



RF Exposure Evaluation

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

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

BT (ANT2)							
Mode	Frequency (MHz)	Output power to antenna (dBm)	Output power to antenna (mW)	Antenna Gain (dBi)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
GFSK	2402	3.290	2.13	1.43	0.000589	1.0	PASS
$\pi/4$ -DQPSK	2402	4.664	2.93	1.43	0.000809	1.0	PASS
8-DPSK	2402	4.981	3.15	1.43	0.000871	1.0	PASS

5.8G WI-FI (ANT1)							
Mode	Frequency (MHz)	Output power to antenna (dBm)	Output power to antenna (mW)	Antenna Gain (dBi)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11 a	5785	10.501	11.22	4.38	0.006120	1.0	PASS
802.11 n20	5785	10.084	10.20	4.38	0.005561	1.0	PASS
802.11 n40	5755	8.132	6.50	4.38	0.003545	1.0	PASS
802.11ac20	5745	10.774	11.95	4.38	0.006518	1.0	PASS
802.11ac40	5755	8.674	7.37	4.38	0.004020	1.0	PASS
802.11ac80	5775	6.795	4.78	4.38	0.002608	1.0	PASS
802.11ax20	5785	11.861	15.35	4.38	0.008372	1.0	PASS
802.11ax40	5795	10.843	12.14	4.38	0.006623	1.0	PASS
802.11ax80	5775	9.548	9.01	4.38	0.004914	1.0	PASS

Remark:

The ANT₁ & ANT₂ can transmit at the same time, So the worst simultaneous transmitting consideration:

The ratio = ANT₁ MPE_(MAX) / limit + ANT₂ MPE_(MAX) / limit = 0.008372 / 1.0 + 0.000871 / 1.0 = 0.009243 < 1.0.