

# SAR Test Report

## For

**Applicant Name:**

Address:

EUT Name:

Brand Name:

Model Number:

**Wuhan Ipason Technology Co., Ltd.**

5th Floor, Multifunctional Building, No. 1, Ipason Avenue, Shekou Street, Huangpi District, Wuhan City, Hubei Province, China

NotebookComputer

N/A

IPASON P3

## Issued By

**Company Name:**

**BTF Testing Lab (Shenzhen) Co., Ltd.**

Address:

F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

Report Number:

BTF230322R01201

47 CFR Part 2.1093 IEEE1528-2013 IEEE C95.1-2019

KDB 447498 D01 KDB 447498 D04 KDB 865664 D01

KDB 865664 D02 KDB 248227 D01 KDB 616217 D04

KDB 690783 D01

FCC ID:

2ATY8-IPASONP3

Test Conclusion:

Pass

Test Date:

2023-03-24

Date of Issue:

2023-03-24

Prepared By:

Monica Zhou

Date:

Monica Zhou / Project Engineer

2023-03-24

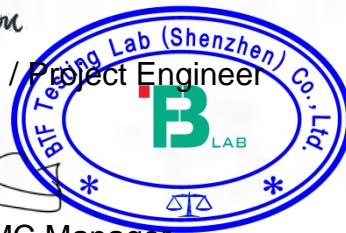
Approved By:

Ryan.CJ / EMC Manager

Date:

2023-03-24

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2023-03-24	Original
<b>Note:</b>	<i>Once the revision has been made, then previous versions reports are invalid.</i>	

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## 1. Introduction

### 1.1 Identification of Testing Laboratory

Company Name:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Phone Number:	+86-0755-23146130
Fax Number:	+86-0755-23146130

### 1.2 Identification of the Responsible Testing Location

Test Location:	BTF Testing Lab (Shenzhen) Co., Ltd.
Address:	F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
Description:	All measurement facilities used to collect the measurement data are located at F101,201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China
FCC Registration Number	518915
Designation Number	CN1330

### 1.3 Laboratory Condition

Ambient Temperature:	21°C to 25°C
Ambient Relative Humidity:	48% to 59%
Ambient Pressure:	100 kPa to 102 kPa

### 1.4 Announcement

- (1) The test report reference to the report template version v0.
- (2) The test report is invalid if not marked with the signatures of the persons responsible for preparing, reviewing and approving the test report.
- (3) The test report is invalid if there is any evidence and/or falsification.
- (4) This document may not be altered or revised in any way unless done so by BTF and all revisions are duly noted in the revisions section.
- (5) Content of the test report, in part or in full, cannot be used for publicity and/or promotional purposes without prior written approval from the laboratory.
- (6) The laboratory is only responsible for the data released by the laboratory, except for the part provided by the applicant.

## 2. Product Information

### 2.1 Application Information

Company Name:	Wuhan Ipason Technology Co., Ltd.
Address:	5th Floor, Multifunctional Building, No. 1, Ipason Avenue, Shekou Street, Huangpi District, Wuhan City, Hubei Province, China

### 2.2 Manufacturer Information

Company Name:	Wuhan Ipason Technology Co., Ltd.
Address:	5th Floor, Multifunctional Building, No. 1, Ipason Avenue, Shekou Street, Huangpi District, Wuhan City, Hubei Province, China

### 2.3 Factory Information

Company Name:	Dongguan Mingxun Electronic Technology Co., LTD
Address:	Floor 3, Building 6, Dasheng Industrial City, Second Industrial Zone, No. 1438 S358 Provincial Road, Shangsha Community, Chang'an, Dongguan

### 2.4 General Description of Equipment under Test (EUT)

EUT Name	Notebook Computer
Under Test Model Name	IPASON P3
Sample No.	BTFSN230321E004-1/1

### 2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Rechargeable Battery	
	Capacity	5000mAh
	Rated Voltage	7.6V

### 2.6 Technical Information

Network and Wireless connectivity	2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/HT40) 5G WIFI 802.11a, 802.11n(HT20/HT40), 802.11ac(VHT20/VHT40/VHT80) Bluetooth (EDR+BLE)
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The requirement for the following technical information of the EUT was tested in this report:

