



# SAR TEST REPORT

Product Name: Baby Monitor Display

Model Name: TL-BM501D

FCC ID: 2BHDZTL-BM501D

Issued For : Dongguan Tianluo Electronic Technology Co.,Ltd  
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Issued By : Shenzhen LGT Test Service Co., Ltd.  
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Report Number: LGT24H138HA01

Sample Received Date: Aug. 26, 2024

Date of Test: Aug. 27, 2024

Date of Issue: Sept. 05, 2024

Max. SAR (1g): Body: 0.802 W/kg

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### Revision History

| Rev. | Issue Date     | Contents      |
|------|----------------|---------------|
| 00   | Sept. 05, 2024 | Initial Issue |
|      |                |               |



## TEST REPORT CERTIFICATION

|                    |   |
|--------------------|---|
| <b>Applicant</b>   | Dongguan Tianluo Electronic Technology Co.,Ltd  |
| Address            | 201room,Block 4,Longchang Science Park,No.26,Hantang Street,Dongcheng District,Dongguan,Guangdong,China |
| <b>Manufacture</b> | Dongguan Tianluo Electronic Technology Co.,Ltd  |
| Address            | 201room,Block 4,Longchang Science Park,No.26,Hantang Street,Dongcheng District,Dongguan,Guangdong,China |
| Product Name       | Baby Monitor Display  |
| Trademark          | N/A   |
| Model Name         | TL-BM501D   |
| Sample number      | LGT2408149-2  |

| APPLICABLE STANDARDS   |              |
|--|--------------|
| STANDARD   | TEST RESULTS |
| IEEE Std C95.1-2005<br>FCC 47 CFR Part 2 (2.1093)<br>IEEE 1528: 2013 | PASS         |

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## 1. General Information

Environmental evaluation measurements of specific absorption rate (SAR) distributions in emulated human head and body tissues exposed to radio frequency (RF) radiation from wireless portable devices for compliance with the rules and regulations of the U.S. Federal Communications Commission (FCC).

### 1.1 EUT Description

|   |   |             |
|---|---|-------------|
| Product Name                              | Baby Monitor Display  |             |
| Trademark                                 | N/A   |             |
| Model Name                                | TL-BM501D   |             |
| Series Model                              | N/A   |             |
| Model Difference                          | N/A   |             |
| Device Category                           | Portable  |             |
| Product stage                             | Production unit   |             |
| RF Exposure Environment                   | General Population / Uncontrolled   |             |
| Hardware Version                          | TL-BM01-PU-V1.5   |             |
| Software Version                          | AK37E_JS00_202405230002   |             |
| Frequency Range                           | WLAN 802.11b/g/n20: 2412 MHz ~ 2462 MHz   |             |
| Max. Reported SAR(1g):<br>(Limit:1.6W/kg) | Mode  | Body (W/kg) |
| Test distance:<br>Body:5mm                | 2.4G WLAN   | 0.802       |
| Operating Mode:                           | IEEE 802.11b: DSSS(CCK, DQPSK, DBPSK)<br>IEEE 802.11g/n: OFDM(64-QAM, 16-QAM, QPSK, BPSK) |             |
| Antenna Specification                     | 2.4G WLAN: External antenna   |             |
| Operating Mode                            | Maximum continuous output   |             |
| Hotspot Mode                              | Not Support   |             |
| DTM Mode                                  | Not Support   |             |



## 1.2 Test Environment

Ambient conditions in the SAR laboratory:

| Items            | Required |
|------------------|----------|
| Temperature (°C) | 18-25    |
| Humidity (%RH)   | 30-70    |

## 1.3 Test Factory

|                           |  |
|---------------------------|--|
| Company Name:             | Shenzhen LGT Test Service Co., Ltd.  |
| Address:                  | Room 205, Building 13, Zone B, Zhenxiong Industrial Park, No.177, Renmin West Road, Jinsha, Kengzi Street, Pingshan District, Shenzhen, Guangdong, China |
| Accreditation Certificate | FCC Registration No.: 746540   |
|                           | A2LA Certificate No.: 6727.01  |
|                           | IC Registration No.: CN0136  |



## 2. Test Standards and Limits

| No. | Identity                            | Document Title  |
|-----|-------------------------------------|---|
| 1   | 47 CFR Part 2                       | Frequency Allocations and Radio Treaty Matters; General Rules and Regulations   |
| 2   | IEEE Std C95.1-2005                 | IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz  |
| 3   | IEEE Std. 1528-2013                 | Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques |
| 4   | FCC KDB 447498 D01 v06              | Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies  |
| 5   | FCC KDB 865664 D01 v01r04           | SAR Measurement 100 MHz to 6 GHz  |
| 6   | FCC KDB 865664 D02 v01r02           | RF Exposure Reporting   |
| 7   | FCC KDB 648474 D04 v01r03           | SAR Evaluation Considerations for Wireless Handsets   |
| 8   | FCC KDB 248227 D01 Wi-Fi SAR v02r02 | SAR Considerations for 802.11 Devices   |

### (A). Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body   Partial-Body   Hands, Wrists, Feet and Ankles

0.4                    8.0                    20.0

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

Whole-Body   Partial-Body   Hands, Wrists, Feet and Ankles

0.08                    1.6                    4.0

NOTE: Whole-Body SAR is averaged over the entire body, partial-body SAR is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

#### Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

#### Occupational/Controlled Environments:

Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

**NOTE**  
**GENERAL POPULATION/UNCONTROLLED EXPOSURE**  
**PARTIAL BODY LIMIT**  
**1.6 W/kg**



### 3. SAR Measurement System

#### 3.1 Definition of Specific Absorption Rate (SAR)

SAR is related to the rate at which energy is absorbed per unit mass in an 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 general population/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 a given density ( $\rho$ ). The equation description is as below:

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

SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

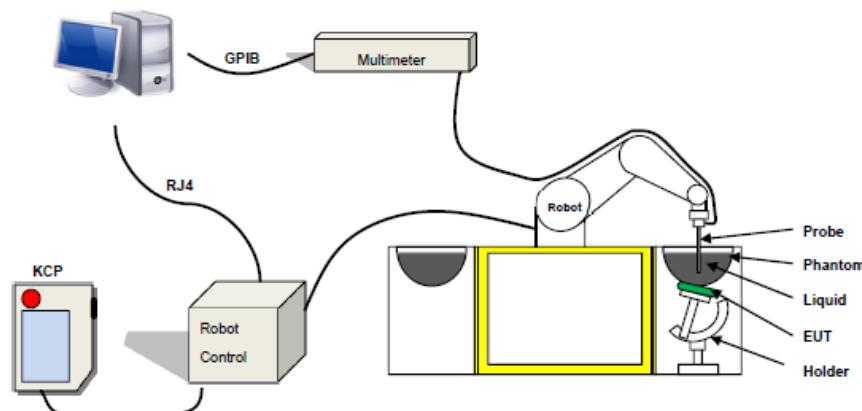
$$\text{SAR} = \frac{\sigma E^2}{\rho}$$

Where:  $\sigma$  is the conductivity of the tissue;

$\rho$  is the mass density of the tissue and  $E$  is the RMS electrical field strength.

