RF Exposure Evaluation

According to KDB447498D01 General RF Exposure Guidance v06 4.3.1. Standalone SAR test exclusion considerations 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 Exclusion Threshold condition, listed below, is satisfied.

Limits

According to FCC Part1.1310: 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 part1.1307(b)

TABLE 1—LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	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/f²)	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/f²)	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 Formula

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 id the limit of MPE . 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 Result of RF Exposure Evaluation

2.4GWIFI Antenna Gain: 2dBi, 5GWIFI Antenna Gain: 2.3dBi,

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 1.0 in linear scale.

Output Power Into Antenna & RF Exposure Evaluation Distance:

Measurement Data

The Max Conducted Peak Output Power data refer to report Report No.: ZKT-211025L5658-01 & ZKT-211025L5658-02

Shenzhen ZKT Technolgy Co., Ltd.
1/F, No. 101, Building B, No. 6, Tangwei Community Industrial Avenue, Fuhai Street, Bao'an District, Shenzhen,China

☎ +86-400-000-9970   🖨 +86-755-2233 6688   ✉ zkt@zkt-lab.com   🌐 www.zkt-lab.com

2.4GWIFI:

Module A --worst mode and channel		
Test channel	Antenna Output Power (dBm)	Tune up tolerance (dBm)
802.11b-CH01	17.61	17±1
802.11g-CH01	16.10	16±1
802.11n20-CH01	14.56	15±1
802.11n40-CH06	12.97	13±1

Test worst case

Test channel	Max tune-up Power (dBm)	Max tune-up Power (mW)	Calculated value (mW/cm2)	Limit (mW/cm2)
802.11b-CH01	18	63.096	0.0199	1.0

Remark:

1)The Max Conducted Peak Output Power data refer to report Report No.: ZKT-211025L5658-01

2)Pd = (Pout*G)/(4* Pi * R^2)=(63.096*1.584)/(4*3.1415*20*20)=0.0199, G=$10^{gain/10}$ =1.584

5GWIFI:

Mode	Test channel	Antenna Output Power (dBm)	Tune up tolerance (dBm)	Max Tune up (dBm)
802.11a	36	7.90	8±1	9
	40	8.53	8±1	9
	48	7.27	8±1	9
	149	0.43	0±1	1
	157	0.14	0±1	1
	165	0.18	0±1	1
802.11n20	36	7.51	7±1	8
	40	7.10	7±1	8
	48	6.50	7±1	8
	149	-0.86	0±1	1
	157	-0.97	0±1	1
	165	-0.73	0±1	1
802.11n 40	38	6.75	6±1	7
	46	6.41	6±1	7
	151	-1.01	-1±1	0
	159	-0.77	-1±1	0
802.11ac20	36	7.06	7±1	8
	40	6.48	7±1	8
	48	7.12	7±1	8
	149	-0.85	-1±1	0
	157	-1.02	-1±1	0
	165	-0.61	-1±1	0

802.11ac40	38	6.81	6±1	7
	46	6.54	6±1	7
	151	-1.09	-1±1	0
	159	-0.78	-1±1	0

Test worst case

Maximum tune-up Power (dbm)	Maximum tune-up Power (mW)	Calculated value (mW/cm2)	Limit (mW/cm2)
9	7.943	0.0027	1.0

Remark:

1)The Max Conducted Peak Output Power data refer to report Report No.: ZKT-211025L5658-02

2) $Pd = (Pout*G)/(4* Pi * R^2)=(7.943 *1.698)/(4*3.1415*20*20)=0.0027$, $G=10^{gain/10} =1.698$

EUT wifi-5G & wifi-2.4G module is more than 20cm away from the human body.

Conclusion: 2.4Gwifi and 5Gwifi RF exposure evaluation results are less than the limit of 1.0, so there is no sar requirement