



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: $Pd = (Pout \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

Pd = power density in mW/cm², **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 is the limit of MPE, 1 mW/cm². 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

For 2.4G WIFI

Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11b	18.848	76.70	0.024158	1.0	PASS
802.11g	20.856	121.79	0.038296	1.0	PASS
802.11n20	20.782	119.73	0.037649	1.0	PASS
802.11n40	18.644	73.18	0.023012	1.0	PASS

For BT

Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Frequency(MHz)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
GFSK	0.19	1.04	2480	0.000329	1	PASS
π /4-DQPSK	1.176	1.31	2480	0.000413	1	PASS
8-DPSK	1.744	1.49	2480	0.000470	1	PASS

For BLE

Mode	Output power to antenna (dBm)	Output power to antenna (mW)	Frequency(MHz)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
GFSK	0.33	1.08	2480	0.000340	1	PASS

Note: Only one single wireless transmission mode can be used at the same time

Remark: antenna gain=2.0dBi

So a SAR test is not required