#### 3.2 SAR System

MVG SAR System Diagram:



COMOSAR is a system that is able to determine the SAR distribution inside a phantom of human being according to different standards. The COMOSAR system consists of the following items:

- Main computer to control all the system
- 6 axis robot
- Data acquisition system
- Miniature E-field probe
- Phone holder
- Head simulating tissue



The following figure shows the system.



The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The OpenSAR software computes the results to give a SAR value in a 1g or 1g mass.

### 3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 04/22 EPGO364 with following specifications is used

- Probe Length: 330 mm
- Length of Individual Dipoles: 2mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 600 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°



Figure 1-MVG COMOSAR Dosimetric E field Probe



### 3.2.2 Phantom

For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The phantom is a polyurethane shell integrated in a wooden table. The thickness of the phantom amounts to 2mm +/- 0.2mm. It enables the dosimetric evaluation of left and right phone usage and includes an additional flat phantom part for the simplified performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.

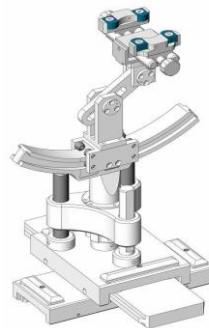


Figure-SN 06/22 SAM 148



Figure-SN 06/22 ELLI 51

### 3.2.3 Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of  $\pm 0.5$  mm would produce a SAR uncertainty of  $\pm 20\%$ . Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.



## 4. Tissue Simulating Liquids

### 4.1 Simulating Liquids Parameter Check

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values

The uncertainty due to the liquid conductivity and permittivity arises from two different sources. The first source of error is the deviation of the liquid conductivity from its target value (max  $\pm 5\%$ ) and the second source of error arises from the measurement procedures used to assess conductivity. The uncertainty shall be assessed using a rectangular probability. For 1 g averaging, the maximum weighting coefficient for SAR is 0.5.

#### IEEE SCC-34/SC-2 RECOMMENDED TISSUE DIELECTRIC PARAMETERS

The head and body tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 have been incorporated in the following table.

| Frequency    | $\epsilon_r$ | $\sigma$ 10g S/m |
|--------------|--------------|------------------|
| 300          | 45.3         | 0.87             |
| 450          | 43.5         | 0.87             |
| 750          | 41.9         | 0.89             |
| 835          | 41.5         | 0.90             |
| 900          | 41.5         | 0.97             |
| 1450         | 40.5         | 1.20             |
| 1800 to 2000 | 40.0         | 1.40             |
| 2100         | 39.8         | 1.49             |
| 2450         | 39.2         | 1.80             |
| 2600         | 39.0         | 1.96             |
| 3000         | 38.5         | 2.40             |
| 3500         | 37.9         | 2.91             |
| 4000         | 37.4         | 3.43             |
| 4500         | 36.8         | 3.94             |
| 5000         | 36.2         | 4.45             |
| 5200         | 36.0         | 4.66             |
| 5400         | 35.8         | 4.86             |
| 5600         | 35.5         | 5.07             |
| 5800         | 35.3         | 5.27             |



## LIQUID MEASUREMENT RESULTS

| Date       | Ambient    |            | Simulating Liquid |            | Parameters   | Target | Measured | Deviation % | Limited % |
|------------|------------|------------|-------------------|------------|--------------|--------|----------|-------------|-----------|
|            | Temp. [°C] | Humidity % | Frequency (MHz)   | Temp. [°C] |              |        |          |             |           |
| 2024-08-27 | 20.9       | 48         | 2450              | 20.6       | Permittivity | 39.20  | 39.60    | 1.02        | ±5        |
|            |            |            |                   |            | Conductivity | 1.80   | 1.85     | 2.78        | ±5        |

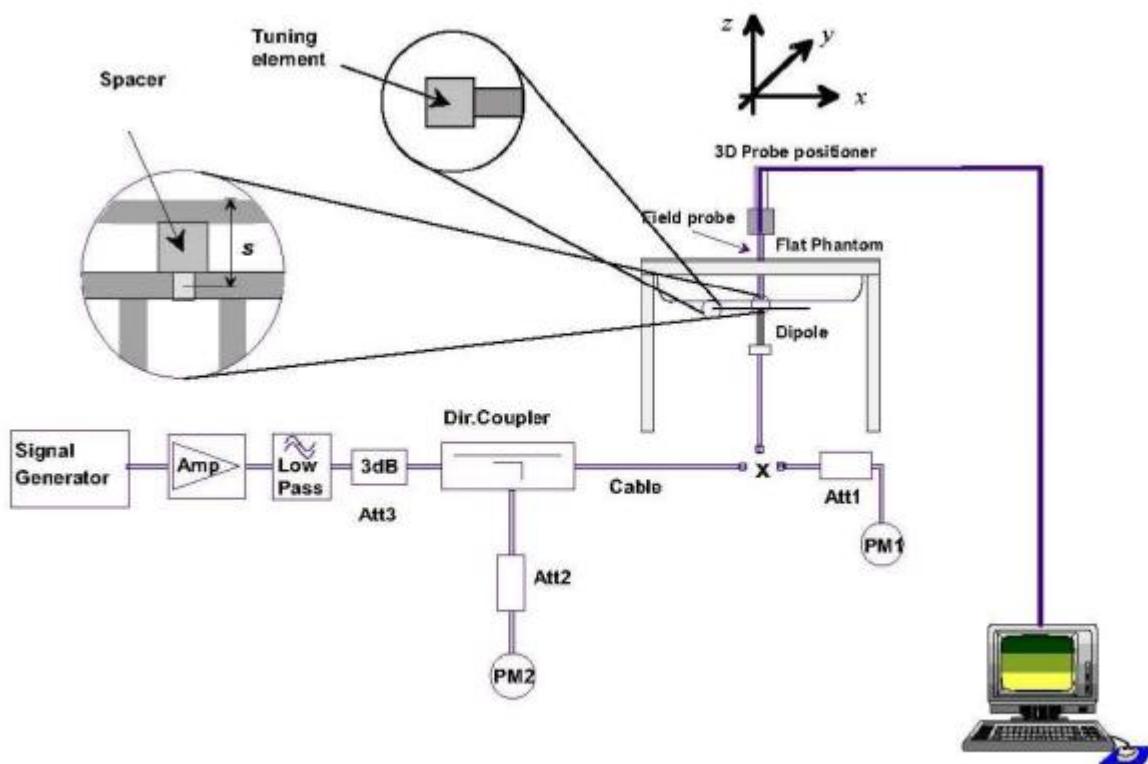


## 5. SAR System Validation

### 5.1 Validation System

Each MVG system is equipped with one or more system validation kits. These units, together with the predefined measurement procedures within the MVG software, enable the user to conduct the system performance 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 validation setup is shown as below.



