



1. METHOD OF MEASUREMENT

1.1 APPLICABLE STANDARD

ANSI C95.1 – 1999: IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

FCC KDB447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device, RF Exposure, Equipment Authorization Procedures.

FCC CFR 47 part1 1.1310: Radio frequency radiation exposure limits

FCC CFR 47 part2 2.1091: Radiofrequency radiation exposure evaluation: mobile devices

The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

1.2 LIMITS

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3–3.0	614	1.63	*(100)	6
3.0–30	1842/f	4.89/f	*(900/f ²)	6
30–300	61.4	0.163	1.0	6
300–1500			f/300	6
1500–100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3–1.34	614	1.63	*(100)	30
1.34–30	824/f	2.19/f	*(180/f ²)	30
30–300	27.5	0.073	0.2	30
300–1500			f/1500	30
1500–100,000			1.0	30

f = frequency in MHz

Friis transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

P_d = power density in mW/cm², P_{out} = output power to antenna in mW;

G = gain of antenna in linear scale, π = 3.1416;

R = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



Test Result of RF Exposure Evaluation

Tune-up Power

2.4G WIFI					
Modulation Type	Frequency (MHz)	Output Power to antenna (dBm)	Output Power to antenna (mW)	Tune-up Power(dBm) ± 1	Maxmun Tune-up Power(dBm)
802.11b	2412	12.99	19.90	12	13
802.11g	2412	14.13	25.88	14	15
802.11n(HT20)	2412	14.24	26.54	14	15
802.11n(HT40)	2422	14.70	29.51	14	15
BT BLE					
GFSK-1M	2402	5.73	7.58	5	6
GFSK-2M	2402	5.83	7.65	5	6

MPE Result

Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11b	13	19.95	0.00548	1.0000	PASS
802.11g	15	31.62	0.00868	1.0000	PASS
802.11n(HT20)	15	31.62	0.00868	1.0000	PASS
802.11n(HT40)	15	31.62	0.00868	1.0000	PASS
GFSM 1M	6	3.98	0.00109	1.0000	PASS
GFSM 2M	6	3.98	0.00109	1.0000	PASS

Remark: antenna gain=1.4dBi

Simultaneous MPE Result

2.4GWIFI ANT MPE (Ratio)	BLE ANT MPE (Ratio)	simultaneous MPE (Ratio)	MPE Limits (Ratio)
0.00868	0.00109	0.00977	1.0000