

RF Exposure evaluation

FCC ID: 2ASRT-PPX320

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

PPX320 can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	FPC Antenna	2000 MHz – 2500 MHz	2.00dBi
Antenna 1	FPC Antenna	2000 MHz – 2500 MHz	2.00dBi

5. Result

5.1 Standalone MPE

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 2dBi, the RF power density can be obtained.

ANT0

Modulation Type	Target power W/ tolerance (dBm)	Max tune up power tolerance(dBm)	Max Output power to antenna (mW)	Antenna Gain (Numeric)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11B	20±1.0	21	125.8925	1.5849	0.0397	1.0	Pass
802.11g	21.5±1.0	22.5	177.8279	1.5849	0.0561	1.0	Pass
802.11n (HT20)	20±1.0	21	125.8925	1.5849	0.0397	1.0	Pass
802.11n (HT40)	20±1.0	21	125.8925	1.5849	0.0397	1.0	Pass

ANT1

Modulation Type	Target power W/ tolerance (dBm)	Max tune up power tolerance(dBm)	Max Output power to antenna (mW)	Antenna Gain (Numeric)	Power Density at R=20cm (mW/cm ²)	Limit (mW/cm ²)	Result
802.11B	19±1.0	20	100.0000	1.5849	0.0315	1.0	Pass
802.11g	20±1.0	21	125.8925	1.5849	0.0397	1.0	Pass
802.11n (HT20)	19±1.0	20	100.0000	1.5849	0.0315	1.0	Pass
802.11n (HT40)	19±1.0	20	100.0000	1.5849	0.0315	1.0	Pass

5.2 Simultaneous Transmission MPE

The sample support one WLAN modular with two same antenna and support MIMO technology, need consider simultaneous transmission;

Maximum Simultaneous transmission MPE Ratio for WLAN

Modulation Type	Maximum MPE Ratio Chain 0	Maximum MPE Ratio Chain 1	Σ MPE ratios	Limit	Results
HT20	0.0397	0.0315	<0.1	1.0	PASS
HT40	0.0397	0.0315	<0.1	1.0	PASS

Remark:

1. Output power including tune-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.