# FCC SAR TEST REPORT

Report No.: STS2201037H01

Issued for

RM Acquisition LLC.

8770 West Bryn Mawr Avenue, Chicago, IL 60631

| | |
|---|---|
| **Product Name:** | GPS Device |
| **Brand Name:** | RAND McNALLY |
| **Model Name:** | TND T1050 |
| **Series Model:** | N/A |
| **FCC ID:** | A4C-10016A |
| **Test Standard:** | ANSI/IEEE Std. C95.1 |
| | FCC 47 CFR Part 2 ( 2.1093) |
| | IEEE 1528: 2013 |
| **Max. Report SAR (1g):** | Body: 1.357 W/kg |



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# Test Report Certification

| | |
|---|---|
| **Applicant's name** ..... : | RM Acquisition LLC. |
| Address..... : | 8770 West Bryn Mawr Avenue, Chicago, IL 60631 |
| **Manufacture's Name**..... : | SHEN ZHEN APICAL TECHNOLOGY CO., LTD |
| Address..... : | 9/F,B Building, Tinghua Unis Infoport, Langshan RD, North district, Hi-tech Industrial Park, Nanshan, Shenzhen |

**Product description**

| | |
|---|---|
| Product name..... : | GPS Device |
| Brand name ..... : | RAND McNALLY |
| Model name ..... : | TND T1050 |
| Series Model..... : | N/A |
| **Standards** ..... : | ANSI/IEEE Std. C95.1-1992<br>FCC 47 CFR Part 2 ( 2.1093)<br>IEEE 1528: 2013 |

The device was tested by Shenzhen STS Test Services Co., Ltd. in accordance with the measurement methods and procedures specified in KDB 865664 The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

**Date of Test**

| | |
|---|---|
| Date (s) of performance of tests.....: | 12 Jan. 2022 ~ 14 Jan. 2022 |
| Date of Issue .....: | 17 Jan. 2022 |
| Test Result .....: | **Pass** |

Testing Engineer : Shi fan. long

(Shifan. Long)

Technical Manager : Sean She

(Sean she)

Authorized Signatory : Vita li

(Vita Li)

# Table of Contents

## Revision History

| Rev. | Issue Date | Report No. | Effect Page | Contents |
|---|---|---|---|---|
| 00 | 17 Jan. 2022 | STS2201037H01 | ALL | Initial Issue |
| | | | | |

# 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 | GPS Device | | |
| Brand Name | RAND McNALLY | | |
| Model Name | TND T1050 | | |
| Series Model | N/A | | |
| Model Difference | N/A | | |
| Battery | Rated Voltage: 3.7V<br>Charge Limit Voltage: 4.2V<br>Capacity: 8000mAh | | |
| Device Category | Portable | | |
| Product stage | Production unit | | |
| RF Exposure Environment | General Population / Uncontrolled | | |
| Hardware Version | TND T1050-MT8176-MAIN-01B | | |
| Software Version | O11019. TND 1050 -P1-220110-110 | | |
| Frequency Range | WLAN802.11b/g/n(HT20)/n(HT40): 2412~2462MHz<br>2.4G WLAN 802.11b/g/n20/n40: 2412 to 2462 MHz<br>5.2G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5150 to 5250 MHz<br>5.3G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5250 ~ 5350 MHz<br>5.6G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5470 to 5725 MHz<br>5.8G WLAN 802.11a/n20/n40/ac20/ac40/ac80: 5725 to 5875 MHz<br>Bluetooth: 2402 to 2480 MHz | | |
| Max. Reported SAR(1g): (Limit:1.6W/kg) | Band | Mode | Body worn and hotspot (W/kg) |
| | DTS | 2.4GHz WLAN | 0.786 |
| | NII | 5.2GHz WLAN | 1.080 |
| | NII | 5.3GHz WLAN | 1.291 |
| | NII | 5.6GHz WLAN | 0.913 |
| | NII | 5.8GHz WLAN | 1.357 |
| FCC Equipment Class | Part 15 Spread Spectrum Transmitter (DSS)<br>Unlicensed National Information Infrastructure TX (NII)<br>Digital Transmission System (DTS) | | |
| Operating Mode | WLAN: 802.11 a/b/g/n20/n40/ac20/ ac80<br>Bluetooth: GFSK | | |
| Antenna Specification | PIFA Antenna | | |
| Hotspot Mode | Support | | |
| DTM Mode | Not Support | | |

Note:
1. Estimated exemption for Bluetooth.
2. The EUT battery must be fully charged and checked periodically during the test to ascertain uniform power
3. The Bluetooth and WLAN can't simultaneous transmission at the same time.

## 1.2 Test Environment

Ambient conditions in the SAR laboratory:

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

## 1.3 Test Factory

ShenZhen STS Test Services Co.,Ltd.

A 1/F, Building B, Zhuoke Science Park, No.190 Chongqing Road, HepingShequ, Fuyong Sub-District, Bao'an District, Shenzhen, Guang Dong, China

FCC test Firm Registration No.: 625569

IC Registration No.: 12108A

A2LA Certificate No.: 4338.01

## 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 | ANSI/IEEE Std. C95.1-1992 | 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 941225 D06 v02r01 | Hotspot Mode SAR |
| 8 | FCC KDB 648474 D04 v01r03 | SAR Evaluation Considerations for Wireless Handsets |
| 9 | 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 (ρ). The equation description is as below:

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

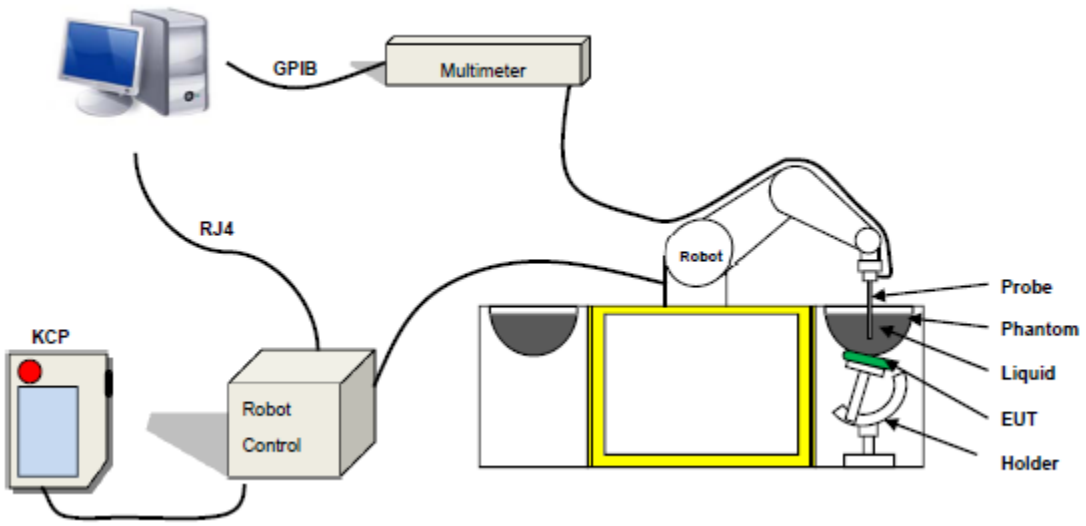
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ 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 Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

3.2.1 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 07/21 EPGO352 with following specifications is used

- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- 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: 150 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

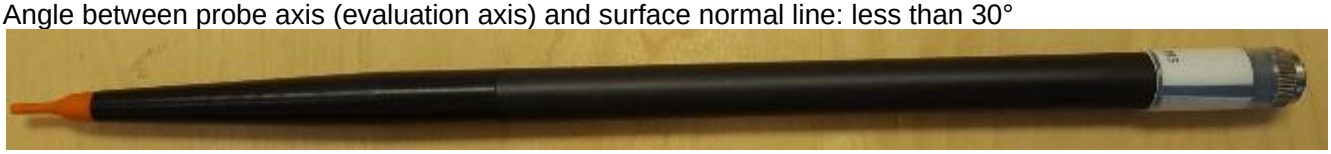


Figure 1-MVG COMOSAR Dosimetric E field Dipole

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.

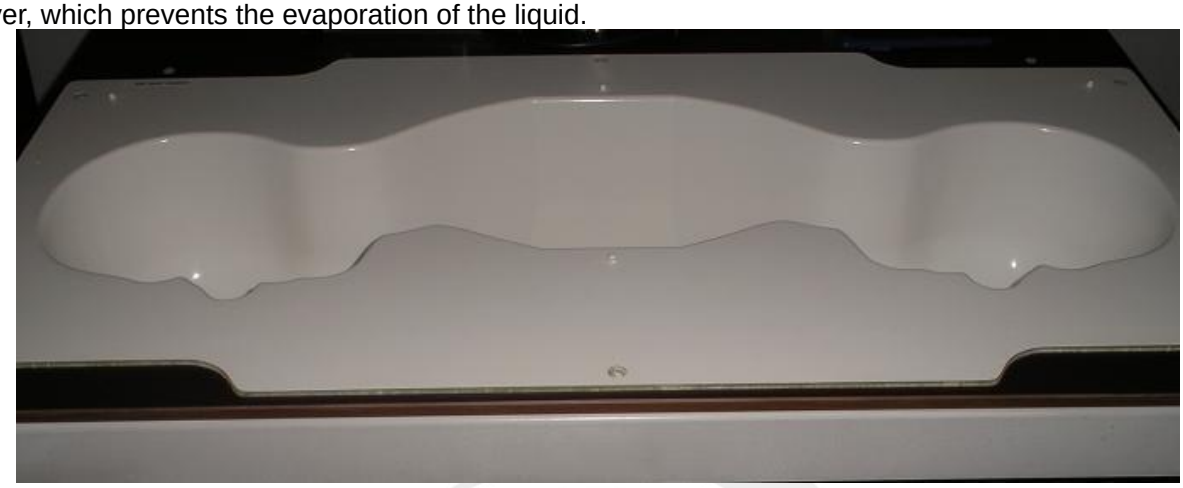
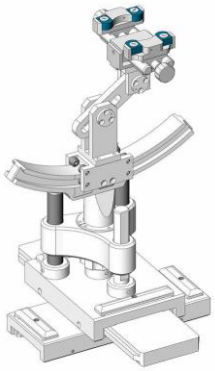


Figure-SN 32/14 SAM115

Figure-SN 32/14 SAM116

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 ± 0.5 mm would produce a SAR uncertainty of ± 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 head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 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 P1528 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 P1528.

Head Tissue

| Frequency (MHz) | cellulose | DGBE | HEC | NaCl | Preventol | Sugar | X100 | Water | Conductivity | Permittivity |
|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | σ | εr |
| 750 | 0.2 | / | / | 1.4 | 0.2 | 57.0 | / | 41.1 | 0.89 | 41.9 |
| 835 | 0.2 | / | / | 1.4 | 0.2 | 57.9 | / | 40.3 | 0.90 | 41.5 |
| 900 | 0.2 | / | / | 1.4 | 0.2 | 57.9 | / | 40.3 | 0.97 | 41.5 |
| 1800 | / | 44.5 | / | 0.3 | / | / | 30.45 | 55.2 | 1.4 | 40.0 |
| 1900 | / | 44.5 | / | 0.3 | / | / | 30.45 | 55.2 | 1.4 | 40.0 |
| 2000 | / | 44.5 | / | 0.3 | / | / | / | 55.2 | 1.4 | 40.0 |
| 2450 | / | 44.9 | / | 0.1 | / | / | / | 55.0 | 1.80 | 39.2 |
| 2600 | / | 45.0 | / | 0.1 | / | / | / | 54.9 | 1.96 | 39.0 |

Body Tissue

| Frequency (MHz) | cellulose | DGBE | HEC | NaCl | Preventol | Sugar | X100 | Water | Conductivity | Permittivity |
|---|---|---|---|---|---|---|---|---|---|---|
| | % | % | % | % | % | % | % | % | σ | εr |
| 750 | 0.2 | / | / | 0.9 | 0.1 | 47.2 | / | 51.7 | 0.96 | 55.5 |
| 835 | 0.2 | / | / | 0.9 | 0.1 | 48.2 | / | 50.8 | 0.97 | 55.2 |
| 900 | 0.2 | / | / | 0.9 | 0.1 | 48.2 | / | 50.8 | 1.05 | 55.0 |
| 1800 | / | 29.4 | / | 0.4 | / | / | 30.45 | 70.2 | 1.52 | 53.3 |
| 1900 | / | 29.4 | / | 0.4 | / | / | 30.45 | 70.2 | 1.52 | 53.3 |
| 2000 | / | 29.4 | / | 0.4 | / | / | / | 70.2 | 1.52 | 53.3 |
| 2450 | / | 31.3 | / | 0.1 | / | / | / | 68.6 | 1.95 | 52.7 |
| 2600 | / | 31.7 | / | 0.1 | / | / | / | 68.2 | 2.16 | 52.3 |

| Tissue dielectric parameters for head and body phantoms | | | | |
|---|---|---|---|---|
| Frequency | εr | | σ S/m | |
| | Head | Body | Head | Body |
| 300 | 45.3 | 58.2 | 0.87 | 0.92 |
| 450 | 43.5 | 56.7 | 0.87 | 0.94 |
| 900 | 41.5 | 55.0 | 0.97 | 1.05 |
| 1450 | 40.5 | 54.0 | 1.20 | 1.30 |
| 1800 | 40.0 | 53.3 | 1.40 | 1.52 |
| 2450 | 39.2 | 52.7 | 1.80 | 1.95 |
| 3000 | 38.5 | 52.0 | 2.40 | 2.73 |
| 5800 | 35.3 | 48.2 | 5.27 | 6.00 |

