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

BT EDR

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2480MHz	1.574	0.00069	1.0	PASS

BLE

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2480MHz	0.748	0.00033	1.0	PASS

Wifi 2.4G

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2452MHz (802.11n(HT40) MIMO	230.144	0.181	1.0	PASS

Wifi 5.2G

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
5190 MHz (802.11n HT40 MIMO)	25.882	0.0253	1.0	PASS

Wifi 5.3G

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
5260 MHz (802.11ac HT20 MIMO)	26.546	0.0243	1.0	PASS

Wifi 5.6G

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
5600 MHz (802.11n HT20 MIMO)	31.405	0.031	1.0	PASS

Wifi 5.8G

Channel	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
5755 MHz (802.11n HT40 MIMO)	21.232	0.021	1.0	PASS

802.11n/ac could work in Synchronous transmitting mode.
The maximum simultaneously power density were as below
BT+2.4G WIFI+5.2G WIFI: 0.20699 <1.
BT+2.4G WIFI+5.3G WIFI: 0.20599 <1
BT+2.4G WIFI+5.6G WIFI: 0.21269 <1
BT+2.4G WIFI+5.8G WIFI: 0.20269 <1

The max power density is less than MPE exempt limit, so it is compliance.