtest-2	19.86	19.98	19.89	20.00
HSUPA Subtest-3	20.87	20.96	20.96	21.00
HSUPA Subtest-4	19.53	19.55	19.55	20.00
HSUPA Subtest-5	20.92	20.95	20.97	21.00
Band	Band 5			Tune-up Limit Power(dBm)
Channel	4132	4182	4233	
Frequency	826.40	836.40	846.60	
AMR 12.2Kbps	22.62	22.64	22.70	23.00
RMC 12.2Kbps	22.77	22.74	22.80	23.00
HSDPA Subtest-1	21.83	21.75	21.73	22.00
HSDPA Subtest-2	21.85	21.70	21.87	22.00
HSDPA Subtest-3	21.13	21.16	21.07	22.00
HSDPA Subtest-4	21.35	21.17	21.10	22.00
HSUPA Subtest-1	19.91	19.75	19.77	20.00
HSUPA Subtest-2	19.66	19.72	19.79	20.00
HSUPA Subtest-3	20.91	20.75	20.61	21.00
HSUPA Subtest-4	19.10	19.29	19.42	20.00
HSUPA Subtest-5	20.56	20.72	20.66	21.00

8.3 LTE Output Power

LTE B5-Full Power -Ant.0							
Bandwidth (MHz)	RB Size	RB offset	Modulation	20407	20525	20643	Tune-up power(dBm)
1.4	1	LOW	QPSK	22.50	22.61	22.49	23.00
		MID	QPSK	22.79	22.82	22.62	23.00
		HIGH	QPSK	22.68	22.69	22.65	23.00
	3	LOW	QPSK	22.61	22.63	22.56	23.00
		MID	QPSK	22.67	22.82	22.70	23.00
		HIGH	QPSK	22.71	22.60	22.66	23.00
	6	LOW	QPSK	21.84	21.76	21.63	22.00
	1.4	LOW	Q16	21.53	21.61	21.59	22.00
		MID	Q16	21.88	21.94	21.85	22.00
		HIGH	Q16	21.46	21.91	21.80	22.00
	3	LOW	Q16	21.52	21.79	21.61	22.00
		MID	Q16	21.80	21.86	21.81	22.00
		HIGH	Q16	21.69	21.94	21.57	22.00
1.4	6	LOW	Q16	20.69	20.75	20.71	21.00
	1	LOW	64QAM	20.54	20.96	20.60	21.00
		MID	64QAM	20.97	20.83	20.76	21.00
		HIGH	64QAM	20.32	20.94	20.86	21.00
	3	LOW	64QAM	20.43	20.55	20.53	21.00
		MID	64QAM	20.86	20.69	20.75	21.00
		HIGH	64QAM	20.72	20.81	20.57	21.00
	6	LOW	64QAM	19.55	19.66	19.64	20.00
Bandwidth (MHz)	RB Size	RB offset	Modulation	20415	20525	20635	Tune-up power(dBm)
3	1	LOW	QPSK	22.72	22.56	22.54	23.00
		MID	QPSK	22.77	22.90	22.73	23.00
		HIGH	QPSK	22.52	22.64	22.68	23.00
	8	LOW	QPSK	21.75	21.73	21.81	22.00
		MID	QPSK	21.68	21.65	21.74	22.00
		HIGH	QPSK	21.82	21.77	21.56	22.00
	15	LOW	QPSK	21.61	21.78	21.57	22.00
	3	LOW	Q16	21.50	21.77	21.65	22.00
		MID	Q16	21.84	21.54	21.98	22.00
		HIGH	Q16	21.50	21.93	21.80	22.00
		LOW	Q16	20.79	20.90	20.99	21.00
		MID	Q16	20.70	20.83	20.87	21.00
		HIGH	Q16	20.94	20.90	20.83	21.00
3	15	LOW	Q16	20.58	20.69	20.80	21.00
	1	LOW	64QAM	20.43	20.56	20.69	21.00
		MID	64QAM	20.68	20.78	20.99	21.00
		HIGH	64QAM	20.42	20.82	20.79	21.00
	8	LOW	64QAM	19.48	19.63	19.57	20.00
		MID	64QAM	19.78	19.83	19.71	20.00
		HIGH	64QAM	19.87	19.52	19.86	20.00
	15	LOW	64QAM	19.84	19.90	19.85	20.00

