

RF Exposure evaluation

FCC ID: 2AVFN-FT412

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

FT412 can only use antennas certificated as follows provided by manufacturer;

Antenna No.	Model No. of antenna:	Type of antenna:	Gain of the antenna (Max.)	Frequency range:
WCDMA	/	External antenna	FDD Band II: 2.63 dBi FDD Band IV: 2.86 dBi FDD Band V: 1.61 dBi	
LTE	/	External antenna	Band 2: 2.63dBi Band 4: 2.86dBi Band 5: 1.61dBi Band 7: 1.07dBi Band 12: 1.61dBi Band 13: 2.19dBi Band 14: 2.22dBi Band 17: 1.61dBi Band 25: 2.63dBi Band 26: 1.93dBi Band:30:0.67 dBi Band 41:2.49 dBi Band 66: 3.76dBi Band 71: 1.39dBi	

5. 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, $r = 20\text{cm}$, as well as the gain of the used antenna is refer to section 4, the RF power density can be obtained.

Test Mode	Frequency Band (MHz)	Maximum Conducted Power (dBm)	Antenna Gain (dBi)	ERP (EIRP) (dBm)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)
WCDMA B2	1850 ~ 1910	24.5	2.63	27.13	0.1027	1
WCDMA B4	1710 ~ 1755	24.5	2.86	27.36	0.1083	1
WCDMA B5	824 ~ 849	24.5	1.61	23.96	0.0495	0.5493
LTE B2	1850 ~ 1910	24	2.63	26.63	0.0916	1
LTE B4	1710 ~ 1755	24	2.86	26.86	0.0965	1
LTE B5	824 ~ 849	24	1.61	23.46	0.0441	0.5493
LTE B7	2500 ~ 2570	24	1.07	25.07	0.0639	1
LTE B12	699 ~ 716	24	1.61	23.46	0.0441	0.466
LTE B13	777 ~ 787	24	2.19	24.04	0.0504	0.518
LTE B14	788 ~ 798	24	2.22	24.07	0.0508	0.5253
LTE B17	704 ~ 716	24	1.61	23.46	0.0441	0.4693
LTE B25	1850 ~ 1915	24	2.63	26.63	0.0916	1
LTE B26	814 ~ 849	24	1.93	23.78	0.0475	0.5427
LTE B30	2305 ~ 2315	24	0.67	24.67	0.0583	1
LTE B41	2496 ~ 2690	24	2.49	26.49	0.0887	1
LTE B66	1710 ~ 1780	24	3.76	27.76	0.1188	1
LTE B71	663 ~ 698	24	1.39	23.24	0.0419	0.442

Remark:

- 1. Output power (Peak) including turn-up tolerance;*
- 2. MPE evaluate distance is 20cm from user manual provide by manufacturer.*

6. Conclusion

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

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