### 5.2 Validation Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of  $\pm 10\%$ .

| Date       | Freq. | Power | Tested Value | Normalized SAR | Target SAR | Tolerance | Limit |
|------------|-------|-------|--------------|----------------|------------|-----------|-------|
|            | (MHz) | (mW)  | (W/Kg)       | (W/kg)         | 1g(W/kg)   | (%)       | (%)   |
| 2024-08-27 | 2450  | 100   | 5.386        | 53.86          | 54.28      | -0.77     | 10    |

**Note:**

1. The tolerance limit of System validation  $\pm 10\%$ .
2. The dipole input power (forward power) was 100 mW.
3. The results are normalized to 1 W input power.



## 6. SAR Evaluation Procedures

The procedure for assessing the average SAR value consists of the following steps:

The following steps are used for each test position

- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air interface
- Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- Measurement of the SAR distribution with a grid of 8 to 16mm \* 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.
- Around this point, a cube of 30 \* 30 \* 30 mm or 32 \* 32 \* 32 mm is assessed by measuring 5 or 8 \* 5 or 8 \* 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

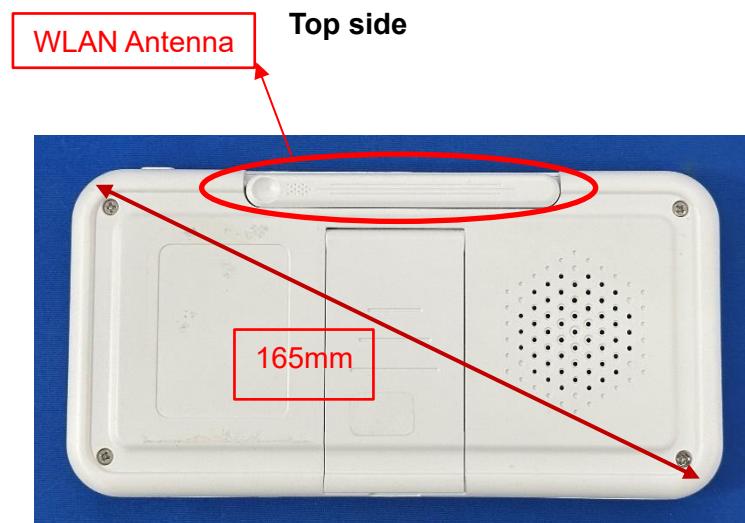
➤ Area Scan& Zoom Scan

First Area Scan is used to locate the approximate location(s) of the local peak SAR value(s). The measurement grid within an Area Scan is defined by the grid extent, grid step size and grid offset. Next, in order to determine the EM field distribution in a three-dimensional spatial extension, Zoom Scan is required. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g. Area scan and zoom scan resolution setting follows KDB 865664 D01 quoted below.

When the 1-g SAR of the highest peak is within 2 dB of the SAR limit, additional zoom scans are required for other peaks within 2 dB of the highest peak that have not been included in any zoom scan to ensure there is no increase in SAR.



## 7. EUT Antenna Location Sketch



**Bottom side  
(Back view)**

| Antenna Separation Distance(mm) |           |            |           |            |          |             |
|---------------------------------|-----------|------------|-----------|------------|----------|-------------|
| ANT                             | Back Side | Front Side | Left Side | Right Side | Top Side | Bottom Side |
| WLAN                            | 5         | 5          | 35        | 35         | 5        | 70          |

Note 1: The antenna information refer the manufacturer provide report, applicable only to the tested sample identified in the report.



## 7.1 SAR test exclusion consider table

The WLAN SAR evaluation of Maximum power (dBm) summing tolerance.

| Exposure Position | Wireless Interface          | 2.4G WLAN |
|-------------------|-----------------------------|-----------|
|                   | Calculated Frequency (MHz)  | 2462      |
|                   | Maximum Turn-up power (dBm) | 17        |
|                   | Maximum rated power(mW)     | 50.12     |
| Back Side         | Separation distance (mm)    | 5         |
|                   | exclusion threshold(mW)     | 9.56      |
|                   | Testing required?           | YES       |
| Front Side        | Separation distance (mm)    | 5         |
|                   | exclusion threshold(mW)     | 9.56      |
|                   | Testing required?           | YES       |
| Left Edge         | Separation distance (mm)    | 35        |
|                   | exclusion threshold(mW)     | 66.92     |
|                   | Testing required?           | NO        |
| Right Edge        | Separation distance (mm)    | 35        |
|                   | exclusion threshold(mW)     | 66.92     |
|                   | Testing required?           | NO        |
| Top Edge          | Separation distance (mm)    | 5         |
|                   | exclusion threshold(mW)     | 9.56      |
|                   | Testing required?           | YES       |
| Bottom Edge       | Separation distance (mm)    | 70        |
|                   | exclusion threshold(mW)     | 295.60    |
|                   | Testing required?           | NO        |



**Note:**

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.
2. per KDB 447498 D01, 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 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm, 25mm is user to determine SAR exclusion threshold
4. per KDB 447498 D01, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distance  $\leq 50$  mm are determined by:  
$$[(\text{max.power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] * [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR}$$

$f(\text{GHz})$  is the RF channel transmit frequency in GHz. Power and distance are rounded to the nearest mW and mm before calculation.

The result is rounded to one decimal place for comparison

For  $< 50$  mm distance, we just calculate mW of the exclusion threshold value(3.0) to do compare

5. per KDB 447498 D01, at 100 MHz to 6GHz and for test separation distances  $> 50$  mm, the SAR test exclusion threshold is determined according to the following
  - a)[threshold at 50mm in step 1]+(test separation distance -50mm)\*(f (MHz)/150)]mW, at 100 MHz to 1500 MHz
  - b) [threshold at 50mm in step1]+( test separation distance -50mm) \*10]mW at  $> 1500$  MHz and  $\leq 6$  GHz
6. Per KDB 248227 D01, choose the highest output power channel to test SAR and determine further SAR exclusion 8. for each frequency band ,testing at higher data rates and higher order modulations is not required when the maximum average output power for each of each of these configurations is less than 1/4db higher than those measured at the lower data rate than 11b mode ,thus the SAR can be excluded.

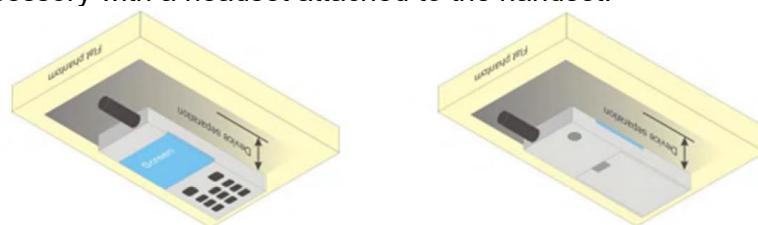


## 8. EUT Test Position

This EUT was tested in Front Side, Back Side and Top Edge.

