

# SAR Test Report

Report No.: AGC01110231219FH01A

**FCC ID** : 2A0KB-A3968R

**APPLICATION PURPOSE** : Class II Permissive Change

**PRODUCT DESIGNATION** : Wireless Headphone

**BRAND NAME** : soundcore

**MODEL NAME** : A3968R

**APPLICANT** : Anker Innovations Limited

**DATE OF ISSUE** : May 10, 2024

**STANDARD(S)** : IEEE Std. 1528:2013  
FCC 47 CFR Part 2§2.1093  
IEEE Std C95.1™-2005

**REPORT VERSION** : V1.0

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**Report Revise Record**

| Report Version | Revise Time | Issued Date  | Valid Version | Notes           |
|----------------|-------------|--------------|---------------|-----------------|
| V1.0           | /           | May 10, 2024 | Valid         | Initial Release |

Note: The original test report AGC01110231219FH01 (dated Jan. 10, 2024 and tested Jan. 02, 2024) was modified on May 10, 2024, including the following changes and additions for:

- Modified the earphone battery (Replaced the battery models M1154A7, 3.85V, 60mAh with 1154PF4B, 3.85V, 60mAh);
- Changed the manufacturer of the battery;
- Changed the color of the prototype;

For above described changes, updated all the test data except the PK. Power.

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## Test Report

|                              |                                                                            |
|------------------------------|----------------------------------------------------------------------------|
| Applicant Name               | Anker Innovations Limited                                                  |
| Applicant Address            | Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, HongKong |
| Manufacturer Name            | Anker Innovations Limited                                                  |
| Manufacturer Address         | Room 1318-19, Hollywood Plaza, 610 Nathan Road, Mongkok, Kowloon, HongKong |
| Factory Name                 | N/A                                                                        |
| Factory Address              | N/A                                                                        |
| Product Designation          | Wireless Headphone                                                         |
| Brand Name                   | soundcore                                                                  |
| Model Name                   | A3968R                                                                     |
| EUT Voltage                  | DC 3.85V by battery                                                        |
| Applicable Standard          | IEEE Std. 1528:2013<br>FCC 47 CFR Part 282.1093<br>IEEE Std C95.1™-2005    |
| Date of receipt of test item | Apr. 07, 2024                                                              |
| Test Date                    | Apr. 18, 2024                                                              |
| Report Template              | AGCRT-US-Bluetooth/SAR (2021-04-20)                                        |

Note: The results of testing in this report apply to the product/system which was tested only.

Prepared By

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Thea Huang  
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May 10, 2024

Reviewed By

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May 10, 2024

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Max Zhang  
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May 10, 2024

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## TABLE OF CONTENTS

|                                                                                              |           |
|----------------------------------------------------------------------------------------------|-----------|
| <b>1. SUMMARY OF MAXIMUM SAR VALUE .....</b>                                                 | <b>5</b>  |
| <b>2. GENERAL INFORMATION.....</b>                                                           | <b>6</b>  |
| 2.1. EUT DESCRIPTION.....                                                                    | 6         |
| <b>3. SAR MEASUREMENT SYSTEM.....</b>                                                        | <b>7</b>  |
| 3.1. THE DASY5 SYSTEM USED FOR PERFORMING COMPLIANCE TESTS CONSISTS OF FOLLOWING ITEMS ..... | 7         |
| 3.2. DASY5 E-FIELD PROBE.....                                                                | 8         |
| 3.3. DATA ACQUISITION ELECTRONICS DESCRIPTION .....                                          | 8         |
| 3.4. ROBOT.....                                                                              | 9         |
| 3.5. LIGHT BEAM UNIT .....                                                                   | 9         |
| 3.6. DEVICE HOLDER .....                                                                     | 10        |
| 3.7. MEASUREMENT SERVER.....                                                                 | 10        |
| 3.8. PHANTOM.....                                                                            | 11        |
| <b>4. SAR MEASUREMENT PROCEDURE.....</b>                                                     | <b>12</b> |
| 4.1. SPECIFIC ABSORPTION RATE (SAR).....                                                     | 12        |
| 4.2. SAR MEASUREMENT PROCEDURE.....                                                          | 13        |
| 4.3. RF EXPOSURE CONDITIONS .....                                                            | 15        |
| <b>5. TISSUE SIMULATING LIQUID.....</b>                                                      | <b>17</b> |
| 5.1. THE COMPOSITION OF THE TISSUE SIMULATING LIQUID.....                                    | 17        |
| 5.2. TISSUE DIELECTRIC PARAMETERS FOR HEAD AND BODY PHANTOMS .....                           | 17        |
| 5.3. TISSUE CALIBRATION RESULT .....                                                         | 18        |
| <b>6. SAR SYSTEM CHECK PROCEDURE .....</b>                                                   | <b>19</b> |
| 6.1. SAR SYSTEM CHECK PROCEDURES .....                                                       | 19        |
| 6.2. SAR SYSTEM CHECK.....                                                                   | 20        |
| <b>7. EUT TEST POSITION.....</b>                                                             | <b>22</b> |
| 7.1. TEST POSITION.....                                                                      | 22        |
| <b>8. SAR EXPOSURE LIMITS .....</b>                                                          | <b>23</b> |
| <b>9. TEST FACILITY .....</b>                                                                | <b>24</b> |
| <b>10. TEST EQUIPMENT LIST .....</b>                                                         | <b>25</b> |
| <b>11. MEASUREMENT UNCERTAINTY .....</b>                                                     | <b>26</b> |
| <b>12. CONDUCTED POWER MEASUREMENT.....</b>                                                  | <b>29</b> |
| <b>13. TEST RESULTS.....</b>                                                                 | <b>30</b> |
| 13.1. SAR TEST RESULTS SUMMARY.....                                                          | 30        |
| <b>APPENDIX A. SAR SYSTEM CHECK DATA .....</b>                                               | <b>32</b> |
| <b>APPENDIX B. SAR MEASUREMENT DATA.....</b>                                                 | <b>33</b> |
| <b>APPENDIX C. TEST SETUP PHOTOGRAPHS.....</b>                                               | <b>37</b> |
| <b>APPENDIX D. CALIBRATION DATA .....</b>                                                    | <b>37</b> |

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## 1. SUMMARY OF MAXIMUM SAR VALUE

The maximum results of Specific Absorption Rate (SAR) found during testing for EUT are as follows:

| Frequency Band  | Highest Reported 1g-SAR(W/kg)<br>Head SAR(with 0mm separation) | SAR Test Limit<br>(W/kg) |
|-----------------|----------------------------------------------------------------|--------------------------|
| BT(BR/EDR)      | 0.799                                                          | 1.6                      |
| BT (BLE)        | 0.215                                                          |                          |
| SAR Test Result | PASS                                                           |                          |

This device is compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6W/kg) specified in IEEE Std. 1528:2013; FCC 47CFR § 2.1093; IEEE/ANSI C95.1:2005 and the following specific FCC Test Procedures:

- KDB 447498 D04 Interim General RF Exposure Guidance v01
- KDB 865664 D01 SAR Measurement 100MHz to 6GHz v01r04

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## 2. GENERAL INFORMATION

### 2.1. EUT Description

| General Information             |                                                               |
|---------------------------------|---------------------------------------------------------------|
| Product Designation             | Wireless Headphone                                            |
| Test Model                      | A3968R                                                        |
| Sample ID                       | 240403092                                                     |
| Hardware Version                | V5                                                            |
| Software Version                | V01.48                                                        |
| Device Category                 | Portable                                                      |
| RF Exposure Environment         | Uncontrolled                                                  |
| Antenna Type                    | FPC Antenna                                                   |
| Bluetooth                       |                                                               |
| Operation Frequency             | 2402~2480MHz                                                  |
| Antenna Gain                    | -1.7dBi                                                       |
| Bluetooth Version               | V5.3                                                          |
| Type of modulation              | <b>BR/EDR:</b> GFSK, $\pi/4$ -DQPSK, 8-DPSK; <b>BLE:</b> GFSK |
| Max. PK Power (dBm)             | <b>BR/EDR:</b> 12.019dBm ; <b>BLE:</b> 7.225dBm               |
| Li-ion Battery                  |                                                               |
| Brand Name                      | N/A                                                           |
| Model Name                      | 1154PF4B                                                      |
| Manufacturer Name               | Chongqing VDL Electronics Co.,Ltd.                            |
| Capacitance                     | 60mAh                                                         |
| Rated Voltage/ Charging Voltage | DC3.85V                                                       |

Note: 1.The sample used for testing is end product.

2.Duty-cycle = [on time/total time] x 100%

3. The test sample has no any deviation to the test method of standard mentioned in page 1.

|         |                                                                                                  |
|---------|--------------------------------------------------------------------------------------------------|
| Product | Type                                                                                             |
|         | <input checked="" type="checkbox"/> Production unit <input type="checkbox"/> Identical Prototype |

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### 3. SAR MEASUREMENT SYSTEM

#### 3.1. The DASY5 system used for performing compliance tests consists of following items



- A standard high precision 6-axis robot with controller, teach pendant and software.
- Data acquisition electronics (DAE) which attached to the robot arm extension. The DAE consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock
- A dosimetric probe equipped with an optical surface detector system.
- The Electro-optical converter (EOC) performs the conversion from optical to electrical signals for the digital Communication to the DAE. To use optical surface detection, a special version of the EOC is required. The EOC signal is transmitted to the measurement server.
- A Light Beam used is for probe alignment. This improves the (absolute) accuracy of the probe positioning.
- A computer running WinXP and the DASY5 software.
- Remote control and teach pendant as well as additional circuitry for robot safety such as warning lamps, etc.
- Phantoms, device holders and other accessories according to the targeted measurement.

