



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

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

BLE Mode							
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	3.349	2.16	3.95	0.00107	1.0	PASS

2.4G WI-FI Mode							
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
802.11b	2412	16.253	42.20	3.95	0.02085	1.0	PASS
802.11g	2412	15.738	37.48	3.95	0.01852	1.0	PASS
802.11n20	2412	15.311	33.97	3.95	0.01678	1.0	PASS

5.2G WI-FI Mode							
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
802.11a	5240	15.479	35.31	0.72	0.00829	1.0	PASS
802.11n20	5180	15.340	34.20	0.72	0.00803	1.0	PASS
802.11n40	5230	15.403	34.70	0.72	0.00815	1.0	PASS
802.11ac20	5240	15.196	33.08	0.72	0.00777	1.0	PASS
802.11ac40	5190	15.151	32.74	0.72	0.00769	1.0	PASS
802.11ac80	5210	15.198	33.10	0.72	0.00777	1.0	PASS



5.8G WI-FI Mode

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
802.11a	5785	16.355	43.20	0.56	0.00978	1.0	PASS
802.11n20	5785	16.340	43.05	0.56	0.00974	1.0	PASS
802.11n40	5795	15.596	36.27	0.56	0.00821	1.0	PASS
802.11ac20	5785	16.185	41.52	0.56	0.00940	1.0	PASS
802.11ac40	5795	15.890	38.82	0.56	0.00878	1.0	PASS
802.11ac80	5775	15.828	38.26	0.56	0.00866	1.0	PASS

Conclusion:

For the max result : $0.01254 \leq 1.0$, compliance with FCC's RF Exposure

The Product unsupported at the same time to Transmitting.