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

Frequency Range (MHz)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2402~2480	5.01	0.000997	1.0	PASS

Remark: antenna gain=0dBi

LTE mode

Band	Frequency Range (MHz)	Max tune-up power (dBm)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
2	1850–1910	24.5	0.056	1.0	PASS
4	1710–1755	24.5	0.056	1.0	PASS
5	824-849	24.5	0.056	0.55	PASS
12	699-716	24.5	0.056	0.47	PASS
13	777-787	24.5	0.056	0.52	PASS
14	788-798	24.5	0.056	0.53	PASS
17	704-716	24.5	0.056	0.47	PASS
25	1850-1915	24.5	0.056	1.0	PASS
26	814-824	24.5	0.056	0.54	PASS
26	824-849	24.5	0.056	0.55	PASS
66	1710-1780	24.5	0.056	1.0	PASS

Remark: antenna gain=0dBi

BLE and LTE transmit simultaneously:

BLE + Band 12 or 17:0.12<1

The max power density is less than SAR exempt limit, so SAR evaluation is not required.

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