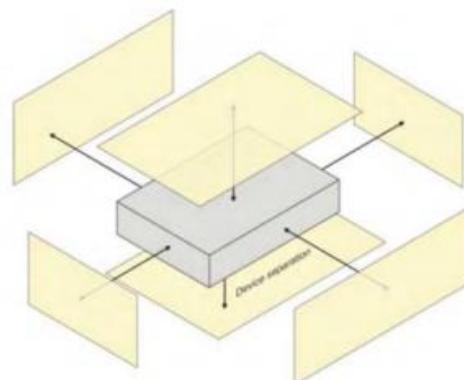
### 8.1 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB Publication 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. When the same wireless transmission configuration is used for testing body-worn accessory and hotspot mode SAR, respectively, in voice and data mode, SAR results for the most conservative *test separation distance* configuration may be used to support both SAR conditions. When the *reported* SAR for a body-worn accessory, measured without a headset connected to the handset, is  $> 1.2 \text{ W/kg}$ , the highest *reported* SAR configuration for that wireless mode and frequency band should be repeated for the body-worn accessory with a headset attached to the handset.



### 8.2 Hotspot mode exposure position condition

For handsets that support hotspot mode operations, with wireless router capabilities and various web browsing function, the relevant hand and body exposure condition are tested according to the hotspot SAR procedures in KDB 941225. A test separation distance of 10 mm is required between the phantom and all surface and edges with a transmitting antenna located within 25 mm from that surface or edge. When form factor of a handset is smaller than 9cm x 5cm, a test separation distance of 5mm (instead of 10mm) is required for testing hotspot mode. When the separate distance required for body-worn accessory testing is larger than or equal to that tested for hotspot mode, in the same wireless mode and for the same surface of the phone, the hotspot mode SAR data may be used to support body-worn accessory SAR compliance for that particular configuration (surface).





## 9. Uncertainty

### 9.1 Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2013. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

| Uncertainty Component   | Tol<br>(+- %) | Prob.<br>Dist. | Div.       | Ci (1g)      | Ci<br>(10g)  | 1g Ui<br>(+-%) | 10g Ui<br>(+-%) | vi       |
|---|---------------|----------------|------------|--------------|--------------|----------------|-----------------|----------|
| <b>Measurement System</b>   |               |                |            |              |              |                |                 |          |
| Probe calibration   | 5.8           | N              | 1          | 1            | 1            | 5.8            | 5.8             | $\infty$ |
| Axial Isotropy  | 3.5           | R              | $\sqrt{3}$ | $\sqrt{0.5}$ | $\sqrt{0.5}$ | 1.43           | 1.43            | $\infty$ |
| Hemispherical Isotropy  | 5.9           | R              | $\sqrt{3}$ | $\sqrt{0.5}$ | $\sqrt{0.5}$ | 2.41           | 2.41            | $\infty$ |
| Boundary effect   | 1             | R              | $\sqrt{3}$ | 1            | 1            | 0.58           | 0.58            | $\infty$ |
| Linearity   | 4.7           | R              | $\sqrt{3}$ | 1            | 1            | 2.71           | 2.71            | $\infty$ |
| System detection limits   | 1             | R              | $\sqrt{3}$ | 1            | 1            | 0.58           | 0.58            | $\infty$ |
| Modulation response   | 3             | R              | $\sqrt{3}$ | 1            | 1            | 1.73           | 1.73            | $\infty$ |
| Readout Electronics   | 0.5           | N              | 1          | 1            | 1            | 0.50           | 0.50            | $\infty$ |
| Response Time   | 0             | R              | $\sqrt{3}$ | 1            | 1            | 0.00           | 0.00            | $\infty$ |
| Integration Time  | 1.4           | R              | $\sqrt{3}$ | 1            | 1            | 1.81           | 1.81            | $\infty$ |
| RF ambient conditions-Noise   | 3             | R              | $\sqrt{3}$ | 1            | 1            | 1.73           | 1.73            | $\infty$ |
| RF ambient conditions-reflections   | 3             | R              | $\sqrt{3}$ | 1            | 1            | 1.73           | 1.73            | $\infty$ |
| Probe positioner mechanical tolerance   | 1.4           | R              | $\sqrt{3}$ | 1            | 1            | 0.81           | 0.81            | $\infty$ |
| Probe positioning with respect to phantom shell                               | 1.4           | R              | $\sqrt{3}$ | 1            | 1            | 0.81           | 0.81            | $\infty$ |
| Extrapolation, Interpolation and Integration Algorithms for Max, SAR          | 2.3           | R              | $\sqrt{3}$ | 1            | 1            | 1.33           | 1.33            | $\infty$ |
| <b>Test sample Related</b>  |               |                |            |              |              |                |                 |          |
| Test sample positioning   | 2.6           | N              | 1          | 1            | 1            | 2.60           | 2.60            | 11       |
| Device holder uncertainty   | 3             | N              | 1          | 1            | 1            | 3.00           | 3.00            | 7        |
| Output Power Variation - SAR Drift Measurement                                | 5             | R              | $\sqrt{3}$ | 1            | 1            | 2.89           | 2.89            | $\infty$ |
| SAR scaling   | 2             | R              | $\sqrt{3}$ | 1            | 1            | 1.15           | 1.15            | $\infty$ |
| <b>Phantom and tissue parameters</b>  |               |                |            |              |              |                |                 |          |
| Phantom uncertainty (shape and thickness uncertainty)                         | 4             | R              | $\sqrt{3}$ | 1            | 1            | 2.31           | 2.31            | $\infty$ |
| Uncertainty in SAR correction for deviations in permittivity and conductivity | 2             | N              | 1          | 1            | 0.84         | 2.00           | 1.68            | $\infty$ |
| Liquid Conductivity - Measurement Uncertainty)                                | 4             | N              | 1          | 0.78         | 0.71         | 3.12           | 2.84            | 5        |
| Liquid Permittivity - Measurement Uncertainty                                 | 5             | N              | 1          | 0.23         | 0.26         | 1.15           | 1.30            | 5        |
| Liquid Conductivity (Temperature Uncertainty)                                 | 2.5           | R              | $\sqrt{3}$ | 0.78         | 0.71         | 1.13           | 1.02            | $\infty$ |
| Liquid Permittivity (Temperature Uncertainty)                                 | 2.5           | R              | $\sqrt{3}$ | 0.23         | 0.26         | 0.33           | 0.38            | $\infty$ |
| <b>Combined Standard Uncertainty</b>  |               | RSS            |            |              |              | 10.47          | 10.34           |          |
| <b>Expanded Uncertainty (95% Confidence interval)</b>                         |               | K              |            |              |              | 20.95          | 20.69           |          |



