# MPE ESTIMATION

FCC ID: 2AJQOQIT1475

### 1,Limit for General Population/ Uncontrolled Exposures

Frequency	Power density (mW/cm <sup>2</sup> )	Averaging time(minutes)		
300MHz1.5GHz	F/1500	30		
1.5GHz100GHz	1.0	30		

Note: F= Frequency in MHz

### 2 Estimation Result

### For ZK-7662 MODULE

### **2.4G WIFI ANT. 1:**

Mode	Max PK Output power(dBm)	Tune Up Power(dBm)	Max Tune Up power(mW)	Antenna Gain(dBi)	Antenna Gain (linear)	MPE (mW/cm²)
11b	19.62	19±1(20)	100.00	1	1.2589	0.02506
11g	19.73	19±1(20)	100.00	1	1.2589	0.02506
11n/HT20	18.68	18±1(19)	79.43	1	1.2589	0.01990
11n/HT40	18.86	18±1(19)	79.43	1	1.2589	0.01990

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note:

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
iviode	СП	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH1	19.62	91.62	1	1.2589	0.02296
11b	CH6	19.57	90.57	1	1.2589	0.02270
	CH11	19.51	89.33	1	1.2589	0.02238
	CH1	19.73	93.97	1	1.2589	0.02355
11g	CH6	19.53	89.74	1	1.2589	0.02249
	CH11	19.16	82.41	1	1.2589	0.02065
	CH1	18.68	73.79	1	1.2589	0.01849
11n/HT20	CH6	18.49	70.63	1	1.2589	0.01770
	CH11	18.17	65.61	1	1.2589	0.01644
	CH1	18.66	73.45	1	1.2589	0.01841
11n/HT40	CH4	18.86	76.91	1	1.2589	0.01927
	CH7	18.62	72.78	1	1.2589	0.01824

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

#### For ZK-7662 MODULE

#### **2.4G WIFI ANT. 2:**

Mode	Max PK Output power(dBm)	Tune Up Power(dBm)	Max Tune Up power(mW)	Antenna Gain(dBi)	Antenna Gain (linear)	MPE (mW/cm²)
11b	19.07	19±1(20)	100.00	1	1.2589	0.02506
11g	18.98	18±1(19)	79.43	1	1.2589	0.01990
11n/HT20	17.72	17±1(18)	63.10	1	1.2589	0.01581
11n/HT40	17.78	17±1(18)	63.10	1	1.2589	0.01581

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

Conducted power see the test report HK1902200283-1E, The MIMO mode power is max, so only calculate max power mode and antenna port 1 gain=1dBi, antenna port 2 gain=1dBi.

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
iviode	СП	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH1	18.75	74.99	1	1.2589	0.01879
11b	CH6	18.92	77.98	1	1.2589	0.01954
	CH11	19.07	80.72	1	1.2589	0.02023
	CH1	18.90	77.62	1	1.2589	0.01945
11g	CH6	18.98	79.07	1	1.2589	0.01981
	CH11	18.73	74.64	1	1.2589	0.01870
	CH1	17.72	59.16	1	1.2589	0.01482
11n/HT20	CH6	17.69	58.75	1	1.2589	0.01472
	CH11	17.48	55.98	1	1.2589	0.01403
	CH1	17.78	59.98	1	1.2589	0.01503
11n/HT40	CH4	17.72	59.16	1	1.2589	0.01482
	CH7	17.30	53.70	1	1.2589	0.01346

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

### For MIMO:

Mode	Max PK Output power(dBm)	Tune Up Power(dBm)	Max Tune Up power(mW)	Antenna Gain(dBi)	Antenna Gain (linear)	MPE (mW/cm²)
11b						
11g						
11n/HT20	21.24	21±1(22)	158.49	4.01	2.518	0.07943
11n/HT40	21.34	21±1(22)	158.49	4.01	2.518	0.07943

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

Conducted power see the test reportHK1902200283-1E, The MIMO mode power is max, so only calculate max power mode and antenna port 1 gain=1dBi, antenna port 2 gain=1dBi.

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	Сп	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH1					
11b	CH6					
	CH11		-	-		
	CH1		-	-		
11g	CH6					
	CH11		-	-		
	CH1	21.24	133.05	4.01	2.518	0.06668
11n/HT20	CH6	21.12	129.42	4.01	2.518	0.06486
	CH11	20.85	121.62	4.01	2.518	0.06095
	CH1	21.25	133.35	4.01	2.518	0.06684
11n/HT40	CH4	21.34	136.14	4.01	2.518	0.06823
	CH7	21.02	126.47	4.01	2.518	0.06339

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

PK Output power= conducted power.

