

## 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 KDB 447498 D01 V06 and 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 <sup>2</sup> )	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 <sup>2</sup> )	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 <sup>2</sup> )	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:  $Pd = (P_{out} * G) / (4 * \pi * r^2)$

Where

**Pd** = power density in mW/cm<sup>2</sup>, **P<sub>out</sub>** = 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/cm<sup>2</sup>. 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

wifi 2.4Gmode: ANT1&ANT2 MIMO

Channel	Output power to antenna (dBm)		Output power to antenna (mW)		Power Density at R=20cm (mW/cm <sup>2</sup> )		Limit (mW/cm <sup>2</sup> )	Result
	Antenna1	Antenna2	Antenna1	Antenna2	Antenna1	Antenna2		
802.11b	16.328	16.583	42.9339	45.5302	0.01505	0.01596	1.0	PASS
802.11g	12.942	13.105	19.6879	20.4409	0.00690	0.00717	1.0	PASS
802.11n20	14.02	14.167	25.2348	26.1036	0.00885	0.00915	1.0	PASS
802.11n40	13.284	13.196	21.3010	20.8737	0.00747	0.00732	1.0	PASS

Remark: antenna gain=2.46dBi

wifi 5Gmode: ANT1&ANT2 MIMO

Channel	Output power to antenna (dBm)		Output power to antenna (mW)		Power Density at R=20cm (mW/cm <sup>2</sup> )		Limit (mW/cm <sup>2</sup> )	Result
	Antenna1	Antenna2	Antenna1	Antenna2	Antenna1	Antenna2		
802.11a	12.407	11.963	17.4060	15.7145	0.00648	0.00585	1.0	PASS
802.11n HT20	11.926	11.978	15.5812	15.7688	0.00580	0.00587	1.0	PASS
802.11n HT40	11.995	11.971	15.8307	15.7435	0.00589	0.00586	1.0	PASS
802.11ac HT20	11.695	11.688	14.7741	14.7503	0.00550	0.00549	1.0	PASS
802.11ac HT40	11.792	11.723	15.1078	14.8696	0.00562	0.00553	1.0	PASS
802.11ac HT80	11.141	10.836	13.0047	12.1227	0.00484	0.00451	1.0	PASS

Remark: antenna gain=2.72dBi

For Simultaneous transmitting, 1): The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits =  $0.01505/1 + 0.01596/1 + 0.00648/1 + 0.00587/1 = 0.04336 < 1$  Since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in the device is  $\leq 1.0$ , the EUT is considered to satisfy MPE compliance for simultaneous transmission operations.