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### 3.2. DASY5 E-Field Probe

The SAR measurement is conducted with the dosimetric probe manufactured by SPEAG. The probe is specially designed and calibrated for use in liquid with high permittivity. The dosimetric probe has special calibration in liquid at different frequency. SPEAG conducts the probe calibration in compliance with international and national standards (e.g. IEEE-1528 etc.) Under ISO17025. The calibration data are in Appendix D.

## Isotropic E-Field Probe Specification

|                      |                                                                                                                                                                                                            |                                                                                    |
|----------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| <b>Model</b>         | EX3DV4-SN:3953                                                                                                                                                                                             |                                                                                    |
| <b>Manufacture</b>   | SPEAG                                                                                                                                                                                                      |                                                                                    |
| <b>frequency</b>     | 2.4GHz-6GHz<br>Linearity: $\pm 0.9\%$ (k=2)                                                                                                                                                                |  |
| <b>Dynamic Range</b> | 0.01W/kg-100W/kg<br>Linearity: $\pm 0.9\%$ (k=2)                                                                                                                                                           |                                                                                    |
| <b>Dimensions</b>    | Overall length: 337mm<br>Tip diameter: 2.5mm<br>Typical distance from probe tip to dipole centers: 1mm                                                                                                     |                                                                                    |
| <b>Application</b>   | High precision dosimetric measurements in any exposure scenario (e.g., very strong gradient fields). Only probe which enables compliance testing for frequencies up to 6 GHz with precision of better 30%. |                                                                                    |

### 3.3. Data Acquisition Electronics description

The data acquisition electronics (DAE) consist of a highly sensitive electrometer-grade preamplifier with auto-zeroing, a channel and gain-switching multiplexer, a fast 16 bit AD-converter and a command decoder with a control logic unit. Transmission to the measurement server is accomplished through an optical downlink for data and status information, as well as an optical uplink for commands and the clock.

The mechanical probe mounting device includes two different sensor systems for frontal and sideways probe contacts. They are used for mechanical surface detection and probe collision detection.

## DAE4

|                              |                          |
|------------------------------|--------------------------|
| <b>Input Impedance</b>       | 200MΩ                    |
| <b>The Inputs</b>            | Symmetrical and floating |
| <b>Common mode rejection</b> | above 80 dB              |

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### 3.4. Robot

The DASY system uses the high precision robots (DASY5:TX60) type from Stäubli SA (France). For the 6-axis controller system, the robot controller version from is used.

The XL robot series have many features that are important for our application:

- ☐ High precision (repeatability 0.02 mm)
- ☐ High reliability (industrial design)
- ☐ Jerk-free straight movements
- ☐ Low ELF interference (the closed metallic construction shields against motor control fields)
- ☐ 6-axis controller



### 3.5. Light Beam Unit

The light beam switch allows automatic “tooling” of the probe. During the process, the actual position of the probe tip with respect to the robot arm is measured, as well as the probe length and the horizontal probe offset. The software then corrects all movements, such that the robot coordinates are valid for the probe tip.

The repeatability of this process is better than 0.1 mm. If a position has been taught with an aligned prob.1 mm, even if the other probe has different dimensions. During probe rotations, the probe tip will keep its actual position. e, the same position will be reached with another aligned probe within 0



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### 3.6. Device Holder

The DASY device holder is designed to cope with different positions given in the standard. It has two scales for the device rotation (with respect to the body axis) and the device inclination (with respect to the line between the ear reference points). The rotation center for both scales is the ear reference point (EPR).

Thus the device needs no repositioning when changing the angles.

The DASY device holder has been made out of low-loss POM material having the following dielectric parameters: relative permittivity  $\epsilon=3$  and loss tangent  $\delta = 0.02$ . The amount of dielectric material has been reduced in the closest vicinity of the device, since measurements have suggested that the influence of the clamp on the test results could thus be lowered.



### 3.7. Measurement Server

The measurement server is based on a PC/104 CPU board with CPU (DASY5: 400 MHz, Intel Celeron), chip-disk (DASY5: 128MB), RAM (DASY5: 128MB). The necessary circuits for communication with the DAE electronic box, as well as the 16 bit AD converter system for optical detection and digital I/O interface are contained on the DAYS I/O board, which is directly connected to the PC/104 bus of the CPU board.

The measurement server performs all the real-time data evaluation for field measurements and surface detection, controls robot movements and handles safety operations.



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### 3.8. PHANTOM SAM Twin Phantom

The SAM twin phantom is a fiberglass shell phantom with 2mm shell thickness (except the ear region where shell thickness increases to 6mm). It has three measurement areas:

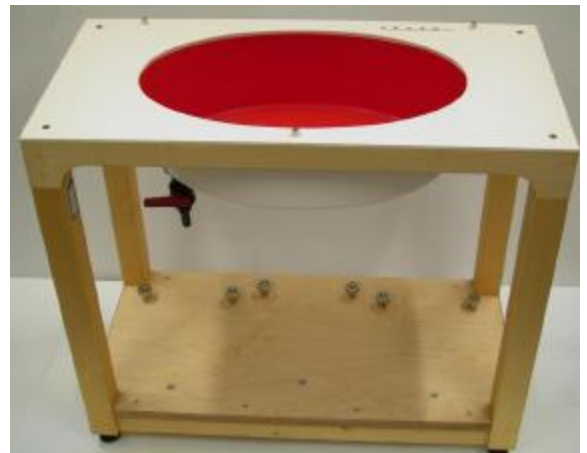
- ☐ Left head
- ☐ Right head
- ☐ Flat phantom



The bottom plate contains three pair of bolts for locking the device holder. The device holder positions are adjusted to the standard measurement positions in the three sections. A white cover is provided to tap the phantom during off-periods to prevent water evaporation and changes in the liquid parameters. On the phantom top, three reference markers are provided to identify the phantom position with respect to the robot.

### ELI4 Phantom

- ☐ Flat phantom a fiberglass shell flat phantom with 2mm $\pm$  0.2 mm shell thickness. It has only one measurement area for Flat phantom



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## 4. SAR MEASUREMENT PROCEDURE

### 4.1. Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in object exposed to a radio field. The SAR distribution in a biological body is complicated and is usually carried out by experimental techniques or numerical modeling. The standard recommends limits for two tiers of groups, occupational/controlled and occupational/uncontrolled, based on a person's awareness and ability to exercise control over his or her exposure. In general, occupational/controlled exposure limits are higher than the limits for general population/uncontrolled.

The SAR definition is the time derivative (rate) of the incremental energy (dW) absorbed by (dissipated in) an incremental mass (dm) contained in a volume element(dv) of given mass density (ρ). The equation description is as below:

$$SAR = \frac{d}{dt} \left( \frac{dW}{dm} \right) = \frac{d}{dt} \left( \frac{dW}{\rho dV} \right)$$

SAR is expressed in units of Watts per kilogram (W/kg)

SAR can be obtained using either of the following equations:

$$SAR = \frac{\sigma E^2}{\rho}$$

$$SAR = c_h \left. \frac{dT}{dt} \right|_{t=0}$$

Where

|                |                                                                                      |
|----------------|--------------------------------------------------------------------------------------|
| SAR            | is the specific absorption rate in watts per kilogram;                               |
| E              | is the r.m.s. value of the electric field strength in the tissue in volts per meter; |
| σ              | is the conductivity of the tissue in siemens per metre;                              |
| ρ              | is the density of the tissue in kilograms per cubic metre;                           |
| c <sub>h</sub> | is the heat capacity of the tissue in joules per kilogram and Kelvin;                |

$\left. \frac{dT}{dt} \right|_{t=0}$  is the initial time derivative of temperature in the tissue in kelvins per second

## 4.2. SAR Measurement Procedure

### Step 1: Power Reference Measurement

The Power Reference Measurement and Power Drift Measurement are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface is 2.7mm This distance cannot be smaller than the distance os sensor calibration points to probe tip as `defined in the probe properties,

### Step 2: Area Scan

The Area Scan is used as a fast scan in two dimensions to find the area of high field values, before doing a fine measurement around the hot spot. The sophisticated interpolation routines implemented in DASY software can find the maximum locations even in relatively coarse grids. When an Area Scan has measured all reachable points, it computes the field maximal found in the scanned area, within a range of the global maximum. The range (in db) is specified in the standards for compliance testing. For example, a 2dB range is required in IEEE Standard 1528, whereby 3db is a requirement when compliance is assessed in accordance with the ARIB standard (Japan) If one Zoom Scan follows the Area Scan, then only the absolute maximum will be taken as reference. For cases where multiple maximum are detected, the number of Zoom Scan has to be increased accordingly.

Area Scan Parameters extracted from KDB 865664 D01 SAR Measurement 100MHz to 6GHz

|                                                                                                        | $\leq 3 \text{ GHz}$                                                                                                                                                                                                                                                   | $> 3 \text{ GHz}$                                                                  |
|--------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|
| Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface | $5 \pm 1 \text{ mm}$                                                                                                                                                                                                                                                   | $\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5 \text{ mm}$                         |
| Maximum probe angle from probe axis to phantom surface normal at the measurement location              | $30^\circ \pm 1^\circ$                                                                                                                                                                                                                                                 | $20^\circ \pm 1^\circ$                                                             |
| Maximum area scan spatial resolution: $\Delta x_{\text{Area}}, \Delta y_{\text{Area}}$                 | $\leq 2 \text{ GHz}: \leq 15 \text{ mm}$<br>$2 - 3 \text{ GHz}: \leq 12 \text{ mm}$                                                                                                                                                                                    | $3 - 4 \text{ GHz}: \leq 12 \text{ mm}$<br>$4 - 6 \text{ GHz}: \leq 10 \text{ mm}$ |
|                                                                                                        | When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device. |                                                                                    |

### Step 3: Zoom Scan

Zoom Scan are used to assess the peak spatial SAR value within a cubic average volume containing 1g abd 10g of simulated tissue. The Zoom Scan measures points(refer to table below) within a cube whose base faces are centered on the maxima found in a preceding area scan job within the same procedure. When the measurement is done, the Zoom Scan evaluates the averaged SAR for 1g and 10g and displays these values next to the job's label.