### For RTL8188 MODULE 2.4G WIFI:

Mode	Max PK Output power(dBm)	Tune Up Power(dBm)	Max Tune Up power(mW)	Antenna Gain(dBi)	Antenna Gain (linear)	MPE (mW/cm²)
11b	16.51	16±1(17)	50.12	1	1.2589	0.01256
11g	16.23	16±1(17)	50.12	1	1.2589	0.01256
11n/HT20	15.55	15±1(16)	39.81	1	1.2589	0.00998
11n/HT40	14.86	14±1(15)	31.62	1	1.2589	0.00792

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note: PK Output power= conducted power.

Conducted power see the test report HK1902200283-4E, antenna gain=1dBi.

Mada	CII	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	СН	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH1	16.51	44.77	1	1.2589	0.01122
11b	CH6	16.35	43.15	1	1.2589	0.01081
	CH11	16.24	42.07	1	1.2589	0.01054
	CH1	16.23	41.98	1	1.2589	0.01052
11g	CH6	16.12	40.93	1	1.2589	0.01026
	CH11	16.05	40.27	1	1.2589	0.01009
	CH1	15.55	35.89	1	1.2589	0.00899
11n/HT20	CH6	15.28	33.73	1	1.2589	0.00845
	CH11	15.33	34.12	1	1.2589	0.00855
	CH1	14.86	30.62	1	1.2589	0.00767
11n/HT40	CH4	14.64	29.11	1	1.2589	0.00729
	CH7	14.66	29.24	1	1.2589	0.00733

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note: PK Output power= conducted power.

Conducted power see the test report HK1902200283-4E, antenna gain=1dBi.

**For 5.2G WIFI ANT. 1::** 

Mada	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a	16.38	$16\pm1(17)$	50.12	1	1.2589	0.01256
11n/HT20	15.44	$15\pm1(16)$	39.81	1	1.2589	0.00998
11n/HT40	15.83	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT20	15.07	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT40	15.88	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT80	15.90	$15\pm1(16)$	39.81	1	1.2589	0.00998

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	Сп	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH36	16.11	40.83	1	1.2589	0.01023
11a	CH40	15.76	37.67	1	1.2589	0.00944
	CH48	16.38	43.45	1	1.2589	0.01089
	CH36	15.28	33.73	1	1.2589	0.00845
11n/HT20	CH40	14.93	31.12	1	1.2589	0.00780
	CH48	15.44	34.99	1	1.2589	0.00877
11n/HT40	CH38	15.83	38.28	1	1.2589	0.00959
1111/H140	CH46	15.37	34.43	1	1.2589	0.00863
	CH36	14.65	29.17	1	1.2589	0.00731
11ac/HT20	CH40	14.93	31.12	1	1.2589	0.00780
	CH48	15.07	32.14	1	1.2589	0.00805
11 /[[[]]]	CH38	15.51	35.56	1	1.2589	0.00891
11ac/HT40	CH46	15.75	37.58	1	1.2589	0.00942
11ac/HT80	CH42	14.92	31.05	1	1.2589	0.00778

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

**For 5.2G WIFI ANT. 2:** 

Mada	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a	15.65	$15\pm1(17)$	50.12	1	1.2589	0.01256
11n/HT20	15.89	$15 \pm 1(16)$	39.81	1	1.2589	0.00998
11n/HT40	14.34	$14\pm1(15)$	31.62	1	1.2589	0.00792
11ac/HT20	14.58	$14\pm1(15)$	31.62	1	1.2589	0.00792
11ac/HT40	15.83	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT80	14.77	$14\pm1(15)$	31.62	1	1.2589	0.00792

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note: The estimation distance is 20cm

Note:

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	Сн	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH36	15.19	33.04	1	1.2589	0.00828
11a	CH40	15.25	33.50	1	1.2589	0.00839
	CH48	15.65	36.73	1	1.2589	0.00920
	CH36	15.89	38.82	1	1.2589	0.00973
11n/HT20	CH40	15.03	31.84	1	1.2589	0.00798
	CH48	14.70	29.51	1	1.2589	0.00740
11n/HT40	CH38	14.22	26.42	1	1.2589	0.00662
1111/H140	CH46	14.34	27.16	1	1.2589	0.00681
	CH36	14.48	28.05	1	1.2589	0.00703
11ac/HT20	CH40	14.42	27.67	1	1.2589	0.00693
	CH48	14.58	28.71	1	1.2589	0.00719
11 /////////	CH38	15.83	38.28	1	1.2589	0.00959
11ac/HT40	CH46	15.14	32.66	1	1.2589	0.00818
11ac/HT80	CH42	14.77	29.99	1	1.2589	0.00752