## 9.2 System validation Uncertainty

| Uncertainty Component   | Tol<br>(+- %) | Prob.<br>Dist. | Div.       | Ci (1g) | Ci<br>(10g) | 1g Ui<br>(+-%) | 10g Ui<br>(+-%) | vi       |
|---|---------------|----------------|------------|---------|-------------|----------------|-----------------|----------|
| <b>Measurement System</b>   |               |                |            |         |             |                |                 |          |
| Probe calibration   | 5.8           | N              | 1          | 1       | 1           | 5.8            | 5.8             | $\infty$ |
| Axial Isotropy  | 3.5           | R              | $\sqrt{3}$ | 1       | 1           | 2.02           | 2.02            | $\infty$ |
| Hemispherical Isotropy  | 5.9           | R              | $\sqrt{3}$ | 0       | 0           | 0.00           | 0.00            | $\infty$ |
| Boundary effect   | 1             | R              | $\sqrt{3}$ | 1       | 1           | 0.58           | 0.58            | $\infty$ |
| Linearity   | 4.7           | R              | $\sqrt{3}$ | 1       | 1           | 0.71           | 0.71            | $\infty$ |
| System detection limits   | 1             | R              | $\sqrt{3}$ | 1       | 1           | 0.58           | 0.58            | $\infty$ |
| Modulation response   | 0             | N              | $\sqrt{3}$ | 0       | 0           | 0.00           | 0.00            | $\infty$ |
| Readout Electronics   | 0.5           | N              | 1          | 1       | 1           | 0.50           | 0.50            | $\infty$ |
| Response Time   | 0             | R              | $\sqrt{3}$ | 0       | 0           | 0.00           | 0.00            | $\infty$ |
| Integration Time  | 1.4           | R              | $\sqrt{3}$ | 0       | 0           | 0.00           | 0.00            | $\infty$ |
| RF ambient conditions-Noise   | 3             | R              | $\sqrt{3}$ | 1       | 1           | 1.73           | 1.73            | $\infty$ |
| RF ambient conditions-reflections   | 3             | R              | $\sqrt{3}$ | 1       | 1           | 1.73           | 1.73            | $\infty$ |
| Probe positioner mechanical tolerance   | 1.4           | R              | $\sqrt{3}$ | 1       | 1           | 0.81           | 0.81            | $\infty$ |
| Probe positioning with respect to phantom shell                               | 1.4           | R              | $\sqrt{3}$ | 1       | 1           | 0.81           | 0.81            | $\infty$ |
| Extrapolation, Interpolation and Integration Algorithms for Max, SAR          | 2.3           | R              | $\sqrt{3}$ | 1       | 1           | 1.33           | 1.33            | $\infty$ |
| <b>Dipole</b>   |               |                |            |         |             |                |                 |          |
| Deviation of Experimental Source from Numerical Source                        | 5             | N              | 1          | 1       | 1           | 5.00           | 5.00            | $\infty$ |
| Input Power and SAR Drift Measurement   | 0.5           | R              | $\sqrt{3}$ | 1       | 1           | 0.29           | 0.29            | $\infty$ |
| Dipole Axis to Liquid Distance  | 2             | R              | $\sqrt{3}$ | 1       | 1           | 1.15           | 1.15            | $\infty$ |
| <b>Phantom and Tissue Parameters</b>  |               |                |            |         |             |                |                 |          |
| Phantom uncertainty (shape and thickness uncertainty)                         | 4             | R              | $\sqrt{3}$ | 1       | 1           | 2.31           | 2.31            | $\infty$ |
| Uncertainty in SAR correction for deviations in permittivity and conductivity | 2             | N              | 1          | 1       | 0.84        | 2.00           | 1.68            | $\infty$ |
| Liquid Conductivity - Measurement Uncertainty)                                | 4             | N              | 1          | 0.78    | 0.71        | 3.12           | 2.84            | 5        |
| Liquid Permittivity - Measurement Uncertainty                                 | 5             | N              | 1          | 0.23    | 0.26        | 1.15           | 1.30            | 5        |
| Liquid Conductivity (Temperature Uncertainty)                                 | 2.5           | R              | $\sqrt{3}$ | 0.78    | 0.71        | 1.13           | 1.02            | $\infty$ |
| Liquid Permittivity (Temperature Uncertainty)                                 | 2.5           | R              | $\sqrt{3}$ | 0.23    | 0.26        | 0.33           | 0.38            | $\infty$ |
| <b>Combined Standard Uncertainty</b>  |               | RSS            |            |         |             | 10.16          | 10.03           |          |
| <b>Expanded Uncertainty (95% Confidence interval)</b>                         |               | K              |            |         |             | 20.32          | 20.06           |          |



## 10. Conducted Power Measurement

### 10.1 Test Result

2.4G WLAN

| 2.4GWIFI      |                |                 |                    |                   |
|---------------|----------------|-----------------|--------------------|-------------------|
| Mode          | Channel Number | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| 802.11b       | 1              | 2412            | 16.49              | 44.57             |
|               | 6              | 2437            | 16.43              | 43.95             |
|               | 11             | 2462            | 16.73              | 47.10             |
| 802.11g       | 1              | 2412            | 15.01              | 31.70             |
|               | 6              | 2437            | 14.61              | 28.91             |
|               | 11             | 2462            | 15.19              | 33.04             |
| 802.11 n-HT20 | 1              | 2412            | 15.05              | 31.99             |
|               | 6              | 2437            | 14.95              | 31.26             |
|               | 11             | 2462            | 14.98              | 31.48             |



## 11. EUT and Test Setup Photo

### 11.1 EUT Photos

Front Side



Back side





Right Edge



Left Edge





Top Edge



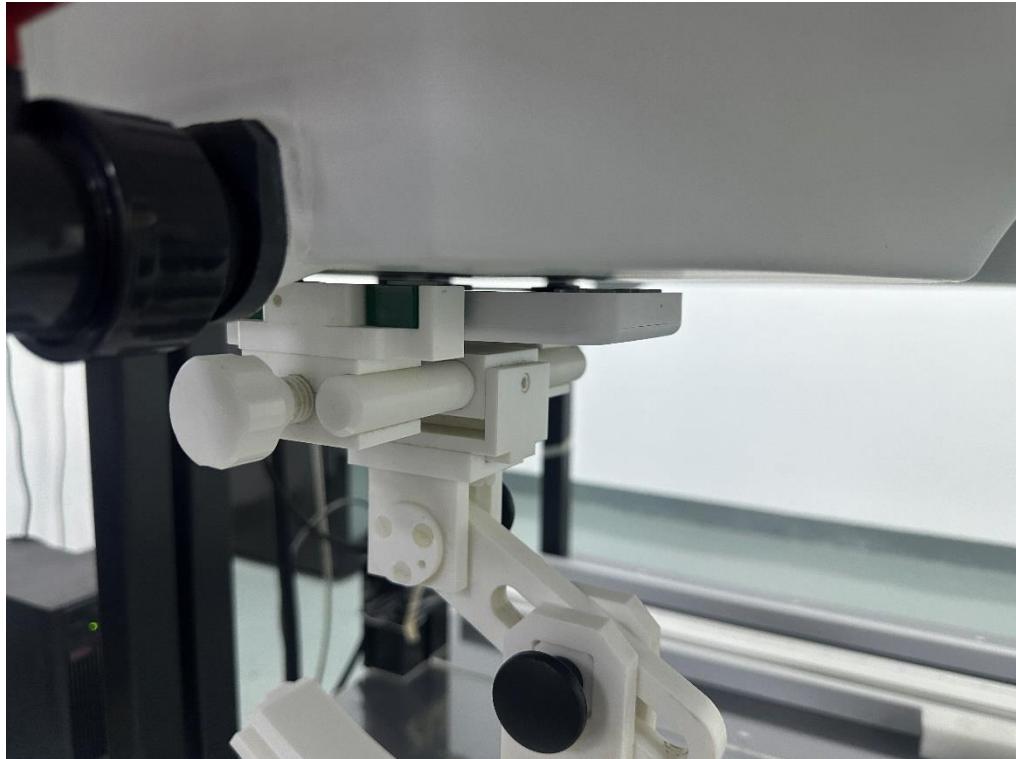
Bottom Edge





## 11.2 Setup Photos

Body Front side ANT 0° (separation distance is 5mm)