#### Zoom Scan Parameters extracted from KDB865664 d01 SAR Measurement 100MHz to 6GHz

|                                                                                                                                                                                                                                                                                                                                               |                                    |                                                                                      |                                                                                     |                                                                                                                               |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------|
| Maximum zoom scan spatial resolution: $\Delta x_{Zoom}$ , $\Delta y_{Zoom}$                                                                                                                                                                                                                                                                   |                                    |                                                                                      | $\leq 2 \text{ GHz}: \leq 8 \text{ mm}$<br>$2 - 3 \text{ GHz}: \leq 5 \text{ mm}^*$ | $3 - 4 \text{ GHz}: \leq 5 \text{ mm}^*$<br>$4 - 6 \text{ GHz}: \leq 4 \text{ mm}^*$                                          |
| Maximum zoom scan spatial resolution, normal to phantom surface                                                                                                                                                                                                                                                                               | uniform grid: $\Delta z_{Zoom}(n)$ |                                                                                      | $\leq 5 \text{ mm}$                                                                 | $3 - 4 \text{ GHz}: \leq 4 \text{ mm}$<br>$4 - 5 \text{ GHz}: \leq 3 \text{ mm}$<br>$5 - 6 \text{ GHz}: \leq 2 \text{ mm}$    |
|                                                                                                                                                                                                                                                                                                                                               | graded grid                        | $\Delta z_{Zoom}(1)$ : between 1 <sup>st</sup> two points closest to phantom surface | $\leq 4 \text{ mm}$                                                                 | $3 - 4 \text{ GHz}: \leq 3 \text{ mm}$<br>$4 - 5 \text{ GHz}: \leq 2.5 \text{ mm}$<br>$5 - 6 \text{ GHz}: \leq 2 \text{ mm}$  |
|                                                                                                                                                                                                                                                                                                                                               |                                    | $\Delta z_{Zoom}(n>1)$ : between subsequent points                                   | $\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$                                               |                                                                                                                               |
| Minimum zoom scan volume                                                                                                                                                                                                                                                                                                                      | x, y, z                            |                                                                                      | $\geq 30 \text{ mm}$                                                                | $3 - 4 \text{ GHz}: \geq 28 \text{ mm}$<br>$4 - 5 \text{ GHz}: \geq 25 \text{ mm}$<br>$5 - 6 \text{ GHz}: \geq 22 \text{ mm}$ |
| Note: $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.                                                                                                                                                                                             |                                    |                                                                                      |                                                                                     |                                                                                                                               |
| * When zoom scan is required and the <u>reported</u> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is $\leq 1.4 \text{ W/kg}$ , $\leq 8 \text{ mm}$ , $\leq 7 \text{ mm}$ and $\leq 5 \text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz. |                                    |                                                                                      |                                                                                     |                                                                                                                               |

#### Step 4: Power Drift Measurement

The Power Drift Measurement measures the field at the same location as the most recent power reference measurement within the same procedure, and with the same settings. The Power Drift Measurement gives the field difference in dB from the reading conducted within the same settings. This allows a user to monitor the power drift of the device under test within a batch process. The measurement procedure is the same as Step 1.

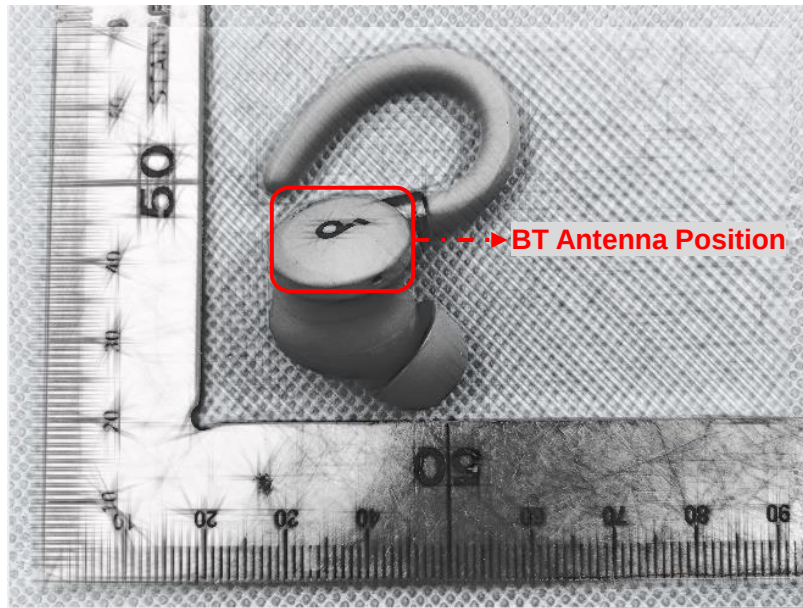
### 4.3. RF Exposure Conditions

Test Configuration and setting:

The device is a bluetooth headset, and supports Bluetooth wireless technology.

For SAR testing, the device was controlled by software to test at reference fixed frequency points.

#### Antenna Location:



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### SAR Test Exclusion Consideration for Adjacent Edges Per KDB 447498 D04 Appendix B:

B.3 MPE-based Exemption: For mobile devices that are not exempt per Table B.1 [Table 1 of § 1.1307(b)(1)(i)(C)] at distances from 20 cm to 40 cm and in 0.3 GHz to 6 GHz, evaluation of compliance with the exposure limits in § 1.1310 is necessary if the ERP of the device is greater than ERP 20cm in Formula (B.1) [repeated from § 2.1091(c)(1) and § 1.1307(b)(1)(i)(B)].

$$P_{th} \text{ (mW)} = ERP_{20 \text{ cm}} \text{ (mW)} = \begin{cases} 2040f & 0.3 \text{ GHz} \leq f < 1.5 \text{ GHz} \\ 3060 & 1.5 \text{ GHz} \leq f \leq 6 \text{ GHz} \end{cases} \quad (\text{B.1})$$

B.4 SAR-based Exemption: 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).  $P_{th}$  is given by Formula (B.2).

$$P_{th} \text{ (mW)} = \begin{cases} ERP_{20 \text{ cm}}(d/20 \text{ cm})^x & d \leq 20 \text{ cm} \\ ERP_{20 \text{ cm}} & 20 \text{ cm} < d \leq 40 \text{ cm} \end{cases} \quad (\text{B.2})$$

11/29/2021

where

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

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20 \text{ cm}}$  is per Formula (B.1).  
The example values shown in Table B.2 are for illustration only.

Table B.2—Example Power Thresholds (mW)

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

| Test mode        | Ch.(GHz) | Distance (mm) | x     | $P_{th}$ (mW) | Max.power (dBm) | Max.power (mW) | SAR test (Yes/No) |
|------------------|----------|---------------|-------|---------------|-----------------|----------------|-------------------|
| Right Ear.       |          |               |       |               |                 |                |                   |
| BR/EDR           | 2.480    | 5             | 1.905 | 2.717         | 12.019          | 15.918         | Yes               |
| BT (BLE) GFSK 1M | 2.480    | 5             | 1.905 | 2.717         | 7.225           | 5.278          | Yes               |

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## 5. TISSUE SIMULATING LIQUID

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15cm. For head SAR testing the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 10% are listed in 6.2

### 5.1. The composition of the tissue simulating liquid

| Ingredient<br>(% Weight)<br>Frequency<br>(MHz) | Water | Nacl | Polysorbate 20 | DGBE | 1,2<br>Propanediol | Triton<br>X-100 |
|------------------------------------------------|-------|------|----------------|------|--------------------|-----------------|
| 2450 Head                                      | 71.88 | 0.16 | 0.0            | 7.99 | 0.0                | 19.97           |

### 5.2. Tissue Dielectric Parameters for Head and Body Phantoms

The head tissue dielectric parameters recommended by the IEEE 1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in IEEE 1528 are derived from the tissue dielectric parameters computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in IEEE 1528.

| Target Frequency<br>(MHz) | head         |                | body         |                |
|---------------------------|--------------|----------------|--------------|----------------|
|                           | $\epsilon_r$ | $\sigma$ (S/m) | $\epsilon_r$ | $\sigma$ (S/m) |
| 300                       | 45.3         | 0.87           | 45.3         | 0.87           |
| 450                       | 43.5         | 0.87           | 43.5         | 0.87           |
| 835                       | 41.5         | 0.90           | 41.5         | 0.90           |
| 900                       | 41.5         | 0.97           | 41.5         | 0.97           |
| 915                       | 41.5         | 1.01           | 41.5         | 1.01           |
| 1450                      | 40.5         | 1.20           | 40.5         | 1.20           |
| 1610                      | 40.3         | 1.29           | 40.3         | 1.29           |
| 1800 – 2000               | 40.0         | 1.40           | 40.0         | 1.40           |
| <b>2450</b>               | <b>39.2</b>  | <b>1.80</b>    | <b>39.2</b>  | <b>1.80</b>    |
| 3000                      | 38.5         | 2.40           | 38.5         | 2.40           |

( $\epsilon_r$  = relative permittivity,  $\sigma$  = conductivity and  $\rho = 1000 \text{ kg/m}^3$ )

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### 5.3. Tissue Calibration Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using DASY 5 Dielectric Probe Kit and R&S Network Analyzer ZVL6.

| Tissue Stimulant Measurement for 2450MHz |              |                                      |                               |                        |                  |
|------------------------------------------|--------------|--------------------------------------|-------------------------------|------------------------|------------------|
| Head                                     | Fr.<br>(MHz) | Dielectric Parameters ( $\pm 10\%$ ) |                               | Tissue<br>Temp<br>[°C] | Test time        |
|                                          |              | $\epsilon_r$ 39.2(35.28-43.12)       | $\delta$ [s/m]1.80(1.62-1.98) |                        |                  |
|                                          | 2402         | 40.13                                | 1.71                          | 21.1                   | Apr. 18,<br>2024 |
|                                          | 2440         | 39.67                                | 1.73                          |                        |                  |
|                                          | 2441         | 39.67                                | 1.73                          |                        |                  |
|                                          | 2450         | 38.16                                | 1.76                          |                        |                  |
|                                          | 2480         | 37.66                                | 1.78                          |                        |                  |