LTE B5-Full Power -Ant.0							
Bandwidth (MHz)	RB Size	RB offset	Modulation	20425	20525	20625	Tune-up power(dBm)
5	1	LOW	QPSK	22.51	22.53	22.47	23.00
		MID	QPSK	22.93	22.76	22.71	23.00
		HIGH	QPSK	22.61	22.71	22.56	23.00
	12	LOW	QPSK	21.63	21.59	21.89	22.00
		MID	QPSK	21.65	21.78	21.81	22.00
		HIGH	QPSK	21.69	21.76	21.64	22.00
	25	LOW	QPSK	21.59	21.70	21.67	22.00
	5	LOW	Q16	21.42	21.97	21.69	22.00
		MID	Q16	21.75	21.72	21.76	22.00
		HIGH	Q16	21.62	21.85	21.74	22.00
		LOW	Q16	20.70	20.68	20.99	21.00
		MID	Q16	20.94	20.67	20.74	21.00
		HIGH	Q16	20.86	20.74	20.89	21.00
5	25	LOW	Q16	20.59	20.66	20.73	21.00
	1	LOW	64QAM	20.48	20.69	20.56	21.00
		MID	64QAM	20.87	20.99	20.88	21.00
		HIGH	64QAM	20.62	20.91	20.57	21.00
	12	LOW	64QAM	19.67	19.58	19.93	20.00
		MID	64QAM	20.00	19.68	19.82	20.00
		HIGH	64QAM	19.81	19.96	19.63	20.00
	25	LOW	64QAM	19.58	19.76	19.74	20.00
Bandwidth (MHz)	RB Size	RB offset	Modulation	20450	20525	20600	Tune-up power(dBm)
10	1	LOW	QPSK	22.63	22.65	22.60	23.00
		MID	QPSK	22.82	22.85	22.73	23.00
		HIGH	QPSK	22.60	22.61	22.55	23.00
	25	LOW	QPSK	21.67	21.72	21.77	22.00
		MID	QPSK	21.72	21.69	21.72	22.00
		HIGH	QPSK	21.72	21.71	21.61	22.00
	50	LOW	QPSK	21.71	21.71	21.71	22.00
	10	LOW	Q16	21.56	21.74	21.68	22.00
		MID	Q16	21.79	21.92	21.88	22.00
		HIGH	Q16	21.56	21.98	21.67	22.00
		LOW	Q16	20.75	20.78	20.89	21.00
		MID	Q16	20.80	20.78	20.83	21.00
		HIGH	Q16	20.82	20.79	20.78	21.00
10	50	LOW	Q16	20.73	20.75	20.76	21.00
	1	LOW	64QAM	20.46	20.87	20.71	21.00
		MID	64QAM	20.88	20.85	20.89	21.00
		HIGH	64QAM	20.47	20.91	20.58	21.00
	25	LOW	64QAM	19.81	19.92	19.99	20.00
		MID	64QAM	19.89	19.92	19.80	20.00
		HIGH	64QAM	19.79	19.75	19.78	20.00
	50	LOW	64QAM	19.75	19.79	19.70	20.00