Operating Mode	WLAN, Bluetooth	
Frequency Band	802.11b/g/n(HT20)	2412 ~ 2462 MHz
	802.11n(HT40)	2422 ~ 2452 MHz
	802.11a/802.11n(HT20/HT40)/ 802.11ac(VHT20/VHT40/VTH80)	5150 ~ 5250 MHz 5725 ~ 5850 MHz
Antenna Type	BT: PIFA Antenna WLAN: PIFA Antenna	
Hotspot Function	Not Support	
Power Reduction	Not Support	
Exposure Category	General Population/Uncontrolled exposure	
EUT Stage	Portable Device	
Product	Type	
	<input type="checkbox"/> Production unit	<input checked="" type="checkbox"/> Identical prototype

### 3. Summary of Test Results

#### 3.1 Test Standards

No.	Identity	Document Title
1	47 CFR Part 2.1093	Radio frequency radiation exposure evaluation: portable devices
2	IEEE1528-2013	Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate in the Human Head from Wireless Communications Devices: Measurement Techniques
3	IEEE C95.1-2019	IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz
4	KDB 447498 D01	General RF Exposure Guidance v06
5	KDB 447498 D04	Interim General RF Exposure Guidance v01
6	KDB 865664 D01	SAR measurement 100MHz to 6GHz v01r04
7	KDB 865664 D02	RF Exposure Reporting v01r02
8	KDB 248227 D01	802.11 Wi-Fi SAR v02r02
9	KDB 616217 D04	SAR for laptop and tablets v01r02
10	KDB 690783 D01	SAR Listings on Grant v01r03

## 3.2 Device Category and SAR Limit

This device belongs to portable device category because its radiating structure is allowed to be used within 20 centimeters of the body of the user. Limit for General Population/Uncontrolled exposure should be applied for this device, it is 1.6 W/kg as averaged over any 1 gram of tissue.

Body Position	SAR Value (W/Kg)	
	General Population/Uncontrolled Exposure	Occupational/Controlled Exposure
Whole-Body SAR (averaged over the entire body)	0.08	0.4
Partial-Body SAR (averaged over any 1 gram of tissue)	1.60	8.0
SAR for hands, wrists, feet and ankles (averaged over any 10 grams of tissue)	4.0	20.0

NOTE:

**General Population/Uncontrolled Exposure:** Locations where there is the exposure of individuals who have no knowledge or control of their exposure. General population/uncontrolled exposure limits are applicable to situations in which the general public may be exposed or in which persons who are exposed as a consequence of their employment may not be made fully aware of the potential for exposure or cannot exercise control over their exposure. Members of the general public would come under this category when exposure is not employment-related; for example, in the case of a wireless transmitter that exposes persons in its vicinity.

**Occupational/Controlled Exposure:** Locations where there is exposure that may be incurred by persons who are aware of the potential for exposure. In general, occupational/controlled exposure limits are applicable to situations in which persons are exposed as a consequence of their employment, who have been made fully aware of the potential for exposure and can exercise control over their exposure. This exposure category is also applicable when the exposure is of a transient nature due to incidental passage through a location where the exposure levels may be higher than the general population/uncontrolled limits, but the exposed person is fully aware of the potential for exposure and can exercise control over his or her exposure by leaving the area or by some other appropriate means.

## 3.3 Test Result Summary

The maximum results of Specific Absorption Rate (SAR) found during test as bellows:

< Highest Reported standalone SAR Summary >

Exposure Position	Frequency Band	Reported SAR (W/kg)	Equipment Class	Highest Reported SAR (W/kg)	
Body 1-g SAR (0 mm Gap)	WLAN 2.4 GHz	0.176	DTS	0.192	
	Bluetooth	0.051	DSS		
	WLAN 5.2 GHz	0.123	NII		
	WLAN 5.8 GHz	0.192			

\*This device is in compliance with Specific Absorption Rate(SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedures specified in IEEE 1528-2013.

