

FCC 47 CFR MPE REPORT

AUDIO PRO AB

MULTICONNECTED WIRELESS LOUDSPEAKER

Model Number: C20

FCC ID: 2AGNC-C20

Applicant:	AUDIO PRO AB
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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

Mode	Frequency (MHz)	Peak output power (dBm)	Peak output power (mW)
GFSK	2402	4.55	2.851
	2441	4.73	2.972
	2480	4.18	2.618
$\pi/4$ -DQPSK	2402	4.2	2.630
	2441	4.29	2.685
	2480	3.47	2.223
8-DPSK	2402	4.43	2.773
	2441	4.58	2.871
	2480	3.84	2.421
BLE 1M	2402	3.54	2.2594
	2440	3.79	2.3933
	2480	2.83	1.9187
BLE 2M	2402	3.65	2.3174
	2440	3.92	2.4660
	2480	2.98	1.9861
IEEE 802.11b	2412	15.5	35.4813
	2437	15.45	35.0752
	2462	15.37	34.4350
IEEE 802.11g	2412	20.67	116.6810
	2437	20.68	116.9499
	2462	20.45	110.9175
IEEE 802.11n HT20	2412	19.94	98.6279
	2437	20.26	106.1696
	2462	20.23	105.4387
IEEE 802.11a	5180	11.07	12.7938
	5200	10.78	11.9674
	5240	10.11	10.2565
	5260	10.07	10.1625
	5300	9.97	9.9312
	5320	10.01	10.0231
	5500	10.4	10.9648
	5580	10.23	10.5439
	5700	11.92	15.5597
	5745	10.14	10.3276

	5785	10.07	10.1625
	5825	10.03	10.0693
IEEE 802.11n HT20	5180	11.95	15.6675
	5200	11.63	14.5546
	5240	10.97	12.5026
	5260	10.78	11.9674
	5300	10.8	12.0226
	5320	10.58	11.4288
	5500	10.02	10.0462
	5580	9.83	9.6161
	5700	11.71	14.8252
	5745	11.94	15.6315
	5785	10.97	12.5026
	5825	10.59	11.4551
IEEE 802.11ac VHT20	5180	10.83	12.1060
	5200	11.64	14.5881
	5240	10.86	12.1899
	5260	11.22	13.2434
	5300	11.26	13.3660
	5320	11.09	12.8529
	5500	10.56	11.3763
	5580	10.48	11.1686
	5700	12.21	16.6341
	5745	11.4	13.8038
	5785	10.49	11.1944
	5825	10.26	10.6170
IEEE 802.11n HT40	5190	11.5	14.1254
	5230	10.61	11.5080
	5270	10.39	10.9396
	5310	10.26	10.6170
	5510	9.56	9.0365
	5550	9.87	9.7051
	5670	11.17	13.0918
	5755	11.36	13.6773
	5795	10.72	11.8032
	5190	11.03	12.6765
	5230	10.25	10.5925
	5270	10.13	10.3039

IEEE 802.11ac VHT40	5310	10.17	10.3992
	5510	10.14	10.3276
	5550	10.55	11.3501
	5670	11.82	15.2055
	5755	11.05	12.7350
	5795	10.51	11.2460
IEEE 802.11ac VHT80	5210	11.29	13.4586
	5290	10.97	12.5026
	5530	10.44	11.0662
	5610	10.55	11.3501
	5775	11.69	14.7571

3. Calculated Result and Limit

Mode	Peak output power (dBm)	Target power (dBm)	MAX 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	4.73	4 ±1	5	4.39	2.748	0.00173	1	Complies
$\pi/4$ -DQPSK	4.29	4 ±1	5	4.39	2.748	0.00173	1	Complies
8-DPSK	4.58	4 ±1	5	4.39	2.748	0.00173	1	Complies
BLE 1M	3.92	3 ±1	4	4.39	2.748	0.00137	1	Complies
BLE 2M	15.5	15 ±1	16	4.39	2.748	0.02176	1	Complies
IEEE 802.11b	20.68	20 ±1	21	4.39	2.748	0.06882	1	Complies
IEEE 802.11g	20.26	20 ±1	21	4.39	2.748	0.06882	1	Complies
IEEE 802.11n HT20	4.73	4 ±1	5	4.39	2.748	0.00173	1	Complies
5G Band								
IEEE 802.11a	11.92	11 ±1	12	5.89	3.882	0.01224	1	Complies
IEEE 802.11n HT20	11.95	11 ±1	12	5.89	3.882	0.01224	1	Complies
IEEE802.11ac VHT20	12.21	12 ±1	13	5.89	3.882	0.01541	1	Complies
IEEE 802.11n HT40	11.5	11 ±1	12	5.89	3.882	0.01224	1	Complies
IEEE802.11ac VHT40	11.82	11 ±1	12	5.89	3.882	0.01224	1	Complies
IEEE802.11ac VHT80	11.69	11 ±1	12	5.89	3.882	0.01224	1	Complies

BT+WIFI

MAX Ture-up power ratio Bluetooth	MAX Ture-up power Total ratio Wi-Fi	Total Ratio	Limit Ratio	Test Result
0.0017	0.0690	0.0707	1	Complies

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

End of Test Report