

## FCC 47 CFR MPE REPORT

AUDIO PRO AB

MULTICONNECTED WIRELESS LOUDSPEAKER

Model Number: A10 MkII

FCC ID: 2AGNC-A10MKII

|                          |                                                                     |
|--------------------------|---------------------------------------------------------------------|
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|                          |                                                                     |
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|                 |                       |
|-----------------|-----------------------|
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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 <sup>2</sup> ) | Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> 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 <sup>2</sup> ) | Averaging Times   E   <sup>2</sup> ,   H   <sup>2</sup> 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) | Target power (dBm) |
|--------------------------|-----------------|-------------------------|------------------------|--------------------|
| GFSK                     | 2402            | 4.29                    | 2.6853                 | $4 \pm 1$          |
|                          | 2441            | 4.58                    | 2.8708                 | $4 \pm 1$          |
|                          | 2480            | 5.30                    | 3.3884                 | $5 \pm 1$          |
| 8-DPSK                   | 2402            | 1.29                    | 1.3459                 | $1 \pm 1$          |
|                          | 2441            | 1.65                    | 1.4622                 | $1 \pm 1$          |
|                          | 2480            | 2.13                    | 1.6331                 | $2 \pm 1$          |
| GFSK 1M                  | 2402            | 4.40                    | 2.7542                 | $4 \pm 1$          |
|                          | 2440            | 5.02                    | 3.1769                 | $5 \pm 1$          |
|                          | 2480            | 5.42                    | 3.4834                 | $5 \pm 1$          |
| IEEE 802.11b             | 2412            | 17.32                   | 53.9511                | $17 \pm 1$         |
|                          | 2437            | 17.50                   | 56.2341                | $17 \pm 1$         |
|                          | 2462            | 17.51                   | 56.3638                | $17 \pm 1$         |
| IEEE 802.11g             | 2412            | 21.76                   | 149.9685               | $21 \pm 1$         |
|                          | 2437            | 21.84                   | 152.7566               | $21 \pm 1$         |
|                          | 2462            | 22.08                   | 161.4359               | $22 \pm 1$         |
| IEEE 802.11n HT20 (2.4G) | 2412            | 19.94                   | 98.6279                | $19 \pm 1$         |
|                          | 2437            | 20.12                   | 102.8016               | $20 \pm 1$         |
|                          | 2462            | 20.09                   | 102.0939               | $20 \pm 1$         |
| IEEE 802.11a             | 5180            | 14.441                  | 27.8035                | $14 \pm 1$         |
|                          | 5200            | 14.644                  | 29.1340                | $14 \pm 1$         |
|                          | 5240            | 14.683                  | 29.3968                | $14 \pm 1$         |
|                          | 5260            | 14.868                  | 30.6761                | $14 \pm 1$         |
|                          | 5300            | 14.560                  | 28.5759                | $14 \pm 1$         |
|                          | 5320            | 14.343                  | 27.1832                | $14 \pm 1$         |
|                          | 5500            | 12.976                  | 19.8427                | $12 \pm 1$         |
|                          | 5580            | 13.470                  | 22.2331                | $13 \pm 1$         |
|                          | 5700            | 13.547                  | 22.6308                | $13 \pm 1$         |
|                          | 5745            | 13.604                  | 22.9298                | $13 \pm 1$         |
|                          | 5785            | 13.113                  | 20.4786                | $13 \pm 1$         |
|                          | 5825            | 12.966                  | 19.7970                | $12 \pm 1$         |

|                              |      |        |         |            |
|------------------------------|------|--------|---------|------------|
| IEEE<br>802.11n<br>HT20 (5G) | 5180 | 11.873 | 15.3922 | $11 \pm 1$ |
|                              | 5200 | 10.326 | 10.7795 | $10 \pm 1$ |
|                              | 5240 | 10.531 | 11.3006 | $10 \pm 1$ |
|                              | 5260 | 14.496 | 28.1579 | $14 \pm 1$ |
|                              | 5300 | 12.144 | 16.3832 | $12 \pm 1$ |
|                              | 5320 | 11.857 | 15.3356 | $11 \pm 1$ |
|                              | 5500 | 12.698 | 18.6123 | $12 \pm 1$ |
|                              | 5580 | 11.477 | 14.0508 | $11 \pm 1$ |
|                              | 5700 | 11.291 | 13.4617 | $11 \pm 1$ |
|                              | 5745 | 13.254 | 21.1544 | $13 \pm 1$ |
|                              | 5785 | 12.791 | 19.0152 | $12 \pm 1$ |
|                              | 5825 | 12.704 | 18.6380 | $12 \pm 1$ |
| IEEE<br>802.11ac<br>VHT20    | 5180 | 11.795 | 15.1182 | $11 \pm 1$ |
|                              | 5200 | 11.991 | 15.8161 | $11 \pm 1$ |
|                              | 5240 | 10.896 | 12.2914 | $10 \pm 1$ |
|                              | 5260 | 14.413 | 27.6249 | $14 \pm 1$ |
|                              | 5300 | 12.013 | 15.8964 | $12 \pm 1$ |
|                              | 5320 | 11.843 | 15.2862 | $11 \pm 1$ |
|                              | 5500 | 12.726 | 18.7327 | $12 \pm 1$ |
|                              | 5580 | 11.287 | 13.4493 | $11 \pm 1$ |
|                              | 5700 | 11.372 | 13.7151 | $11 \pm 1$ |
|                              | 5745 | 13.234 | 21.0572 | $13 \pm 1$ |
|                              | 5785 | 12.754 | 18.8538 | $12 \pm 1$ |
|                              | 5825 | 12.626 | 18.3063 | $12 \pm 1$ |
| IEEE<br>802.11n<br>HT40 (5G) | 5190 | 13.579 | 22.7982 | $13 \pm 1$ |
|                              | 5230 | 13.812 | 24.0547 | $13 \pm 1$ |
|                              | 5270 | 13.824 | 24.1213 | $13 \pm 1$ |
|                              | 5310 | 13.663 | 23.2434 | $13 \pm 1$ |
|                              | 5510 | 12.050 | 16.0325 | $12 \pm 1$ |
|                              | 5590 | 12.515 | 17.8443 | $12 \pm 1$ |
|                              | 5670 | 12.778 | 18.9583 | $12 \pm 1$ |
|                              | 5755 | 12.772 | 18.9322 | $12 \pm 1$ |
|                              | 5795 | 12.276 | 16.8888 | $12 \pm 1$ |

