

RF Exposure Evaluation

According to KDB 447498 D01 General RF Exposure Guidance v06 and part 2.1091, Unless specifically required by the published RF exposure KDB procedures, standalone 1-g head or body and 10-g extremity SAR evaluation for general population exposure conditions, by measurement or numerical simulation, is not required when the corresponding SAR Test Exclusion Threshold condition(s), listed below, is (are) satisfied.

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

WIFI 2.4G gain	1.95 dBi
WIFI 5G gain (U-NII-1)	1.97 dBi
WIFI 5G gain (U-NII-3)	-0.76 dBi

Wifi 2.4G:

modulation	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
802.11b	2412	17.02	±1	18.02	1.57	0.019757	1
	2437	17.99	±1	18.99	1.57	0.024702	1
	2462	17.91	±1	18.91	1.57	0.024251	1
802.11g	2412	20.68	±1	21.68	1.57	0.045891	1
	2437	20.32	±1	21.32	1.57	0.042241	1
	2462	20.5	±1	21.50	1.57	0.044028	1
802.11n20	2412	20.54	±1	21.54	1.57	0.044435	1
	2437	20.33	±1	21.33	1.57	0.042338	1
	2462	20.32	±1	21.32	1.57	0.042241	1
802.11n40	2422	20.5	±1	21.50	1.57	0.044028	1
	2437	20.45	±1	21.45	1.57	0.043524	1
	2452	20.54	±1	21.54	1.57	0.044435	1

WIFI 5G:

Frequency range	Channel Freq. (MHz)	Measured power (dBm)	Tune-up power (dBm)	Max tune-up power (dBm)	Antenna Gain Numeric	Evaluation result (mW/cm ²)	Power density Limits (mW/cm ²)
UNII-1	802.11a	9.57	±1	10.57	1.57	0.003571	1
	802.11n	9.71	±1	10.71	1.57	0.003687	1
UNII-3	802.11a	10.11	±1	11.11	0.84	0.002156	1
	802.11n	9.27	±1	10.27	0.84	0.001777	1

The worst-case situation is 0.045891 which is less than “1”,

This confirmed that the device comply with FCC 1.1310 MPE limit.