Body Back side ANT 0° (separation distance 5mm)





Body Top side ANT 0° (separation distance is 5mm)



Front Side ANT 90° (separation distance 5mm)





Back Side ANT 90° (separation distance 5mm)

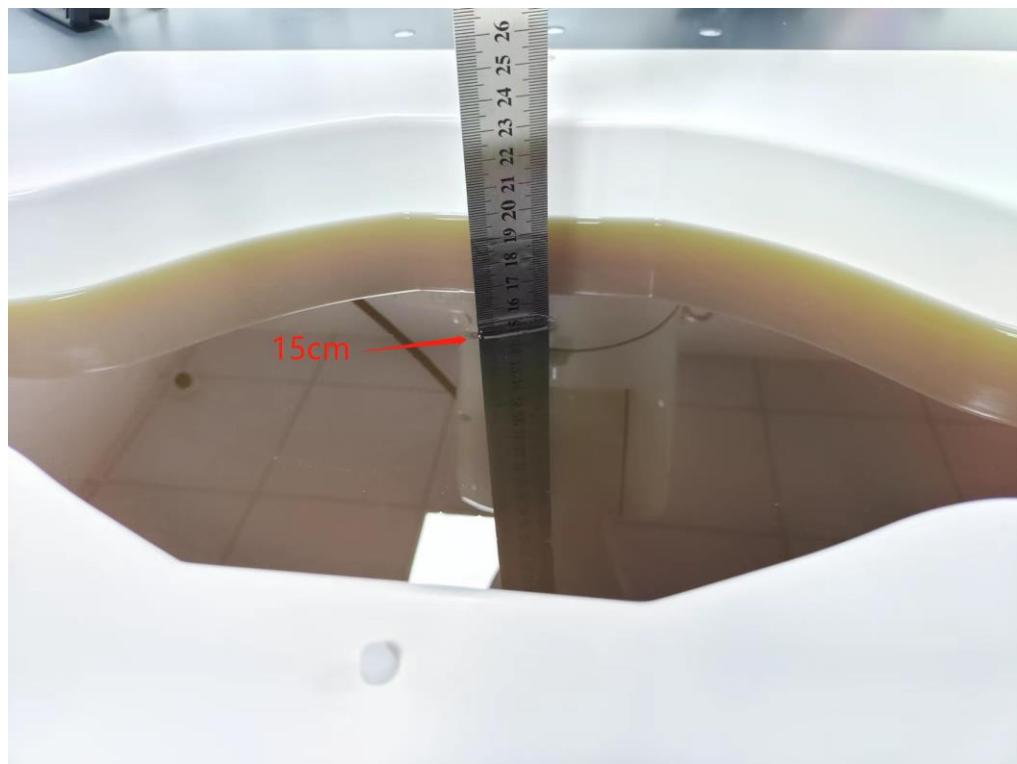


Top Side ANT 90° (separation distance 5mm)





Liquid depth (15 cm)





## 12. SAR Result Summary

### 12.1 Body SAR

| Band           | Model   | Test Position      | Freq. | SAR<br>(1g)<br>(W/kg) | Power<br>Drift<br>(%) | Max.<br>Turn-<br>up<br>Power<br>(dBm) | Meas.<br>Output<br>Power<br>(dBm) | Scaled<br>SAR<br>(W/Kg) | Meas.<br>No. |
|----------------|---------|--------------------|-------|-----------------------|-----------------------|---------------------------------------|-----------------------------------|-------------------------|--------------|
| 2.4GHz<br>WLAN | 802.11b | Front Side ANT 0°  | 2462  | 0.118                 | 1.00                  | 17.00                                 | 16.73                             | 0.126                   | /            |
|                |         | Front Side ANT 90° | 2462  | 0.061                 | -1.28                 | 17.00                                 | 16.73                             | 0.065                   | /            |
|                |         | Back Side ANT 0°   | 2412  | 0.588                 | 3.76                  | 17.00                                 | 16.49                             | 0.661                   | /            |
|                |         | Back Side ANT 0°   | 2437  | 0.656                 | -3.38                 | 17.00                                 | 16.43                             | 0.748                   | /            |
|                |         | Back Side ANT 0°   | 2462  | 0.754                 | -0.17                 | 17.00                                 | 16.73                             | <b>0.802</b>            | <b>1</b>     |
|                |         | Back Side ANT 90°  | 2462  | 0.496                 | 3.09                  | 17.00                                 | 16.73                             | 0.528                   | /            |
|                |         | Top Side ANT 0°    | 2462  | 0.650                 | 3.63                  | 17.00                                 | 16.73                             | 0.692                   | /            |
|                |         | Top Side ANT 90°   | 2462  | 0.237                 | -3.62                 | 17.00                                 | 16.73                             | 0.252                   | /            |

**Note:**

1. The test separation of all above table is 5mm.
2. Per KDB 447498 D01, the reported SAR is the measured SAR value adjusted for maximum tune-up tolerance.
  - a. Tune-up scaling Factor = tune-up limit power (mW) / EUT RF power (mW), where tune-up limit is the maximum rated power among all production units.
  - b. Scaled SAR(W/kg) = Measured SAR(W/kg) \*Tune-up Scaling Factor



## 12.2 Repeated SAR

| Band        | Mode    | Test Position | Ch.  | Result 1g (W/Kg) | Power Drift(%) | Max.Turn-up Power(dBm) | Meas.Output Power(dBm) | Scaled SAR(W/Kg) |
|-------------|---------|---------------|------|------------------|----------------|------------------------|------------------------|------------------|
| 2.4GHz WLAN | 802.11b | Back Side     | 2462 | 0.731            | -2.66          | 17.00                  | 16.73                  | 0.778            |

## 12.3 Repeated SAR measurement

| Band        | Mode    | Test Position | Ch.  | Original Measured SAR 1g(W/kg) | 1 st Repeated SAR 1g | Ratio |
|-------------|---------|---------------|------|--------------------------------|----------------------|-------|
| 2.4GHz WLAN | 802.11b | Back Side     | 2462 | 0.754                          | 0.731                | 1.031 |

Note:

1. Per KDB 865664 D01,for each frequency band ,repeated SAR measurement is required only when the measured SAR is  $\geq 0.8\text{W/Kg}$ .
2. Per KDB 865664 D01,if the ratio of largest to smallest SAR for the original and first repeated measurement is  $\leq 1.2$  and the measured SAR  $< 1.45\text{W/Kg}$ , only one repeated measurement is required.
3. 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  $\geq 1.45\text{W/Kg}$ .
4. The ratio is the difference in percentage between original and repeated measured SAR.