|                           |      |        |         |            |
|---------------------------|------|--------|---------|------------|
| IEEE<br>802.11ac<br>VHT40 | 5190 | 13.562 | 22.7091 | $13 \pm 1$ |
|                           | 5230 | 13.801 | 23.9939 | $13 \pm 1$ |
|                           | 5270 | 13.835 | 24.1824 | $13 \pm 1$ |
|                           | 5310 | 13.693 | 23.4045 | $13 \pm 1$ |
|                           | 5510 | 12.029 | 15.9551 | $12 \pm 1$ |
|                           | 5590 | 12.476 | 17.6848 | $12 \pm 1$ |
|                           | 5670 | 12.752 | 18.8452 | $12 \pm 1$ |
|                           | 5755 | 12.543 | 17.9597 | $12 \pm 1$ |
|                           | 5795 | 12.293 | 16.9551 | $12 \pm 1$ |
| IEEE<br>802.11ac<br>VHT80 | 5210 | 10.892 | 12.2800 | $10 \pm 1$ |
|                           | 5290 | 10.351 | 10.8418 | $10 \pm 1$ |
|                           | 5530 | 9.435  | 8.7801  | $9 \pm 1$  |
|                           | 5610 | 9.904  | 9.7814  | $9 \pm 1$  |
|                           | 5775 | 9.458  | 8.8267  | $9 \pm 1$  |

### 3. Calculated Result and Limit

#### Bluetooth

| Antenna | Channel | MAX<br>Target<br>power<br>(dBm) | Antenna gain |          | Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Limited of<br>Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|---------|---------|---------------------------------|--------------|----------|--------------------------------------------------|----------------------------------------------------------------|----------------|
|         |         |                                 | (dBi)        | (Linear) |                                                  |                                                                |                |
| 1       | 2480    | 6                               | 2            | 1.585    | 0.0013                                           | 1                                                              | Complies       |

#### WLAN 2.4G

| Antenna | Channel | MAX<br>Target<br>power<br>(dBm) | Antenna gain |          | Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Limited of<br>Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|---------|---------|---------------------------------|--------------|----------|--------------------------------------------------|----------------------------------------------------------------|----------------|
|         |         |                                 | (dBi)        | (Linear) |                                                  |                                                                |                |
| 1       | 2462    | 23                              | 2            | 1.585    | 0.0629                                           | 1                                                              | Complies       |

#### WLAN 5G

| Antenna | Channel | MAX<br>Target<br>power<br>(dBm) | Antenna gain |          | Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Limited of<br>Power<br>Density<br>(S)<br>(mW/cm <sup>2</sup> ) | Test<br>Result |
|---------|---------|---------------------------------|--------------|----------|--------------------------------------------------|----------------------------------------------------------------|----------------|
|         |         |                                 | (dBi)        | (Linear) |                                                  |                                                                |                |
| 1       | 5260    | 15                              | 2            | 1.585    | 0.0100                                           | 1                                                              | Complies       |

#### Bluetooth+ WLAN

| MAX<br>Power Density<br>(S)<br>(mW/cm <sup>2</sup> )<br>Bluetooth | MAX<br>Power Density<br>(S)<br>(mW/cm <sup>2</sup> )<br>WiFi | Total Ratio | Limit Ratio | Test Result |
|-------------------------------------------------------------------|--------------------------------------------------------------|-------------|-------------|-------------|
| 0.0013                                                            | 0.0629                                                       | 0.0642      | 1           | Complies    |

#### End of Test Report