RF Exposure Evaluation

Limits

447498 D01 General RF Exposure Guidance v06

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

2.4G WIFI mode ANT0

Antenna Gain (dBi)	Antenna Gain (numeric)	Max tune-up conducted power	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
3.00	1.995	13.00	19.95	0.007920	1	PASS

2.4G WIFI mode ANT1

Antenna Gain (dBi)	Antenna Gain (numeric)	Max tune-up conducted power	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
3.00	1.995	13.00	19.95	0.007920	1	PASS

5G WIFI mode ANT0

Antenna Gain (dBi)	Antenna Gain (numeric)	Max tune-up conducted power	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
3.00	1.995	12.40	17.38	0.006898	1	PASS

5G WIFI mode ANT1

Antenna Gain (dBi)	Antenna Gain (numeric)	Max tune-up conducted power	Output power to antenna (mW)	Power Density at R=20cm (mW/cm^2)	Limit (mW/cm^2)	Result
3.00	1.995	12.40	17.38	0.006898	1	PASS

For WIFI 2.4G ANT0 + WIFI 2.4G ANT1 Simultaneous Transmission According to the following format:

0.007920+0.007920=0.01584<1

For WIFI 5G ANT0 + WIFI 5G ANT1 Simultaneous Transmission According to the following format:

0.006898+0.006898=0.013796<1

For WIFI 2.4G+ WIFI 5G Simultaneous Transmission According to the following format:

0.007920+0.006898=0.0148<1

$$\sum_{i=1}^{a}\frac{P_i}{P_{\mathrm{th},i}}+\sum_{j=1}^{b}\frac{ERP_j}{ERP_{\mathrm{th},j}}+\sum_{k=1}^{c}\frac{Evaluated_k}{Exposure\ Limit_k}\leq 1$$

Remark: 2.4G/5G WIFI ANT0 Gain =3dBi, 2.4G/5G WIFI ANT1 Gain =3dBi,

2.4G WIFI Directional gain =6.01dBi,

5G WIFI Directional gain =6.01dBi