

FCC 47 CFR MPE REPORT

AUDIO PRO AB

MULTICONNECTED WIRELESS LOUDSPEAKER

Model Number: C20

FCC ID: 2AGNC-C20

| | |
|--------------------------|---|
| 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-R2307087 |
| Date of Test: | Jun. 05~Jul. 06, 2023 |
| Date of Report: | Jul. 11, 2023 |

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

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

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 |
| 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 |
| π/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