

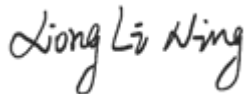
TEST REPORT

Applicant: 3M Company
Address: 3M Center, Saint Paul, Minnesota United States
55144
Equipment Type: WorkTunes Connect + AM/FM
Model Name: 90572
Brand Name: 3M
FCC ID: DGF-90572
Test Standard: 47 CFR Part 2.1093
(refer to section 3.1)
Sample Arrival Date: Jan. 24, 2024
Test Date: Feb. 03, 2024 - Mar. 01, 2024
Date of Issue: Mar. 27, 2024

ISSUED BY:

Shenzhen BALUN Technology Co., Ltd.

Tested by: Xiong Lining



Checked by: Xu Rui



Approved by: Tolan Tu

(Testing Director)



| Revision History | | |
|-------------------------|----------------------|----------------------|
| Version | Issue Date | Revisions Content |
| <u>Rev. 01</u> | <u>Mar. 27, 2024</u> | <u>Initial Issue</u> |

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1 GENERAL INFORMATION

1.1 Test Laboratory

| | |
|--------------|--|
| Name | Shenzhen BALUN Technology Co., Ltd. |
| Address | Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Phone Number | +86 755 6685 0100 |

1.2 Test Location

| | |
|---------------------------|---|
| Name | Shenzhen BALUN Technology Co., Ltd. |
| Location | <input checked="" type="checkbox"/> Block B, 1/F, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| | <input type="checkbox"/> 1/F, Building B, Ganghongji High-tech Intelligent Industrial Park, No. 1008, Songbai Road, Yangguang Community, Xili Sub-district, Nanshan District, Shenzhen, Guangdong Province, P. R. China |
| Accreditation Certificate | The laboratory is a testing organization accredited by FCC as a accredited testing laboratory. The designation number is CN1196. |

2 PRODUCT INFORMATION

2.1 Applicant Information

| | |
|-----------|--|
| Applicant | 3M Company |
| Address | 3M Center, Saint Paul, Minnesota United States 55144 |

2.2 Manufacturer Information

| | |
|--------------|--|
| Manufacturer | 3M Company |
| Address | 3M Center, Saint Paul, Minnesota United States 55144 |

2.3 General Description for Equipment under Test (EUT)

| | |
|---|---------------------------|
| EUT Name | WorkTunes Connect + AM/FM |
| Model Name Under Test | 90572 |
| Series Model Name | N/A |
| Description of Model name differentiation | N/A |
| Hardware Version | R1.1A |
| Software Version | 1.4.0 |
| Dimensions (Approx.) | N/A |
| Weight (Approx.) | N/A |

2.4 Technical Information

| | |
|-----------------------------------|------------------------|
| Network and Wireless connectivity | Bluetooth (BR+EDR+BLE) |
|-----------------------------------|------------------------|

The requirement for the following technical information of the EUT was tested in this report:

| | | |
|-------------------|--|-------------------|
| Operating Mode | Bluetooth | |
| Frequency Range | Bluetooth | 2400 ~ 2483.5 MHz |
| Antenna Type | Bluetooth | PCB Antenna |
| Exposure Category | General Population/Uncontrolled Exposure | |
| Product Type | Portable Device | |

3 SUMMARY OF TEST RESULT

3.1 Test Standards

| No. | Identity | Document Title |
|-----|--------------------|--|
| 1 | 47 CFR Part 2.1093 | Radiofrequency radiation exposure evaluation: portable devices |
| 2 | KDB 447498 D04 v01 | KDB 447498 D04 Interim General RF Exposure Guidance v01 |

4 DEVICE CATEGORY AND LEVELS LIMITS

Portable Devices:

CFR Title 47 §2.1093(b)

(b) For purposes of this section, a portable device is defined as a transmitting device designed to be used so that the radiating structure(s) of the device is/are within 20 centimeters of the body of the user.

FCC KDB 447498 Devices:

According with FCC KDB 447498 D04, Appendix B, The SAR-based exemption formula applies for single fixed, mobile, and portable RF sources with available maximum time-averaged power or effective radiated power (ERP), whichever is greater, of less than or equal to the threshold P_{th} (mW).

