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/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, 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	2.486	1.77	3.95	0.00088	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	14.046	25.39	3.95	0.01254	1.0	PASS
802.11g	2412	12.613	18.25	3.95	0.00902	1.0	PASS
802.11n20	2412	11.419	13.86	3.95	0.00685	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	11.897	15.48	0.72	0.00363	1.0	PASS
802.11n20	5180	11.452	13.97	0.72	0.00328	1.0	PASS
802.11n40	5230	9.916	9.81	0.72	0.00230	1.0	PASS
802.11ac20	5240	10.737	11.85	0.72	0.00278	1.0	PASS
802.11ac40	5190	10.544	11.33	0.72	0.00266	1.0	PASS
802.11ac80	5210	9.717	9.37	0.72	0.00220	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	12.475	17.68	0.56	0.00400	1.0	PASS
802.11n20	5785	12.629	18.32	0.56	0.00415	1.0	PASS
802.11n40	5795	12.089	16.18	0.56	0.00366	1.0	PASS
802.11ac20	5785	12.147	16.39	0.56	0.00371	1.0	PASS
802.11ac40	5795	11.784	15.08	0.56	0.00341	1.0	PASS
802.11ac80	5775	11.171	13.09	0.56	0.00296	1.0	PASS

Conclusion:

For the max result : 0.01254≤ 1.0, compliance with FCC's RF Exposure

The Product unsupported at the same time to Transmitting.