## LIQUID MEASUREMENT RESULTS

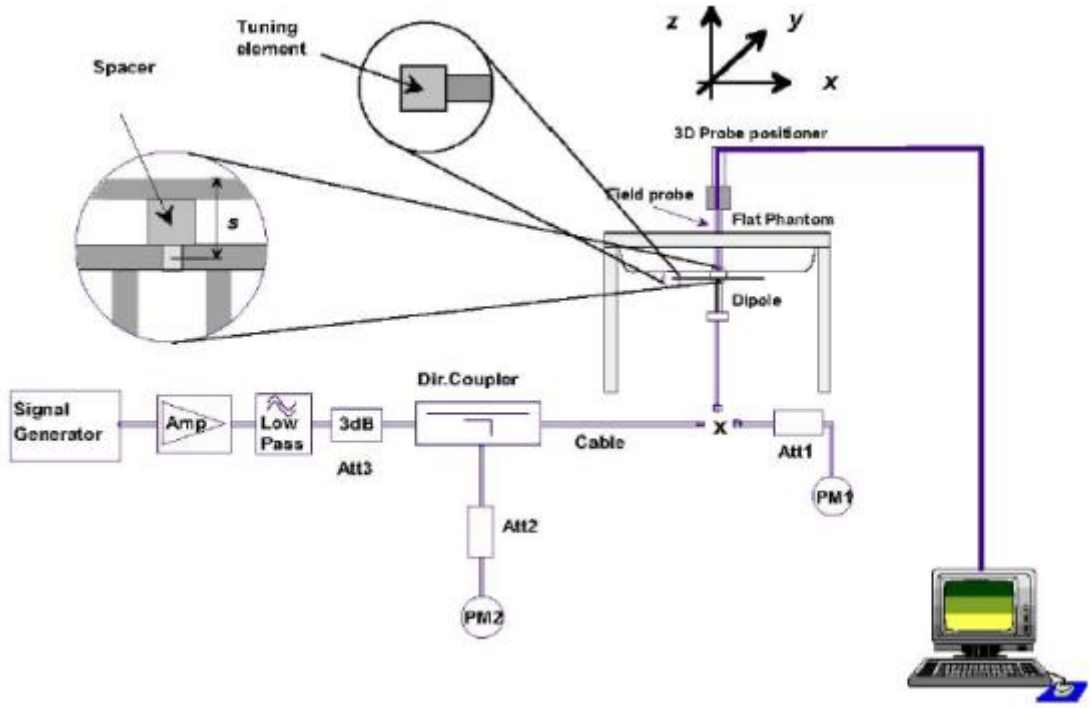
| Date | Ambient | | Simulating Liquid | | Parameters | Target | Measured | Deviation % | Limited % |
|---|---|---|---|---|---|---|---|---|---|
| | Temp. [°C] | Humidity % | Frequency | Temp. [°C] | | | | | |
| 2022-01-12 | 20.8 | 49 | 2450 MHz | 20.6 | Permittivity | 39.20 | 38.81 | -0.99 | ±5 |
| | | | | | Conductivity | 1.80 | 1.82 | 1.27 | ±5 |
| 2022-01-12 | 22.7 | 42 | 2472 MHz | 22.4 | Permittivity | 39.17 | 39.54 | 0.95 | ±5 |
| | | | | | Conductivity | 1.82 | 1.80 | -1.05 | ±5 |
| 2022-01-12 | 20.2 | 44 | 5180 MHz | 19.8 | Permittivity | 36.02 | 35.90 | -0.32 | ±5 |
| | | | | | Conductivity | 4.64 | 4.62 | -0.45 | ±5 |
| 2022-01-12 | 23.3 | 51 | 5200 MHz | 23.0 | Permittivity | 36.00 | 35.77 | -0.65 | ±5 |
| | | | | | Conductivity | 4.66 | 4.77 | 2.39 | ±5 |
| 2022-01-12 | 20.1 | 42 | 5240 MHz | 19.8 | Permittivity | 35.96 | 36.09 | 0.35 | ±5 |
| | | | | | Conductivity | 4.70 | 4.76 | 1.28 | ±5 |
| 2022-01-12 | 22.7 | 43 | 5260 MHz | 22.4 | Permittivity | 35.94 | 36.33 | 1.09 | ±5 |
| | | | | | Conductivity | 4.72 | 4.83 | 2.34 | ±5 |
| 2022-01-12 | 22.5 | 60 | 5280 MHz | 22.2 | Permittivity | 35.92 | 35.26 | -1.84 | ±5 |
| | | | | | Conductivity | 4.74 | 4.73 | -0.13 | ±5 |
| 2022-01-12 | 22.0 | 41 | 5300 MHz | 21.8 | Permittivity | 35.90 | 37.20 | 3.61 | ±5 |
| | | | | | Conductivity | 4.76 | 4.87 | 2.28 | ±5 |
| 2022-01-12 | 20.6 | 58 | 5320 MHz | 20.3 | Permittivity | 35.88 | 36.18 | 0.84 | ±5 |
| | | | | | Conductivity | 4.78 | 4.62 | -3.25 | ±5 |
| 2022-01-14 | 24.0 | 49 | 5500 MHz | 23.8 | Permittivity | 35.68 | 35.53 | -0.41 | ±5 |
| | | | | | Conductivity | 4.96 | 4.91 | -1.12 | ±5 |
| 2022-01-14 | 21.7 | 60 | 5580 MHz | 21.4 | Permittivity | 35.58 | 36.10 | 1.48 | ±5 |
| | | | | | Conductivity | 5.04 | 5.07 | 0.49 | ±5 |
| 2022-01-14 | 24.0 | 50 | 5600 MHz | 23.7 | Permittivity | 35.50 | 35.02 | -1.36 | ±5 |
| | | | | | Conductivity | 5.07 | 5.28 | 4.20 | ±5 |
| 2022-01-14 | 21.2 | 50 | 5700 MHz | 20.9 | Permittivity | 35.43 | 35.78 | 0.99 | ±5 |
| | | | | | Conductivity | 5.17 | 5.08 | -1.75 | ±5 |
| 2022-01-14 | 22.4 | 41 | 5745 MHz | 22.2 | Permittivity | 35.37 | 36.47 | 3.10 | ±5 |
| | | | | | Conductivity | 5.21 | 5.24 | 0.51 | ±5 |
| 2022-01-14 | 22.0 | 55 | 5785 MHz | 21.7 | Permittivity | 35.32 | 35.06 | -0.74 | ±5 |
| | | | | | Conductivity | 5.25 | 5.23 | -0.38 | ±5 |
| 2022-01-14 | 22.8 | 50 | 5800 MHz | 22.5 | Permittivity | 35.30 | 35.36 | 0.16 | ±5 |
| | | | | | Conductivity | 5.27 | 5.26 | -0.16 | ±5 |
| 2022-01-14 | 20.3 | 52 | 5825 MHz | 20.0 | Permittivity | 35.30 | 35.29 | -0.02 | ±5 |
| | | | | | Conductivity | 5.28 | 5.42 | 2.66 | ±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 10 %.

| Date | Freq. | Power | Tested Value | Normalized SAR | Target SAR | Tolerance | Limit |
|---|---|---|---|---|---|---|---|
| | (MHz) | (mW) | (W/Kg) | (W/kg) | 1g(W/kg) | (%) | (%) |
| 2022/1/12 | 2450 | 100 | 5.230 | 52.30 | 52.40 | -0.19 | 10 |
| 2022/1/12 | 5200 | 100 | 16.109 | 161.09 | 159.00 | 1.31 | 10 |
| 2022/1/12 | 5300 | 100 | 16.854 | 168.54 | 166.40 | 1.29 | 10 |
| 2022/1/14 | 5600 | 100 | 16.678 | 166.78 | 173.80 | -4.04 | 10 |
| 2022/1/14 | 5800 | 100 | 17.821 | 178.21 | 181.20 | -1.65 | 10 |

Note:

1. The tolerance limit of System validation ±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

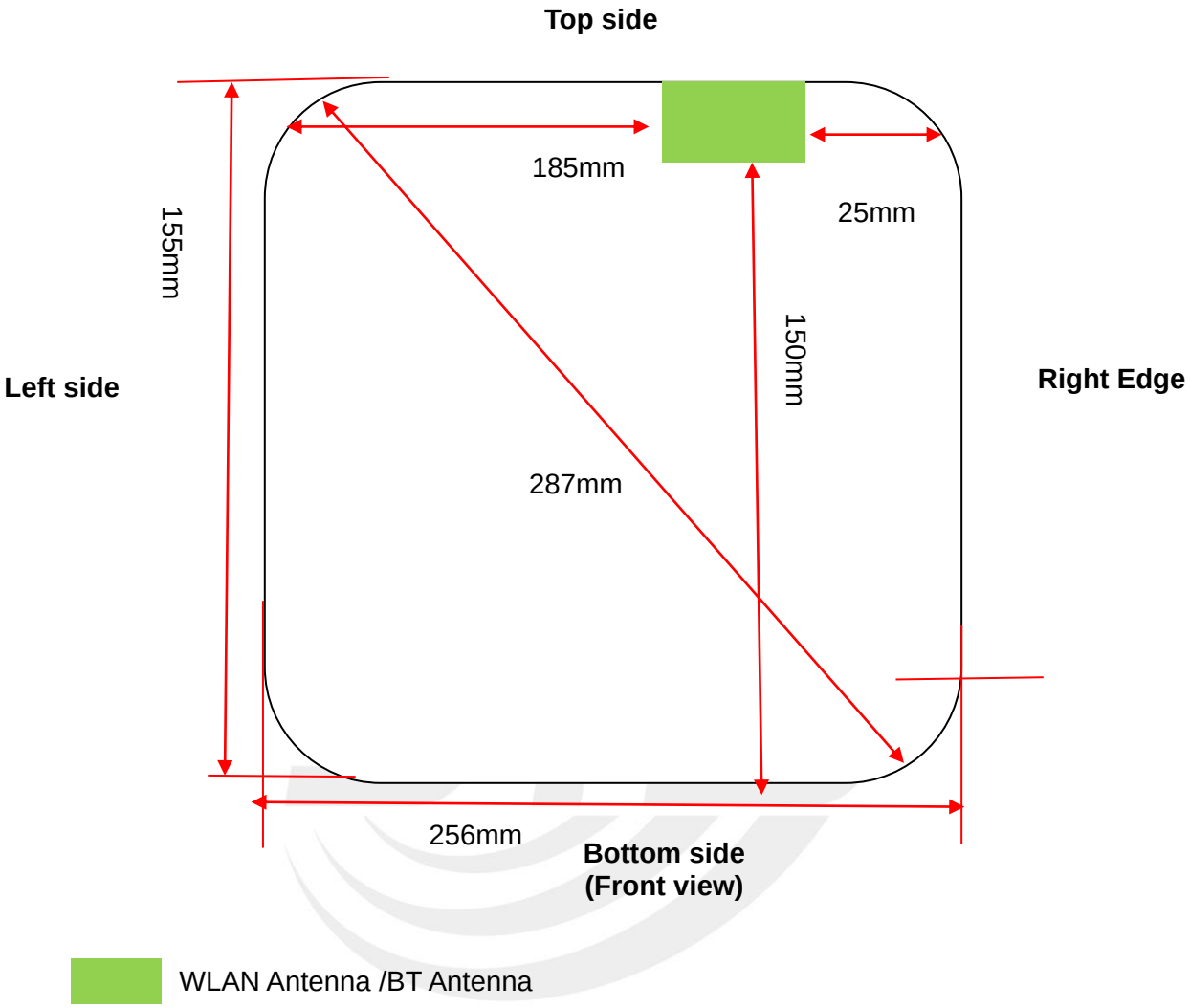
The procedure for assessing the average SAR value consists of the following steps:
The following steps are used for each test position
- Establish a call with the maximum output power with a base station simulator. The connection between the mobile and the base station simulator is established via air 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 to16 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 D01v01r01 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

It is a GPS Device, support BT/WLAN mode.




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/BT SAR evaluation of Maximum power (dBm) summing tolerance.

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Exposure Position | Wireless Interface | BT | 2.4G WLAN | 5.2G WLAN | 5.3G WLAN | 5.6G WLAN | 5.8G WLAN |
| | Calculated Frequency | 2480 | 2472 | 5180 | 5280 | 5500 | 5745 |
| | Maximum Turn-up power (dBm) | 6 | 16.2 | 14.5 | 14.5 | 15 | 15 |
| | Maximum rated power(mW) | 3.98 | 41.69 | 28.18 | 28.18 | 31.62 | 31.62 |
| Back Side | Separation distance (mm) | ≤5 | ≤5 | ≤5 | ≤5 | ≤5 | ≤5 |
| | exclusion threshold(mW) | 9.53 | 9.54 | 6.59 | 6.53 | 6.40 | 6.26 |
| | Testing required? | NO | YES | YES | YES | YES | YES |
| Left Edge | Separation distance (mm) | 185 | 185 | 185 | 185 | 185 | 185 |
| | exclusion threshold(mW) | 1445.25 | 1445.40 | 1415.91 | 1415.28 | 1413.96 | 1412.58 |
| | Testing required? | NO | NO | NO | NO | NO | NO |
| Right Edge | Separation distance (mm) | 25 | 25 | 25 | 25 | 25 | 25 |
| | exclusion threshold(mW) | 47.63 | 47.70 | 32.95 | 32.64 | 31.98 | 31.29 |
| | Testing required? | NO | NO | NO | NO | NO | YES |
| Top Edge | Separation distance (mm) | ≤5 | ≤5 | ≤5 | ≤5 | ≤5 | ≤5 |
| | exclusion threshold(mW) | 9.53 | 9.54 | 6.59 | 6.53 | 6.40 | 6.26 |
| | Testing required? | NO | YES | YES | YES | YES | YES |
| Bottom Edge | Separation distance (mm) | 150 | 150 | 150 | 150 | 150 | 150 |
| | exclusion threshold(mW) | 1095.25 | 1095.40 | 1065.91 | 1065.28 | 1063.96 | 1062.58 |
| | Testing required? | NO | NO | NO | NO | NO | NO |

**Note:**

1. maximum power is the source-based time-average power and represents the maximum RF output power among production units.

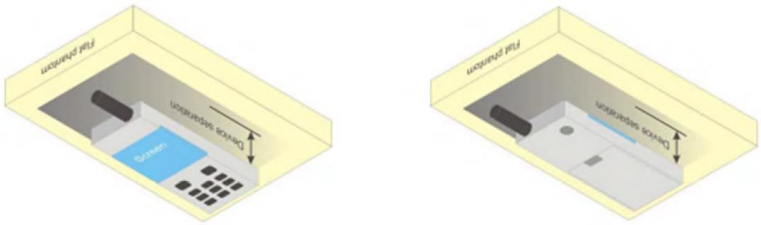
2. per KDB 447498 D01, for larger devices, the test separation distance of adjacent edge configuration is determined by the closest separation between the antenna and the user.
3. per KDB 447498 D01, standalone SAR test exclusion threshold is applied; if the distance of the antenna to the user is <25mm,25mm 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 ≤50mm are determined by:
   [(max.power of channel, including tune-up tolerance, Mw)/( min. test separation distance, mm)]*[ √f(GHZ))≤3.0 for 1-g SAR and≤7.5 for10-g extremity SAR ,f(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 <50mm 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 >50mm, 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＞1500MHz and≤ 6GHz
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.
7. Per KDB 616217 D04, SAR evaluation for the front surface of tablet display screens are generally not necessary.

# 8. EUT Test Position

This EUT was tested in Front Face and Rear Face.

