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/cm2)	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/f2)	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/f2)	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

Worst Case:

Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm²)	Limit (mW/cm²)	Result
BLE	5.42	3.48	0.0007	1.0	PASS
2.4G Wi-Fi	13.09	20.37	0.0041	1.0	PASS
5.2G Wi-Fi	9.72	9.38	0.0026	1.0	PASS
5.3G Wi-Fi	10.79	11.99	0.0034	1.0	PASS
5.6G Wi-Fi	10.65	11.61	0.0033	1.0	PASS
5.8G Wi-Fi	11.99	15.81	0.0044	1.0	PASS
LTE Band 2	23.48	222.84	0.0351	1.0	PASS
LTE Band 4	23.33	215.28	0.0348	1.0	PASS
LTE Band 5	23.29	213.30	0.0346	0.55	PASS
LTE Band 7	23.31	214.29	0.0455	1.0	PASS
LTE Band 38	23.5	223.87	0.0466	1.0	PASS
LTE Band 40	23.58	228.03	0.0473	1.0	PASS
LTE Band 41	23.69	233.88	0.0486	1.0	PASS
LTE Band 66	23.05	201.84	0.0418	1.0	PASS

Remark: Antenna Gain: BT antenna gain: 0dBi, Wi-Fi antenna gain: 2.4GHz ANT =0dBi, 5GHz ANT =1.5dBi; LTE Band 2: -1.01dBi, LTE Band 4: -0.9dBi, LTE Band 5: -0.89dBi, LTE Band 7: 0.28dBi, LTE Band 38: 0.2dBi, LTE Band 40: 0.18dBi, LTE Band 41: 0.19dBi, LTE Band 66: 0.17dBi
So a SAR test is not required

The device cannot transmit with 2.4GHz Wi-Fi and 5.2GHz, 5.3GHz, 5.6GHz, 5.8GHz Wi-Fi simultaneously, can transmit with 2.4G Wi-Fi, 5.2GHz, 5.3GHz, 5.6GHz, 5.8GHz Wi-Fi , BT and LTE simultaneously.

Calculations for simultaneously transmit

Worst Case:

Mode	Ratios	Result	Limit	Result
BLE	0.0007			
2.4G Wi-Fi	0.0041	0.0534	1	PASS
LTE Band 41	0.0486			

Ratios = Power Density / Power density Limit