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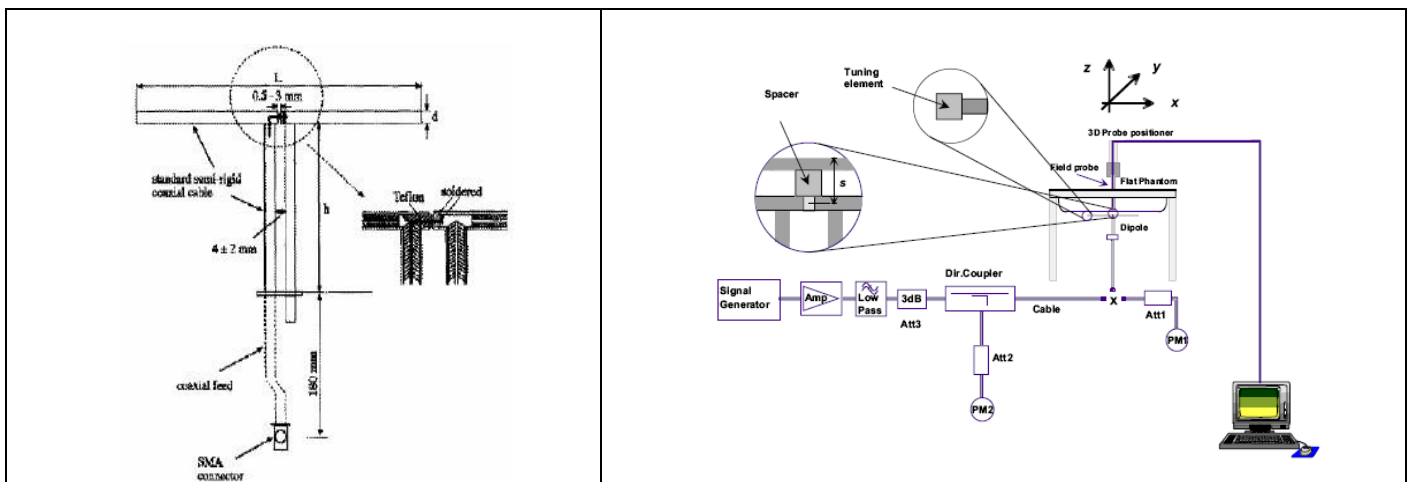
## 6. SAR SYSTEM CHECK PROCEDURE

### 6.1. SAR System Check Procedures

SAR system check is required to confirm measurement accuracy, according to the tissue dielectric media, probe calibration points and other system operating parameters required for measuring the SAR of a test device. The system verification must be performed for each frequency band and within the valid range of each probe calibration point required for testing the device. The same SAR probe(s) and tissue-equivalent media combinations used with each specific SAR system for system verification must be used for device testing. When multiple probe calibration points are required to cover substantially large transmission bands, independent system verifications are required for each probe calibration point. A system verification must be performed before each series of SAR measurements using the same probe calibration point and tissue-equivalent medium. Additional system verification should be considered according to the conditions of the tissue-equivalent medium and measured tissue dielectric parameters, typically every three to four days when the liquid parameters are remeasured or sooner when marginal liquid parameters are used at the beginning of a series of measurements.

Each DASY system is equipped with one or more system check kits. These units, together with the predefined measurement procedures within the DASY software, enable the user to conduct the system check and system validation. System kit includes a dipole, and dipole device holder.

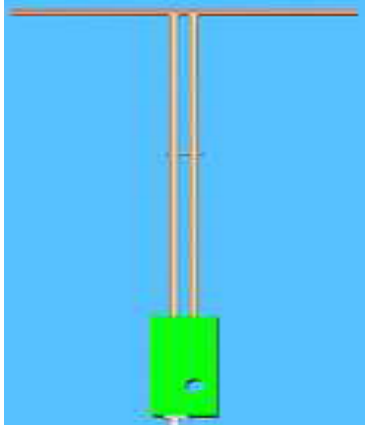
The system check verifies that the system operates within its specifications. It's performed daily or before every SAR measurement. The system check uses normal SAR measurement in the flat section of the phantom with a matched dipole at a specified distance. The system check setup is shown as below.



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## 6.2. SAR System Check

### 6.2.1. Dipoles

|                                                                                   |                                                                                                                                                                                                                                                                      |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|  | <p>The dipoles used are based on the IEEE-1528 standard, and is complied with mechanical and electrical specifications in line with the requirements of IEEE. the table below provides details for the mechanical and electrical specifications for the dipoles.</p> |
|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

| Frequency | L (mm) | h (mm) | d (mm) |
|-----------|--------|--------|--------|
| 2450MHz   | 51.5   | 30.4   | 3.6    |

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## 6.2.2. System Check Result

| System Performance Check at 2450MHz for Head |                       |      |                                    |             |                       |       |                         |               |
|----------------------------------------------|-----------------------|------|------------------------------------|-------------|-----------------------|-------|-------------------------|---------------|
| Validation Kit: D2450V2-SN:968               |                       |      |                                    |             |                       |       |                         |               |
| Frequency<br>[MHz]                           | Target<br>Value(W/kg) |      | Reference Result<br>( $\pm 10\%$ ) |             | Tested<br>Value(W/kg) |       | Tissue<br>Temp.<br>[°C] | Test time     |
|                                              | 1g                    | 10g  | 1g                                 | 10g         | 1g                    | 10g   |                         |               |
| 2450                                         | 53.5                  | 25.0 | 48.15-58.85                        | 22.50-27.50 | 52.40                 | 23.90 | 21.1                    | Apr. 18, 2024 |

Note:

(1) We use a CW signal of 10dBm for system check, and then all SAR values are normalized to 1W forward power. The result must be within  $\pm 10\%$  of target value.

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## 7. EUT TEST POSITION

This EUT was tested in **Back, Front**.

### 7.1. Test Position

- (1) To position the EUT parallel to the phantom surface.
- (2) To adjust the EUT parallel to the flat phantom.
- (3) To adjust the distance between the EUT surface and the flat phantom to **0mm**.

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## 8. SAR EXPOSURE LIMITS

### Limits for General Population/Uncontrolled Exposure (W/kg)

| Type Exposure                                       | Uncontrolled Environment Limit (W/kg) |
|-----------------------------------------------------|---------------------------------------|
| Spatial Peak SAR (1g cube tissue for brain or body) | 1.60                                  |
| Spatial Average SAR (Whole body)                    | 0.08                                  |
| Spatial Peak SAR (Limbs)                            | 4.0                                   |

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## 9. TEST FACILITY

|                                          |                                                                                                                                          |
|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Test Site</b>                         | Attestation of Global Compliance (Shenzhen) Co., Ltd                                                                                     |
| <b>Location</b>                          | 1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China |
| <b>Designation Number</b>                | CN1259                                                                                                                                   |
| <b>FCC Test Firm Registration Number</b> | 975832                                                                                                                                   |
| <b>A2LA Cert. No.</b>                    | 5054.02                                                                                                                                  |
| <b>Description</b>                       | Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA                                                                |

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## 10. TEST EQUIPMENT LIST

| Equipment description                             | Manufacturer/ Model     | Identification No. | Software version | Current calibration date | Next calibration date |
|---------------------------------------------------|-------------------------|--------------------|------------------|--------------------------|-----------------------|
| Stäubli Robot                                     | Stäubli-TX60            | F13/5Q2UD1/A/01    | N/A              | N/A                      | N/A                   |
| Robot Controller                                  | Stäubli-CS8             | 139522             | N/A              | N/A                      | N/A                   |
| E-Field Probe                                     | Speag- EX3DV4           | SN:3953            | N/A              | Sep. 05, 2023            | Sep. 04, 2024         |
| SAM Twin Phantom                                  | Speag-SAM               | 1790               | N/A              | N/A                      | N/A                   |
| Device Holder                                     | Speag-SD 000 H01 KA     | SD 000 H01 KA      | N/A              | N/A                      | N/A                   |
| DAE4                                              | Speag-SD 000 D04 BM     | 1398               | N/A              | May 17, 2023             | May 16, 2024          |
| SAR Software                                      | Speag-DASY5             | DASY52.8.7.1137    | N/A              | N/A                      | N/A                   |
| Liquid                                            | SATIMO                  | -                  | N/A              | N/A                      | N/A                   |
| Dipole                                            | D2450V2                 | SN968              | N/A              | May 18, 2023             | May 17, 2026          |
| Signal Generator                                  | Agilent-E4438C          | US41461365         | V5.03            | Jun. 01, 2023            | May 31, 2024          |
| EXA Signal Analyzer                               | Agilent / N9010A        | MY53470504         | N/A              | Jun. 01, 2023            | May 31, 2024          |
| Network Analyzer                                  | Rhode & Schwarz ZVL6    | SN101443           | 3.2              | Sep. 21, 2023            | Sep. 20, 2024         |
| Attenuator                                        | Warison /WATT-6SR1211   | S/N:WRJ34AYM2F1    | N/A              | June 07, 2023            | June 06, 2024         |
| Attenuator                                        | Mini-circuits / VAT-10+ | 31405              | N/A              | June 07, 2023            | June 06, 2024         |
| Amplifier                                         | AS0104-55_55            | 1004793            | N/A              | N/A                      | N/A                   |
| Directional Couple                                | Werlatone/ C5571-10     | SN99463            | N/A              | Feb. 01, 2024            | Jan. 31, 2026         |
| Directional Couple                                | Werlatone/ C6026-10     | SN99482            | N/A              | Feb. 01, 2024            | Jan. 31, 2026         |
| Power Sensor                                      | NRP-Z21                 | 1137.6000.02       | N/A              | Sep. 05, 2023            | Sep. 04, 2024         |
| Power Sensor                                      | NRP-Z23                 | 100323             | N/A              | Jun. 06, 2023            | Jun. 05, 2024         |
| Power Viewer                                      | R&S                     | V2.3.1.0           | N/A              | N/A                      | N/A                   |
| Calibration standard parts for network sub - port | R&S/ ZV-Z132            | N/A                | V2.3.1.0         | Nov. 11, 2023            | Nov. 10, 2024         |

Note: Per KDB 865664 Dipole SAR Validation, AGC Lab has adopted 3 years calibration intervals. On annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement;
4. Impedance is within 5Ω of calibrated measurement.