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

## For MIMO:

M - 1 -	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a						
11n/HT20	18.61	$18\pm1(19)$	79.43	4.01	2.518	0.03981
11n/HT40	18.11	$18\pm1(19)$	79.43	4.01	2.518	0.03981
11ac/HT20	17.84	$17 \pm 1(18)$	63.10	4.01	2.518	0.03162
11ac/HT40	18.68	$18\pm1(19)$	79.43	4.01	2.518	0.03981
11ac/HT80	17.86	$17 \pm 1(18)$	63.10	4.01	2.518	0.03162

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

Mode	CH	PK Output	Output	Antenna	Antenna Gain	MPE
Mode Cr	СН	power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
	CH36					
11a	CH40					
	CH48	-				
	CH36	18.61	72.61	4.01	2.518	0.03639
11n/HT20	CH40	17.99	62.95	4.01	2.518	0.03155
	CH48	18.10	64.57	4.01	2.518	0.03236
11 /IJT40	CH38	18.11	64.71	4.01	2.518	0.03243
11n/HT40	CH46	17.90	61.66	4.01	2.518	0.03090
	CH36	17.58	57.28	4.01	2.518	0.02871
11ac/HT20	CH40	17.69	58.75	4.01	2.518	0.02944
	CH48	17.84	60.81	4.01	2.518	0.03048
11 /////////	CH38	18.68	73.79	4.01	2.518	0.03698
11ac/HT40	CH46	18.47	70.31	4.01	2.518	0.03524
11ac/HT80	CH42	17.86	61.09	4.01	2.518	0.03062

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

**For 5.8G WIFI ANT. 1:** 

Mada	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a	16.69	$16\pm1(17)$	50.12	1	1.2589	0.01256
11n/HT20	16.57	$16\pm1(17)$	50.12	1	1.2589	0.01256
11n/HT40	15.44	$15 \pm 1(16)$	39.81	1	1.2589	0.00998
11ac/HT20	16.66	$16\pm1(17)$	50.12	1	1.2589	0.01256
11ac/HT40	15.96	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT80	15.90	$15\pm1(16)$	39.81	1	1.2589	0.00998

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	Сн	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH149	16.63	46.03	1	1.2589	0.01153
11a	CH157	16.26	42.27	1	1.2589	0.01059
	CH165	16.69	46.67	1	1.2589	0.01169
	CH149	16.34	43.05	1	1.2589	0.01079
11n/HT20	CH157	16.57	45.39	1	1.2589	0.01137
	CH165	16.47	44.36	1	1.2589	0.01112
11n/HT40	CH151	15.44	34.99	1	1.2589	0.00877
1111/11140	CH159	15.25	33.50	1	1.2589	0.00839
	CH149	15.93	39.17	1	1.2589	0.00982
11ac/HT20	CH157	15.82	38.19	1	1.2589	0.00957
	CH165	15.66	36.81	1	1.2589	0.00922
1100/UT40	CH151	15.88	38.73	1	1.2589	0.00970
11ac/HT40	CH159	15.96	39.45	1	1.2589	0.00988
11ac/HT80	CH155	15.90	38.90	1	1.2589	0.00975

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

For 5.8G WIFI ANT. 2:

Mode	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a	16.67	$16\pm1(17)$	50.12	1	1.2589	0.01256
11n/HT20	15.89	$15\pm1(16)$	39.81	1	1.2589	0.00998
11n/HT40	14.23	$14\pm1(15)$	31.62	1	1.2589	0.00792
11ac/HT20	15.43	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT40	15.81	$15\pm1(16)$	39.81	1	1.2589	0.00998
11ac/HT80	14.98	$14\pm1(15)$	31.62	1	1.2589	0.00792

