RF Exposure evaluation

FCC ID: 2ASYH-MS-001Q

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 =20cm, as well as the gain of the used antenna is 3.06dBi for 2.4GHz and 5GHz,the RF power density can be obtained.

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	-0.10	0.9772	2.0230	0.0004	1.0000	PASS
	2440	-0.35	0.9226	2.0230	0.0004	1.0000	PASS
	2480	-1.23	0.7534	2.0230	0.0003	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
2412	20.13	103.0386	2.0230	0.0415	1.0000	PASS
2437	21.08	128.2331	2.0230	0.0516	1.0000	PASS
2462	20.19	104.4720	2.0230	0.0420	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	14.25	26.6073	2.0230	0.0107	1.0000	PASS
802.11n(HT20)	14.70	29.5121	2.0230	0.0119	1.0000	PASS
802.11n(HT40)	14.37	27.3527	2.0230	0.0110	1.0000	PASS

2.4G BT+WIFI

BT Max. Output Power (mW)	WIFI Max. Output Power (mW)	BT+WIFI Max. Output Power (mW)	Antenna Gain (Numeric)	Power Density At 20 cm (mW/cm^2)	Power Density Limit FCC (mW/cm^2)	Test Results
0.9772	128.2331	129.2303	2.0230	0.0520	1.0000	PASS

5. Conclusion

The SAR evaluation is not required.