

FCC 47 CFR MPE REPORT

AUDIO PRO AB

WIRELESS MULTIROOM LOUDSPEAKER

Model Number: A38

Additional Model: A28

FCC ID: 2AGNC-A38

Applicant:	AUDIO PRO AB
Address:	Garnisonsgatan 52, 25466, Helsingborg, Sweden
Prepared By:	EST Technology Co., Ltd.
	Chilingxiang, Qishantou, Santun, Houjie, Dongguan, Guangdong, China
Tel: 86-769-83081888-808	

Report Number:	ESTE-R2112046
Date of Test:	Sep. 09~Dec. 07, 2021
Date of Report:	Dec. 09, 2021



Maximum Permissible Exposure

1. Applicable Standards

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 limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2m normally can be maintained between the user and the device.

1.1. Limits for Maximum Permissible Exposure (MPE)

(a) Limits for Occupational/Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842/f	4.89/f	(900/f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-10000			5	6

(b) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm ²)	Averaging Times E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-10000			1.0	30

Note: f=frequency in MHz; *Plane-wave equivalent power density

1.2. MPE Calculation Method

$$E \text{ (V/m)} = \frac{\sqrt{30 \times P \times G}}{d} \quad \text{Power Density: } Pd \text{ (W/m}^2\text{)} = \frac{E^2}{377}$$

E = Electric Field (V/m)

P = Peak RF output Power (W)

G = EUT Antenna numeric gain (numeric)

d = Separation distance between radiator and human body (m)

The formula can be changed to

$$Pd = \frac{30 \times P \times G}{377 \times d^2}$$

From the peak EUT RF output power, the minimum mobile separation distance, d=0.2m, as well as the gain of the used antenna, the RF power density can be obtained

2. Conducted Power Result

Antenna 1

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)
GFSK	2402	4.63	2.90	5±1
	2441	4.19	2.62	4±1
	2480	3.96	2.49	4±1
8-DPSK	2402	1.45	1.40	1±1
	2441	1.43	1.39	1±1
	2480	0.74	1.19	1±1
BLE	2402	4.33	2.71	4±1
	2440	4.03	2.53	4±1
	2480	3.71	2.35	4±1
IEEE 802.11b	2412	17.25	53.09	17±1
	2437	17.39	54.83	17±1
	2462	17.42	55.21	17±1
IEEE 802.11g	2412	21.49	140.93	21±1
	2437	21.58	143.88	22±1
	2462	22.04	159.96	22±1
IEEE 802.11n HT20 (2.4G)	2412	23.36	216.77	23±1
	2437	24.08	255.86	24±1
	2462	24.13	258.82	24±1
IEEE 802.11a	5180	14.408	27.593	14±1
	5200	14.267	26.712	14±1
	5240	14.383	27.435	14±1
	5745	14.373	27.372	14±1
	5785	14.197	26.285	14±1
	5825	13.292	21.340	13±1
IEEE 802.11n HT20 (5G)	5180	14.225	26.455	14±1
	5200	13.854	24.288	14±1
	5240	14.180	26.182	14±1
	5745	14.030	25.293	14±1
	5785	13.858	24.311	14±1
	5825	13.066	20.258	13±1

IEEE 802.11ac VHT20	5180	14.213	26.382	14±1
	5200	13.853	24.283	14±1
	5240	14.143	25.960	14±1
	5745	13.990	25.061	14±1
	5785	13.990	25.061	14±1
	5825	13.033	20.105	13±1
IEEE 802.11n HT40 (5G)	5190	12.286	16.928	12±1
	5230	12.468	17.652	12±1
	5755	12.647	18.395	13±1
	5795	12.086	16.166	12±1
IEEE 802.11ac VHT40	5190	12.301	16.986	12±1
	5230	12.479	17.697	12±1
	5755	12.648	18.399	13±1
	5795	12.142	16.376	12±1
IEEE 802.11ac VHT80	5210	12.130	16.331	12±1
	5775	11.567	14.345	12±1

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)
IEEE 802.11b	2412	16.69	46.67	17±1
	2437	16.72	46.99	17±1
	2462	17.03	50.47	17±1
IEEE 802.11g	2412	21.09	128.53	21±1
	2437	21.16	130.62	21±1
	2462	21.37	137.09	21±1
IEEE 802.11n HT20 (2.4G)	2412	23.76	237.68	24±1
	2437	23.53	225.42	24±1
	2462	23.74	236.59	24±1
IEEE 802.11a	5180	13.189	20.840	13±1
	5200	13.700	23.442	14±1
	5240	13.903	24.564	14±1
	5745	12.879	19.404	13±1
	5785	12.172	16.489	12±1
	5825	11.504	14.138	12±1

IEEE 802.11n HT20 (5G)	5180	12.904	19.516	13±1
	5200	13.396	21.857	13±1
	5240	13.649	23.169	14±1
	5745	12.775	18.945	13±1
	5785	11.874	15.396	12±1
	5825	11.179	13.119	11±1
IEEE 802.11ac VHT20	5180	12.903	19.512	13±1
	5200	13.407	21.913	13±1
	5240	13.632	23.078	14±1
	5745	12.713	18.677	13±1
	5785	12.039	15.992	12±1
	5825	11.265	13.381	11±1
IEEE 802.11n HT40 (5G)	5190	11.521	14.194	12±1
	5230	11.359	13.674	11±1
	5755	11.231	13.277	11±1
	5795	10.338	10.809	10±1
IEEE 802.11ac VHT40	5190	11.547	14.279	12±1
	5230	11.951	15.671	12±1
	5755	11.416	13.855	11±1
	5795	10.101	10.235	10±1
IEEE 802.11ac VHT80	5210	11.508	14.151	12±1
	5775	9.883	9.734	10±1

3. Calculated Result and Limit

Bluetooth

Antenna	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
			(dBi)	(Linear)			
1	2402	6	2	1.585	0.00126	1	Complies

WLAN 2.4G SISO

Antenna	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
			(dBi)	(Linear)			
1	2462	25	2	1.585	0.09971	1	Complies
2	2462	25	2	1.585	0.09971	1	Complies

WLAN 2.4G MIMO

Worst case	Channel	Target power (dBm)	Target power (dBm)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total Ratio	Limit Ratio	Test Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2			
IEEE 802.11n HT20	2462	25	25	0.09971	0.09971	0.19942	1	Complies

WLAN 5G SISO

Antenna	Channel	MAX Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
			(dBi)	(Linear)			
1	5180	15	2	1.585	0.00997	1	Complies
2	5240	15	2	1.585	0.00997	1	Complies

WLAN 5G MIMO

Worst case	Channel	Target power (dBm)	Target power (dBm)	Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total Ratio	Limit Ratio	Test Result
		Antenna 1	Antenna 2	Antenna 1	Antenna 2			
IEEE 802.11n HT20	5240	15	15	0.00997	0.00997	0.01994	1	Complies

Bluetooth+ WLAN

MAX Power Density (S) (mW/cm ²) Bluetooth	MAX Power Density (S) (mW/cm ²) WiFi	Total Ratio	Limit Ratio	Test Result
0.00126	0.19942	0.20068	1	Complies

- Note: 1. only the worst case was recorded.**
2. 2.4G wifi & 5G wifi can't transmit simultaneously.

End of Test Report