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

Mode	CH	PK Output	Output	Antenna	Antenna Gain	MPE
Mode	СН	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH149	16.44	44.06	1	1.2589	0.01104
11a	CH157	16.25	42.17	1	1.2589	0.01057
	CH165	16.67	46.45	1	1.2589	0.01164
	CH149	15.62	36.48	1	1.2589	0.00914
11n/HT20	CH157	15.40	34.67	1	1.2589	0.00869
	CH165	15.89	38.82	1	1.2589	0.00973
11n/HT40	CH151	14.12	25.82	1	1.2589	0.00647
1111/11140	CH159	14.23	26.49	1	1.2589	0.00664
	CH149	15.43	34.91	1	1.2589	0.00875
11ac/HT20	CH157	15.42	34.83	1	1.2589	0.00873
	CH165	15.12	32.51	1	1.2589	0.00815
1100/UT40	CH151	15.81	38.11	1	1.2589	0.00955
11ac/HT40	CH159	15.51	35.56	1	1.2589	0.00891
11ac/HT80	CH155	14.98	31.48	1	1.2589	0.00789

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

## For MIMO:

Mada	Max PK Output	Tune Up	Max Tune Up	Antenna	Antenna Gain	MPE
Mode	power(dBm)	Power(dBm)	power(mW)	Gain(dBi)	(linear)	$(mW/cm^2)$
11a						
11n/HT20	19.20	$19\pm1(20)$	100.00	4.01	2.518	0.05012
11n/HT40	17.84	$17 \pm 1(18)$	63.10	4.01	2.518	0.03162
11ac/HT20	18.97	$18\pm1(19)$	79.43	4.01	2.518	0.03981
11ac/HT40	18.86	$18\pm1(19)$	79.43	4.01	2.518	0.03981
11ac/HT80	18.47	$18\pm1(19)$	79.43	4.01	2.518	0.03981

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note:

Mode	СН	PK Output	Output	Antenna	Antenna Gain	MPE
Wiode CII	Сп	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH36	-	1	1		1
11a	CH40	-	1	1		1
	CH48	-	1	1		1
	CH36	19.01	79.62	4.01	2.518	0.03990
11n/HT20	CH40	19.03	79.98	4.01	2.518	0.04009
	CH48	19.20	83.18	4.01	2.518	0.04169
11n/HT40	CH38	17.84	60.81	4.01	2.518	0.03048
1111/H140	CH46	17.78	59.98	4.01	2.518	0.03006
	CH36	18.70	74.13	4.01	2.518	0.03715
11ac/HT20	CH40	18.63	72.95	4.01	2.518	0.03656
	CH48	18.97	78.89	4.01	2.518	0.03954
11 ////////	CH38	18.86	76.91	4.01	2.518	0.03855
11ac/HT40	CH46	18.75	74.99	4.01	2.518	0.03758
11ac/HT80	CH42	18.47	70.31	4.01	2.518	0.03524

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note: The estimation distance is 20cm

Note:

### For ZK-7662 MODULE BT:

Mode	Max PK Output power(dBm)	Tune Up Power(dBm)	Max Tune Up power(mW)	Antenna Gain(dBi)	Antenna Gain (linear)	MPE (mW/cm²)
GFSK	3.699	3±1(4)	2.51	1	1.2589	0.00063
π/4DQPSK	2.953	2±1(3)	2.00	1	1.2589	0.00050
8DPSK	3.123	3±1(4)	2.51	1	1.2589	0.00063

$$Pd = \frac{Pout * G}{4\pi r^2}:$$

Note:

Note: The estimation distance is 20cm

Note: PK Output power= conducted power.

Conducted power see the test report HK1902200283-2E, antenna gain=1dBi.

Mode CH	СН	PK Output	Output	Antenna	Antenna Gain	MPE
ivioue	СП	power(dBm)	power(mW)	Gain(dBi)	(linear)	(mW/cm²)
	CH00	3.699	2.34	1	1.2589	0.00059
GFSK	CH39	3.611	2.30	1	1.2589	0.00058
	CH78	3.880	2.44	1	1.2589	0.00061
	CH00	2.734	1.88	1	1.2589	0.00047
π/4DQPSK	CH39	2.649	1.84	1	1.2589	0.00046
	CH78	2.953	1.97	1	1.2589	0.00049
	CH00	2.852	1.93	1	1.2589	0.00048
8DPSK	CH39	2.803	1.91	1	1.2589	0.00048
	CH78	3.123	2.05	1	1.2589	0.00051

$$Pd = \frac{Pout * G}{4\pi r^2}$$

Note:

Note: The estimation distance is 20cm

Note: PK Output power= conducted power.

Conducted power see the test report HK1902200283-2E, antenna gain=1dBi.

----The End-----