< Highest Reported Simultaneous SAR >

Exposure Position	Simultaneous Configuration	Highest Reported Simultaneous Transmission SAR (W/kg)	Limit (W/kg)	Verdict
Body 1-g SAR	5.8 G Wifi + Bluetooth	0.243	1.6	Pass

### 3.4 Test Uncertainty

#### 3.4.1 Measurement uncertainty evaluation for SAR test

#### Measurement uncertainty evaluation for SAR test (300MHz to 6GHz)

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+- %)	10 g Ui (+- %)	Vi eff
<b>Measurement System</b>								
Probe calibration	5.8	N	1	1	1	5.80	5.80	$\infty$
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	1.0	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	1.0	R	$\sqrt{3}$	1	1	0.58	0.58	$\infty$
Modulation response	3.0	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	0.81	0.81	$\infty$
RF ambient Conditions - Noise	3.0	R	$\sqrt{3}$	1	1	1.73	1.73	$\infty$
RF ambient Conditions - Reflections	3.0	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 Evaluation	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	3.0	N	1	1	1	3.00	3.00	7
Output power Variation - SAR drift measurement	5.0	R	$\sqrt{3}$	1	1	2.89	2.89	$\infty$
SAR scaling	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	$\infty$
<b>Phantom and Tissue Parameters</b>								
Phantom Shell Uncertainty - Shape,Thickness and Permittivity	4	R	$\sqrt{3}$	1	1	2.31	2.31	$\infty$
Uncertainty in SAR correction for deviation in permittivity and conductivity	2.0	N	1	1	0.84	2.00	1.68	$\infty$
Liquid conductivity measurement	4.0	N	1	0.78	0.71	3.12	2.84	5
Liquid permittivity measurement	5.0	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	$\infty$
Combined Standard Uncertainty		RSS				10.47	10.34	
Expanded Uncertainty (95% Confidence interval)		k				20.95	20.69	

\* This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.

### 3.4.2 Measurement uncertainty evaluation for system check

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10 g)	1g Ui (+- %)	10 g Ui (+- %)	Vi veff
<b>Measurement System</b>								
Probe calibration	5.8	N	1	1	1	5.80	5.80	$\infty$
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	2.71	2.71	$\infty$
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 Evaluation	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 driftmeasurement	0.5	R	$\sqrt{3}$	1	1	0.29	0.29	$\infty$
Dipole Axis to Liquid Dist.	2.0	R	$\sqrt{3}$	1	1	1.15	1.15	$\infty$
<b>Phantom and Tissue Parameters</b>								
Phantom Shell Uncertainty - Shape, Thickness and Permittivity	4	R	$\sqrt{3}$	1	1	2.31	2.31	$\infty$
Uncertainty in SAR correction for deviation in permittivity and conductivity	2.0	N	1	1	0.84	2.00	1.68	$\infty$
Liquid conductivity measurement	4	N	1	0.78	0.71	3.12	2.84	5
Liquid permittivity measurement	5.0	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	$\infty$
Combined Standard Uncertainty		RSS				10.16	10.03	
Expanded Uncertainty (95% Confidence interval)		k				20.32	20.06	

## 4. Measurement System

### 4.1 Specific Absorption Rate (SAR) Definition

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:

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

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

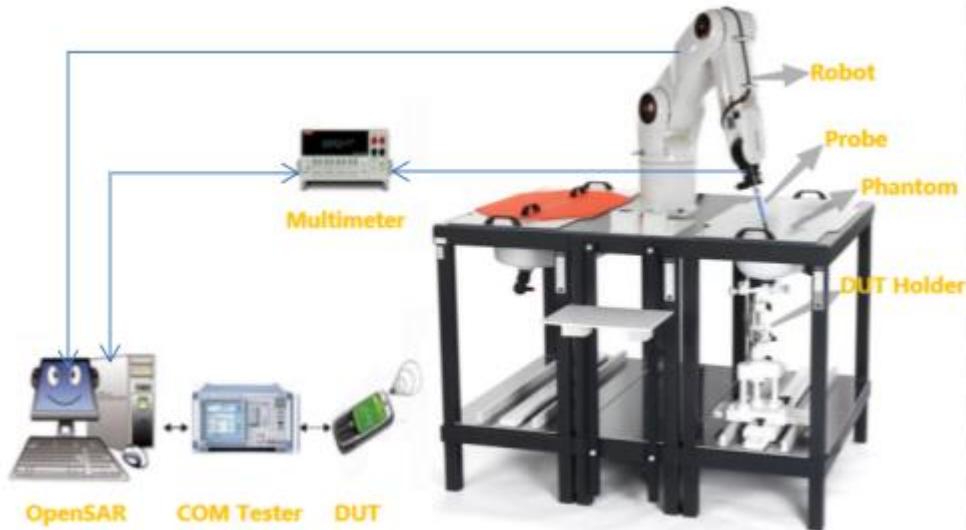
$$\mathbf{SAR} = \frac{\sigma E^2}{\rho}$$

