

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	16.13	16	1
	802.11g	16.10	16	1
	802.11n(HT20)	15.58	16	1
5G WIFI U-NII-1	802.11a	12.37	12	1
	802.11n(HT20)	12.00	12	1
	802.11n(HT40)	12.16	12	1
	802.11ac(VHT20)	11.96	12	1
	802.11ac(VHT40)	11.97	12	1
	802.11ac(VHT80)	11.17	12	1
5G WIFI U-NII-2A	802.11a	12.68	12	1
	802.11n(HT20)	12.30	12	1
	802.11n(HT40)	12.33	12	1
	802.11ac(VHT20)	12.29	12	1
	802.11ac(VHT40)	12.39	12	1

	802.11ac(VHT80)	9.48	10	1
5G WIFI U-NII-2C	802.11a	11.07	11	1
	802.11n(HT20)	10.93	11	1
	802.11n(HT40)	11.00	11	1
	802.11ac(VHT20)	10.84	11	1
	802.11ac(VHT40)	11.08	11	1
	802.11ac(VHT80)	10.56	11	1
	5G WIFI U-NII-3	802.11a	15.73	15
802.11n(HT20)		15.48	15	1
802.11n(HT40)		15.70	15	1
802.11ac(VHT20)		15.56	15	1
802.11ac(VHT40)		15.70	15	1
802.11ac(VHT80)		15.37	15	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	1.58	0.016	1	PASS
	802.11g	20	17	50.12	1.58	0.016	1	PASS
	802.11n(HT20)	20	17	50.12	1.58	0.016	1	PASS
5G WIFI U-NII-1	802.11b	20	13	19.95	1.58	0.006	1	PASS
	802.11n(HT20)	20	13	19.95	1.58	0.006	1	PASS
	802.11n(HT40)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT20)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT40)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT80)	20	13	19.95	1.58	0.006	1	PASS
5G WIFI U-NII-2A	802.11b	20	13	19.95	1.58	0.006	1	PASS
	802.11n(HT20)	20	13	19.95	1.58	0.006	1	PASS
	802.11n(HT40)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT20)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT40)	20	13	19.95	1.58	0.006	1	PASS
	802.11ac(VHT80)	20	11	12.59	1.58	0.004	1	PASS
5G WIFI U-NII-2C	802.11b	20	12	15.85	1.58	0.005	1	PASS
	802.11n(HT20)	20	12	15.85	1.58	0.005	1	PASS
	802.11n(HT40)	20	12	15.85	1.58	0.005	1	PASS
	802.11ac(VHT20)	20	12	15.85	1.58	0.005	1	PASS
	802.11ac(VHT40)	20	12	15.85	1.58	0.005	1	PASS
	802.11ac(VHT80)	20	12	15.85	1.58	0.005	1	PASS
5G WIFI	802.11b	20	16	39.81	1.58	0.013	1	PASS

U-NII-3	802.11n(HT20)	20	16	39.81	1.58	0.013	1	PASS
	802.11n(HT40)	20	16	39.81	1.58	0.013	1	PASS
	802.11ac(VHT20)	20	16	39.81	1.58	0.013	1	PASS
	802.11ac(VHT40)	20	16	39.81	1.58	0.013	1	PASS
	802.11ac(VHT80)	20	16	39.81	1.58	0.013	1	PASS

Remark:

1. *Output power including tune up tolerance;*
2. *The maximum antenna gain is 2dBi*
3. *The exposure safety distance is 20cm.*

Conclusion

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.