



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/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

2.4G WIFI mode

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	14.780		30.06			0.005980	1.0	PASS
802.11g	17.837		60.77			0.012090	1.0	PASS
802.11n20	ANT1 17.730	ANT2 17.778	ANT1 59.29	ANT2 59.95	Total 119.24	(ANT1/1)+(ANT2/1) =0.023722	1.0	PASS
802.11n40	ANT1 18.116	ANT2 17.834	ANT1 64.80	ANT2 60.73	Total 125.53	(ANT1/1)+(ANT2/1) =0.024973	1.0	PASS

Remark: 802.11b/g antenna gain=0dBi

The 802.11n20 and 802.11n40 is MIMO.

5.2G WIFI mode

Mode	Output power to antenna (dBm)		Output power to antenna (mW)			Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11a	8.413		6.94			0.001381	1.0	PASS
802.11n20	ANT1 8.350	ANT2 8.243	ANT1 6.84	ANT2 6.67	Total 13.51	(ANT1/1)+(ANT2/1) =0.002688	1.0	PASS
802.11n40	ANT1 9.432	ANT2 9.552	ANT1 8.77	ANT2 9.02	Total 17.79	(ANT1/1)+(ANT2/1) =0.003539	1.0	PASS
802.11ac20	ANT1 8.372	ANT2 8.207	ANT1 6.87	ANT2 6.62	Total 13.49	(ANT1/1)+(ANT2/1) =0.002683	1.0	PASS
802.11ac40	ANT1 9.281	ANT2 9.504	ANT1 8.47	ANT2 8.92	Total 17.39	(ANT1/1)+(ANT2/1) =0.003460	1.0	PASS
802.11ac80	ANT1 6.408	ANT2 6.826	ANT1 4.37	ANT2 4.82	Total 9.19	(ANT1/1)+(ANT2/1) =0.001827	1.0	PASS



5.8G WIFI mode

Mode	Output power to antenna (dBm)		Output power to antenna (mW)			Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
	ANT1	ANT2	ANT1	ANT2	Total			
802.11a	6.769		7.485			0.001381	1.0	PASS
802.11n20	ANT1 7.668	ANT2 8.004	ANT1 5.85	ANT2 6.32	Total 12.17	(ANT1/1)+(ANT2/1) =0.002420	1.0	PASS
802.11n40	ANT1 8.377	ANT2 7.654	ANT1 6.88	ANT2 5.83	Total 12.71	(ANT1/1)+(ANT2/1) =0.002528	1.0	PASS
802.11ac20	ANT1 7.886	ANT2 7.705	ANT1 6.15	ANT2 5.90	Total 12.05	(ANT1/1)+(ANT2/1) =0.002397	1.0	PASS
802.11ac40	ANT1 8.006	ANT2 8.266	ANT1 6.32	ANT2 6.71	Total 13.03	(ANT1/1)+(ANT2/1) =0.002592	1.0	PASS
802.11ac80	AMT1 7.020	ANT2 7.292	ANT1 5.04	ANT2 5.36	Total 10.40	(ANT1/1)+(ANT2/1) =0.002069	1.0	PASS

Remark: 802.11a antenna gain=0dBi,

The 802.11ac/n20 and 802.11ac/n40 802.11ac80 is MIMO.

Note:5G&2.4G antenna does not support simultaneous operation, 5G antenna does not work when 2.4G antenna is working, 5G antenna does not work when 2.4G antenna is working.