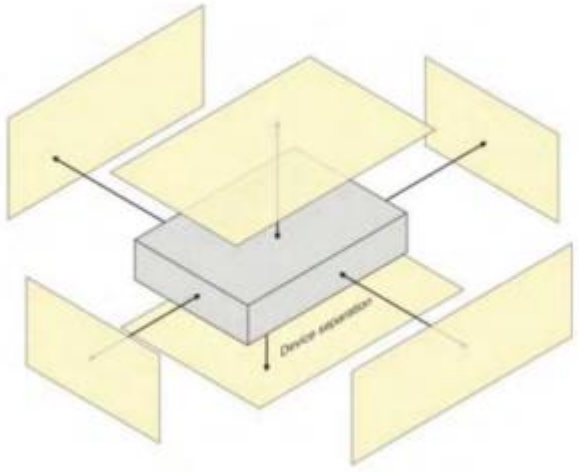
## 8.1 Body-worn Position Conditions

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 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 form 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. 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 (+- %) | Prob. Dist. | Div. | Ci (1g) | Ci (10g) | 1g Ui (+-%) | 10g Ui (+-%) | vi |
|---|---|---|---|---|---|---|---|---|
| **Measurement System** | | | | | | | | |
| Probe calibration | 5.86 | N | 1 | 1 | 1 | 5.86 | 5.86 | ∞ |
| Axial Isotropy | 0.16 | R | $\sqrt{3}$ | √0.5 | √0.5 | 0.07 | 0.07 | ∞ |
| Hemispherical Isotropy | 1.06 | R | $\sqrt{3}$ | √0.5 | √0.5 | 0.43 | 0.43 | ∞ |
| Boundary effect | 1 | R | $\sqrt{3}$ | 1 | 1 | 0.58 | 0.58 | ∞ |
| Linearity | 1.27 | R | $\sqrt{3}$ | 1 | 1 | 0.73 | 0.73 | ∞ |
| System detection limits | 1.23 | R | $\sqrt{3}$ | 1 | 1 | 0.71 | 0.71 | ∞ |
| Modulation response | 3.6 | R | $\sqrt{3}$ | 1 | 1 | 3.60 | 3.60 | ∞ |
| Readout Electronics | 0.28 | N | 1 | 1 | 1 | 0.28 | 0.28 | ∞ |
| Response Time | 0.19 | R | $\sqrt{3}$ | 1 | 1 | 0.11 | 0.11 | ∞ |
| Integration Time | 1.47 | R | $\sqrt{3}$ | 1 | 1 | 0.85 | 0.85 | ∞ |
| RF ambient conditions-Noise | 3.5 | R | $\sqrt{3}$ | 1 | 1 | 2.02 | 2.02 | ∞ |
| RF ambient conditions-reflections | 3.2 | R | $\sqrt{3}$ | 1 | 1 | 1.85 | 1.85 | ∞ |
| Probe positioner mechanical tolerance | 1.4 | R | $\sqrt{3}$ | 1 | 1 | 0.81 | 0.81 | ∞ |
| Probe positioning with respect to phantom shell | 1.4 | R | $\sqrt{3}$ | 1 | 1 | 0.81 | 0.81 | ∞ |
| Post-processing | 2.3 | R | $\sqrt{3}$ | 1 | 1 | 1.33 | 1.33 | ∞ |
| **Test sample Related** | | | | | | | | |
| Test sample positioning | 3.1 | N | 1 | 1 | 1 | 3.10 | 3.10 | ∞ |
| Device holder uncertainty | 3.8 | N | 1 | 1 | 1 | 3.80 | 3.80 | ∞ |
| SAR drift measurement | 4.8 | R | $\sqrt{3}$ | 1 | 1 | 2.77 | 2.77 | ∞ |
| SAR scaling | 2 | R | $\sqrt{3}$ | 1 | 1 | 1.15 | 1.15 | ∞ |
| **Phantom and tissue parameters** | | | | | | | | |
| Phantom uncertainty (shape and thickness uncertainty) | 4 | R | $\sqrt{3}$ | 1 | 1 | 2.31 | 2.31 | ∞ |
| Uncertainty in SAR correction for deviations in permittivity and conductivity | 2 | N | 1 | 1 | 0.84 | 2.00 | 1.68 | ∞ |
| Liquid conductivity (temperature uncertainty) | 2.5 | R | $\sqrt{3}$ | 0.78 | 0.71 | 1.95 | 1.78 | ∞ |
| Liquid conductivity (measured) | 4 | N | 1 | 0.78 | 0.71 | 0.92 | 1.04 | M |
| Liquid permittivity (temperature uncertainty) | 2.5 | R | $\sqrt{3}$ | 0.23 | 0.26 | 1.95 | 1.78 | ∞ |
| Liquid permittivity (measured) | 5 | N | 1 | 0.23 | 0.26 | 1.15 | 1.30 | M |
| Combined Standard Uncertainty | | RSS | | | | 10.60 | 10.51 | |
| Expanded Uncertainty (95% Confidence interval) | | K=2 | | | | 21.21 | 21.03 | |

# 10. Conducted Power Measurement

## 10.1 Test Result

### 2.4G WLAN

| Mode | Channel Number | Frequency (MHz) | Average Power (dBm) | Output Power (mW) |
|---|---|---|---|---|
| 802.11b | 1 | 2412 | 16.11 | 40.83 |
| | 6 | 2437 | 16.16 | 41.30 |
| | 13 | 2472 | 16.18 | 41.50 |
| 802.11g | 1 | 2412 | 12.40 | 17.38 |
| | 7 | 2437 | 13.97 | 24.95 |
| | 11 | 2472 | 14.27 | 26.73 |
| 802.11 n-HT20 | 1 | 2412 | 12.26 | 16.83 |
| | 7 | 2437 | 13.89 | 24.49 |
| | 11 | 2472 | 14.06 | 25.47 |
| 802.11 n-HT40 | 3 | 2422 | 13.39 | 21.83 |
| | 6 | 2437 | 13.27 | 21.23 |
| | 11 | 2462 | 13.08 | 20.32 |

### BT

| BT | | | | |
|---|---|---|---|---|
| Mode | Channel Number | Frequency (MHz) | Average Power (dBm) | Output Power (mW) |
| GFSK(1Mbps) | 0 | 2402 | 4.47 | 2.80 |
| | 39 | 2441 | 5.64 | 3.66 |
| | 78 | 2480 | 5.76 | 3.77 |

**5G WLAN**

| 5.2G WLAN | | | | |
|---|---|---|---|---|
| Mode | Channel Number | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| 802.11a20 | 36 | 5180 | 14.14 | 25.94 |
| | 40 | 5200 | 14.22 | 26.42 |
| | 48 | 5240 | 14.05 | 25.41 |
| 802.11 n-HT20 | 36 | 5180 | 14.06 | 25.47 |
| | 40 | 5200 | 14.21 | 26.36 |
| | 48 | 5240 | 14.42 | 27.67 |
| 802.11 n-HT40 | 38 | 5190 | 14.06 | 25.47 |
| | 46 | 5230 | 14.06 | 25.47 |
| 802.11ac-VHT20 | 36 | 5180 | 12.56 | 18.03 |
| | 40 | 5200 | 12.64 | 18.37 |
| | 48 | 5240 | 12.53 | 17.91 |
| 802.11ac-VHT40 | 38 | 5190 | 11.52 | 14.19 |
| | 46 | 5230 | 10.64 | 11.59 |
| 802.11ac-VHT80 | 42 | 5210 | 9.69 | 9.31 |

| 5.3G WLAN | | | | |
|---|---|---|---|---|
| Mode | Channel Number | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| 802.11a20 | 52 | 5260 | 14.12 | 25.82 |
| | 56 | 5280 | 14.05 | 25.41 |
| | 64 | 5320 | 14.16 | 26.06 |
| 802.11 n-HT20 | 52 | 5260 | 13.42 | 21.98 |
| | 56 | 5280 | 14.05 | 25.41 |
| | 64 | 5320 | 14.13 | 25.88 |
| 802.11 n-HT40 | 54 | 5270 | 13.52 | 22.49 |
| | 62 | 5310 | 14.05 | 25.41 |
| 802.11ac-VHT20 | 52 | 5260 | 14.13 | 25.88 |
| | 56 | 5280 | 14.06 | 25.47 |
| | 64 | 5320 | 13.85 | 24.27 |
| 802.11ac-VHT40 | 54 | 5270 | 12.65 | 18.41 |
| | 62 | 5310 | 11.25 | 13.34 |
| 802.11ac-VHT80 | 58 | 5290 | 10.06 | 10.14 |

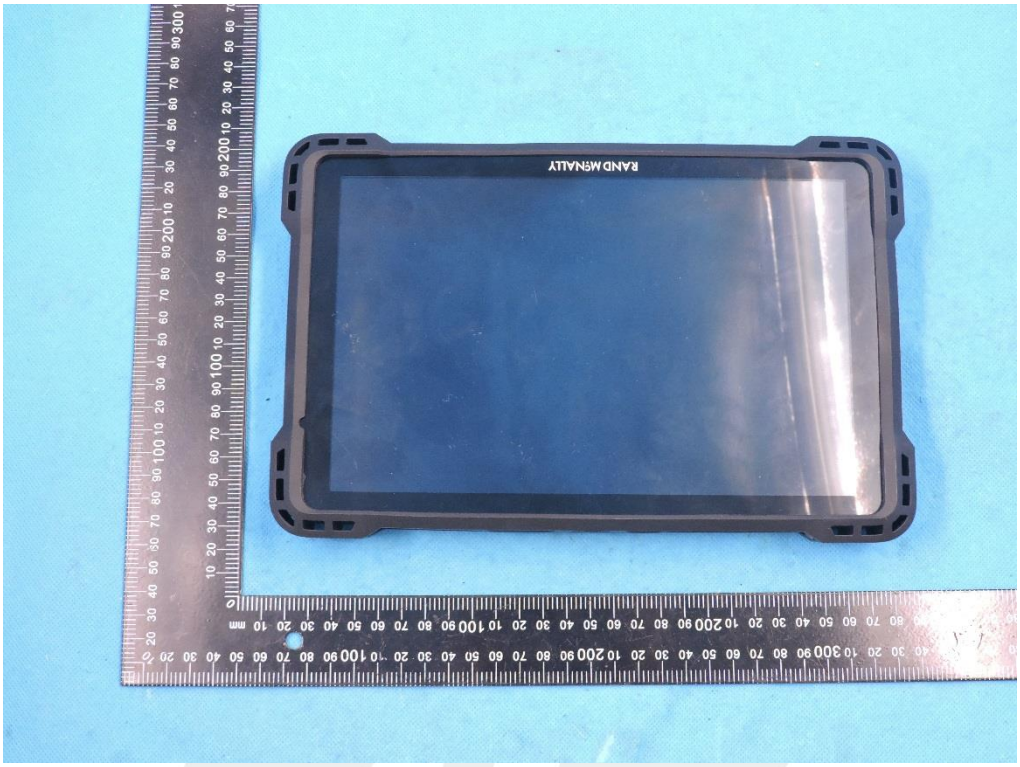
| 5.6G WLAN | | | | |
|---|---|---|---|---|
| Mode | Channel Number | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| 802.11a20 | 100 | 5500 | 14.84 | 30.48 |
| | 120 | 5580 | 14.26 | 26.67 |
| | 140 | 5700 | 14.03 | 25.29 |
| 802.11 n-HT20 | 100 | 5500 | 14.13 | 25.88 |
| | 120 | 5580 | 14.10 | 25.70 |
| | 140 | 5700 | 14.06 | 25.47 |
| 802.11 n-HT40 | 102 | 5510 | 13.52 | 22.49 |
| | 110 | 5550 | 14.03 | 25.29 |
| | 134 | 5670 | 14.15 | 26.00 |
| 802.11ac-VHT20 | 100 | 5500 | 13.56 | 22.70 |
| | 120 | 5580 | 13.34 | 21.58 |
| | 140 | 5700 | 13.62 | 23.01 |
| 802.11ac-VHT40 | 102 | 5510 | 13.52 | 22.49 |
| | 110 | 5550 | 12.89 | 19.45 |
| | 134 | 5670 | 11.86 | 15.35 |
| 802.11ac-VHT80 | 106 | 5530 | 11.87 | 15.38 |
| | 122 | 5610 | 10.52 | 11.27 |

| 5.8G WLAN | | | | |
|---|---|---|---|---|
| Mode | Channel Number | Frequency (MHz) | Output Power (dBm) | Output Power (mW) |
| 802.11a20 | 149 | 5745 | 14.52 | 28.31 |
| | 157 | 5785 | 14.62 | 28.97 |
| | 165 | 5825 | 14.25 | 26.61 |
| 802.11 n-HT20 | 149 | 5745 | 14.13 | 25.88 |
| | 157 | 5785 | 14.25 | 26.61 |
| | 165 | 5825 | 14.05 | 25.41 |
| 802.11 n-HT40 | 151 | 5755 | 13.99 | 25.06 |
| | 159 | 5795 | 13.84 | 24.21 |
| 802.11ac-VHT20 | 149 | 5745 | 12.95 | 19.72 |
| | 157 | 5785 | 13.06 | 20.23 |
| | 165 | 5825 | 12.76 | 18.88 |
| 802.11ac-VHT40 | 151 | 5755 | 11.98 | 15.78 |
| | 159 | 5795 | 11.56 | 14.32 |
| 802.11ac-VHT80 | 155 | 5775 | 10.49 | 11.19 |

