RF Exposure evaluation

FCC ID: 2AGHJ-RWM101B

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 v06: Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies

RSS-102 Issue 5 March 2015 Radio Frequency (RF) Exposure Compliance of Radio communication Apparatus (All Frequency Bands)

2. Limit

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure (FCC)

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm²)	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

RF Field Strength Limits for Devices Used by the General Public (Uncontrolled Environment) (IC)

Frequency Range (MHz)	Electric Field (V/m rms)	Magnetic Field (A/m rms)	Power Density (W/m²)	Reference Period (minutes)
$0.003\text{-}10^{21}$	83	90	-	Instantaneous*
0.1-10	-	0.73/f	-	6**
1.1-10	87/$f^{0.5}$	-	-	6**
10-20	27.46	0.0728	2	6
20-48	58.07/$f^{0.25}$	0.1540/$f^{0.25}$	8.944/$f^{0.5}$	6
48-300	22.06	0.05852	1.291	6
300-6000	3.142 $f^{0.3417}$	0.008335 $f^{0.3417}$	0.02619$f^{0.6834}$	6
6000-15000	61.4	0.163	10	6
15000-150000	61.4	0.163	10	616000/$f^{1.2}$
150000-300000	0.158 $f^{0.5}$	4.21 x $10^{-4} f^{0.5}$	6.67 x $10^{-5} f$	616000/$f^{1.2}$

Note: f is frequency in MHz.
*Based on nerve stimulation (NS).
** Based on specific absorption rate (SAR).

Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is

$\leqslant$ 1.0

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 1.25dBi, the RF power density can be obtained.

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	15.74	37.4973	1.3335	0.00995		1		PASS

Zigbee

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
2405	19.45	88.1049	1.3335	0.0234		1		PASS

Simultaneous transmission MPE

Max.Power Density At 20 cm WIFI (mW/cm^2)		Max.Power Density At 20 cm Zigbee (mW/cm^2)		Max.sum of the MPE ratios		Limit	Test Results
0.0099	+	0.0234	=	0.0333	<	1	PASS

5. Conclusion

The RF exposure evaluation is not required.