

FCC 47 CFR MPE REPORT

AUDIO PRO AB

MULTICONNECTED WIRELESS LOUDSPEAKER

Model Number: ADDON C10 MkII

FCC ID: 2AGNC-C10MKII

Prepared for:	AUDIO PRO AB
	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-R2101117
Date of Test:	Nov. 10, 2020~Jan. 22, 2021
Date of Report:	Jan. 25, 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)	Antenna gain	
					(dBi)	(Linear)
GFSK	2402	5.21	3.319	5 ± 2	2	1.58
	2441	4.64	2.911	4 ± 2	2	1.58
	2480	3.92	2.466	3 ± 2	2	1.58
8-DPSK	2402	1.54	1.426	1 ± 2	2	1.58
	2441	1.56	1.432	1 ± 2	2	1.58
	2480	1.40	1.380	1 ± 2	2	1.58
BLE	2402	4.44	2.780	4 ± 2	2	1.58
	2440	4.33	2.710	4 ± 2	2	1.58
	2480	3.85	2.427	3 ± 2	2	1.58
IEEE 802.11b	2412	17.27	53.333	17 ± 2	2	1.58
	2437	17.38	54.702	17 ± 2	2	1.58
	2462	17.32	53.951	17 ± 2	2	1.58
IEEE 802.11g	2412	21.28	134.276	21 ± 2	2	1.58
	2437	21.64	145.881	21 ± 2	2	1.58
	2462	21.56	143.219	21 ± 2	2	1.58
IEEE 802.11n HT20 (2.4G)	2412	23.67	232.809	23 ± 2	2	1.58
	2437	23.71	234.963	23 ± 2	2	1.58
	2462	23.86	243.220	23 ± 2	2	1.58
IEEE 802.11a	5180	19.21	83.368	19 ± 2	2	1.58
	5200	18.99	79.250	18 ± 2	2	1.58
	5240	18.75	74.989	18 ± 2	2	1.58
	5745	19.53	89.743	19 ± 2	2	1.58
	5785	19.78	95.060	19 ± 2	2	1.58
	5825	19.96	99.083	19 ± 2	2	1.58

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT20 (5G)	5180	13.80	23.988	13 ± 2	2	1.58
	5200	13.46	22.182	13 ± 2	2	1.58
	5240	12.86	19.320	12 ± 2	2	1.58
	5745	19.78	95.060	19 ± 2	2	1.58
	5785	19.44	87.902	19 ± 2	2	1.58
	5825	19.75	94.406	19 ± 2	2	1.58
IEEE 802.11ac VHT20	5180	13.66	23.227	13 ± 2	2	1.58
	5200	12.41	17.418	12 ± 2	2	1.58
	5240	11.87	15.382	11 ± 2	2	1.58
	5745	18.57	71.945	18 ± 2	2	1.58
	5785	18.29	67.453	18 ± 2	2	1.58
	5825	18.55	71.614	18 ± 2	2	1.58
IEEE 802.11n HT40 (5G)	5190	12.42	17.458	12 ± 2	2	1.58
	5230	11.71	14.825	11 ± 2	2	1.58
	5755	18.94	78.343	18 ± 2	2	1.58
	5795	19.08	80.910	19 ± 2	2	1.58
IEEE 802.11ac VHT40	5190	12.06	16.069	12 ± 2	2	1.58
	5230	11.74	14.928	11 ± 2	2	1.58
	5755	19.12	81.658	19 ± 2	2	1.58
	5795	18.95	78.524	18 ± 2	2	1.58
IEEE 802.11ac VHT80	5210	10.89	12.274	10 ± 2	2	1.58
	5775	16.43	43.954	16 ± 2	2	1.58

Antenna 2

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11b	2412	17.07	50.933	17 ± 2	2	1.58
	2437	17.13	51.642	17 ± 2	2	1.58
	2462	17.24	52.966	17 ± 2	2	1.58
IEEE 802.11g	2412	21.18	131.220	21 ± 2	2	1.58
	2437	21.40	138.038	21 ± 2	2	1.58
	2462	21.30	134.896	21 ± 2	2	1.58
IEEE 802.11n HT20 (2.4G)	2412	23.19	208.449	23 ± 2	2	1.58
	2437	23.67	232.809	23 ± 2	2	1.58
	2462	23.66	232.274	23 ± 2	2	1.58
IEEE 802.11a	5180	18.17	65.615	18 ± 2	2	1.58
	5200	17.74	59.429	17 ± 2	2	1.58
	5240	17.54	56.754	17 ± 2	2	1.58
	5745	18.31	67.764	18 ± 2	2	1.58
	5785	18.40	69.183	18 ± 2	2	1.58
	5825	18.71	74.302	18 ± 2	2	1.58
IEEE 802.11n HT20 (5G)	5180	12.19	16.558	12 ± 2	2	1.58
	5200	12.05	16.032	12 ± 2	2	1.58
	5240	11.94	15.631	11 ± 2	2	1.58
	5745	18.62	72.778	18 ± 2	2	1.58
	5785	19.24	83.946	19 ± 2	2	1.58
	5825	18.70	74.131	18 ± 2	2	1.58
IEEE 802.11ac VHT20	5180	12.17	16.482	12 ± 2	2	1.58
	5200	10.82	12.078	10 ± 2	2	1.58
	5240	10.66	11.641	10 ± 2	2	1.58
	5745	17.23	52.845	17 ± 2	2	1.58
	5785	17.40	54.954	17 ± 2	2	1.58
	5825	17.94	62.230	14 ± 2	2	1.58

