

RF Exposure evaluation

FCC ID: SMQISEEDAN

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

$$S=PG/4\pi R^2$$

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 of the used antenna is 2.50dBi for 2.4GHz and 3.0dBi for GHz, and Band 5: 0.78dBiBand, 40: 1.35dBi, Band 41: 1.45dBi the RF power density can be obtained.

For 2.4Ghz Bluetooth BR/EDR

Mode	Max. Output Power (dBm)	Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit FCC (mW/cm ²)	Test Results
GFSK	10.42	11.0154	1.7783	0.0039	1.0000	PASS
Pi/4DQPSK	10.54	11.3240	1.7783	0.0040	1.0000	PASS
8DPSK	11.55	14.2889	1.7783	0.0051	1.0000	PASS

For 2.4Ghz Bluetooth low Energy

Mode	Frequency(MHz)	Max. Output Power (dBm)	Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit FCC (mW/cm ²)	Test Results
GFSK	2402	6.48	4.4463	1.7783	0.0016	1.0000	PASS
	2440	5.81	3.8107	1.7783	0.0013	1.0000	PASS
	2480	5.57	3.6058	1.7783	0.0013	1.0000	PASS

For 2.4Ghz Wifi

Frequency(MHz)	Max. Output Power (dBm)	Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit FCC (mW/cm ²)	Test Results
802.11b	19.86	96.8278	1.7783	0.0343	1.0000	PASS
802.11g	22.87	193.6422	1.7783	0.0685	1.0000	PASS
802.11n(HT20)	22.54	179.4734	1.7783	0.0635	1.0000	PASS

For 5Ghz Wifi

Mode	Max. Output Power (dBm)	Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit FCC (mW/cm ²)	Test Results
802.11a	14.32	27.0396	1.9953	0.0107	1.0000	PASS
802.11n(HT20)	12.31	17.0216	1.9953	0.0068	1.0000	PASS
802.11ac(VHT20)	12.35	17.1791	1.9953	0.0068	1.0000	PASS

For Band 5/Band40 /Band 41

Mode	Max. Output Power (dBm)	Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm ²)	Power Density Limit FCC (mW/cm ²)	Test Results
Band 5	22.93	196.3360	1.1967	0.0423	1.0000	PASS
Band40a	23.30	213.7962	1.3646	0.0580	1.0000	PASS
Band40b	23.45	221.3095	1.3646	0.0601	1.0000	PASS
Band 41	22.76	188.7991	1.3964	0.0524	1.0000	PASS

5. Conclusion

Compliance with RF Exposure requirement.