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

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	0.434	1.11	-0.42	0.00020	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	2437	14.787	30.11	1.73	0.00892	1.0	PASS
802.11g	2462	14.490	28.12	1.73	0.00833	1.0	PASS
802.11n20	2412	12.396	17.36	1.73	0.00514	1.0	PASS
802.11n40	2452	11.159	13.06	1.73	0.00387	1.0	PASS

Remark: ANT1 & ANT2 can transmit atthe same time, So the worst simultaneous transmntting corsideration:

The ratio = ANT1 MPE$_{(MAX)}$ / limit + ANT2 MPE$_{(MAX)}$ / limit = 0.00020 / 1.0 + 0.00892 / 1.0 = 0.00912 < 1.0.