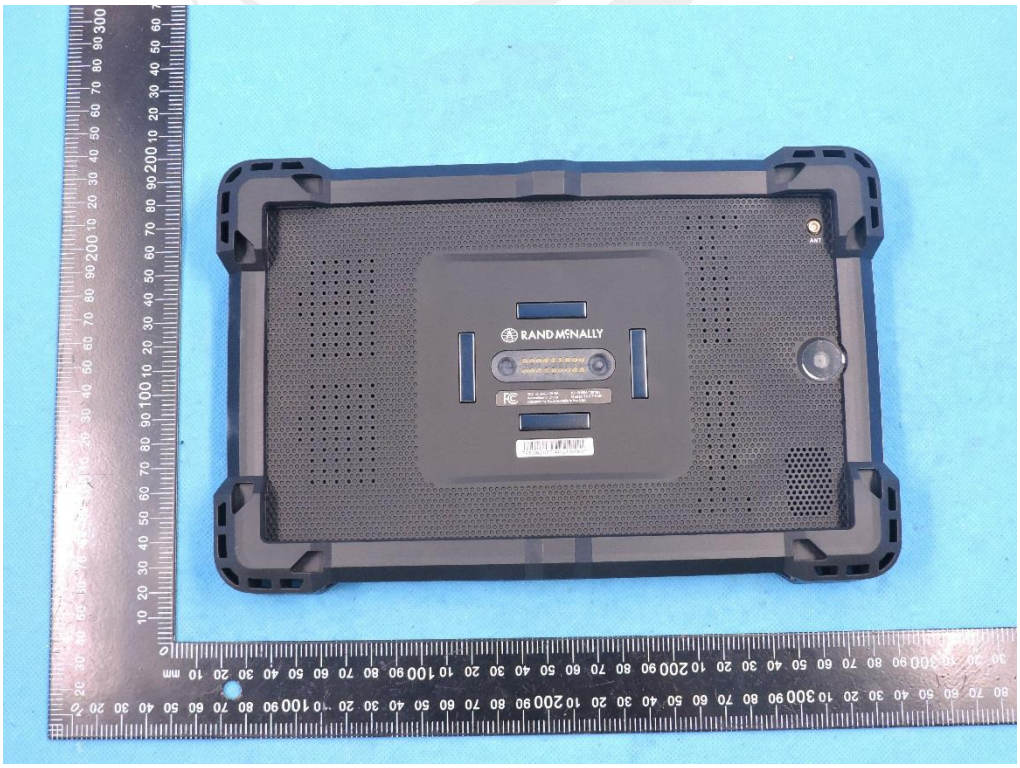
# 11. EUT And Test Setup Photo

## 11.1 EUT Photo

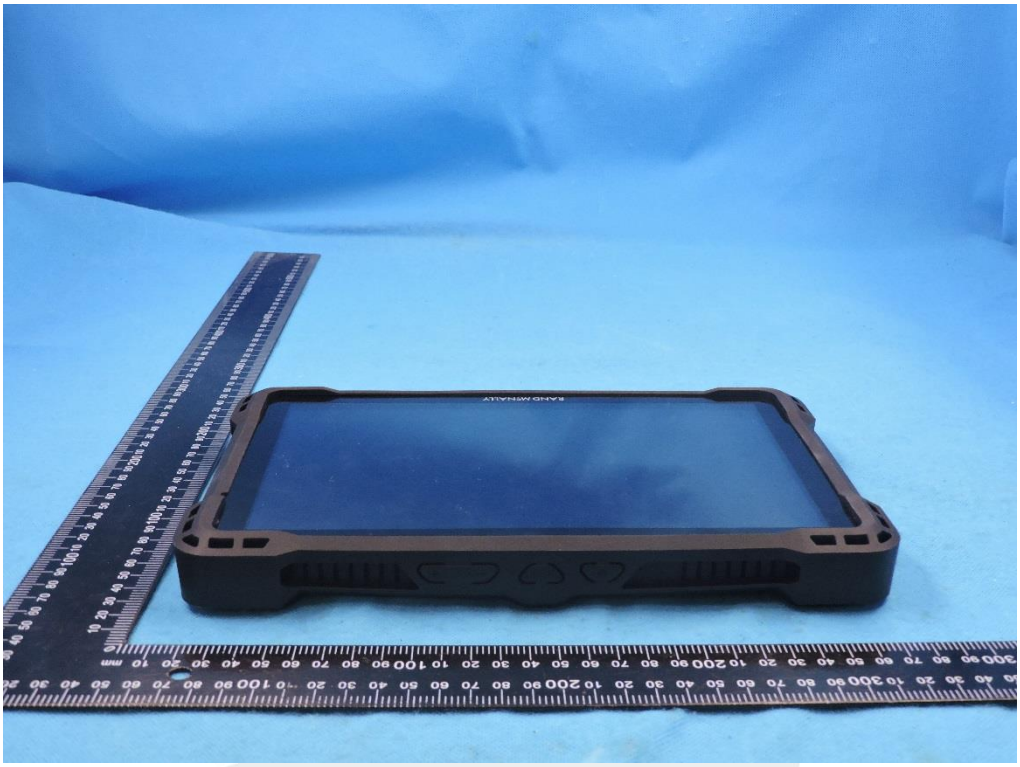
Front side



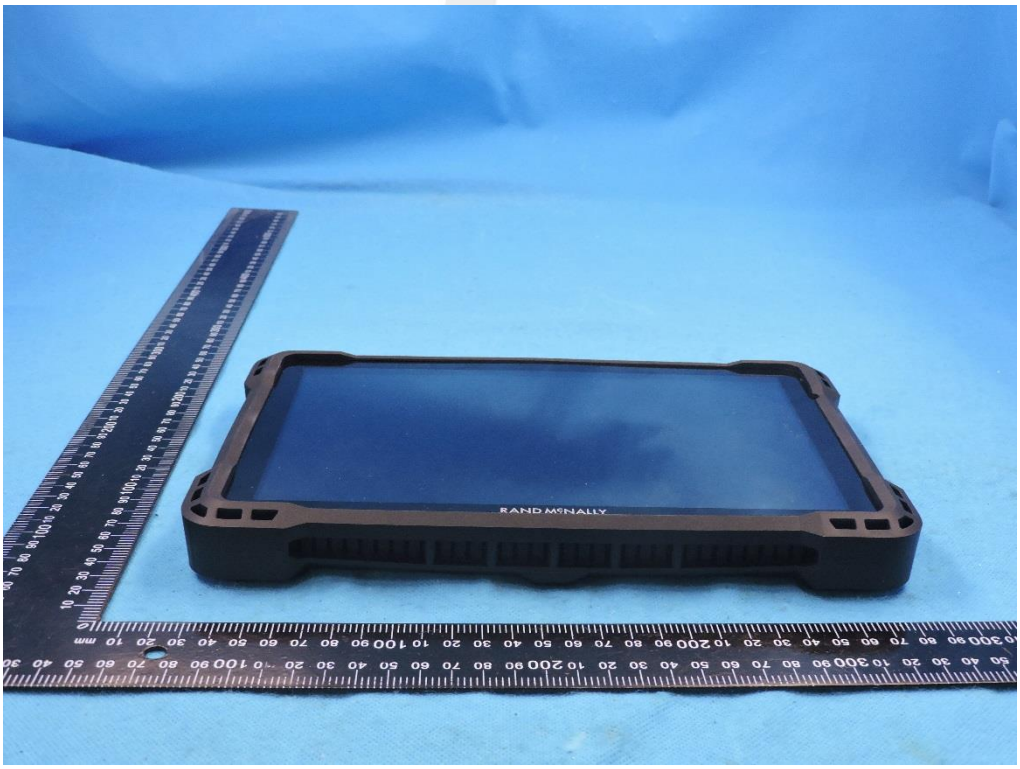
Back side



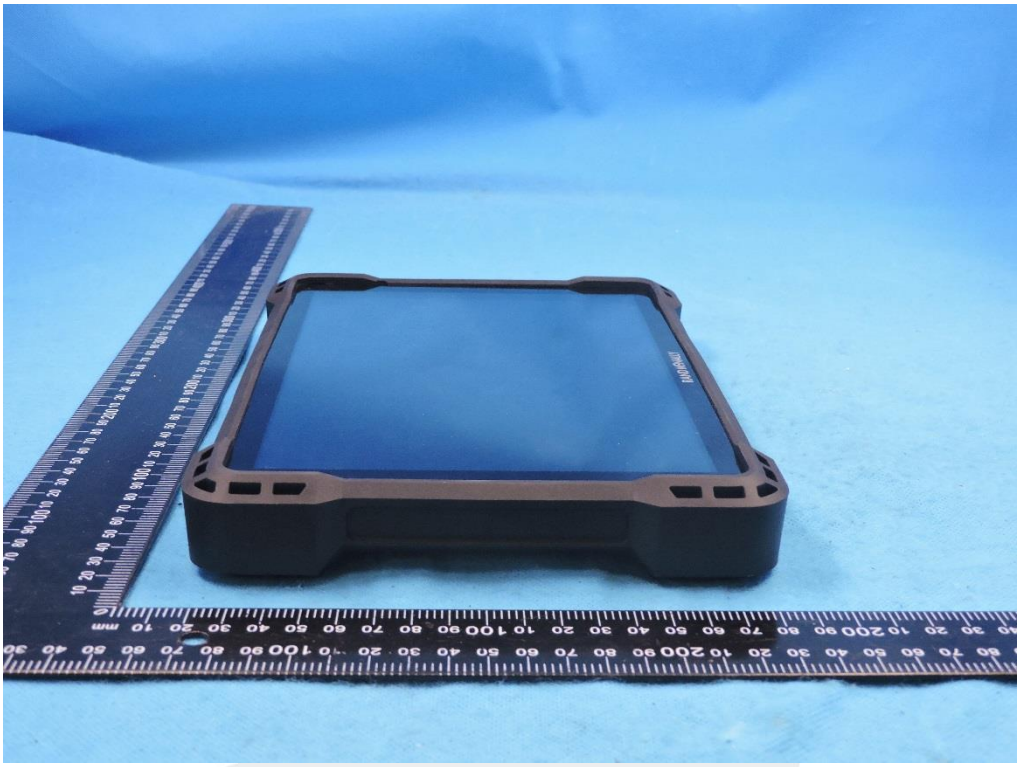
Top side



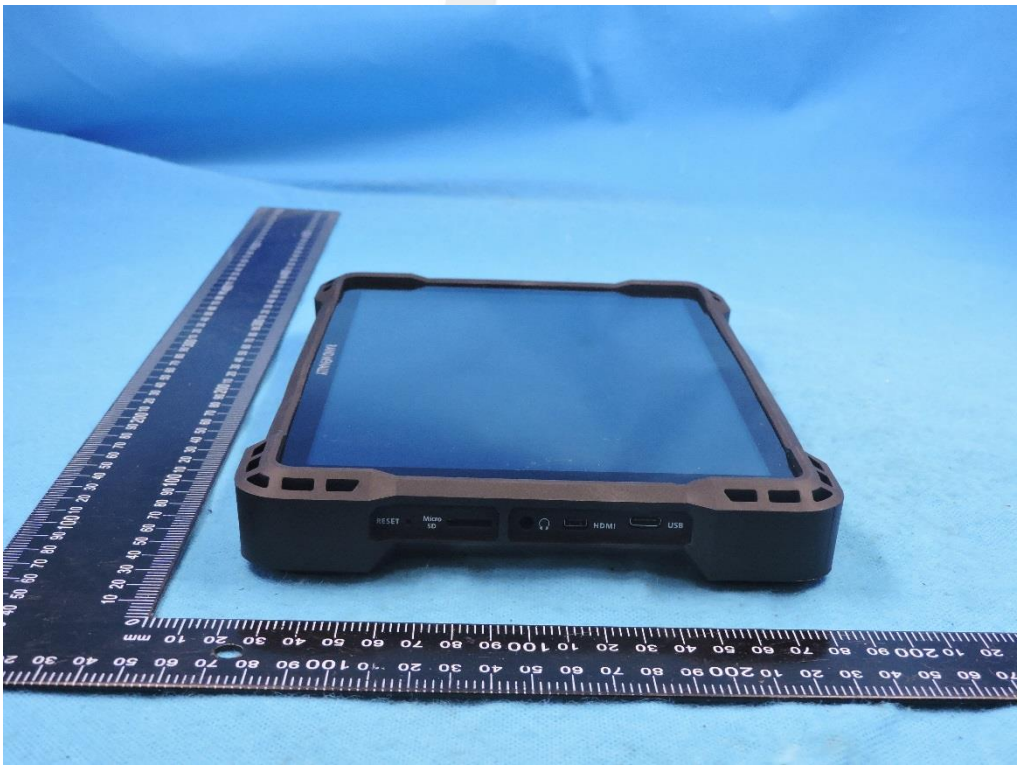
Bottom side



Left side

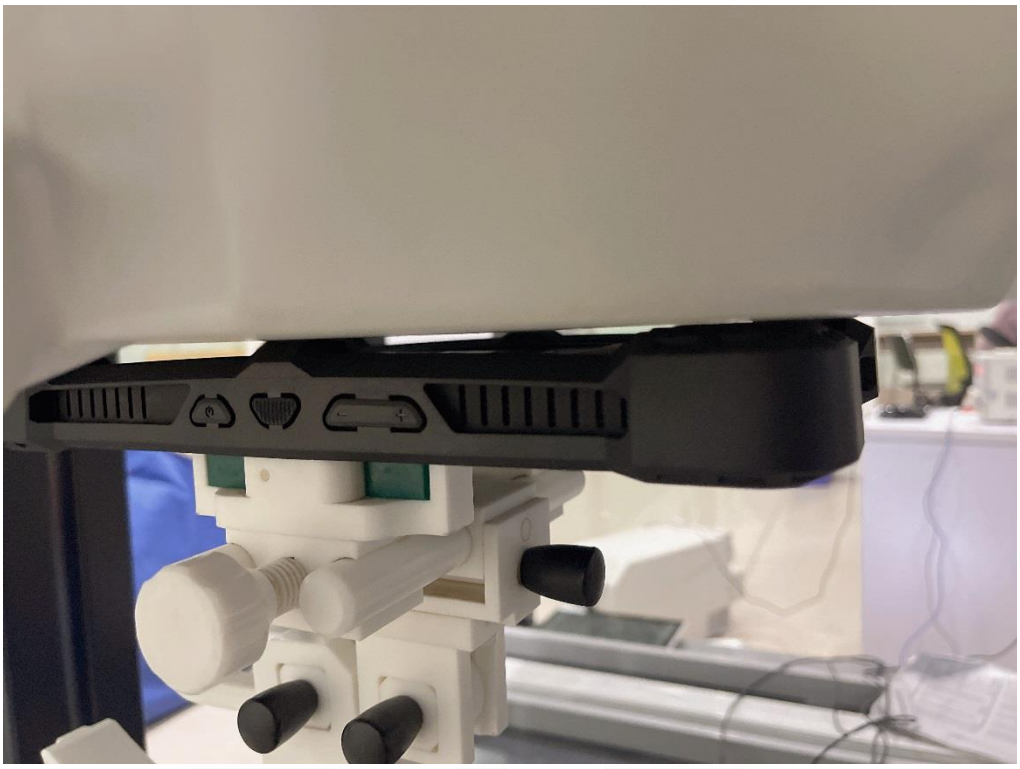


Right side



## 11.2 Setup Photo

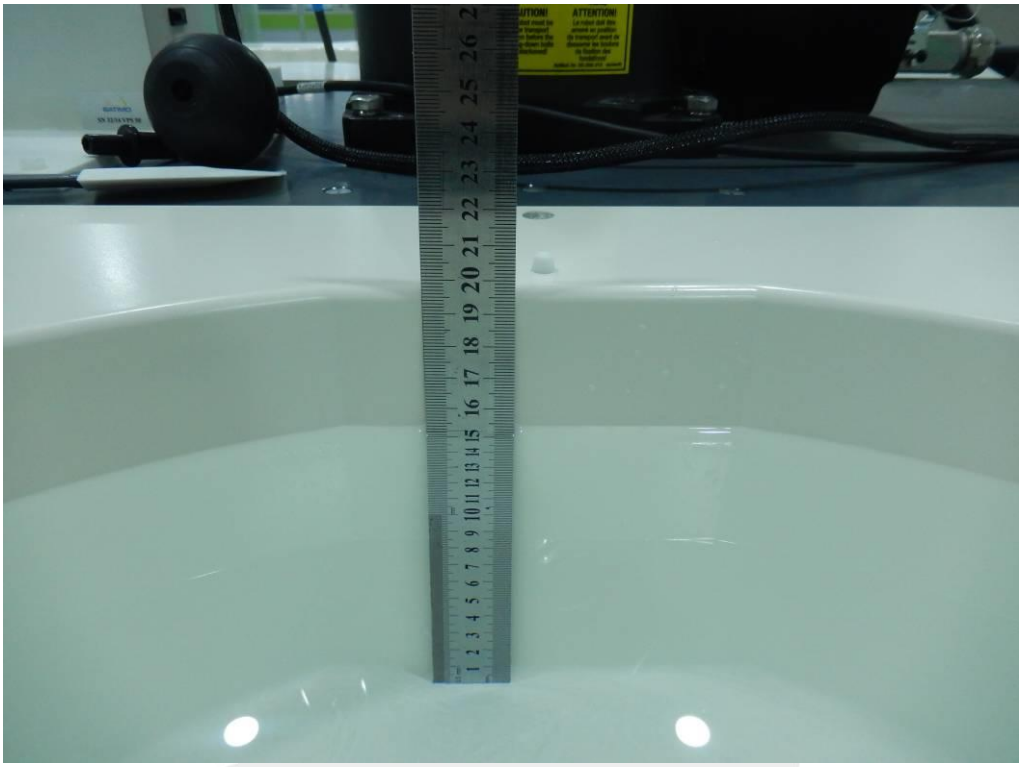
Body Back side(separation distance is 0mm)



