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

Mode	Channel	Output power to antenna (dBm)	Tune-up power (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2.4G WIFI	802.11b	16.71	17±1	63.10	0.01255	1.0	PASS
	802.11g	17.66	17±1	63.10	0.01255	1.0	PASS
	802.11n(HT20)	17.32	17±1	63.10	0.01255	1.0	PASS
BLE	2402	3.76	3±1	2.51	0.0005	1.0	PASS
LTE	Band 13	26.5	26.5±1	562.34	0.50343	0.525	PASS

WiFi, BLE and LTE support for simultaneous transmission:

Power Density at R=20cm (mW/cm^2):0.01255+0.0005+0.50343=0.51648〈0.525 Limit (mW/cm^2), So a SAR test is not required.

Remark: WIFI and BLE antenna gain=2.07dBi, LTE ntenna gain=4.5dBi