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^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.

EIRP=EMeas+20log(dMeas)-104.7

EIRP is the equivalent isotropically radiated power, in dBm

EMeas is the field strength of the emission at the measurement distance, in dBμV/m

dMeas is the measurement distance, in m

Test Result of RF Exposure Evaluation

wifi 2.4G mode

Channel	Output power to antenna (dBm)		Output power to antenna (mW)		Power Density at R=20cm (mW/cm^2)		Limit (mW/cm^2)	Result
	Antenna1	Antenna2	Antenna1	Antenna2	Antenna1	Antenna2		
802.11b	16.60	16.31	45.71	42.76	0.01441	0.01348	1.0	PASS
802.11g	17.52	17.11	56.49	51.40	0.01781	0.01621	1.0	PASS
802.11n20	16.11	15.78	40.83	37.84	0.01287	0.01193	1.0	PASS
802.11n40	16.58	16.15	45.50	41.21	0.01435	0.01299	1.0	PASS

wifi 5.8G mode

Channel	Output power to antenna (dBm)		Output power to antenna (mW)		Power Density at R=20cm (mW/cm^2)		Limit (mW/cm^2)	Result
	Antenna1	Antenna2	Antenna1	Antenna2	Antenna1	Antenna2		
802.11a	15.545	15.368	35.85	34.42	0.01130	0.01085	1.0	PASS
802.11ac20	15.305	15.263	33.92	33.60	0.01070	0.01059	1.0	PASS
802.11ac40	15.202	13.457	33.13	22.17	0.01045	0.00699	1.0	PASS
802.11ac80	15.145	13.62	32.70	23.01	0.01031	0.00726	1.0	PASS
802.11ax20	15.167	13.692	32.86	23.40	0.01036	0.00738	1.0	PASS
802.11ax40	15.005	13.685	31.66	23.36	0.00998	0.00737	1.0	PASS
802.11ax80	15.047	13.092	31.97	20.38	0.01008	0.00643	1.0	PASS
802.11n20	15.307	15.285	33.94	33.77	0.01070	0.01065	1.0	PASS
802.11n40	15.142	15.588	32.67	36.21	0.01030	0.01142	1.0	PASS

Remark: 2.4G antenna gain=5.01dBi(For MIMO), 2.0dBi(For SISO), 5.8G antenna gain=5.01dBi(For MIMO), 2.0dBi(For SISO)

For Simultaneous transmitting, 1): The sum of the ratios of the spatially averaged results to the applicable frequency dependent MPE limits =0.01435/1 +0.01299/1+0.01030/1+0.01142/1 = 0.04906< 1 Since the sum of the MPE ratios for all simultaneously transmitting antennas incorporated in the device is $\leqslant$ 1.0, the EUT is considered to satisfy MPE compliance for simultaneous transmission operations.