

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: $P_d = (P_{out} * G) / (4 * \pi * R^2)$

Where

P_d = power density in mW/cm², P_{out} = output power to antenna in mW, G = gain of antenna in linear scale; $P_i = 3.1416$, 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	16.46	16	1
	802.11g	15.58	15	1
	802.11n(HT20)	15.46	15	1
BLE	GFSK	4.59	4	1

Evaluation Results

Spec.	Operating Mode	Antenna Distance (cm)	Output Power		Gain of antenna in linear scale	Power Density (mW/cm ²)	Limit (mW/cm ²)	Result
			dBm	mW				
2.4G WIFI	802.11b	20	17	50.12	1.98	0.0197	1	PASS
	802.11g	20	16	39.81	1.98	0.0157	1	PASS
	802.11n(HT20)	20	16	39.81	1.98	0.0157	1	PASS
BLE	GFSK	20	5	3.16	0.46	0.0003	1	PASS

Remark:

- 1. Output power including tune up tolerance.*
- 2. The maximum antenna gain of WIFI 2.4G is 2.97dBi.*
- 3. The maximum antenna gain of BLE is -3.38dBi.*
- 4. The exposure safety distance is 20cm.*

Conclusion

For WLAN & Bluetooth can be working simultaneously, so the total Exposure Ratio = $0.0197 + 0.0003 = 0.02$. The measurement results comply with the FCC Limit per 47 CFR 1.1310 & 2.1091 for the uncontrolled RF Exposure and MPE compliance per KDB 447498 v06.

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