LTE B7-Full Power -Ant.0								
Bandwidth (Mh)	RB Size	RB offset	Modulation	20775	21100	21425	Tune-up power(dBm)	
5	1	LOW	QPSK	22.08	21.93	21.74	23.00	
		MID	QPSK	22.41	21.91	21.90	23.00	
		HIGH	QPSK	21.69	21.28	21.37	23.00	
	12	LOW	QPSK	20.68	20.69	20.84	22.00	
		MID	QPSK	20.61	20.90	20.90	22.00	
		HIGH	QPSK	20.64	20.65	20.76	22.00	
	25	LOW	QPSK	20.60	20.64	20.93	22.00	
	5	1	LOW	Q16	20.93	21.14	20.86	22.00
			MID	Q16	21.57	21.50	21.36	22.00
HIGH			Q16	21.06	20.91	20.81	22.00	
12		LOW	Q16	19.66	19.80	20.00	21.00	
		MID	Q16	19.85	19.94	19.82	21.00	
		HIGH	Q16	19.53	19.74	19.79	21.00	
25	LOW	Q16	19.76	19.85	19.78	21.00		
5	1	LOW	64QAM	20.10	20.03	19.88	21.00	
		MID	64QAM	20.54	20.35	20.28	21.00	
		HIGH	64QAM	19.91	19.84	19.96	21.00	
	12	LOW	64QAM	18.77	18.58	18.97	20.00	
		MID	64QAM	18.71	18.83	18.88	20.00	
		HIGH	64QAM	18.76	18.78	18.61	20.00	
	25	LOW	64QAM	18.87	18.56	18.71	20.00	
	10	1	LOW	QPSK	21.89	21.90	21.88	23.00
MID			QPSK	22.31	22.00	21.98	23.00	
HIGH			QPSK	21.50	21.29	21.45	23.00	
25		LOW	QPSK	20.80	20.57	20.75	22.00	
		MID	QPSK	20.84	20.80	20.76	22.00	
		HIGH	QPSK	20.70	20.78	20.70	22.00	
50		LOW	QPSK	20.66	20.68	20.91	22.00	
10		1	LOW	Q16	21.11	21.20	20.83	22.00
			MID	Q16	21.37	21.53	21.27	22.00
			HIGH	Q16	20.86	20.87	20.80	22.00
		25	LOW	Q16	19.64	19.89	19.76	21.00
			MID	Q16	19.79	19.96	19.81	21.00
			HIGH	Q16	19.74	19.74	19.61	21.00
50		LOW	Q16	19.80	19.65	19.69	21.00	
10		1	LOW	64QAM	20.15	20.26	20.14	21.00
			MID	64QAM	20.61	20.58	20.15	21.00
			HIGH	64QAM	19.91	20.11	20.01	21.00
	25	LOW	64QAM	18.50	18.89	18.89	20.00	
		MID	64QAM	18.83	19.06	18.90	20.00	
		HIGH	64QAM	18.54	18.78	18.88	20.00	
	50	LOW	64QAM	18.39	18.71	18.90	20.00	

LTE B7-Full Power -Ant.0							
Bandwidth (Mh)	RB Size	RB offset	Modulation	20825	21100	21375	Tune-up power(dBm)
15	1	LOW	QPSK	22.06	21.86	21.91	23.00
		MID	QPSK	22.43	21.98	22.05	23.00
		HIGH	QPSK	21.65	21.32	21.52	23.00
	36	LOW	QPSK	20.53	20.82	20.74	22.00
		MID	QPSK	20.87	20.78	20.88	22.00
		HIGH	QPSK	20.63	20.86	20.59	22.00
75	LOW	QPSK	20.57	20.69	20.83	22.00	
15	1	LOW	Q16	20.96	21.15	20.96	22.00
		MID	Q16	21.63	21.58	21.23	22.00
		HIGH	Q16	21.03	20.96	20.99	22.00
	36	LOW	Q16	19.67	19.85	19.89	21.00
		MID	Q16	19.89	19.73	19.85	21.00
		HIGH	Q16	19.66	19.91	19.76	21.00
75	LOW	Q16	19.69	19.67	19.68	21.00	
15	1	LOW	64QAM	20.05	20.14	19.85	21.00
		MID	64QAM	20.43	20.41	20.50	21.00
		HIGH	64QAM	19.89	19.94	19.88	21.00
	36	LOW	64QAM	18.94	18.67	18.92	20.00
		MID	64QAM	18.54	18.72	19.11	20.00
		HIGH	64QAM	18.81	18.85	18.82	20.00
75	LOW	64QAM	18.57	18.65	18.75	20.00	
Bandwidth (Mh)	RB Size	RB offset	Modulation	20850	21100	21350	Tune-up power(dBm)
20	1	LOW	QPSK	21.96	21.89	21.85	23.00
		MID	QPSK	22.36	22.04	22.00	23.00
		HIGH	QPSK	21.57	21.38	21.40	23.00
	50	LOW	QPSK	20.67	20.67	20.87	22.00
		MID	QPSK	20.74	20.75	20.85	22.00
		HIGH	QPSK	20.58	20.74	20.66	22.00
100	LOW	QPSK	20.63	20.70	20.79	22.00	
20	1	LOW	Q16	21.05	21.18	20.93	22.00
		MID	Q16	21.51	21.54	21.36	22.00
		HIGH	Q16	20.91	20.94	20.87	22.00
	50	LOW	Q16	19.68	19.74	19.88	21.00
		MID	Q16	19.76	19.86	19.90	21.00
		HIGH	Q16	19.63	19.88	19.70	21.00
100	LOW	Q16	19.65	19.78	19.83	21.00	
20	1	LOW	64QAM	20.12	20.07	20.01	21.00
		MID	64QAM	20.57	20.53	20.47	21.00
		HIGH	64QAM	19.76	19.82	19.92	21.00
	50	LOW	64QAM	18.75	18.83	18.98	20.00
		MID	64QAM	18.72	18.85	18.77	20.00
		HIGH	64QAM	18.62	18.96	18.56	20.00
100	LOW	64QAM	18.79	18.85	18.94	20.00	