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

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

### 4.2 MVG SAR System

#### 4.2.1 SAR system diagram



#### 4.2.2 Robot



A standard high precision 6-axis robot (Denso) with teaches pendant with Scanning System

- It must be able to scan all the volume of the phantom to evaluate the tridimensional distribution of SAR.
- Must be able to set the probe orthogonal of the surface of the phantom ( $\pm 30^\circ$ ).
- Detects stresses on the probe and stop itself if necessary to keep the integrity of the probe.

#### 4.2.3 E-Field Probe

For the measurements, the Specific Dosimetric SSE2 E-Field Probe with following specifications is used:

- Dynamic range: 0.01-100 W/kg
- Tip diameter: 2mm for SSE2
- Distance between probe tip and sensor centre: 1mm for SSE2
- Distance between sensor centre and the inner phantom surface: 2mm for  $f \geq 4\text{GHz}$ .
- Probe linearity: <0.25dB.
- Axial Isotropy: <0.25dB.
- Spherical Isotropy: <0.50dB.
- Calibration range: 150 to 6000 MHz for head & body simulating liquid
- Angle between probe axis (evaluation axis) and surface normal line: less than  $20^\circ$ .

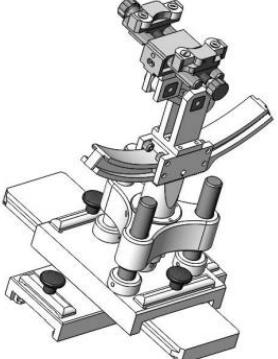


#### 4.2.4 Phantoms

SAM Phantom	
For the measurements the Specific Anthropomorphic Mannequin (SAM) defined by the IEEE SCC-34/SC2 group is used. The probe scanning of the E-Field is done in the 2 halves of the normalized head. The normalized shape of the phantom corresponds to the dimensions of 90% of an adult head size. It enables the dosimetric evaluation of left and right-hand phone usage and includes an additional flat phantom part for the simplified body performance check. The phantom set-up includes a cover, which prevents the evaporation of the liquid.	
	The thickness of the phantom amounts to $2 \text{ mm} \pm 0.2 \text{ mm}$ . The materials for the phantom do not affect the radiation of the device under test (DUT) : $\epsilon_r' < 5$ The head is filled with tissue simulating liquid. The hand do not have to be modeled.
TWIN SAM phantom	
Mechanical	Electrical
Overall thickness	$2 \pm 0.2 \text{ mm}$ (except ear area)
Dimensions	1000 mm(L) x 500 mm(W) x 200 mm(H)
Maximum volume	27 L
Material	Fiberglass based