This method shall only be used at separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive). The following table shows the power threshold from 5mm to 50mm.

| Power Thresholds (mW) | | | | | |
|-----------------------|---------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| Frequency (MHz) | At separation distance of ≤ 5 mm | At separation distance of 10 mm | At separation distance of 15 mm | At separation distance of 20 mm | At separation distance of 25 mm |
| 300 | 39 mW | 65 mW | 88 mW | 110 mW | 129 mW |
| 450 | 22 mW | 44 mW | 67 mW | 89 mW | 112 mW |
| 835 | 9 mW | 25 mW | 44 mW | 66 mW | 90 mW |
| 1900 | 3 mW | 12 mW | 26 mW | 44 mW | 66 mW |
| 2450 | 3 mW | 10 mW | 22 mW | 38 mW | 59 mW |
| 3600 | 2 mW | 8 mW | 18 mW | 32 mW | 49 mW |
| 5800 | 1 mW | 6 mW | 14 mW | 25 mW | 40 mW |
| Frequency (MHz) | At separation distance of 30 mm | At separation distance of 35 mm | At separation distance of 40 mm | At separation distance of 45 mm | At separation distance of 50 mm |
| 300 | 148 mW | 166 mW | 184 mW | 201 mW | 217 mW |
| 450 | 135 mW | 158 mW | 180 mW | 203 mW | 226 mW |
| 835 | 116 mW | 145 mW | 175 mW | 207 mW | 240 mW |
| 1900 | 92 mW | 122 mW | 157 mW | 195 mW | 236 mW |
| 2450 | 83 mW | 111 mW | 143 mW | 179 mW | 219 mW |
| 3600 | 71 mW | 96 mW | 125 mW | 158 mW | 195 mW |
| 5800 | 58 mW | 80 mW | 106 mW | 136 mW | 169 mW |

Note:

1. Maximum power is the source-based time-average power and represents the maximum RF output power including tune-up tolerance among production units
2. Per KDB 447498 D04, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. Per KDB 447498 D04, standalone SAR test exclusion threshold is applied; If the distance of the antenna to the user is < 5mm, 5mm is used to determine SAR exclusion threshold
4. Per KDB 447498 D04, for separation distances from 0.5 cm to 40 cm and at frequencies from 0.3 GHz to 6 GHz (inclusive), the threshold Pth (mW) is given by Following:

$$P_{th} (mW) = \begin{cases} ERP_{20cm} (d/20cm)^x & d \leq 20cm \\ ERP_{20cm} & 20cm < d \leq 40cm \end{cases}$$

where

$$x = -\log_{10} \left(\frac{60}{ERP_{20cm} \sqrt{f}} \right)$$

- a. f(GHz) is the RF channel transmit frequency in GHz
- b. d is the separation distance (cm), The result is rounded to one decimal place for comparison
- c. ERP_{20cm} are determined by:

$$ERP_{20cm} (mW) = f(x) = \begin{cases} 2040f & 0.3GHz \leq f < 1.5GHz \\ 3060 & 1.5GHz \leq f \leq 6GHz \end{cases}$$

5 ASSESSMENT RESULT

5.1 Output Power

| Mode | Bluetooth |
|-----------------------|-----------|
| Conducted Power (dBm) | 2.92 |
| Antenna Gain (dBi) | 0.50 |
| EIRP (dBm) | 3.42 |

Note: This report listed the worst case power value, please refer to BL-SZ2411137-603&BL-SZ2411137-604 report for more details.

5.2 Tune-up power

| Mode | Conducted Power Range (dBm) | EIRP Range (dBm) | ERP Range (dBm) |
|-----------|-----------------------------|------------------|-----------------|
| Bluetooth | [1.00, 3.00] | [2.00, 4.00] | [-0.15, 1.85] |

Note1: ERP= EIRP -2.15dB
Note2: According KDB 447498 D04, used the greater of maximum conducted power and ERP to compare with the threshold value Pth.

5.3 RF Exposure Evaluation Result

| Mode | Distance (mm) | Calculation Frequency (MHz) | Tune-up limit power (dBm) | Tune-up limit power (mW) | Threshold Value(mW) | Verdict |
|-----------|---------------|-----------------------------|---------------------------|--------------------------|---------------------|------------|
| Bluetooth | 5 | 2480 | 3.00 | 2.00 | 2.72 | Compliance |

5.4 Conclusion

This EUT is deemed to comply with the reference level limits, therefore the basic restrictions are compliant with human exposure limits.

Statement

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--END OF REPORT--