8.4 WIFI Output Power

8.4.1 WIFI2.4G Output Power

WIFI2.4G-ANT1-Full Power						
2.4G	Mode	Channel	Frequency (MHz)	AV power (dBm)	Tune up (dBm)	SAR Test
	11b	1	2412	17.91	18.00	Yes
		6	2437	17.53	18.00	Yes
		11	2462	17.62	18.00	Yes
	11g	1	2412	15.51	16.00	No
		6	2437	15.64	16.00	No
		11	2462	15.74	16.00	No
	11n-HT20	1	2412	14.71	15.00	No
		6	2437	14.51	15.00	No
		11	2462	14.36	15.00	No
	11n-HT40	3	2422	13.11	13.50	No
		6	2437	13.06	13.50	No
		9	2452	12.96	13.50	No

Note: When multiple channel bandwidth configurations in a frequency band have the same maximum tune-up output power, the test configuration is determined by applying the following steps sequentially.

- 1) The largest channel bandwidth configuration is selected between the multiple configurations in a frequency band with the same maximum tune-up output power.
- 2) When multiple transmission modes (802.11b/g/n) have the same maximum tune-up output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11b is chosen over 802.11g, and 802.11g chosen over 802.11n.
- 3) According KDB 247228, when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2 W/kg, OFDM SAR test is not required.

Adjusted SAR = $0.534 * (39.81\text{mW}/63.10\text{mW}) = 0.337$ W/Kg, so 2.4G OFDM SAR test is not required.

