



Maximum Permissible Exposure Report

1. Product Information

EUT : AURORA
Test Model : 7120+3120
Power Supply : Input: 12V $\overline{=}$ 3A
For AC Adapter Input: 100-240V~, 50/60Hz, 0.9A
Adapter Output: 12V $\overline{=}$ 3A, Max 36W
Hardware Version : V1.0
Software Version : V1.0

5.2G WLAN

Frequency Range : 5180MHz~5240MHz
Channel Number : 2 channels for 40MHz bandwidth(5190MHz~5230MHz)
Modulation Type : IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description : Antenna1: External Antenna, 5.0dBi(Max.)
Antenna2: External Antenna, 5.0dBi(Max.)
Antenna3: External Antenna, 5.0dBi(Max.)
Antenna4: External Antenna, 5.0dBi(Max.)

5.8G WLAN

Frequency Range : 5745MHz~5825MHz
Channel Number : 2 channels for 40MHz bandwidth(5755MHz~5795MHz)
Modulation Type : IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
Antenna Description : Antenna1: External Antenna, 5.0dBi(Max.)
Antenna2: External Antenna, 5.0dBi(Max.)
Antenna3: External Antenna, 5.0dBi(Max.)
Antenna4: External Antenna, 5.0dBi(Max.)
Exposure category : General population/uncontrolled environment
EUT Type : Production Unit
Device Type : Mobile Devices





2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR 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. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for 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 ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3.1 Refer Evaluation Method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: Mobile Devices

3.2 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





4. 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

5. Antenna Information

External Antenna can only use antennas certificated as follows provided by manufacturer;

Antenna type and antenna number	Operate frequency band	TX Path	Maximum antenna gain	Notes
External Antenna	5180MHz-5240MHz	4	5 dBi	WiFi Antenna
External Antenna	5745MHz-5825MHz	4	5 dBi	WiFi Antenna





6. Conducted Power

[5.2GWIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Ant 1 Max Conducted Power(Dbm)	Ant 2 Max Conducted Power(Dbm)	Ant 3 Max Conducted Power(Dbm)	Ant 4 Max Conducted Power(Dbm)
11AC40 SISO	38	5190	12.59	12.52	12.62	12.65
	46	5230	12.25	11.99	12.19	12.17

[5.8WIFI Max Conducted Power]

Mode	Channel	Frequency (MHz)	Ant 1 Max Conducted Power(Dbm)	Ant 2 Max Conducted Power(Dbm)	Ant 3 Max Conducted Power(Dbm)	Ant 4 Max Conducted Power(Dbm)
11AC40 SISO	151	5755	11.46	11.54	11.60	11.62
	159	5795	10.43	10.3	10.33	10.34

7.Manufacturing Tolerance

5.2GWIFI

11AC40(Peak)								
Channel	Channe38				Channel 46			
	ANT1	ANT2	ANT3	ANT4	ANT1	ANT2	ANT3	ANT4
Target (dBm)	13	13	13	13	12	12	12	12
Tolerance ±(dB)	1.0				1.0			

5.8GWIFI

11AC40(Peak)								
Channel	Channe151				Channel 159			
	ANT1	ANT2	ANT3	ANT4	ANT1	ANT2	ANT3	ANT4
Target (dBm)	11	12	12	12	10	10	10	10
Tolerance ±(dB)	1.0				1.0			





8. Evaluation Results

8.1 Standalone MPE Evaluation

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 refer to antenna information, the RF power density can be obtained.

ANT1

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		dBm	mW				
11AC40	5.180-5.240	13	19.95	5.0	3.1623	0.012559	1.0000
	5.745-5.825	12	15.8489	5.0	3.1623	0.009976	1.0000

ANT2

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		dBm	mW				
11AC40	5.180-5.240	13	19.95	5.0	3.1623	0.012559	1.0000
	5.745-5.825	12	15.8489	5.0	3.1623	0.009976	1.0000

ANT3

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		dBm	mW				
11AC40	5.180-5.240	13	19.95	5.0	3.1623	0.012559	1.0000
	5.745-5.825	12	15.8489	5.0	3.1623	0.009976	1.0000

ANT4

Band/Mode	f (GHz)	RF output power		Antenna Gain (dBi)	Antenna Gain (linear)	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
		dBm	mW				
11AC40	5.180-5.240	13	19.95	5.0	3.1623	0.012559	1.0000
	5.745-5.825	12	15.8489	5.0	3.1623	0.009976	1.0000





8.2 Simultaneous Transmission MPE

The sample support Ant1 5.2GWIFI&5.8GWIFI, Ant2 5.2GWIFI &5.8GWIFI , Ant3 5.2GWIFI &5.8GWIFI, Ant4 5.2GWIFI&5.8GWIFI transmit antenna, so need consider simultaneous transmission;

Simultaneous transmission MPE

According to KDB447498 for Transmitters used in mobile exposure conditions for simultaneous transmission operations;

$\sum \sum$ of MPE ratios ≤ 1.0

5.2GWIFI:

Mode	\sum MPE ratios	Limit	Results
ANT1+ANT2+ANT3+ANT4	0.05	1.000	Pass

5.8GWIFI:

Mode	\sum MPE ratios	Limit	Results
ANT1+ANT2+ANT3+ANT4	0.05	1.000	Pass

Remark:

1. Output power including turn-up tolerance;
2. Output power is burst average power;
3. MPE evaluate distance is 20cm from user manual provide by manufacturer;
4. $MPE \text{ values} = PG/4\pi R^2$

9. 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-----