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## 11. MEASUREMENT UNCERTAINTY

| DASY Uncertainty- EX3DV4<br>Measurement uncertainty for Dipole averaged over 1 gram / 10 gram. |       |              |                |                        |              |              |                       |                       |    |
|------------------------------------------------------------------------------------------------|-------|--------------|----------------|------------------------|--------------|--------------|-----------------------|-----------------------|----|
| a                                                                                              | b     | c            | d              | <sup>e</sup><br>f(d,k) | f            | g            | <sup>h</sup><br>c×f/e | <sup>i</sup><br>c×g/e | k  |
| Uncertainty Component                                                                          | Sec.  | Tol<br>(± %) | Prob.<br>Dist. | Div.                   | Ci (1g)      | Ci (10g)     | 1g Ui<br>(±%)         | 10g Ui<br>(±%)        | vi |
| <b>Measurement System</b>                                                                      |       |              |                |                        |              |              |                       |                       |    |
| Probe calibration                                                                              | E.2.1 | 6.95         | N              | 1                      | 1            | 1            | 6.95                  | 6.95                  | ∞  |
| Axial Isotropy                                                                                 | E.2.2 | 0.6          | R              | $\sqrt{3}$             | $\sqrt{0.5}$ | $\sqrt{0.5}$ | 0.24                  | 0.24                  | ∞  |
| Hemispherical Isotropy                                                                         | E.2.2 | 1.6          | R              | $\sqrt{3}$             | $\sqrt{0.5}$ | $\sqrt{0.5}$ | 0.65                  | 0.65                  | ∞  |
| Boundary effect                                                                                | E.2.3 | 1            | R              | $\sqrt{3}$             | 1            | 1            | 0.58                  | 0.58                  | ∞  |
| Linearity                                                                                      | E.2.4 | 0.45         | R              | $\sqrt{3}$             | 1            | 1            | 0.26                  | 0.26                  | ∞  |
| System detection limits                                                                        | E.2.4 | 1            | R              | $\sqrt{3}$             | 1            | 1            | 0.58                  | 0.58                  | ∞  |
| Modulation response                                                                            | E.2.5 | 3.3          | R              | $\sqrt{3}$             | 1            | 1            | 1.91                  | 1.91                  | ∞  |
| Readout Electronics                                                                            | E.2.6 | 0.15         | N              | 1                      | 1            | 1            | 0.15                  | 0.15                  | ∞  |
| Response Time                                                                                  | E.2.7 | 0            | R              | $\sqrt{3}$             | 1            | 1            | 0.00                  | 0.00                  | ∞  |
| Integration Time                                                                               | E.2.8 | 1.7          | R              | $\sqrt{3}$             | 1            | 1            | 0.98                  | 0.98                  | ∞  |
| RF ambient conditions-Noise                                                                    | E.6.1 | 3            | R              | $\sqrt{3}$             | 1            | 1            | 1.73                  | 1.73                  | ∞  |
| RF ambient conditions-reflections                                                              | E.6.1 | 3            | R              | $\sqrt{3}$             | 1            | 1            | 1.73                  | 1.73                  | ∞  |
| Probe positioner mechanical tolerance                                                          | E.6.2 | 0.4          | R              | $\sqrt{3}$             | 1            | 1            | 0.23                  | 0.23                  | ∞  |
| Probe positioning with respect to phantom shell                                                | E.6.3 | 6.7          | R              | $\sqrt{3}$             | 1            | 1            | 3.87                  | 3.87                  | ∞  |
| Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation              | E.5   | 4            | R              | $\sqrt{3}$             | 1            | 1            | 2.31                  | 2.31                  | ∞  |
| <b>Test sample Related</b>                                                                     |       |              |                |                        |              |              |                       |                       |    |
| Test sample positioning                                                                        | E.4.2 | 2.9          | N              | 1                      | 1            | 1            | 2.90                  | 2.90                  | ∞  |
| Device holder uncertainty                                                                      | E.4.1 | 3.6          | N              | 1                      | 1            | 1            | 3.60                  | 3.60                  | ∞  |
| Output power variation—SAR drift measurement                                                   | E.2.9 | 5            | R              | $\sqrt{3}$             | 1            | 1            | 2.89                  | 2.89                  | ∞  |
| SAR scaling                                                                                    | E.6.5 | 5            | R              | $\sqrt{3}$             | 1            | 1            | 2.89                  | 2.89                  | ∞  |
| <b>Phantom and tissue parameters</b>                                                           |       |              |                |                        |              |              |                       |                       |    |
| Phantom shell uncertainty—shape, thickness, and permittivity                                   | E.3.1 | 6.6          | R              | $\sqrt{3}$             | 1            | 1            | 3.81                  | 3.81                  | ∞  |
| Uncertainty in SAR correction for deviations in permittivity and conductivity                  | E.3.2 | 1.9          | N              | 1                      | 1            | 0.84         | 1.90                  | 1.60                  | ∞  |
| Liquid conductivity measurement                                                                | E.3.3 | 4            | N              | 1                      | 0.78         | 0.71         | 3.12                  | 2.84                  | M  |
| Liquid permittivity measurement                                                                | E.3.3 | 5            | N              | 1                      | 0.23         | 0.26         | 1.15                  | 1.30                  | M  |
| Liquid conductivity—temperature uncertainty                                                    | E.3.4 | 2.5          | R              | $\sqrt{3}$             | 0.78         | 0.71         | 1.13                  | 1.02                  | ∞  |
| Liquid permittivity—temperature uncertainty                                                    | E.3.4 | 2.5          | R              | $\sqrt{3}$             | 0.23         | 0.26         | 0.33                  | 0.38                  | ∞  |
| Combined Standard Uncertainty                                                                  |       |              | RSS            |                        |              |              | 11.97                 | 11.80                 |    |
| Expanded Uncertainty (95% Confidence interval)                                                 |       |              | K=2            |                        |              |              | 23.93                 | 23.61                 |    |

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| DASY Uncertainty- EX3DV4                                                          |         |              |                |             |         |          |               |                |    |
|-----------------------------------------------------------------------------------|---------|--------------|----------------|-------------|---------|----------|---------------|----------------|----|
| System Check uncertainty for Dipole averaged over 1 gram / 10 gram.               |         |              |                |             |         |          |               |                |    |
| a                                                                                 | b       | c            | d              | e<br>f(d,k) | f       | g        | h<br>c×f/e    | i<br>c×g/e     | k  |
| Uncertainty Component                                                             | Sec.    | Tol<br>(± %) | Prob.<br>Dist. | Div.        | Ci (1g) | Ci (10g) | 1g Ui<br>(±%) | 10g Ui<br>(±%) | vi |
| <b>Measurement System</b>                                                         |         |              |                |             |         |          |               |                |    |
| Probe calibration drift                                                           | E.2.1   | 0.5          | N              | 1           | 1       | 1        | 0.5           | 0.5            | ∞  |
| Axial Isotropy                                                                    | E.2.2   | 0.6          | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Hemispherical Isotropy                                                            | E.2.2   | 1.6          | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Boundary effect                                                                   | E.2.3   | 1            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Linearity                                                                         | E.2.4   | 0.45         | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| System detection limits                                                           | E.2.4   | 1            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Modulation response                                                               | E.2.5   | 3.3          | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Readout Electronics                                                               | E.2.6   | 0.15         | N              | 1           | 0       | 0        | 0.00          | 0.00           | ∞  |
| Response Time                                                                     | E.2.7   | 0            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Integration Time                                                                  | E.2.8   | 1.7          | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| RF ambient conditions-Noise                                                       | E.6.1   | 3            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| RF ambient conditions-reflections                                                 | E.6.1   | 3            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Probe positioner mechanical tolerance                                             | E.6.2   | 0.4          | R              | $\sqrt{3}$  | 1       | 1        | 0.37          | 0.37           | ∞  |
| Probe positioning with respect to phantom shell                                   | E.6.3   | 6.7          | R              | $\sqrt{3}$  | 1       | 1        | 3.87          | 3.87           | ∞  |
| Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation | E.5     | 4            | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| <b>System check source (dipole)</b>                                               |         |              |                |             |         |          |               |                |    |
| Deviation of experimental dipoles                                                 | E.6.4   | 2.0          | N              | 1           | 1       | 1        | 2.00          | 2.00           | ∞  |
| Input power and SAR drift measurement                                             | 8,6.6.4 | 5.0          | R              | $\sqrt{3}$  | 1       | 1        | 2.89          | 2.89           | ∞  |
| Dipole axis to liquid distance                                                    | 8,E.6.6 | 2.0          | R              | $\sqrt{3}$  | 1       | 1        | 1.15          | 1.15           | ∞  |
| <b>Phantom and tissue parameters</b>                                              |         |              |                |             |         |          |               |                |    |
| Phantom shell uncertainty—shape, thickness, and permittivity                      | E.3.1   | 6.6          | R              | $\sqrt{3}$  | 1       | 1        | 3.81          | 3.81           | ∞  |
| Uncertainty in SAR correction for deviations in permittivity and conductivity     | E.3.2   | 1.9          | N              | 1           | 1       | 0.84     | 1.90          | 1.60           | ∞  |
| Liquid conductivity measurement                                                   | E.3.3   | 4            | N              | 1           | 0.78    | 0.71     | 3.12          | 2.84           | M  |
| Liquid permittivity measurement                                                   | E.3.3   | 5            | N              | 1           | 0.23    | 0.26     | 1.15          | 1.30           | M  |
| Liquid conductivity—temperature uncertainty                                       | E.3.4   | 2.5          | R              | $\sqrt{3}$  | 0.78    | 0.71     | 1.13          | 1.02           | ∞  |
| Liquid permittivity—temperature uncertainty                                       | E.3.4   | 2.5          | R              | $\sqrt{3}$  | 0.23    | 0.26     | 0.33          | 0.38           | ∞  |
| Combined Standard Uncertainty                                                     |         |              | RSS            |             |         |          | 7.34          | 7.07           |    |
| Expanded Uncertainty (95% Confidence interval)                                    |         |              | K=2            |             |         |          | 14.67         | 14.14          |    |