8.4.2 WIFI5G Output Power

WIFI5G-ANT1-Full Power						
	Mode	Channel	Frequency (MHz)	AV power (dBm)	Tune up (dBm)	SAR Test
5.2G	11a	36	5180	13.36	14.00	No
		44	5220	13.79	14.00	No
		48	5240	13.41	14.00	No
	11n20	36	5180	13.29	13.50	No
		44	5220	13.15	13.50	No
		48	5240	13.31	13.50	No
	11n40	38	5190	13.08	13.50	No
		46	5230	13.18	13.50	No
	11ac20	36	5180	13.32	13.50	No
		44	5220	13.12	13.50	No
		48	5240	13.42	13.50	No
	11ac40	38	5190	12.56	13.00	No
		46	5230	12.61	13.00	No
	11ac80	42	5210	12.35	13.00	No
5.3G	11a	52	5260	13.48	14.00	Yes
		60	5300	13.35	14.00	Yes
		64	5320	13.36	14.00	Yes
	11n20	52	5260	13.05	13.50	No
		60	5300	13.21	13.50	No
		64	5320	13.22	13.50	No
	11n40	54	5270	13.25	13.50	No
		62	5310	13.02	13.50	No
	11ac20	52	5260	13.01	13.50	No
		60	5300	13.25	13.50	No
		64	5320	13.09	13.50	No
	11ac40	54	5270	12.68	13.00	No
		62	5310	12.43	13.00	No
	11ac80	58	5290	12.45	13.00	No
5.6G	11a	100	5500	13.53	14.00	Yes
		116	5580	13.56	14.00	Yes
		140	5700	13.71	14.00	Yes
	11n20	100	5500	12.91	13.50	No
		116	5580	13.03	13.50	No
		140	5700	13.11	13.50	No
	11n40	102	5510	13.23	13.50	No
		118	5590	13.31	13.50	No
		134	5670	13.15	13.50	No
	11ac20	100	5500	12.95	13.50	No
		116	5580	13.03	13.50	No
		140	5700	13.13	13.50	No
	11ac40	102	5510	12.76	13.00	No
		118	5590	12.39	13.00	No
		134	5670	12.55	13.00	No
	11ac80	106	5530	12.54	13.00	No
5.8G	11a	122	5610	12.61	13.00	No
		149	5745	13.71	14.00	Yes
		157	5785	13.29	14.00	Yes
	11n20	165	5825	13.45	14.00	Yes
		149	5745	13.05	13.50	No
		157	5785	13.13	13.50	No
	11n40	165	5825	13.31	13.50	No
		151	5755	13.29	13.50	No
		159	5795	12.93	13.50	No
	11ac20	149	5745	13.02	13.50	No
		157	5785	13.13	13.50	No
		165	5825	13.26	13.50	No
	11ac40	151	5755	12.81	13.00	No
		159	5795	12.44	13.00	No
	11ac80	155	5775	12.48	13.00	No

Note: When multiple channel bandwidth configurations in a frequency band have the same maximum tune-up output power, the test configuration is determined by applying the following steps sequentially.

1)When the same maximum output power is specified for both bands, begin SAR measurement in U-NII-2A band by applying the OFDM SAR requirements. If the highest reported SAR for a test configuration is ≤ 1.2 W/kg, SAR is not required for U-NII-1 band for that configuration (802.11 mode and exposure condition); otherwise, each band is tested independently for SAR.

2)The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same maximum tune-up output power.

3) When multiple transmission modes (802.11a/n/ac) have the same maximum tune-up output power, largest channel bandwidth, lowest order modulation and lowest data rate, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac.

8.5 Bluetooth

8.5.1 Bluetooth Output Power

Bluetooth-Ant.1-Full Power						
Test Mode	Modulation	Channel number	Frequency(MHz)	AV power (dBm)	Tune up (dBm))	SAR Test
BT	DH5	0	2402	4.02	6.00	No
		39	2441	5.51	6.00	No
		78	2480	5.25	6.00	No
	2DH5	0	2402	5.88	7.00	Yes
		39	2441	6.39	7.00	Yes
		78	2480	6.64	7.00	Yes
	3DH5	0	2402	5.78	7.00	No
		39	2441	6.44	7.00	No
		78	2480	6.70	7.00	No
	BLE-1M	0	2402	2.17	4.00	No
		19	2440	3.65	4.00	No
		39	2480	3.36	4.00	No
	BLE-2M	1	2404	2.19	4.00	No
		19	2440	3.67	4.00	No
		38	2478	3.52	4.00	No
Note: Since bluetooth BR mode is the maximum output power mode, SAR measurements were performed with test software using DH5 modulation, and SAR measurement is not required for the EDR and LE. When the secondary mode is ≤ ¼ dB higher than the primary mode.						

8.5.2 Bluetooth Duty Cycle

The Bluetooth duty cycle is 77.03% as following figure, according to 2016 Oct. TCB workshop for Bluetooth SAR scaling need further consideration and the maximum duty cycle is 100%, therefore the actual duty cycle will be scaled up to 100% for Bluetooth reported SAR calculation.

Duty Cycle

