RF Exposure Evaluation

FCC KDB publication 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

Limits

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)

Limits for Maximum Permissible Exposure (MPE)

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: **$Pd = (Pout*G)/(4*pi*r^2)$**

Where

Pd = power density in mW/cm^2, **Pout** = output power to antenna in mW;

G = gain of antenna in linear scale, **Pi** = 3.1416;

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

Pd id the limit of MPE, 1 mW/cm^2. 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 Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, and highest channel individually.

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Test Result of RF Exposure Evaluation

For BLE

Antenna Gain: 1.88dBi

Test Frequency（MHz）	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm^2)	Power Density At 20 cm (mW/cm^2)	Test Results
2402	20.00	0.11	0±1	1.259	1.88	1	0.0004	Pass
2440	20.00	0.45	0±1	1.259	1.88	1	0.0004	Pass
2480	20.00	1.00	1±1	1.585	1.88	1	0.0005	Pass

For 2.4G WIFI

Antenna Gain: 1.88dBi

Test Mode	Minimum Separation Distance (cm)	Output Power (dBm)	Target power (dBm)	Target power (mW)	Antenna Gain (Numeric)	Power Density Limit (mW/cm^2)	Power Density At 20 cm (mW/cm^2)	Test Results
802.11b	20.00	9.40	9±1	10.965	1.88	1	0.00336	Pass
802.11g	20.00	11.01	11±1	15.885	1.88	1	0.00487	Pass
802.11 n(HT20)	20.00	10.65	10±1	14.622	1.88	1	0.00448	Pass
802.11 n(HT40)	20.00	10.63	10±1	14.555	1.88	1	0.00446	Pass

Note: BLE and 2.4G WIFI cannot transmit at the same time

Conclusion:

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure.

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