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| DASY Uncertainty- EX3DV4                                                          |         |             |                |             |         |          |               |                |    |
|-----------------------------------------------------------------------------------|---------|-------------|----------------|-------------|---------|----------|---------------|----------------|----|
| System Validation uncertainty for Dipole averaged over 1 gram / 10 gram.          |         |             |                |             |         |          |               |                |    |
| a                                                                                 | b       | c           | d              | e<br>f(d,k) | f       | g        | h<br>cxf/e    | i<br>cxg/e     | k  |
| Uncertainty Component                                                             | Sec.    | Tol<br>(±%) | Prob.<br>Dist. | Div.        | Ci (1g) | Ci (10g) | 1g Ui<br>(±%) | 10g Ui<br>(±%) | vi |
| <b>Measurement System</b>                                                         |         |             |                |             |         |          |               |                |    |
| Probe calibration                                                                 | E.2.1   | 6.95        | N              | 1           | 1       | 1        | 6.95          | 6.95           | ∞  |
| Axial Isotropy                                                                    | E.2.2   | 0.6         | R              | $\sqrt{3}$  | 1       | 1        | 0.35          | 0.35           | ∞  |
| Hemispherical Isotropy                                                            | E.2.2   | 1.6         | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Boundary effect                                                                   | E.2.3   | 1           | R              | $\sqrt{3}$  | 1       | 1        | 0.58          | 0.58           | ∞  |
| Linearity                                                                         | E.2.4   | 0.45        | R              | $\sqrt{3}$  | 1       | 1        | 0.26          | 0.26           | ∞  |
| System detection limits                                                           | E.2.4   | 1           | R              | $\sqrt{3}$  | 1       | 1        | 0.58          | 0.58           | ∞  |
| Modulation response                                                               | E.2.5   | 3.3         | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Readout Electronics                                                               | E.2.6   | 0.15        | N              | 1           | 1       | 1        | 0.15          | 0.15           | ∞  |
| Response Time                                                                     | E.2.7   | 0           | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| Integration Time                                                                  | E.2.8   | 1.7         | R              | $\sqrt{3}$  | 0       | 0        | 0.00          | 0.00           | ∞  |
| RF ambient conditions-Noise                                                       | E.6.1   | 3           | R              | $\sqrt{3}$  | 1       | 1        | 1.73          | 1.73           | ∞  |
| RF ambient conditions-reflections                                                 | E.6.1   | 3           | R              | $\sqrt{3}$  | 1       | 1        | 1.73          | 1.73           | ∞  |
| Probe positioner mechanical tolerance                                             | E.6.2   | 0.4         | R              | $\sqrt{3}$  | 1       | 1        | 0.23          | 0.23           | ∞  |
| Probe positioning with respect to phantom shell                                   | E.6.3   | 6.7         | R              | $\sqrt{3}$  | 1       | 1        | 3.87          | 3.87           | ∞  |
| Extrapolation, interpolation, and integrations algorithms for max. SAR evaluation | E.5     | 4           | R              | $\sqrt{3}$  | 1       | 1        | 2.31          | 2.31           | ∞  |
| <b>System check source (dipole)</b>                                               |         |             |                |             |         |          |               |                |    |
| Deviation of experimental dipole from numerical dipole                            | E.6.4   | 5.0         | N              | 1           | 1       | 1        | 5.00          | 5.00           | ∞  |
| Input power and SAR drift measurement                                             | 8,6.6.4 | 5.0         | R              | $\sqrt{3}$  | 1       | 1        | 2.89          | 2.89           | ∞  |
| Dipole axis to liquid distance                                                    | 8,E.6.6 | 2.0         | R              | $\sqrt{3}$  | 1       | 1        | 1.15          | 1.15           | ∞  |
| <b>Phantom and tissue parameters</b>                                              |         |             |                |             |         |          |               |                |    |
| Phantom shell uncertainty—shape, thickness, and permittivity                      | E.3.1   | 6.6         | R              | $\sqrt{3}$  | 1       | 1        | 3.81          | 3.81           | ∞  |
| Uncertainty in SAR correction for deviations in permittivity and conductivity     | E.3.2   | 1.9         | N              | 1           | 1       | 0.84     | 1.90          | 1.60           | ∞  |
| Liquid conductivity measurement                                                   | E.3.3   | 4           | N              | 1           | 0.78    | 0.71     | 3.12          | 2.84           | M  |
| Liquid permittivity measurement                                                   | E.3.3   | 5           | N              | 1           | 0.23    | 0.26     | 1.15          | 1.30           | M  |
| Liquid conductivity—temperature uncertainty                                       | E.3.4   | 2.5         | R              | $\sqrt{3}$  | 0.78    | 0.71     | 1.13          | 1.02           | ∞  |
| Liquid permittivity—temperature uncertainty                                       | E.3.4   | 2.5         | R              | $\sqrt{3}$  | 0.23    | 0.26     | 0.33          | 0.38           | ∞  |
| Combined Standard Uncertainty                                                     |         |             | RSS            |             |         |          | 11.62         | 11.46          |    |
| Expanded Uncertainty (95% Confidence interval)                                    |         |             | K=2            |             |         |          | 23.25         | 22.91          |    |

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## 12. CONDUCTED POWER MEASUREMENT

### Bluetooth\_V5.3

| Modulation     | Channel | Frequency(MHz) | PK. Power (dBm) |
|----------------|---------|----------------|-----------------|
| BR/EDR         |         |                |                 |
| GFSK           | 0       | 2402           | 11.537          |
|                | 39      | 2441           | 11.795          |
|                | 78      | 2480           | 11.985          |
| $\pi$ /4-DQPSK | 0       | 2402           | 11.516          |
|                | 39      | 2441           | 11.806          |
|                | 78      | 2480           | 12.011          |
| 8-DPSK         | 0       | 2402           | 11.545          |
|                | 39      | 2441           | 11.819          |
|                | 78      | 2480           | <b>12.019</b>   |
| BLE            |         |                |                 |
| GFSK 1M        | 0       | 2402           | 6.748           |
|                | 19      | 2440           | 7.057           |
|                | 39      | 2480           | <b>7.225</b>    |

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## 13. TEST RESULTS

### 13.1. SAR Test Results Summary

#### 13.1.1. Test position and configuration

1. The EUT is a model of Bluetooth headset.

According to KDB 447498 D04 General RF Exposure Guide v01, due to maximum peak power for bluetooth is more than just a test exclusion threshold, which must be tested.

2. Test procedure:

(1) Lab. test 1-g SAR at a test separation distance of 0mm from the flat phantom filled with head tissue simulating Liquid.

1. For SAR testing, the device was controlled by software to test at reference fixed frequency points.

#### 13.1.2. Operation Mode

1. Per KDB 447498 D04 v01 ,for each exposure position, if the highest 1-g SAR is  $\leq 0.8$  W/kg, testing for low and high channel is optional.
2. Per KDB 865664 D01 v01r04,for each frequency band, if the measured SAR is  $\geq 0.8$ W/kg, testing for repeated SAR measurement is required , that the highest measured SAR is only to be tested. When the SAR results are near the limit, the following procedures are required for each device to verify these types of SAR measurement related variation concerns by repeating the highest measured SAR configuration in each frequency band.
  - (1) When the original highest measured SAR is  $\geq 0.8$ W/kg, repeat that measurement once.
  - (2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is  $>1.20$  or when the original or repeated measurement is  $\geq 1.45$  W/kg.
  - (3) Perform a third repeated measurement only if the original, first and second repeated measurement is  $\geq 1.5$  W/kg and ratio of largest to smallest SAR for the original, first and second measurement is  $\geq 1.20$ .
3. Maximum Scaling SAR in order to calculate the Maximum SAR values to test under the standard Peak Power, Calculation method is as follows:  
Maximum Scaling SAR =tested SAR (Max.)  $\times$  [maximum turn-up power (mw)/ maximum measurement output power(mw) ]