## 13. Equipment List

| Kind of Equipment                 | Manufacturer | Type No. | Serial No.            | Last Calibration | Calibrated Until |
|-----------------------------------|--------------|----------|-----------------------|------------------|------------------|
| 2450MHz Dipole                    | MVG          | DIP2G450 | SN 06/22 DIP2G450-645 | 2022.02.11       | 2025.02.10       |
| E-Field Probe                     | MVG          | EPGO364  | SN 04/22 EPGO364      | 2024.02.07       | 2025.02.06       |
| Liquid Calibration Kit            | MVG          | OCPG 87  | SN 06/22 OCPG87       | 2024.02.07       | 2025.02.06       |
| Antenna                           | MVG          | ANTA 73  | SN 06/22 ANTA 73      | N/A              | N/A              |
| Ellipsoid Phantom                 | MVG          | ELLI 51  | SN 06/22 ELLI 51      | N/A              | N/A              |
| Phantom                           | MVG          | SAM 148  | SN 06/22 SAM148       | N/A              | N/A              |
| Phone holder                      | MVG          | MSH 117  | SN 06/22 MSH 117      | N/A              | N/A              |
| Laptop positioner                 | MVG          | LSH 36   | SN 06/22 LSH 38       | N/A              | N/A              |
| Directional coupler               | SHW          | SHWDCP   | 202203280013          | N/A              | N/A              |
| Network Analyzer                  | ZVL          | R&S      | 116184-HC             | 2024.03.25       | 2025.03.24       |
| Multi Meter                       | DMM6500      | Keithley | 4527252               | 2024.03.15       | 2025.03.14       |
| Signal Generator                  | Keysight     | N5182B   | MY59100717            | 2024.03.09       | 2025.03.08       |
| Wireless Communication Test Set   | R&S          | CMW500   | 137737                | 2024.03.09       | 2025.03.08       |
| Power Sensor                      | R&S          | Z11      | 116184                | 2024.02.23       | 2025.02.22       |
| Electronic Temperature hygrometer | N/A          | ST-W2318 | N/A                   | 2024.03.11       | 2025.03.10       |
| Temperature hygrometer            | N/A          | TP101    | N/A                   | 2024.03.11       | 2025.03.10       |



## Appendix A. System Validation Plots

### System Performance Check Data (2450MHz)

Type: Phone measurement (Complete)

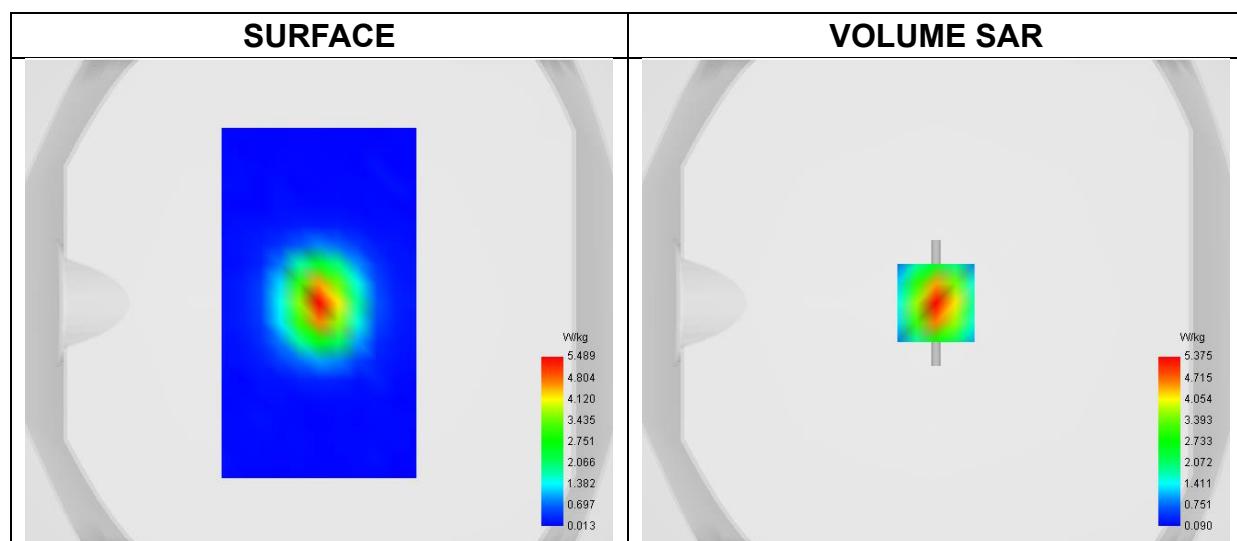
Area scan resolution: dx=8mm, dy=8mm

Zoom scan resolution: dx=8mm, dy=8mm, dz=5mm

Date of measurement: 2024-08-27

### Experimental conditions.

| Phantom               | Validation plane |
|-----------------------|------------------|
| Device Position       | Dipole           |
| Band                  | CW2450           |
| Channels              | Middle           |
| Signal                | CW               |
| Frequency (MHz)       | 2450.000         |
| Relative permittivity | 39.60            |
| Conductivity (S/m)    | 1.85             |
| Probe                 | SN 04/22 EPGO364 |
| ConvF                 | 2.30             |
| Crest factor:         | 1:1              |

