



RF Exposure evaluation

Exposure category: General population/uncontrolled

environment EUT Type: Production Unit

Device Type: Mobile Device

Refer Standard: KDB 447498 D01 General RF Exposure Guidance
v06

FCC Part 2 §2.1091

FCC ID: 2BSYP-S2

1. Reference

According to §1.1307(b)(1), systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines.

According to §1.1310 and §2.1091 RF exposure is calculated.

KDB447498 D01: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

2. Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
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

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 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

*=Plane-wave equivalent power density

3. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = \frac{PG}{4\pi R^2}$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator R=distance to the center of radiation of the antenna

4. Result

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r = 20\text{cm}$, as well as the gain see below table , the RF power density can be obtained.

Internal Identification	Antenna Identification in Internal photos	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Internal Antenna	2.4G/5G Wifi Ant	Internal Antenna	2.4G WIFI: 2412-2462MHz 5.2G WIFI: 5180MHz~5240MHz 5.8G WIFI: 5745MHz~5825MHz	1.51dBi @ 2.4GHz; 1.65dBi @ 5.2GHz; 2.55dBi @ 5.8GHz

Freq. (MHz)	Output Power (dBm)	Target power W/ tolerance (dBm)	Max tune up power tolerance (dBm)	Output power to antenna (mW)	Ant Gain (dBi)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
2.4G WIFI: IEEE 802.11b								
2412	12.71	13.0±1.0	14.0	25.1189	1.51	0.0071	1	Pass
2437	12.47	12.5±1.0	13.5	22.3872	1.51	0.0063	1	Pass
2462	11.99	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
2.4G WIFI: IEEE 802.11g								
2412	13.49	13.5±1.0	14.5	28.1838	1.51	0.0079	1	Pass
2437	13.07	13.0±1.0	14.0	25.1189	1.51	0.0071	1	Pass
2462	12.41	12.5±1.0	13.5	22.3872	1.51	0.0063	1	Pass
2.4G WIFI: IEEE 802.11n HT20								
2412	12.92	13.0±1.0	14.0	25.1189	1.51	0.0071	1	Pass
2437	12.87	12.5±1.0	13.5	22.3872	1.51	0.0063	1	Pass
2462	12.19	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
2.4G WIFI: IEEE 802.11n HT40								
2422	12.84	13.0±1.0	14.0	25.1189	1.51	0.0071	1	Pass
2437	13.51	13.5±1.0	14.5	28.1838	1.51	0.0079	1	Pass
2452	12.85	13.0±1.0	14.0	25.1189	1.51	0.0071	1	Pass
2.4G WIFI: IEEE 802.11ax HE20								
2412	11.61	11.5±1.0	12.5	17.7828	1.51	0.0050	1	Pass

2437	11.44	11.5±1.0	12.5	17.7828	1.51	0.0050	1	Pass
2462	11.95	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
2.4G WIFI: IEEE 802.11ax HE40								
2422	11.93	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
2437	12.07	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
2452	11.89	12.0±1.0	13.0	19.9526	1.51	0.0056	1	Pass
5.2G WIFI: IEEE 802.11a								
5180	8.76	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5200	9.14	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5240	8.72	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5.2G WIFI: IEEE 802.11n HT20								
5180	8.49	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5200	8.34	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5240	8.69	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5.2G WIFI: IEEE 802.11n HT40								
5190	8.42	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5230	8.09	8.0±1.0	9.0	7.9433	1.65	0.0023	1	Pass
5.2G WIFI: IEEE 802.11ac VHT20								
5180	9.04	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5200	9.16	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5240	8.73	9.0±1.0	10.0	10.0000	1.65	0.0029	1	Pass
5.2G WIFI: IEEE 802.11ac VHT40								
5190	5.78	6.0±1.0	7.0	5.0119	1.65	0.0015	1	Pass
5230	6.17	6.0±1.0	7.0	5.0119	1.65	0.0015	1	Pass
5.2G WIFI: IEEE 802.11ac VHT80								
5210	3.95	4.0±1.0	5.0	3.1623	1.65	0.0009	1	Pass
5.2G WIFI: IEEE 802.11ax HE20								
5180	8.83	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5200	8.66	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5240	8.59	8.5±1.0	9.5	8.9125	1.65	0.0026	1	Pass
5.2G WIFI: IEEE 802.11ax HE40								
5190	7.99	8.0±1.0	9.0	7.9433	1.65	0.0023	1	Pass
5230	7.38	7.5±1.0	8.5	7.0795	1.65	0.0021	1	Pass
5.2G WIFI: IEEE 802.11ax HE80								
5210	5.95	6.0±1.0	7.0	5.0119	1.65	0.0015	1	Pass
5.8G WIFI: IEEE 802.11a								
5745	8.29	8.5±1.0	9.5	8.9125	2.55	0.0032	1	Pass
5785	8.92	8.5±1.0	9.5	8.9125	2.55	0.0032	1	Pass
5825	9.29	9.0±1.0	10.0	10.0000	2.55	0.0036	1	Pass
5.8G WIFI: IEEE 802.11n HT20								
5745	7.77	8.0±1.0	9.0	7.9433	2.55	0.0028	1	Pass
5785	7.72	8.0±1.0	9.0	7.9433	2.55	0.0028	1	Pass

5825	8.41	8.5±1.0	9.5	8.9125	2.55	0.0032	1	Pass
5.8G WIFI: IEEE 802.11n HT40								
5755	6.73	7.0±1.0	8.0	6.3096	2.55	0.0023	1	Pass
5795	6.70	7.0±1.0	8.0	6.3096	2.55	0.0023	1	Pass
5.8G WIFI: IEEE 802.11ac VHT20								
5745	7.48	7.5±1.0	8.5	7.0795	2.55	0.0025	1	Pass
5785	7.56	7.5±1.0	8.5	7.0795	2.55	0.0025	1	Pass
5825	8.36	8.0±1.0	9.0	7.9433	2.55	0.0028	1	Pass
5.8G WIFI: IEEE 802.11ac VHT40								
5755	6.39	6.5±1.0	7.5	5.6234	2.55	0.0020	1	Pass
5795	6.08	6.0±1.0	7.0	5.0119	2.55	0.0018	1	Pass
5.8G WIFI: IEEE 802.11ac VHT80								
5775	3.90	4.0±1.0	5.0	3.1623	2.55	0.0011	1	Pass
5.8G WIFI: IEEE 802.11ax HE20								
5745	8.27	8.5±1.0	9.5	8.9125	2.55	0.0032	1	Pass
5785	8.37	8.5±1.0	9.5	8.9125	2.55	0.0032	1	Pass
5825	9.07	9.0±1.0	10.0	10.0000	2.55	0.0036	1	Pass
5.8G WIFI: IEEE 802.11ax HE40								
5755	7.06	7.0±1.0	8.0	6.3096	2.55	0.0023	1	Pass
5795	6.47	6.5±1.0	7.5	5.6234	2.55	0.0020	1	Pass
5.8G WIFI: IEEE 802.11ax HE80								
5775	6.05	6.0±1.0	7.0	5.0119	2.55	0.0018	1	Pass

Note: The estimation distance is 20cm.

3. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----