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### 13.1.3. Test Result

| SAR MEASUREMENT                      |      |     |           |                        |                             |                          |                          |                   |            |
|--------------------------------------|------|-----|-----------|------------------------|-----------------------------|--------------------------|--------------------------|-------------------|------------|
| Depth of Liquid (cm):>15             |      |     |           |                        | Relative Humidity (%): 53.8 |                          |                          |                   |            |
| Product: Wireless Headphone          |      |     |           |                        |                             |                          |                          |                   |            |
| Test Mode: Bluetooth for head liquid |      |     |           |                        |                             |                          |                          |                   |            |
| Position                             | Mode | Ch. | Fr. (MHz) | Power Drift (<±0.2d B) | SAR (1g) (W/kg)             | Max. Tune-up Power (dBm) | Meas. output Power (dBm) | Scaled SAR (W/kg) | Limit W/kg |
| Test Mode: BT (BR/EDR)               |      |     |           |                        |                             |                          |                          |                   |            |
| Back                                 | 1DH5 | 0   | 2402      | -0.13                  | 0.507                       | 12.50                    | 11.537                   | 0.633             | 1.6        |
| Back                                 | 1DH5 | 39  | 2441      | 0.15                   | <b>0.679</b>                | 12.50                    | 11.795                   | <b>0.799</b>      | 1.6        |
| Back                                 | 1DH5 | 78  | 2480      | 0.13                   | 0.570                       | 12.50                    | 11.985                   | 0.642             | 1.6        |
| Front                                | 1DH5 | 39  | 2441      | 0.15                   | 0.184                       | 12.50                    | 11.795                   | 0.216             | 1.6        |
| Test Mode: BT (BLE)_GFSK 1M          |      |     |           |                        |                             |                          |                          |                   |            |
| Back                                 | GFSK | 0   | 2402      | 0.19                   | 0.181                       | 7.50                     | 6.748                    | 0.215             | 1.6        |
| Back                                 | GFSK | 19  | 2440      | 0.10                   | <b>0.194</b>                | 7.50                     | 7.057                    | <b>0.215</b>      | 1.6        |
| Back                                 | GFSK | 39  | 2480      | 0.10                   | 0.169                       | 7.50                     | 7.225                    | 0.180             | 1.6        |
| Front                                | GFSK | 19  | 2440      | 0.13                   | 0.051                       | 7.50                     | 7.057                    | 0.056             | 1.6        |

Note:

- When the 1-g SAR is  $\leq 0.8\text{W/kg}$ , testing for low and high channel is optional.
- The test separation of all above table is 0mm.
- Plots are only shown for the bold marked worst case SAR results.

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## APPENDIX A. SAR SYSTEM CHECK DATA

Test Laboratory: AGC Lab

Date: Apr. 18, 2024

System Check Head 2450 MHz

DUT: Dipole 2450 MHz Type: D2450V2

Communication System CW; Communication System Band: D2450 (2450.0 MHz); Duty Cycle: 1:1;  
Frequency: 2450 MHz; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.76$  mho/m;  $\epsilon_r = 38.16$ ;  $\rho = 1000$  kg/m<sup>3</sup>;  
Phantom section: Flat Section; Input Power=10dBm  
Ambient temperature (°C): 21.6, Liquid temperature (°C): 21.1

DASY Configuration:

- Probe: EX3DV4 – SN:3953; ConvF(7.78, 7.78, 7.78); Calibrated: Sep. 05, 2023;
- Sensor-Surface: 1.4mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 SN1398; Calibrated: May 17, 2023
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**Configuration/System Check Head 2450MHz/Area Scan (5x8x1):** Measurement grid: dx=15mm, dy=15mm  
Maximum value of SAR (measured) = 0.692 W/kg

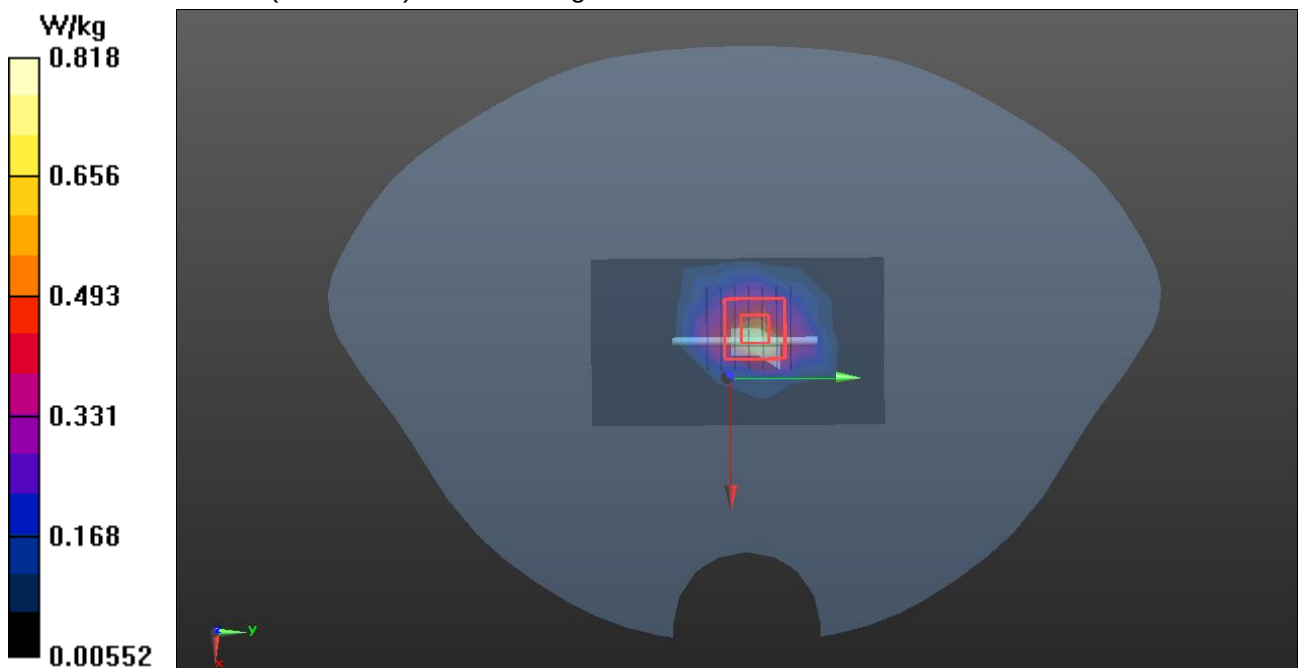
**Configuration/System Check Head 2450MHz/Zoom Scan (7x7x7)/Cube 0:** Measurement grid: dx=5mm, dy=5mm, dz=5mm

Reference Value = 19.462 V/m; Power Drift = 0.38 dB

Peak SAR (extrapolated) = 1.14 W/kg

SAR(1 g) = 0.524 W/kg; SAR(10 g) = 0.239 W/kg

Maximum value of SAR (measured) = 0.818 W/kg



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## APPENDIX B. SAR MEASUREMENT DATA

Test Laboratory: AGC Lab

Date: Apr. 18, 2024

BT(BR/EDR) Mid- Back (1DH5)

DUT: Wireless Headphone; Type: A3968R

Communication System: Bluetooth; Communication System Band: Bluetooth; Duty Cycle: 57.69%;  
Frequency: 2441 MHz; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.73$  mho/m;  $\epsilon_r = 39.67$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 21.6, Liquid temperature (°C):21.1

DASY Configuration:

- Probe: EX3DV4 – SN:3953; ConvF(7.78, 7.78, 7.78); Calibrated: Sep. 05, 2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0, 31.0$
- Electronics: DAE4 SN1398; Calibrated: May 17, 2023
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**BODY/BACK/Area Scan (6x9x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 0.525 W/kg

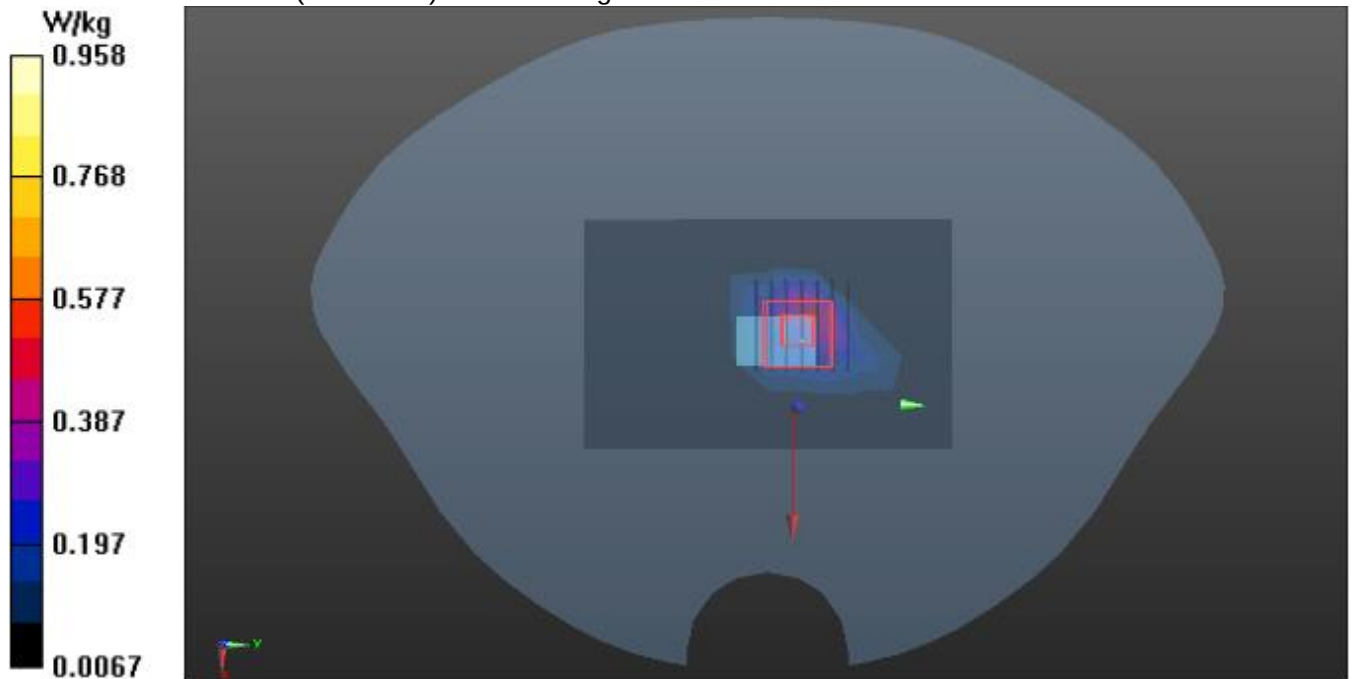
**BODY/BACK/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 13.224 V/m; Power Drift = 0.15 dB