Body Right side(separation distance is 0mm)

Body Top Edge (separation distance is 0mm)

Liquid depth (15 cm)



# 12. SAR Result Summary

## 12.1 Body-worn and hotspot SAR

| Band | Model | Test Position | Freq. | SAR (1g) (W/kg) | Power Drift(%) | Max.Turn-up Power(dBm) | Meas.Output Power(dBm) | Scaled SAR (W/Kg) | Meas.No. |
|---|---|---|---|---|---|---|---|---|---|
| 2.4GHz WLAN | 802.11b | Back Side | 2472 | 0.782 | 1.95 | 16.20 | 16.18 | **0.786** | **1** |
| | | Top Edge | 2472 | 0.715 | 1.04 | 16.50 | 16.18 | 0.770 | / |
| 5.2GHz WLAN | 802.11a | Back Side | 5180 | 0.980 | 0.81 | 14.50 | 14.14 | 1.065 | / |
| | | Back Side | 5200 | 1.013 | 0.94 | 14.50 | 14.22 | **1.080** | **2** |
| | | Back Side | 5240 | 0.971 | -3.97 | 14.50 | 14.05 | 1.077 | / |
| | | Top Edge | 5180 | 0.821 | -0.87 | 14.50 | 14.14 | 0.892 | / |
| | | Top Edge | 5200 | 0.956 | -1.07 | 14.50 | 14.22 | 1.020 | / |
| | | Top Edge | 5240 | 0.897 | -0.57 | 14.50 | 14.05 | 0.995 | / |
| 5.3GHz WLAN | 802.11a | Back Side | 5260 | 1.012 | -2.85 | 14.50 | 14.12 | 1.105 | / |
| | | Back Side | 5280 | 1.105 | 1.47 | 14.50 | 14.05 | 1.226 | / |
| | | Back Side | 5320 | 1.194 | -0.78 | 14.50 | 14.16 | **1.291** | **3** |
| | | Top Edge | 5260 | 0.951 | -1.05 | 14.50 | 14.12 | 1.038 | / |
| | | Top Edge | 5280 | 0.973 | -1.07 | 14.50 | 14.05 | 1.079 | / |
| | | Top Edge | 5320 | 0.982 | -0.93 | 14.50 | 14.16 | 1.062 | / |
| 5.6GHz WLAN | 802.11a | Back Side | 5500 | 0.880 | -3.62 | 15.00 | 14.84 | **0.913** | **4** |
| | | Back Side | 5580 | 0.752 | -0.61 | 15.00 | 14.26 | 0.892 | / |
| | | Back Side | 5700 | 0.725 | 2.95 | 15.00 | 14.03 | 0.906 | / |
| | | Top Edge | 5500 | 0.768 | -3.32 | 15.00 | 14.84 | 0.797 | / |
| 5.8GHz WLAN | 802.11a | Back Side | 5745 | 1.122 | -0.57 | 15.00 | 14.52 | 1.253 | / |
| | | Back Side | 5785 | 1.243 | -3.24 | 15.00 | 14.62 | **1.357** | **5** |
| | | Back Side | 5825 | 1.132 | 1.98 | 15.00 | 14.25 | 1.345 | / |
| | | Right Edge | 5745 | 0.685 | 1.74 | 15.00 | 14.62 | 0.748 | / |
| | | Top Edge | 5745 | 0.934 | 0.32 | 15.00 | 14.52 | 1.043 | / |
| | | Top Edge | 5785 | 0.971 | 0.35 | 15.00 | 14.62 | 1.060 | / |
| | | Top Edge | 5825 | 0.902 | 0.95 | 15.00 | 14.25 | 1.072 | / |

Note:

1. The test separation of all above table is 0mm.
2. The Bluetooth and WLAN can't simultaneous transmission at the same time.
3. 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. For WWAN: Scaled SAR(W/kg)= Measured SAR(W/kg)*Tune-up Scaling Factor
4. Per KDB 248227- When the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is $\leqslant$ 1.2 W/kg. (The highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power was **0.543** W/kg for Body)

5. When the user enables the personal Wireless router functions for the handsets, actual operations include simultaneous transmission of both the Wi-Fi transmitting frequency and thus cannot be evaluated for SAR under actual use conditions. The “Portable Hotspot” feature on the handset was NOT activated, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal.

**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) | Meas. No. |
|---|---|---|---|---|---|---|---|---|---|
| 5.2GHz WLAN | 802.11a | Back Side | 5180 | 0.958 | 3.81 | 14.50 | 14.14 | 1.041 | - |
| | | Back Side | 5200 | 0.996 | -1.18 | 14.50 | 14.22 | 1.062 | - |
| | | Back Side | 5240 | 0.932 | 1.17 | 14.50 | 14.05 | 1.034 | - |
| | | Top Edge | 5180 | 0.784 | 0.37 | 14.50 | 14.14 | 0.852 | - |
| | | Top Edge | 5200 | 0.948 | 0.89 | 14.50 | 14.22 | 1.011 | - |
| | | Top Edge | 5240 | 0.878 | -1.27 | 14.50 | 14.05 | 0.974 | - |
| 5.3GHz WLAN | 802.11a | Back Side | 5260 | 0.962 | -3.99 | 14.50 | 14.12 | 1.050 | - |
| | | Back Side | 5280 | 1.100 | 1.53 | 14.50 | 14.05 | 1.220 | - |
| | | Back Side | 5320 | 1.155 | 2.21 | 14.50 | 14.16 | 1.249 | - |
| | | Back Side | 5280 | 1.005 | 1.27 | 14.50 | 14.05 | 1.115 | - |
| | | Back Side | 5320 | 1.056 | 1.24 | 14.50 | 14.16 | 1.142 | - |
| | | Top Edge | 5260 | 0.908 | -1.35 | 14.50 | 14.12 | 0.991 | - |
| | | Top Edge | 5280 | 0.953 | 0.57 | 14.50 | 14.05 | 1.057 | - |
| | | Top Edge | 5320 | 0.945 | 1.18 | 14.50 | 14.16 | 1.022 | - |
| 5.3GHz WLAN | 802.11a | Back Side | 5500 | 0.843 | 0.46 | 15.00 | 14.84 | 0.875 | - |
| | | Back Side | 5580 | 0.740 | 0.58 | 15.00 | 14.26 | 0.877 | - |
| | | Back Side | 5700 | 0.711 | 3.78 | 15.00 | 14.03 | 0.889 | - |
| 5.8GHz WLAN | 802.11a | Back Side | 5745 | 1.112 | 2.12 | 15.00 | 14.52 | 1.242 | - |
| | | Back Side | 5785 | 1.237 | -2.50 | 15.00 | 14.62 | 1.350 | - |
| | | Back Side | 5825 | 1.083 | 3.08 | 15.00 | 14.25 | 1.287 | - |
| | | Back Side | 5745 | 1.057 | 0.15 | 15.00 | 14.52 | 1.181 | - |
| | | Back Side | 5785 | 1.157 | -1.27 | 15.00 | 14.62 | 1.263 | - |
| | | Back Side | 5825 | 1.051 | 0.96 | 15.00 | 14.25 | 1.249 | - |
| | | Top Edge | 5745 | 0.899 | -0.75 | 15.00 | 14.52 | 1.004 | - |
| | | Top Edge | 5785 | 0.971 | -0.17 | 15.00 | 14.62 | 1.060 | - |
| | | Top Edge | 5825 | 0.873 | 1.27 | 15.00 | 14.25 | 1.038 | - |

## 12.2 repeated SAR measurement

| Band | Mode | Test Position | Ch. | Original Measured SAR 1g(W/kg) | 1 st Repeated SAR 1g | Ratio | Original Measured SAR 1g(W/kg) | 2nd Repeated SAR 1g | Ratio |
|---|---|---|---|---|---|---|---|---|---|
| 5.2GHz WLAN | 802.11a | Back Side | 5180 | 0.980 | 0.958 | 1.023 | - | - | - |
| | | Back Side | 5200 | 1.013 | 0.996 | 1.017 | - | - | - |
| | | Back Side | 5240 | 0.971 | 0.932 | 1.042 | - | - | - |
| | | Top Edge | 5180 | 0.821 | 0.784 | 1.047 | - | - | - |
| | | Top Edge | 5200 | 0.956 | 0.948 | 1.008 | - | - | - |
| | | Top Edge | 5240 | 0.897 | 0.878 | 1.022 | - | - | - |
| 5.3GHz WLAN | 802.11a | Back Side | 5260 | 1.012 | 0.962 | 1.052 | - | - | - |
| | | Back Side | 5280 | 1.105 | 1.100 | 1.005 | 1.105 | 1.005 | 1.100 |
| | | Back Side | 5320 | 1.194 | 1.155 | 1.034 | 1.194 | 1.056 | 1.131 |
| | | Top Edge | 5260 | 0.951 | 0.908 | 1.047 | - | - | - |
| | | Top Edge | 5280 | 0.973 | 0.953 | 1.021 | - | - | - |
| | | Top Edge | 5320 | 0.982 | 0.945 | 1.039 | - | - | - |
| 5.6GHz WLAN | 802.11a | Back Side | 5500 | 0.880 | 0.843 | 1.044 | - | - | - |
| | | Back Side | 5580 | 0.752 | 0.740 | 1.016 | - | - | - |
| | | Back Side | 5700 | 0.725 | 0.711 | 1.020 | - | - | - |
| 5.8GHz WLAN | 802.11a | Back Side | 5745 | 1.122 | 1.112 | 1.009 | 1.122 | 1.057 | 1.061 |
| | | Back Side | 5785 | 1.243 | 1.237 | 1.005 | 1.243 | 1.157 | 1.074 |
| | | Back Side | 5825 | 1.132 | 1.083 | 1.045 | 1.132 | 1.051 | 1.077 |
| | | Top Edge | 5745 | 0.934 | 0.899 | 1.039 | - | - | - |
| | | Top Edge | 5785 | 0.971 | 0.971 | 1.000 | - | - | - |
| | | Top Edge | 5825 | 0.902 | 0.873 | 1.033 | - | - | - |

Note:

1. Per KDB 865664 D01,for each frequency band ,repeated SAR measurement is required only when the measured SAR is≥0.8W/Kg.
2. Per KDB 865664 D01,if the ratio of largest to smallest SAR for the original and first repeated measurement is≤1.2 and the measured SAR＜1.45W/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 ≥ 1.45W/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 |
|---|---|---|---|---|---|
| 2450MHzDipole | MVG | SID2450 | SN 30/14 DIP2G450-335 | 2020.07.14 | 2023.07.13 |
| Waveguide | SATIMO | SWG5500 | SN 13/14 WGA32 | 2020.07.14 | 2023.07.13 |
| E-Field Probe | MVG | SSE2 | SN 07/21 EPGO352 | 2021.03.01 | 2022.02.28 |
| Dielectric Probe Kit | MVG | SCLMP | SN 32/14 OCPG67 | 2021.11.23 | 2022.11.22 |
| Antenna | MVG | ANTA3 | SN 07/13 ZNTA52 | N/A | N/A |
| Phantom1 | MVG | SAM | SN 32/14 SAM115 | N/A | N/A |
| Phantom2 | MVG | SAM | SN 32/14 SAM116 | N/A | N/A |
| Phone holder | MVG | N/A | SN 32/14 MSH97 | N/A | N/A |
| Laptop holder | MVG | N/A | SN 32/14 LSH29 | N/A | N/A |
| Attenuator | Agilent | 99899 | DC-18GHz | N/A | N/A |
| Directional coupler | Narda | 4226-20 | 3305 | N/A | N/A |
| Network Analyzer | Agilent | 8753ES | US38432810 | 2021.09.29 | 2022.09.28 |
| Multi Meter | Keithley | Multi Meter 2000 | 4050073 | 2021.10.08 | 2022.10.07 |
| Signal Generator | Agilent | N5182A | MY50140530 | 2021.09.30 | 2022.09.29 |
| Wireless Communication Test Set | Agilent | 8960-E5515C | MY48360751 | 2021.09.30 | 2022.09.29 |
| Wireless Communication Test Set | R&S | CMW500 | 117239 | 2021.09.30 | 2022.09.29 |
| Power Amplifier | DESAY | ZHL-42W | 9638 | 2021.10.09 | 2022.10.08 |
| Power Meter | R&S | NRP | 100510 | 2021.09.29 | 2022.09.28 |
| Power Sensor | R&S | NRP-Z11 | 101919 | 2021.09.29 | 2022.09.28 |
| Temperature hygrometer | SuWei | SW-108 | N/A | 2021.10.09 | 2022.10.08 |
| Thermograph | Elitech | RC-4 | S/N EF7176501537 | 2021.10.09 | 2022.10.08 |

Note:
Per KDB 865664 D01, Dipole SAR Validation Verification, STS 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
Return-loss in within 20% of calibrated measurement

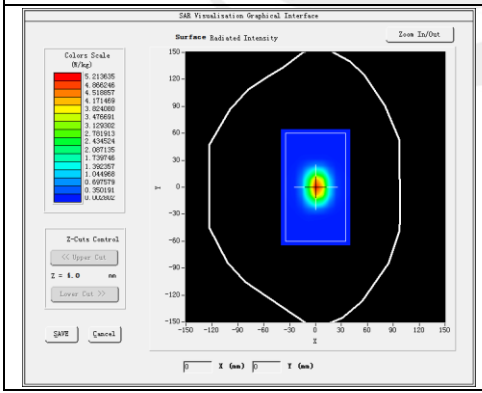
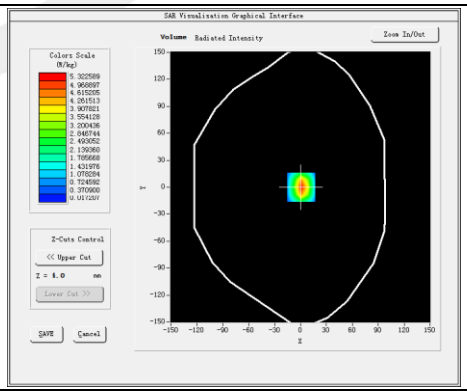
# Appendix A. System Validation Plots