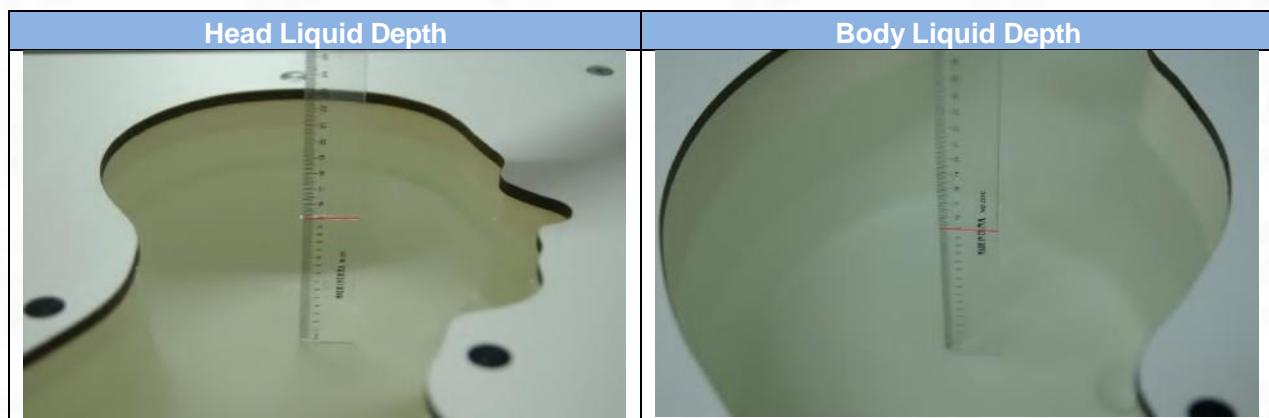
ELLIPTICAL Phantom	
The phantom is for Body performance check filled with tissue-equivalent liquid to a depth of at least 150 mm, whose shell material is resistant to damage or reaction with tissue-equivalent liquid chemicals.	
	The shape of the phantom is an ellipse with length $600\text{mm} \pm 5\text{mm}$ and width $400\text{mm} \pm 5\text{mm}$ . The phantom shell is made of low-loss and low-permittivity material, having loss tangent $\tan\delta \leq 0.05$ and relative permittivity: $\epsilon_r' \leq 5$ for $f \leq 3 \text{ GHz}$ $3 \leq \epsilon_r' \leq 5$ for $f > 3 \text{ GHz}$ The thickness of the bottom-wall of the flat phantom is 2.0 mm with a tolerance of $\pm 0.2 \text{ mm}$ .
Technical & mechanical characteristics	
Shell thickness	$2 \text{ mm} \pm 0.2 \text{ mm}$
Filling volume	25 L
Dimensions	600 mm x 400 mm x 200mm
Permittivity	4.4
Loss tangent	0.017

#### 4.2.5 Device Holder

													
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">System Material</th><th style="text-align: center;">Permittivity</th><th style="text-align: center;">Loss tangent</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">Delrin</td><td style="text-align: center;">3.7</td><td style="text-align: center;">0.005</td></tr> </tbody> </table>	System Material	Permittivity	Loss tangent	Delrin	3.7	0.005	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">System Material</th><th style="text-align: center;">Permittivity</th><th style="text-align: center;">Loss tangent</th></tr> </thead> <tbody> <tr> <td style="text-align: center;">PMMA</td><td style="text-align: center;">2.9</td><td style="text-align: center;">0.028</td></tr> </tbody> </table>	System Material	Permittivity	Loss tangent	PMMA	2.9	0.028
System Material	Permittivity	Loss tangent											
Delrin	3.7	0.005											
System Material	Permittivity	Loss tangent											
PMMA	2.9	0.028											
<small>The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1°.</small>													

#### 4.2.6 Simulating Liquid

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid height from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm. For body SAR testing, the liquid height from the center of the flat phantom to the liquid top surface is larger than 15 cm. The nominal dielectric values of the tissue simulating liquids in the phantom and the tolerance of 5%.



The following table gives the recipes for tissue simulating liquid and the theoretical Conductivity/Permittivity.

