RF Exposure Evaluation

Limit

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 1.1310 & 2.1091

Table 1-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

Note: f = frequency in MHz

Evaluation Method

Transmission formula: $P_d = (Pout*G)/(4*pi*R^2)$

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

Conducted Power Results & Manufacturing tolerance

Specification	Operating Mode	Conducted Output Power (dBm)	Target (dBm)	Tolerance ±(dB)
2.4G WIFI	802.11b	17.48	17	1
	802.11g	14.96	14	1
	802.11n(HT20)	14.87	14	1
BLE	GFSK	3.55	3	1

Evaluation Results

Spec.	Operating Mode	Antenna Distance (cm)	Output Power		Gain of antenna in linear scale	Power Density (mW/cm2)	Limit (mW/cm2)	Result
			dBm	mW				
2.4G WIFI	802.11b	20	18	63.1	1.01	0.0127	1	PASS
	802.11g	20	15	31.62	1.01	0.0064	1	PASS
	802.11n(HT20)	20	15	31.62	1.01	0.0064	1	PASS
BLE	GFSK	20	4	2.51	0.35	0.0002	1	PASS

Remark:

1. Output power including tune up tolerance.

2. The maximum antenna gain of WIFI 2.4G is 0.04dBi.

3. The maximum antenna gain of BLE is -4.5dBi.

4. The exposure safety distance is 20cm.

Conclusion

For WLAN & Bluetooth can be working simultaneously, so the total MPE result is 0.0129. The measurement results comply with the FCC Limit per 47 CFR 1.1310 & 2.1091 for the uncontrolled RF Exposure and MPE complicance per KDB 447498 v06.

----------End of the report----------