Peak SAR (extrapolated) = 3.97 W/kg

**SAR(1 g) = 0.679 W/kg; SAR(10 g) = 0.201 W/kg**

Maximum value of SAR (measured) = 0.958 W/kg

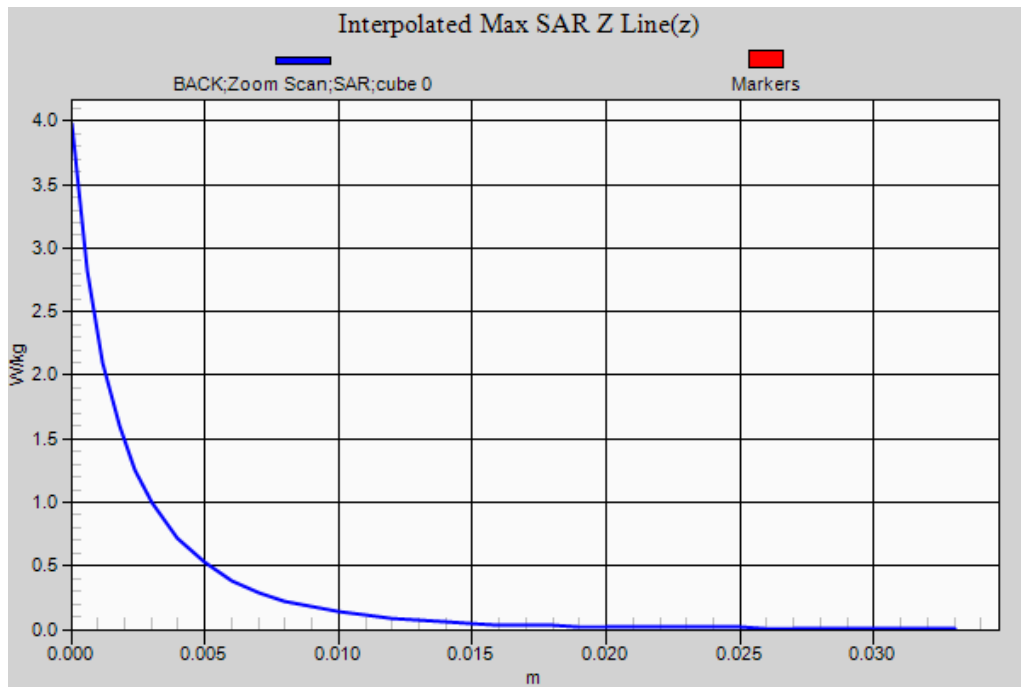


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**Test Laboratory: AGC Lab**  
**BT (BLE) Mid- Back (GFSK\_1M)**  
**DUT: Wireless Headphone; Type: A3968R**

**Date: Apr. 18, 2024**

Communication System: Bluetooth; Communication System Band: Bluetooth; Duty Cycle: 62.30%;  
Frequency: 2440 MHz; Medium parameters used:  $f = 2450$  MHz;  $\sigma = 1.73$  mho/m;  $\epsilon_r = 39.67$ ;  $\rho = 1000$  kg/m<sup>3</sup> ;  
Phantom section: Flat Section  
Ambient temperature (°C): 21.6, Liquid temperature (°C):21.1

DASY Configuration:

- Probe: EX3DV4 – SN:3953; ConvF(7.78, 7.78, 7.78); Calibrated: Sep. 05, 2023;
- Sensor-Surface: 3mm (Mechanical Surface Detection),  $z = 1.0$ , 31.0
- Electronics: DAE4 SN1398; Calibrated: May 17, 2023
- Phantom: SAM (20deg probe tilt) with CRP v5.0; Type: QD000P40CD;
- DASY52 52.8.7(1137); SEMCAD X 14.6.10(7164)

**BODY/BACK-BLE-1M/Area Scan (6x9x1):** Measurement grid:  $dx=15$ mm,  $dy=15$ mm

Maximum value of SAR (measured) = 0.162 W/kg

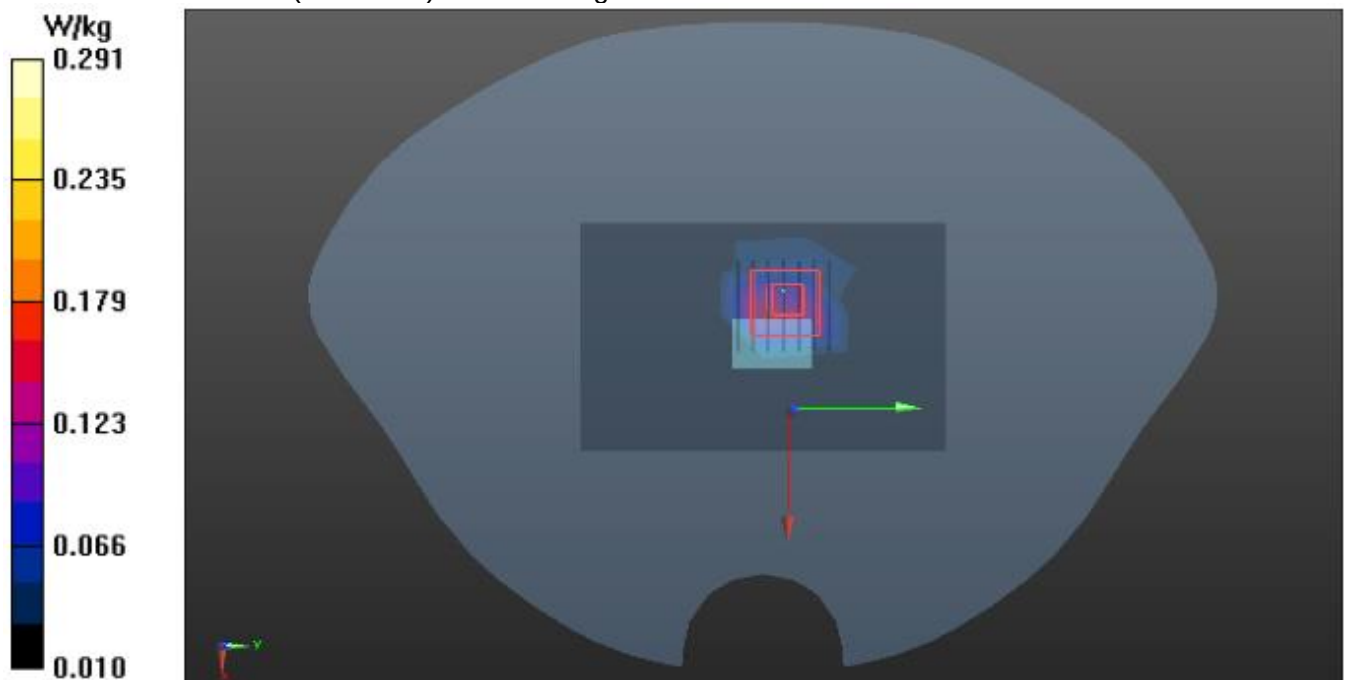
**BODY/BACK-BLE-1M/Zoom Scan (7x7x7)/Cube 0:** Measurement grid:  $dx=5$ mm,  $dy=5$ mm,  $dz=5$ mm

Reference Value = 5.058 V/m; Power Drift = 0.10 dB

Peak SAR (extrapolated) = 0.592 W/kg

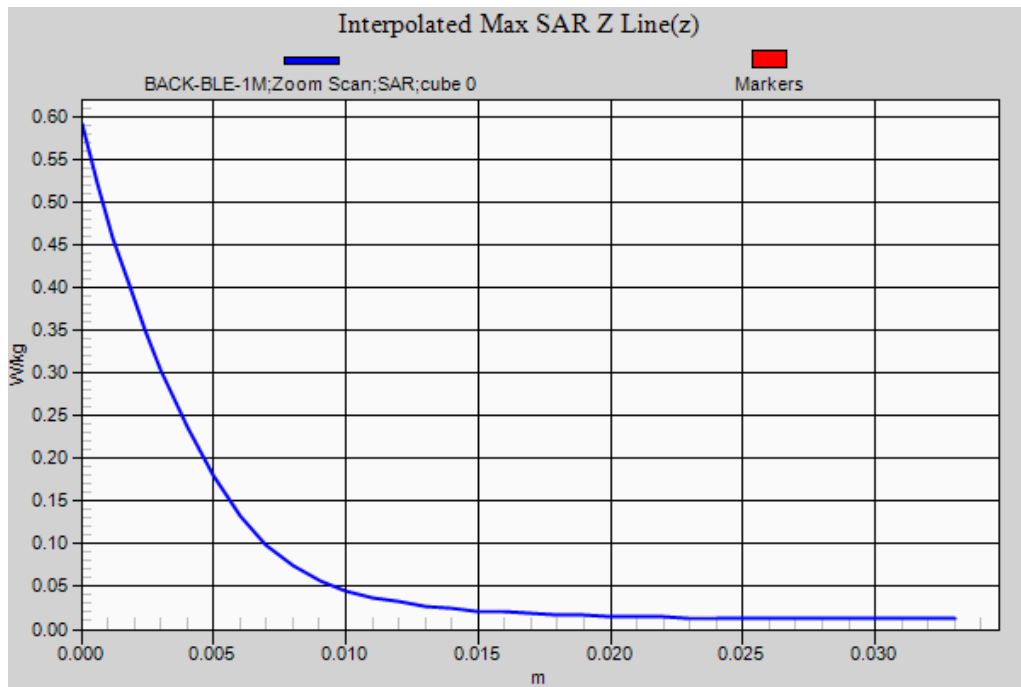
**SAR(1 g) = 0.194 W/kg; SAR(10 g) = 0.067 W/kg**

Maximum value of SAR (measured) = 0.291 W/kg



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## **APPENDIX C. TEST SETUP PHOTOGRAPHS**

Refer to Attached files

## **APPENDIX D. CALIBRATION DATA**

Refer to Attached files.

**-----END OF REPORT-----**

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