## 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: 2022-01-12

**Experimental conditions.**

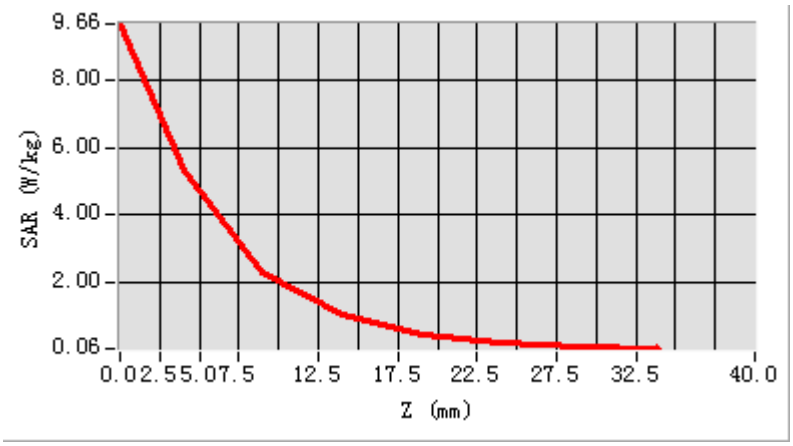
| | |
|---|---|
| Device Position | Validation plane |
| Band | 2450 MHz |
| Channels | - |
| Signal | CW |
| Frequency (MHz) | 2450 |
| Relative permittivity | 38.81 |
| Conductivity (S/m) | 1.82 |
| Probe | SN 07/21 EPGO352 |
| ConvF | 1.75 |
| Crest factor | 1:1 |

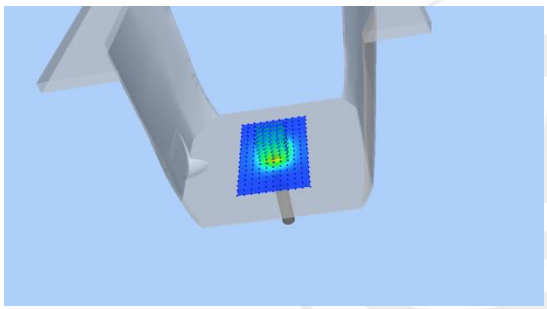
| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |

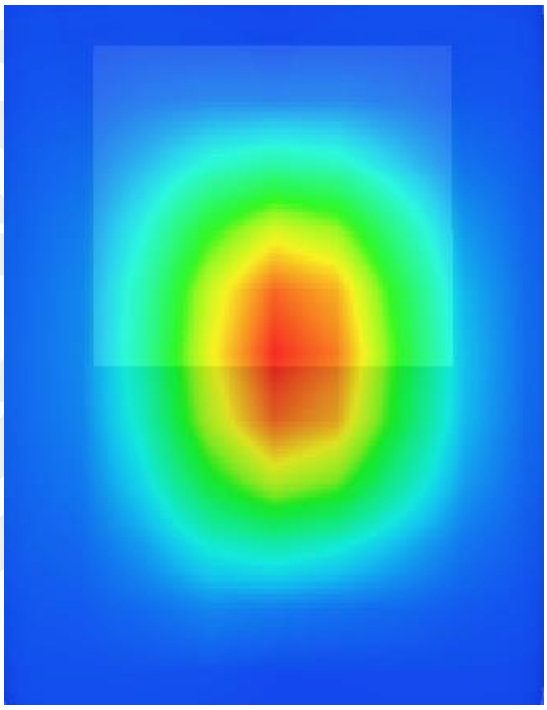
**Maximum location: X=1.00, Y=0.00**

| | |
|---|---|
| SAR 10g (W/Kg) | 2.372717 |
| SAR 1g (W/Kg) | 5.230429 |

# Z Axis Scan


9.66
8.00
6.00
4.00
2.00
0.06
SAR (W/kg)
0.0 2.5 5.0 7.5 12.5 17.5 22.5 27.5 32.5 40.0
Z (mm)



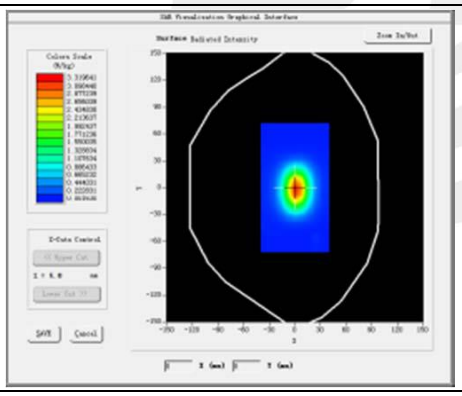
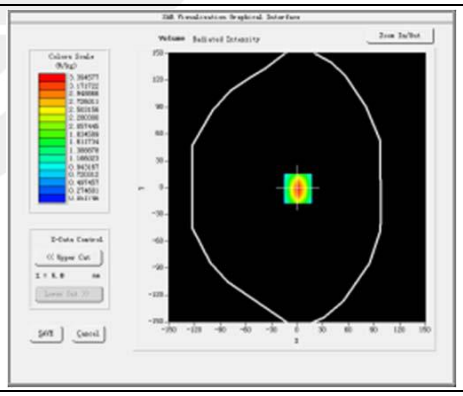


**System Performance Check Data(5200MHz)**

Type: Dipole measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2022-01-12

**Experimental conditions.**

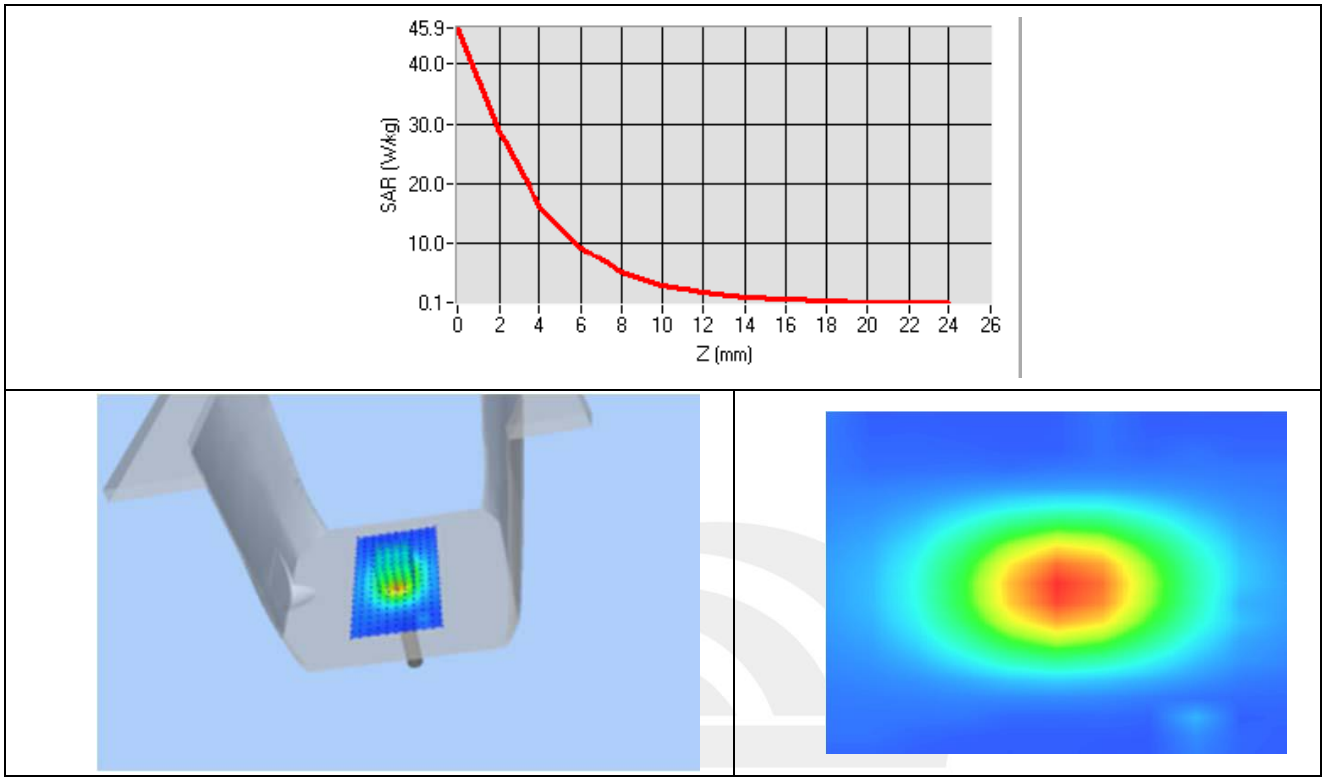
| Device Position | Validation plane |
|---|---|
| Band | 5200 MHz |
| Channels | - |
| Signal | CW |
| Frequency (MHz) | 5200 |
| Relative permittivity | 35.77 |
| Conductivity (S/m) | 4.77 |
| Probe | SN 07/21 EPGO352 |
| ConvF | 1.47 |
| Crest factor: | 1:1 |

| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |

**Maximum location: X=7.00, Y=2.00**

| | |
|---|---|
| SAR 10g (W/Kg) | 5.588217 |
| SAR 1g (W/Kg) | 16.109293 |

# Z Axis Scan

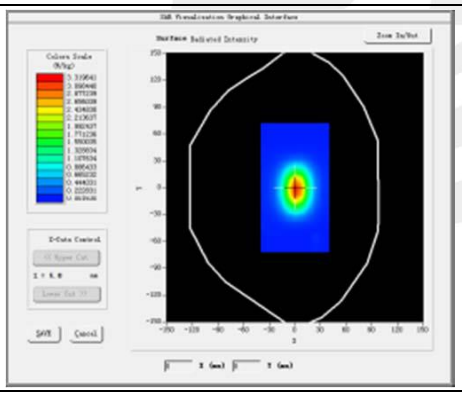
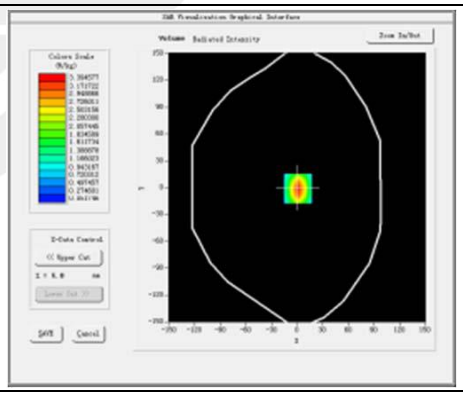


**System Performance Check Data(5300MHz)**

Type: Dipole measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2022-01-12

**Experimental conditions.**

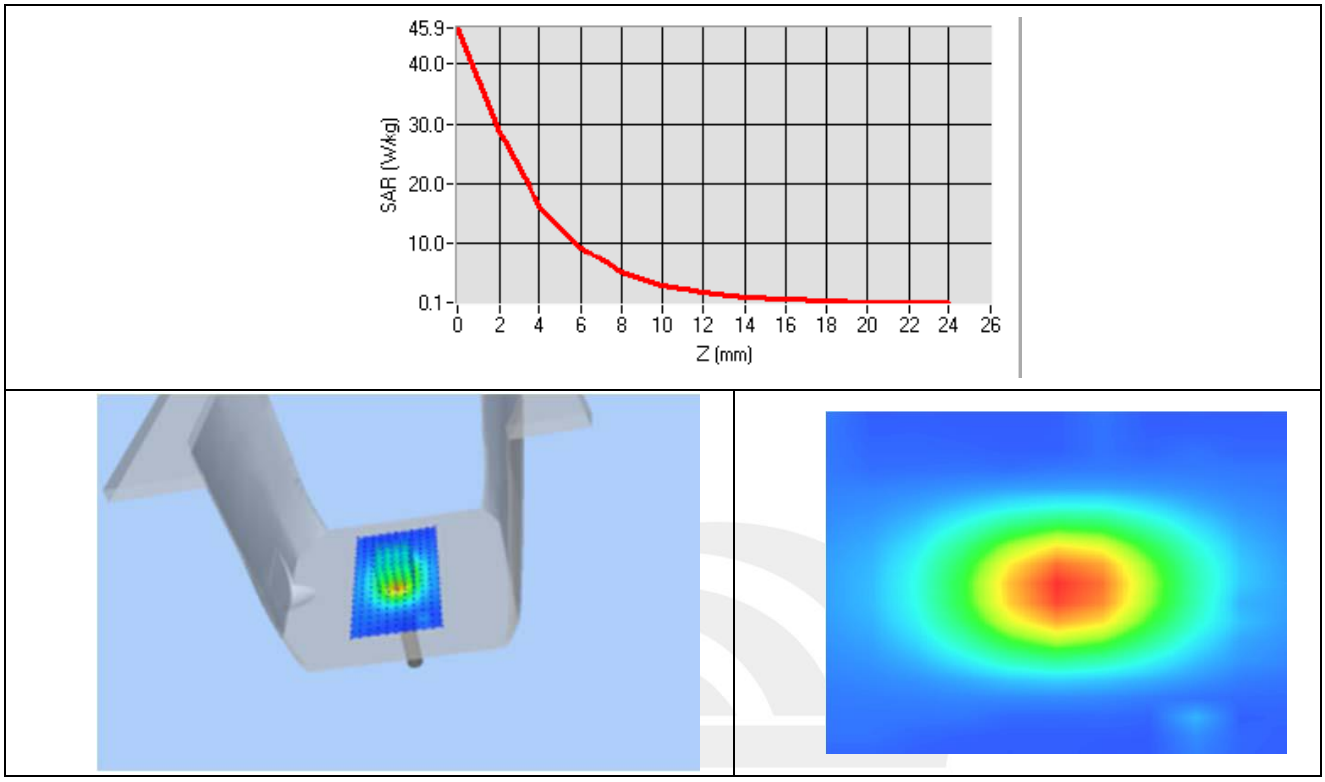
| Device Position | Validation plane |
|---|---|
| Band | 5300 MHz |
| Channels | - |
| Signal | CW |
| Frequency (MHz) | 5300 |
| Relative permittivity | 37.20 |
| Conductivity (S/m) | 4.87 |
| Probe | SN 07/21 EPGO352 |
| ConvF | 1.47 |
| Crest factor: | 1:1 |

| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |

**Maximum location: X=7.00, Y=2.00**

| | |
|---|---|
| SAR 10g (W/Kg) | 5.585484 |
| SAR 1g (W/Kg) | 16.853868 |

# Z Axis Scan

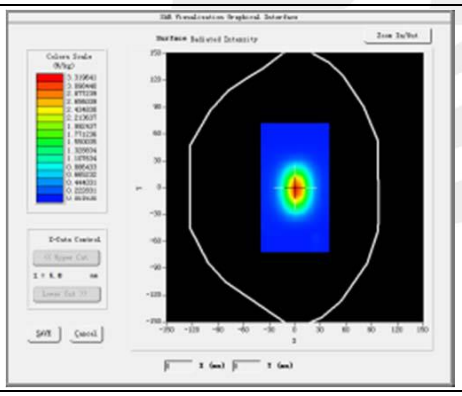
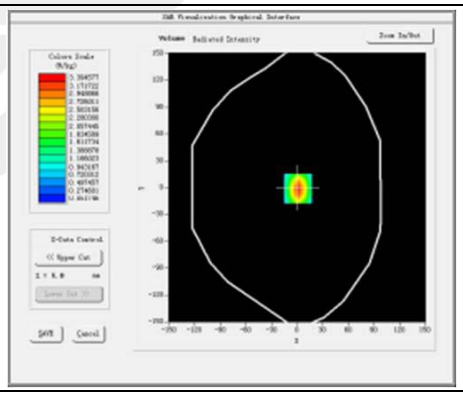