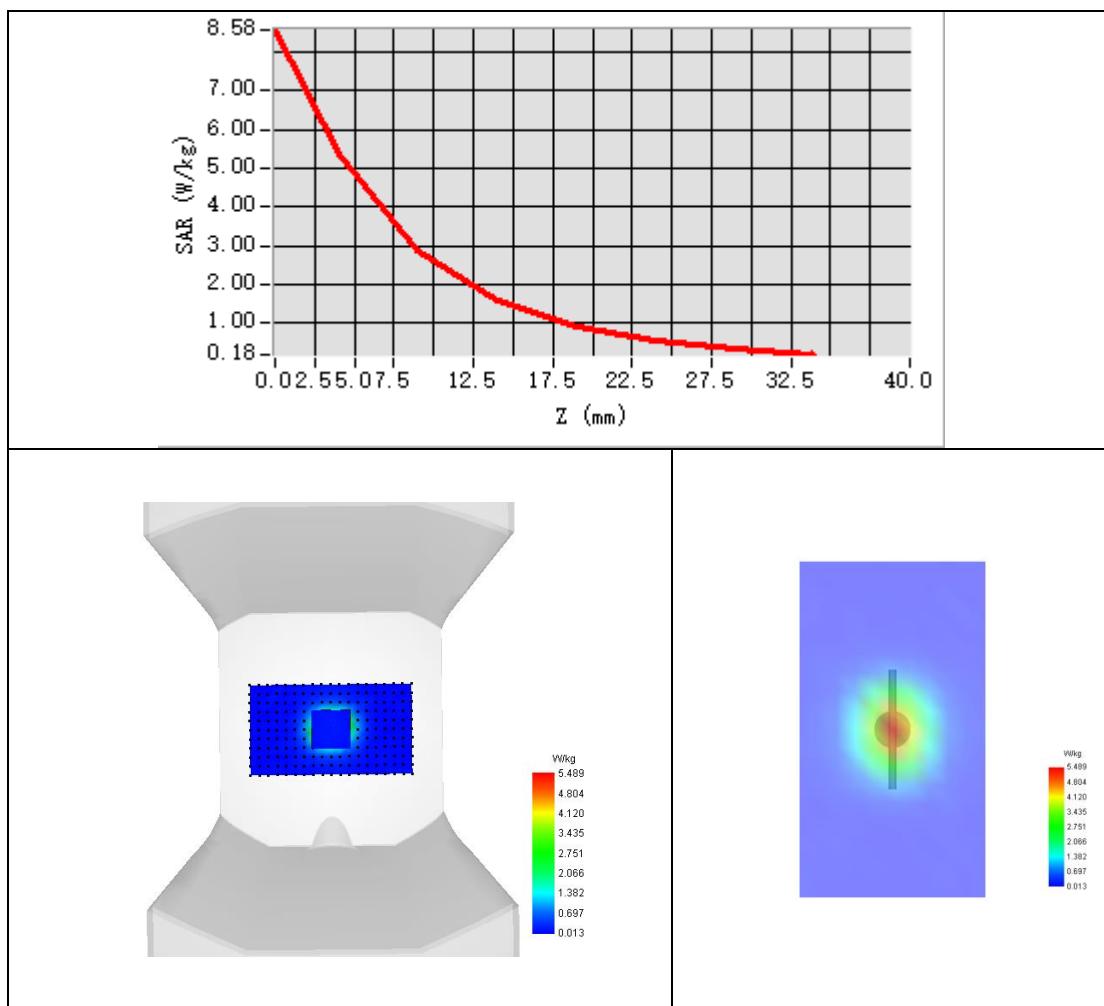


Maximum location: X=0.00, Y=0.00 ; SAR Peak: 8.55 W/kg

|                |       |
|----------------|-------|
| SAR 10g (W/Kg) | 2.335 |
| SAR 1g (W/Kg)  | 5.400 |



### Z Axis Scan



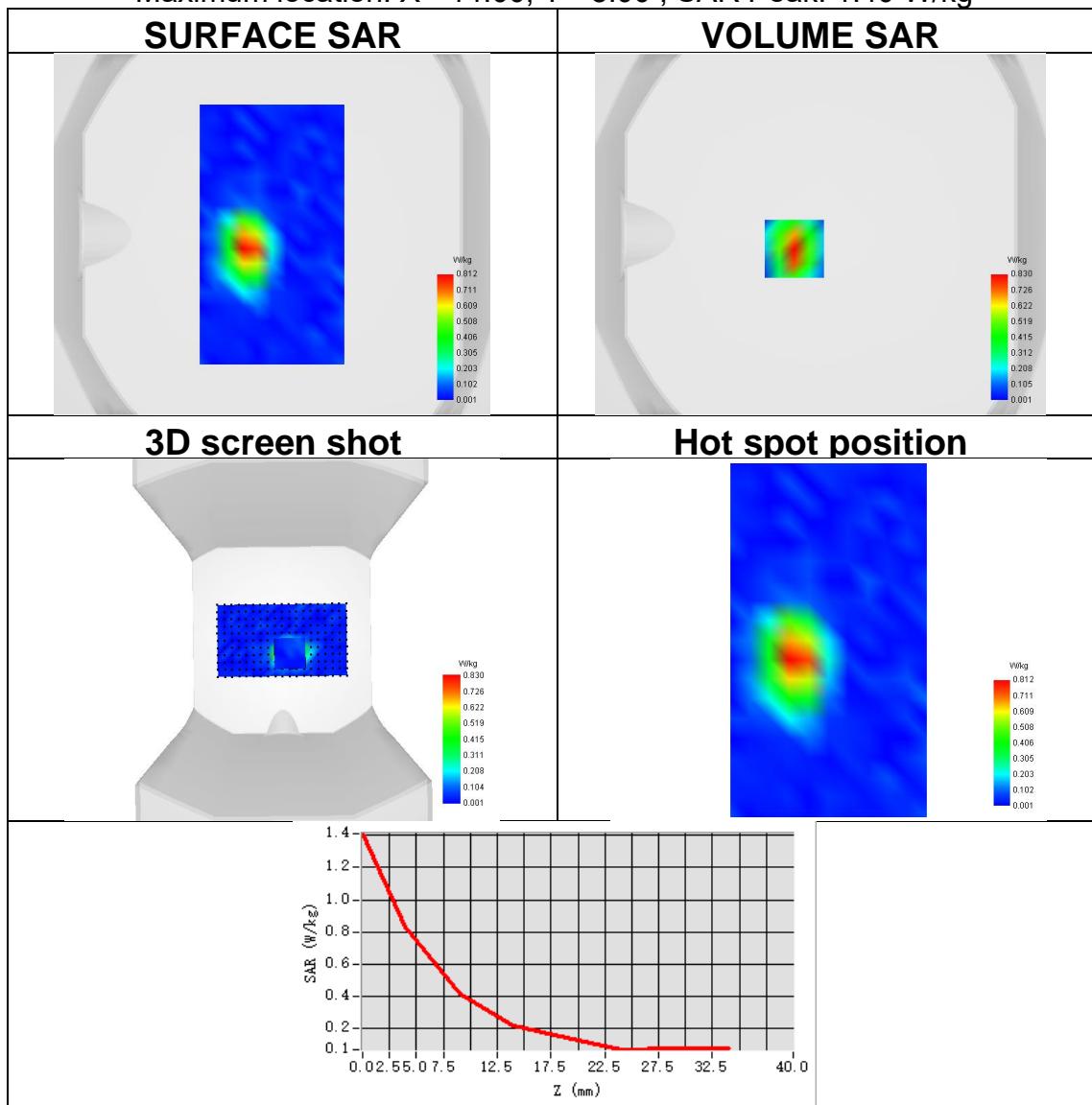


## Appendix B. SAR Test Plots

Plot 1:

|                       |                             |
|-----------------------|-----------------------------|
| Test Date             | 2024-08-27                  |
| Area Scan             | dx=8mm dy=8mm               |
| Zoom Scan             | 5x5x7, dx=8mm dy=8mm dz=5mm |
| Phantom               | Validation plane            |
| Device Position       | Back Side                   |
| Band                  | ISM                         |
| Signal                | IEEE 802.11 b               |
| Frequency             | 2462                        |
| SAR 10g (W/Kg)        | 0.337                       |
| SAR 1g (W/Kg)         | 0.754                       |
| ConvF                 | 2.30                        |
| Relative permittivity | 39.60                       |
| Conductivity (S/m)    | 1.85                        |

Maximum location: X=-14.00, Y=-8.00 ; SAR Peak: 1.40 W/kg





## Appendix C. Probe Calibration and Dipole Calibration Report

Refer the appendix Calibration Report.

\*\*\*\*\*END OF THE REPORT\*\*\*\*\*