RF Exposure evaluation

FCC ID: Z52NAS-WV07W

Exposure category: General population/uncontrolled environment

EUT Type: Production Unit

Device Type: Mobile Device

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. Antenna Information

the device can only use antennas certificated as follows provided by manufacturer;

Type	Antenna type	Gain	Frequency
BT/WIFI	Copper tube antenna	0.65dBi 1.40dBi	2400-2500MHz 5150-5800 MHz

5. Manufacturing Tolerance

BT

Mode	**Channel**	**Target Power**
BLE 1M	0	0±1 dBm
	19	0±1 dBm
	39	0±1 dBm

WIFI2.4G

Mode	**Channel**	**Target Power**
802.11b	1	13.0±1 dBm
	6	13.0±1 dBm
	11	13.0±1 dBm
802.11g	1	18.0±1 dBm
	6	18.0±1 dBm
	11	18.0±1 dBm
802.11n-HT20	1	18.0±1 dBm
	6	18.0±1 dBm
	11	18.0±1 dBm
802.11n-HT40	3	18.0±1 dBm
	6	18.0±1 dBm
	9	18.0±1 dBm

WIFI5G U-NII 1

Mode	Channel	Target Power
802.11a	36	10±1 dBm
	40	10±1 dBm
	48	11±1 dBm
802.11n(HT20)	36	10±1 dBm
	40	10±1 dBm
	48	11±1 dBm
802.11n(HT40)	38	10±1 dBm
	46	11±1 dBm
802.11ac(HT20)	36	10±1 dBm
	40	10±1 dBm
	48	11±1 dBm
802.11ac(HT40)	38	10±1 dBm
	46	11±1 dBm
802.11ac(HT80)	42	11±1 dBm

WIFI5G U-NII 3

Mode	Channel	Target Power
802.11a	149	14±1 dBm
	157	14±1 dBm
	165	10±1 dBm
802.11n(HT20)	149	14±1 dBm
	157	14±1 dBm
	165	10±1 dBm
802.11n(HT40)	151	10±1 dBm
	159	14±1 dBm
802.11ac(HT20)	149	14±1 dBm
	157	14±1 dBm
	165	14±1 dBm
802.11ac(HT40)	151	14±1 dBm
	159	14±1 dBm
802.11ac(HT80)	155	14±1 dBm

6. Standalone MPE 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 list in section 4, the RF power density can be obtained.

Mode	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm^2)	MPE Limits (mW/cm^2)
	dBm	mW				
BLE	1	3.1623	0.65	1.1614	0.0007	1.0000
WIFI 2.4G	19	79.4328	0.65	1.1614	0.0184	1.0000
WIFI 5.1G	12	15.8489	1.4	1.3804	0.0044	1.0000
WIFI 5.8G	15	31.6228	1.4	1.3804	0.0087	1.0000

Remark:

1. Output power (Average) including turn-up tolerance;

2. Output power was adjust to duty cycle at 100% if measured duty cycle less than 98%;

3. MPE evaluate distance is 20cm from user manual provide by manufacturer.

7. Summary simultaneous transmission

The BT and wifi cannot simultaneous transmission.

8. 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----------