**System Performance Check Data(5600MHz)**

Type: Dipole measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2022-01-14

**Experimental conditions.**

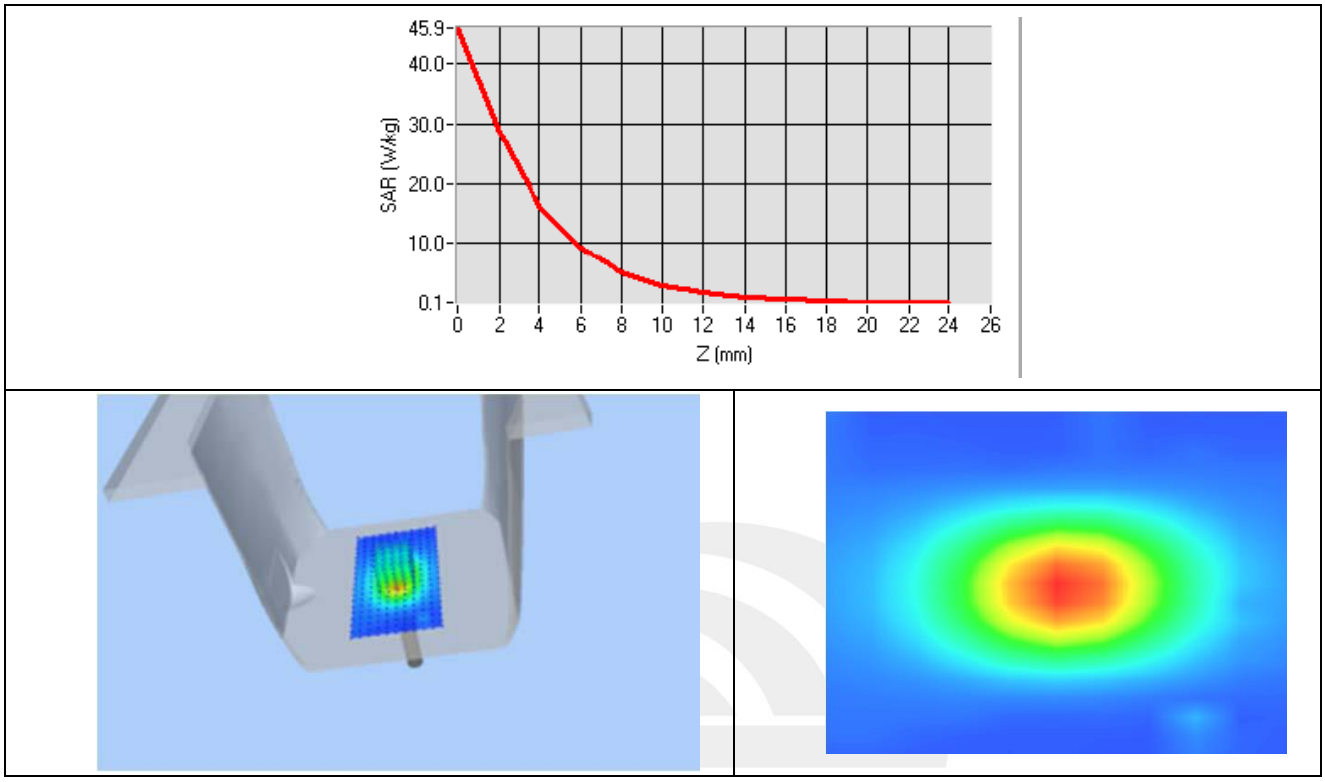
| | |
|---|---|
| Device Position | Validation plane |
| Band | 5600 MHz |
| Channels | - |
| Signal | CW |
| Frequency (MHz) | 5600 |
| Relative permittivity | 35.02 |
| Conductivity (S/m) | 5.28 |
| Probe | SN 07/21 EPGO352 |
| ConvF | 1.47 |
| Crest factor: | 1:1 |

| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |

**Maximum location: X=7.00, Y=2.00**

| | |
|---|---|
| SAR 10g (W/Kg) | 5.587831 |
| SAR 1g (W/Kg) | 16.67763 |

# Z Axis Scan

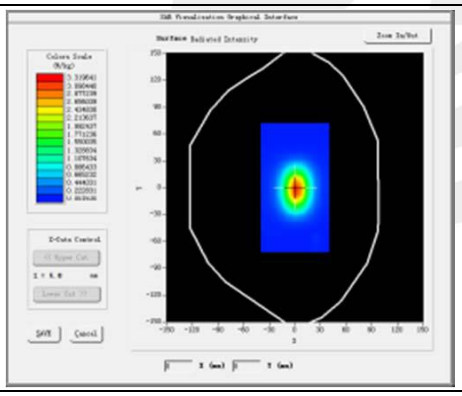
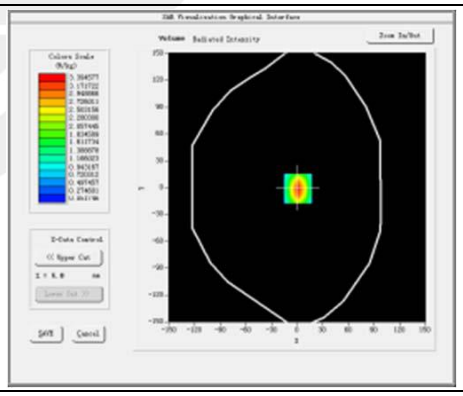


**System Performance Check Data(5800MHz)**

Type: Dipole measurement (Complete)
Area scan resolution: dx=8mm,dy=8mm
Zoom scan resolution: dx=4mm, dy=4mm, dz=2mm
Date of measurement: 2022-01-14

**Experimental conditions.**

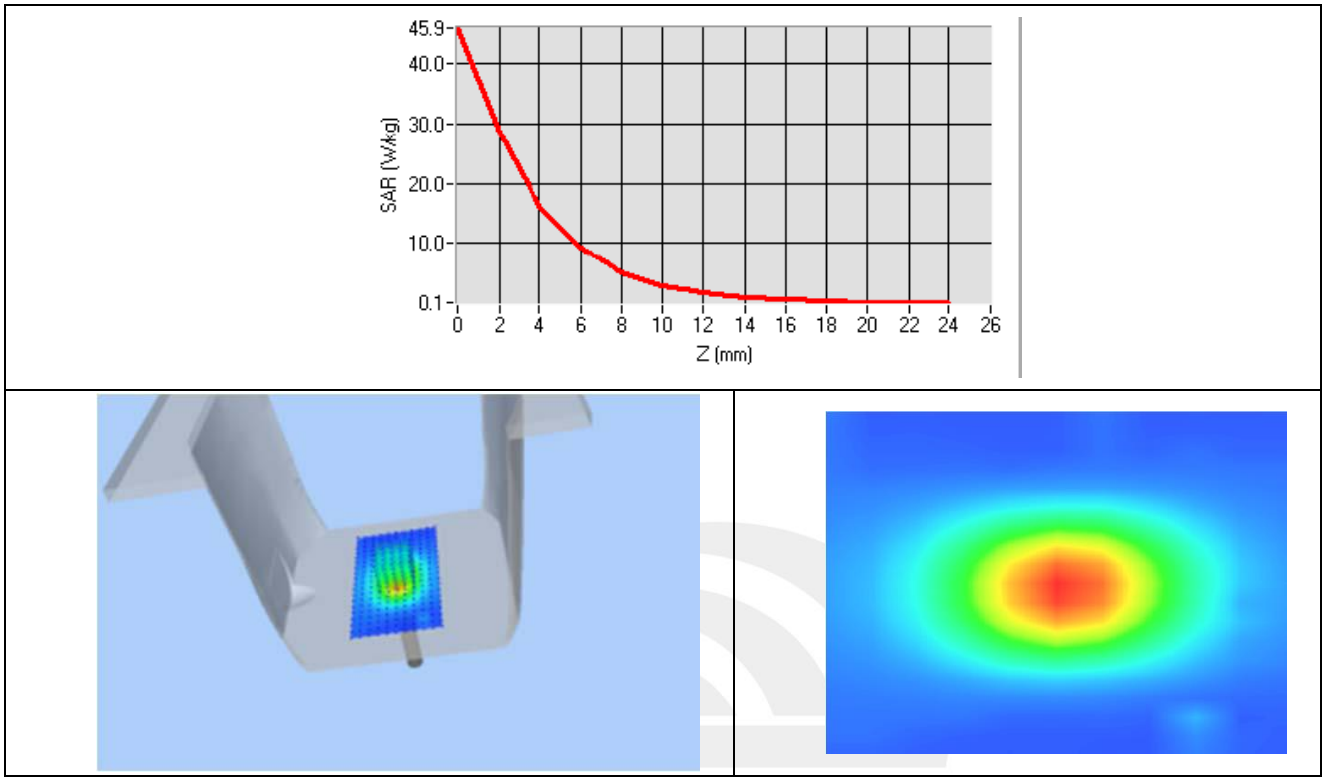
| | |
|---|---|
| Device Position | Validation plane |
| Band | 5800 MHz |
| Channels | - |
| Signal | CW |
| Frequency (MHz) | 5800 |
| Relative permittivity | 35.36 |
| Conductivity (S/m) | 5.26 |
| Probe | SN 07/21 EPGO352 |
| ConvF | 1.64 |
| Crest factor: | 1:1 |

| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |

**Maximum location: X=7.00, Y=2.00**

| | |
|---|---|
| SAR 10g (W/Kg) | 6.183710 |
| SAR 1g (W/Kg) | 17.820605 |

# Z Axis Scan



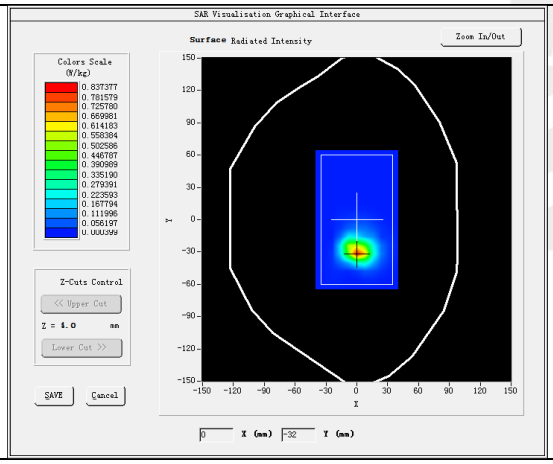
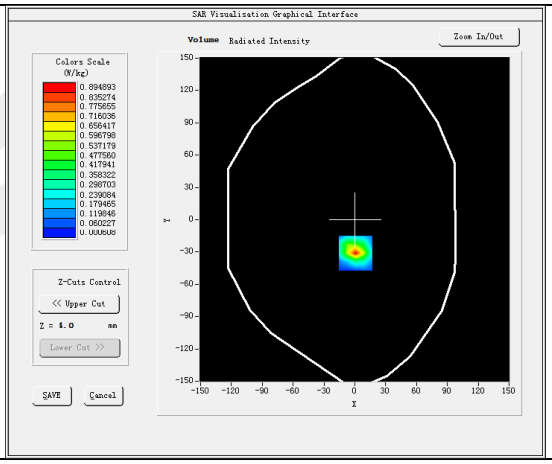
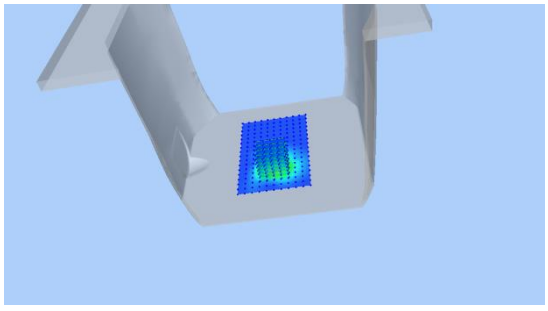
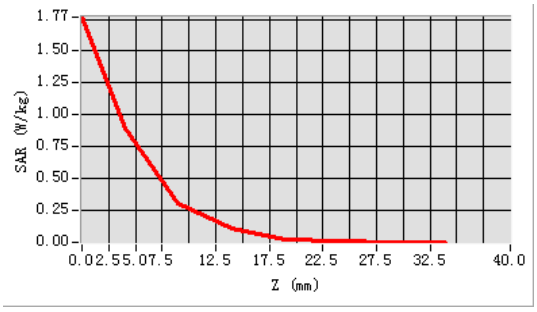
# Appendix B. SAR Test Plots

## Plot 1: DUT: GPS Device; EUT Model: TND T1050

| | |
|---|---|
| Test Date | 2022-01-12 |
| Probe | SN 07/21 EPGO352 |
| Area Scan | dx=8mm, dy=8mm, h= 5.00 mm |
| Zoom Scan | 5x5x7,dx=8mm, dy=8mm, dz=5mm, Complete/ndx=8mm, dy=8mm, h= 5.00 mm |
| Phantom | Validation plane |
| Device Position | Back Side |
| Band | IEEE 802.11b |
| Channels | 13 |
| Signal | IEEE802.11b (Crest factor: 1.0) |
| Frequency (MHz) | 2472 |
| Relative permittivity (real part) | 39.54 |
| Conductivity (S/m) | 1.80 |