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)	Target power (dBm)	Antenna gain	
					(dBi)	(Linear)
IEEE 802.11n HT40 (5G)	5190	10.82	12.078	10 ± 2	2	1.58
	5230	10.64	11.588	10 ± 2	2	1.58
	5755	18.07	64.121	18 ± 2	2	1.58
	5795	18.08	64.269	18 ± 2	2	1.58
IEEE 802.11ac VHT40	5190	11.06	12.764	11 ± 2	2	1.58
	5230	10.76	11.912	10 ± 2	2	1.58
	5755	18.07	64.121	18 ± 2	2	1.58
	5795	18.03	63.533	18 ± 2	2	1.58
IEEE 802.11ac VHT80	5210	10.03	10.069	10 ± 2	2	1.58
	5775	15.89	38.815	15 ± 2	2	1.58

3. Calculated Result and Limit

Antenna 1

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
		(dBi)	(Linear)			
2.4G Band						
GFSK	7	2	1.58	0.00158	1	Compiles
8-DPSK	3	2	1.58	0.00063	1	Compiles
BLE	6	2	1.58	0.00126	1	Compiles
IEEE 802.11b	19	2	1.58	0.02505	1	Compiles
IEEE 802.11g	23	2	1.58	0.06291	1	Compiles
IEEE 802.11n HT20	25	2	1.58	0.09971	1	Compiles
5G Band						
IEEE 802.11a	21	2	1.58	0.03969	1	Compiles
IEEE 802.11n HT20	21	2	1.58	0.03969	1	Compiles
IEEE 802.11ac VHT20	20	2	1.58	0.03153	1	Compiles
IEEE 802.11n HT40	21	2	1.58	0.03969	1	Compiles
IEEE 802.11ac VHT40	21	2	1.58	0.03969	1	Compiles
IEEE 802.11ac VHT80	18	2	1.58	0.01989	1	Compiles

Antenna 2

Mode	Target power (dBm)	Antenna gain		Power Density (S) (mW/cm ²)	Limited of Power Density (S) (mW/cm ²)	Test Result
		(dBi)	(Linear)			
2.4G Band						
IEEE 802.11b	19	2	1.58	0.02505	1	Compiles
IEEE 802.11g	23	2	1.58	0.06291	1	Compiles
IEEE 802.11n HT20	25	2	1.58	0.09971	1	Compiles
5G Band						
IEEE 802.11a	20	2	1.58	0.03153	1	Compiles
IEEE 802.11n HT20	21	2	1.58	0.03969	1	Compiles
IEEE 802.11ac VHT20	19	2	1.58	0.02505	1	Compiles
IEEE 802.11n HT40	20	2	1.58	0.03153	1	Compiles
IEEE 802.11ac VHT40	20	2	1.58	0.03153	1	Compiles
IEEE 802.11ac VHT80	17	2	1.58	0.01580	1	Compiles

Antenna 1+2

Mode	Power Density (S) (mW/cm ²) Antenna 1	Power Density (S) (mW/cm ²) Antenna 2	Power Density (S) (mW/cm ²) Total	Limited of Power Density (S) (mW/cm ²)	Test Result
2.4G Band					
IEEE 802.11n HT20	0.09971	0.09971	0.19942	1	Compiles
5G Band					
IEEE 802.11n HT20	0.03969	0.03969	0.07938	1	Compiles
IEEE 802.11ac VHT20	0.03153	0.02505	0.05658	1	Compiles
IEEE 802.11n HT40	0.03969	0.03153	0.07122	1	Compiles
IEEE 802.11ac VHT40	0.03969	0.03153	0.07122	1	Compiles
IEEE 802.11ac VHT80	0.01989	0.01580	0.03569	1	Compiles

Note: 2.4 and 5GHz bands are share an antenna, Can't both the 2.4 and 5 GHz bands operate simultaneously.

End of Test Report