



RF Exposure Evaluation

Limits

According to 47 CFR Part 2.1091 and 47498 D01 General RF Exposure Guidance v06

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

Where

Pd = power density in mW/cm², **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 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 Procedure

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

**Test Result of RF Exposure Evaluation**

The source of the evaluation data results is based on the test report ET-26084329 E01/02/03

BLE Antenna gain=1.94dBi 2.4GWIFI Antenna gain=1.94dBi 5GWIFI Antenna gain=2.93dBi

FOR BLE

Mode	Output power (dBm)	Tune-up power (dBm)	Max Tune-up (dBm)	Max Tune-up (mW)	Numeric antenna gain	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
GFSK	1.25	2±1	3	2.00	1.56	0.0006	1.0	PASS

FOR 2.4GWIFI

Mode	Output power (dBm)	Tune-up power (dBm)	Max Tune-up (dBm)	Max Tune-up (mW)	Numeric antenna gain	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11g	14.89	15±1	16	39.81	1.56	0.0124	1.0	PASS

FOR 5.2G WIFI

Mode	Output power (dBm)	Tune-up power (dBm)	Max Tune-up (dBm)	Max Tune-up (mW)	Numeric antenna gain	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11a	14.44	15±1	16	39.81	1.96	0.0155	1.0	PASS

FOR 5.8GWIFI

Mode	Output power (dBm)	Tune-up power (dBm)	Max Tune-up (dBm)	Max Tune-up (mW)	Numeric antenna gain	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11a	14.76	15±1	16	39.81	1.96	0.0155	1.0	PASS

$$\text{dBm} = E(\text{dBuV/m}) - 95.2 = 72.78 - 95.2 = -22.42 \text{ dBm}$$

BT&2.4G WIFI&5.2GWIFI&5.8GWIFI cannot work simultaneously, then

If BT and 2.4G WIFI work simultaneously ,The total power density is $0.0006/1 + 0.0124/1 = 0.0130 < 1$

If BT and 5.2G WIFI work simultaneously ,The total power density is $0.0006/1 + 0.0155/1 = 0.0161 < 1$.

If BT and 5.8G WIFI work simultaneously ,The total power density is $0.0006/1 + 0.0155/1 = 0.0161 < 1$.

Maximum power density=0.0161 <1. Then SAR evaluation is not require .