Maximum location: X=1.00, Y=-31.00
SAR Peak: 1.74 W/kg

| | |
|---|---|
| SAR 10g (W/Kg) | 0.270213 |
| SAR 1g (W/Kg) | 0.782245 |

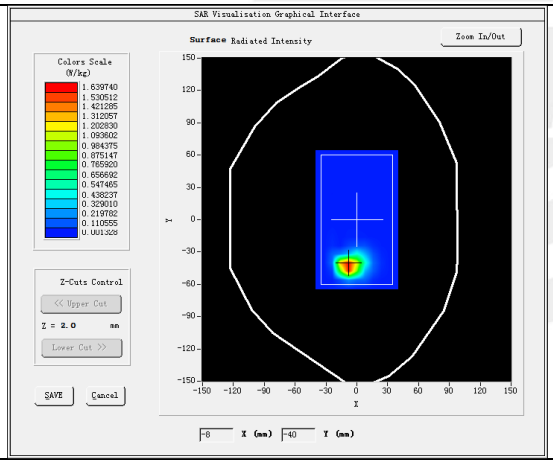
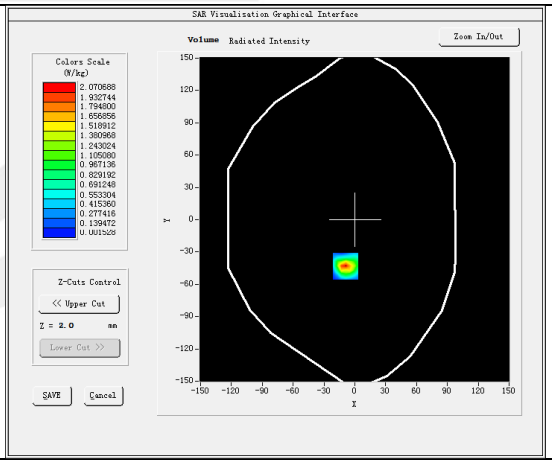
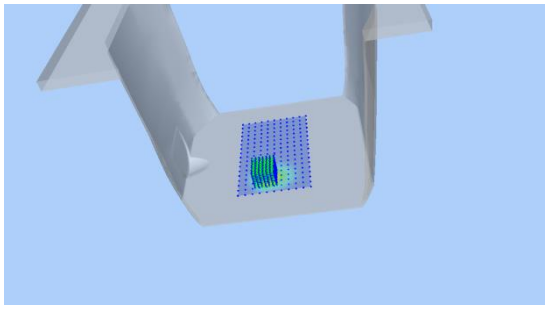
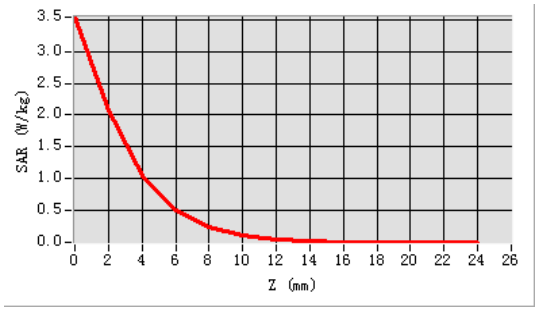
| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |
| **3D** | **Z Axis Scan** |
|  |  |

## Plot 2: DUT: GPS Device; EUT Model: TND T1050

| | |
|---|---|
| Test Date | 2022-01-12 |
| Probe | SN 07/21 EPGO352 |
| Area Scan | dx=8mm dy=8mm, h= 5.00 mm |
| Zoom Scan | 7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom | Validation plane |
| Device Position | Back Side |
| Band | IEEE 802.11a |
| Channels | 40 |
| Signal | IEEE802.11a (Crest factor: 1.0) |
| Frequency (MHz) | 5200 |
| Relative permittivity (real part) | 35.77 |
| Conductivity (S/m) | 4.77 |

Maximum location: X=-9.00, Y=-43.00
SAR Peak: 3.72 W/kg

| | |
|---|---|
| SAR 10g (W/Kg) | 0.292660 |
| SAR 1g (W/Kg) | 1.013214 |

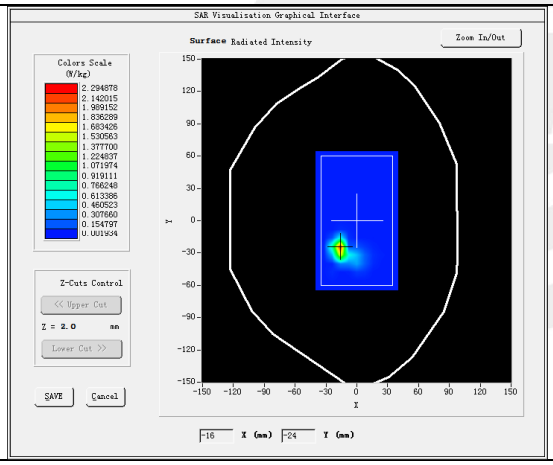
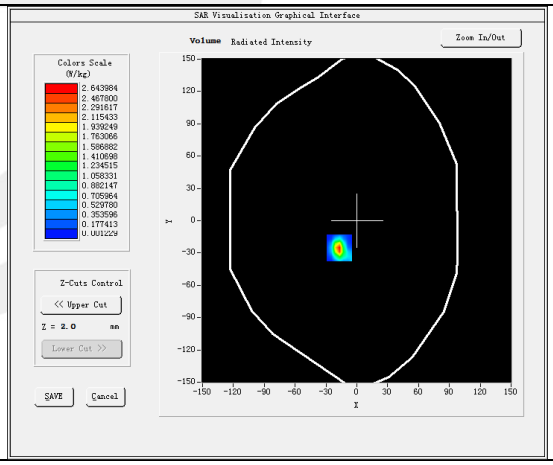
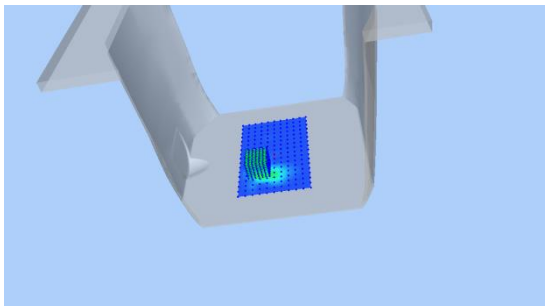
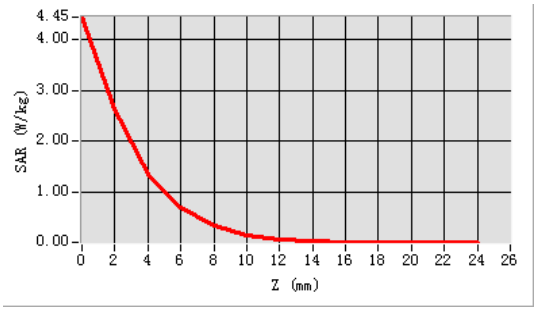
| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |
| **3D** | **Z Axis Scan** |
|  |  |

## Plot 3: DUT: GPS Device; EUT Model: TND T1050

| | |
|---|---|
| Test Date | 2022-01-12 |
| Probe | SN 07/21 EPGO352 |
| Area Scan | dx=8mm dy=8mm, h= 5.00 mm |
| Zoom Scan | 7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom | Validation plane |
| Device Position | Back Side |
| Band | IEEE 802.11a |
| Channels | 64 |
| Signal | IEEE802.11a (Crest factor: 1.0) |
| Frequency (MHz) | 5320 |
| Relative permittivity (real part) | 0.255929 |
| Conductivity (S/m) | 1.194166 |

Maximum location: X=-17.00, Y=-25.00
SAR Peak: 4.82 W/kg

| | |
|---|---|
| SAR 10g (W/Kg) | 0.292660 |
| SAR 1g (W/Kg) | 1.013214 |

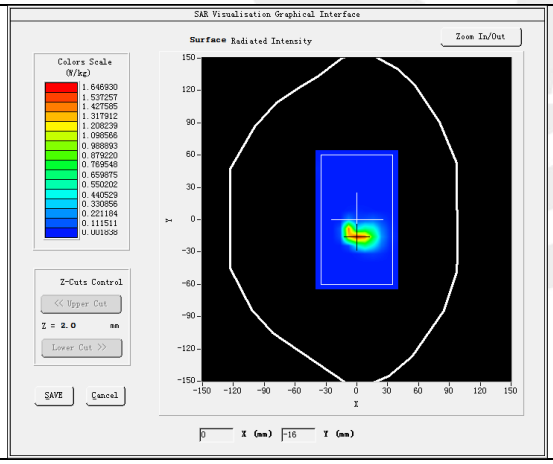
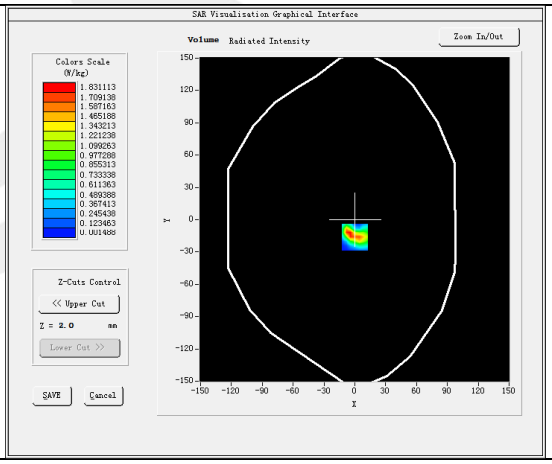
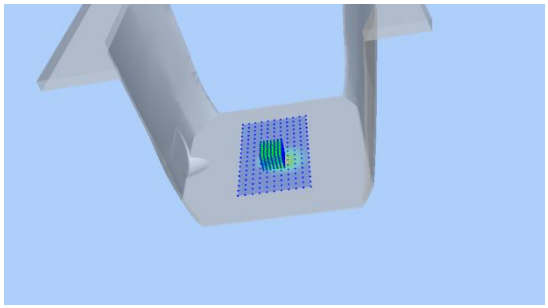
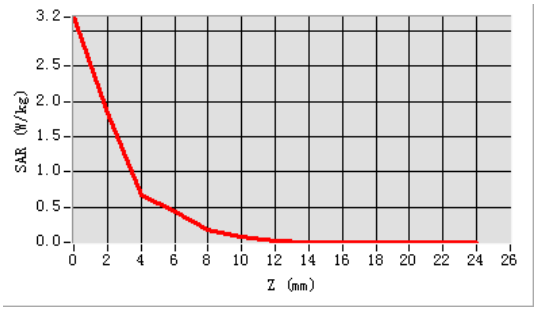
| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |
| **3D** | **Z Axis Scan** |
|  |  |

## Plot 4: DUT: GPS Device; EUT Model: TND T1050

| | |
|---|---|
| Test Date | 2022-01-14 |
| Probe | SN 07/21 EPGO352 |
| Area Scan | dx=8mm dy=8mm, h= 5.00 mm |
| Zoom Scan | 7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom | Validation plane |
| Device Position | Back Side |
| Band | IEEE 802.11a |
| Channels | 100 |
| Signal | IEEE802.11a (Crest factor: 1.0) |
| Frequency (MHz) | 5500 |
| Relative permittivity (real part) | 35.53 |
| Conductivity (S/m) | 4.91 |

Maximum location: X=0.00, Y=-16.00
SAR Peak: 3.62 W/kg

| | |
|---|---|
| SAR 10g (W/Kg) | 0.264280 |
| SAR 1g (W/Kg) | 0.880442 |

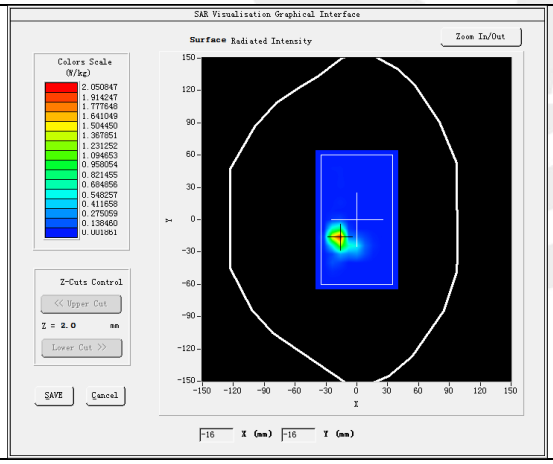
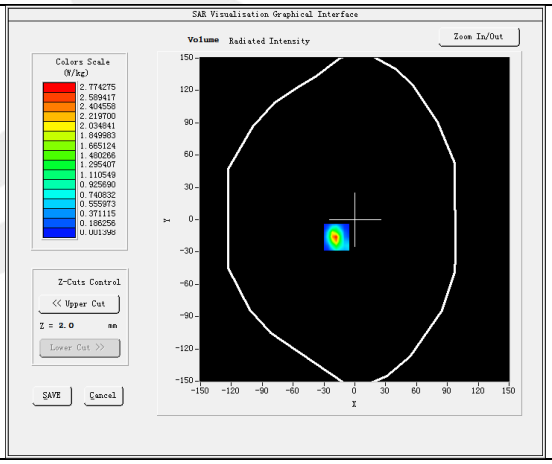
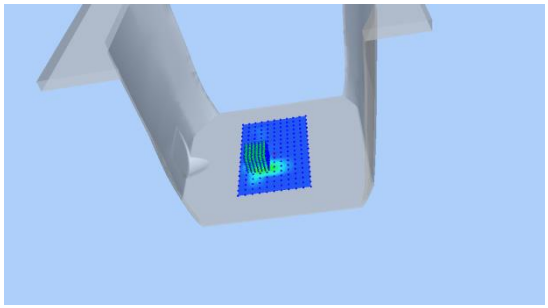
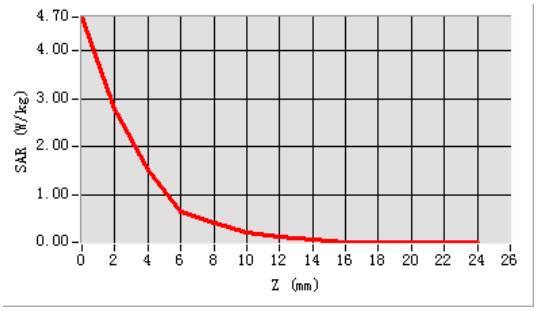
| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |
| **3D** | **Z Axis Scan** |
|  |  |

## Plot 5: DUT: GPS Device; EUT Model: TND T1050

| | |
|---|---|
| Test Date | 2022-01-14 |
| Probe | SN 07/21 EPGO352 |
| Area Scan | dx=8mm dy=8mm, h= 5.00 mm |
| Zoom Scan | 7x7x12,dx=4mm dy=4mm dz=2mm, Complete/ndx=8mm dy=8mm, h= 5.00 mm |
| Phantom | Validation plane |
| Device Position | Back Side |
| Band | IEEE 802.11a |
| Channels | 157 |
| Signal | IEEE802.11a (Crest factor: 1.0) |
| Frequency (MHz) | 5785 |
| Relative permittivity (real part) | 35.06 |
| Conductivity (S/m) | 5.23 |

Maximum location: X=-18.00, Y=-16.00
SAR Peak: 5.14 W/kg

| | |
|---|---|
| SAR 10g (W/Kg) | 0.286748 |
| SAR 1g (W/Kg) | 1.243040 |

| SURFACE SAR | VOLUME SAR |
|---|---|
|  |  |
| **3D** | **Z Axis Scan** |
|  |  |

# Appendix C. Probe Calibration And Dipole Calibration Report

Refer the appendix Calibration Report.

※※※※※END OF THE REPORT※※※※※