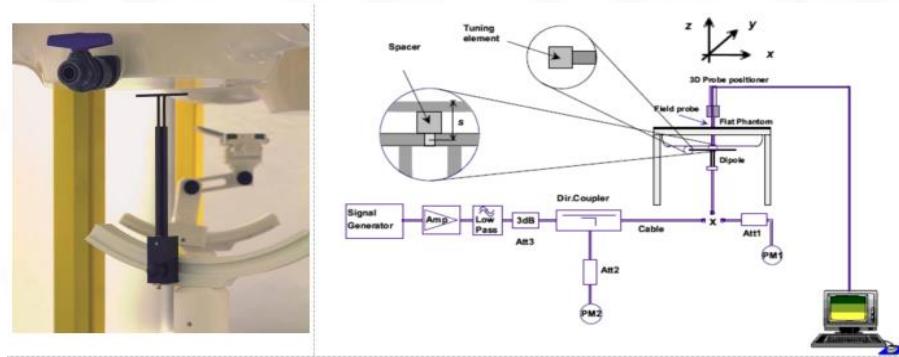
Head (Reference IEEE1528)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity $\sigma$ (S/m)	Permittivity $\epsilon$
750	41.1	57.0	0.2	1.4	0.2	0	0.89	41.9
835	40.3	57.9	0.2	1.4	0.2	0	0.90	41.5
900	40.3	57.9	0.2	1.4	0.2	0	0.97	41.5
1800, 1900, 2000	55.2	0	0	0.3	0	44.5	1.4	40.0
2450	55.0	0	0	0.1	0	44.9	1.80	39.2
2600	54.9	0	0	0.1	0	45.0	1.96	39.0
Frequency (MHz)	Water (%)	Hexyl Carbitol			Triton X-100		Conductivity $\sigma$ (S/m)	Permittivity $\epsilon$
5200	62.52	17.24			17.24		4.66	36.0
5800	62.52	17.24			17.24		5.27	35.3
Body (From instrument manufacturer)								
Frequency (MHz)	Water (%)	Sugar (%)	Cellulose (%)	Salt (%)	Preventol (%)	DGBE (%)	Conductivity $\sigma$ (S/m)	Permittivity $\epsilon$
750	51.7	47.2	0	0.9	0.1	0	0.96	55.5
835	50.8	48.2	0	0.9	0.1	0	0.97	55.2
900	50.8	48.2	0	0.9	0.1	0	1.05	55.0
1800, 1900, 2000	70.2	0	0	0.4	0	29.4	1.52	53.3
2450	68.6	0	0	0.1	0	31.3	1.95	52.7
2600	68.2	0	0	0.1	0	31.7	2.16	52.5
Frequency(MHz)	Water	DGBE			Salt		Conductivity $\sigma$ (S/m)	Permittivity $\epsilon$
5200	78.60	21.40			/		5.30	49.00
5800	78.50	21.40			0.1		6.00	48.20

## 5. System Verification

### 5.1 Purpose of System Check

The system performance check verifies that the system operates within its specifications. System and operator errors can be detected and corrected. It is recommended that the system performance check be performed prior to any usage of the system in order to guarantee reproducible results. The system performance check uses normal SAR measurements in a simplified setup with a well characterized source. The setup was selected to give a high sensitivity to all parameters that might fail or vary over time. The system check does not intend to replace the calibration of the components, but indicates situations where the system uncertainty is exceeded due to drift or failure.

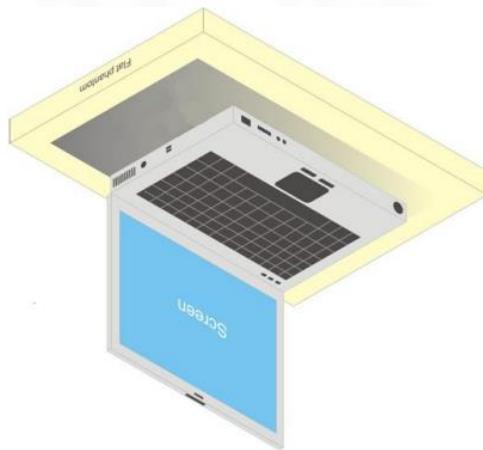
## 5.2 System Check Setup



## 6. Test Position Configurations

### 6.1 Positioning of the DUT in Relation to the Phantom

For laptop PC, according to KDB 616217 D04, SAR evaluation is required for the bottom surface of the keyboard. This EUT was tested in the base of EUT directly against the flat phantom. The required minimum test separation distance for incorporating transmitters and antennas into laptop computer display is determined with the display screen opened at an angle of 90° to the keyboard compartment.



## 6.2 SAR Testing with Wi-Fi Transmitter

<KDB 248227 D01, SAR Guidance for Wi-Fi Transmitters>

(1) For handsets operating next to ear, hotspot mode or mini-tablet configurations, the initial test position procedures were applied. The test position with the highest extrapolated peak SAR will be used as the initial test position. When the reported SAR of initial test position is  $\leq 0.4$  W/kg, SAR testing for remaining test positions is not required. Otherwise, SAR is evaluated at the subsequent highest peak SAR positions until the reported SAR result is  $\leq 0.8$  W/kg or all test positions are measured.

(2) For WLAN 2.4 GHz, the highest measured maximum output power channel for DSSS was selected for SAR measurement. When the reported SAR is  $\leq 0.8$  W/kg, no further SAR testing is required. Otherwise, SAR is evaluated at the next highest measured output power channel. When any reported SAR is  $> 1.2$  W/kg, SAR is required for the third channel. For OFDM modes (802.11g/n), SAR is not required when the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and it is  $\leq 1.2$  W/kg.

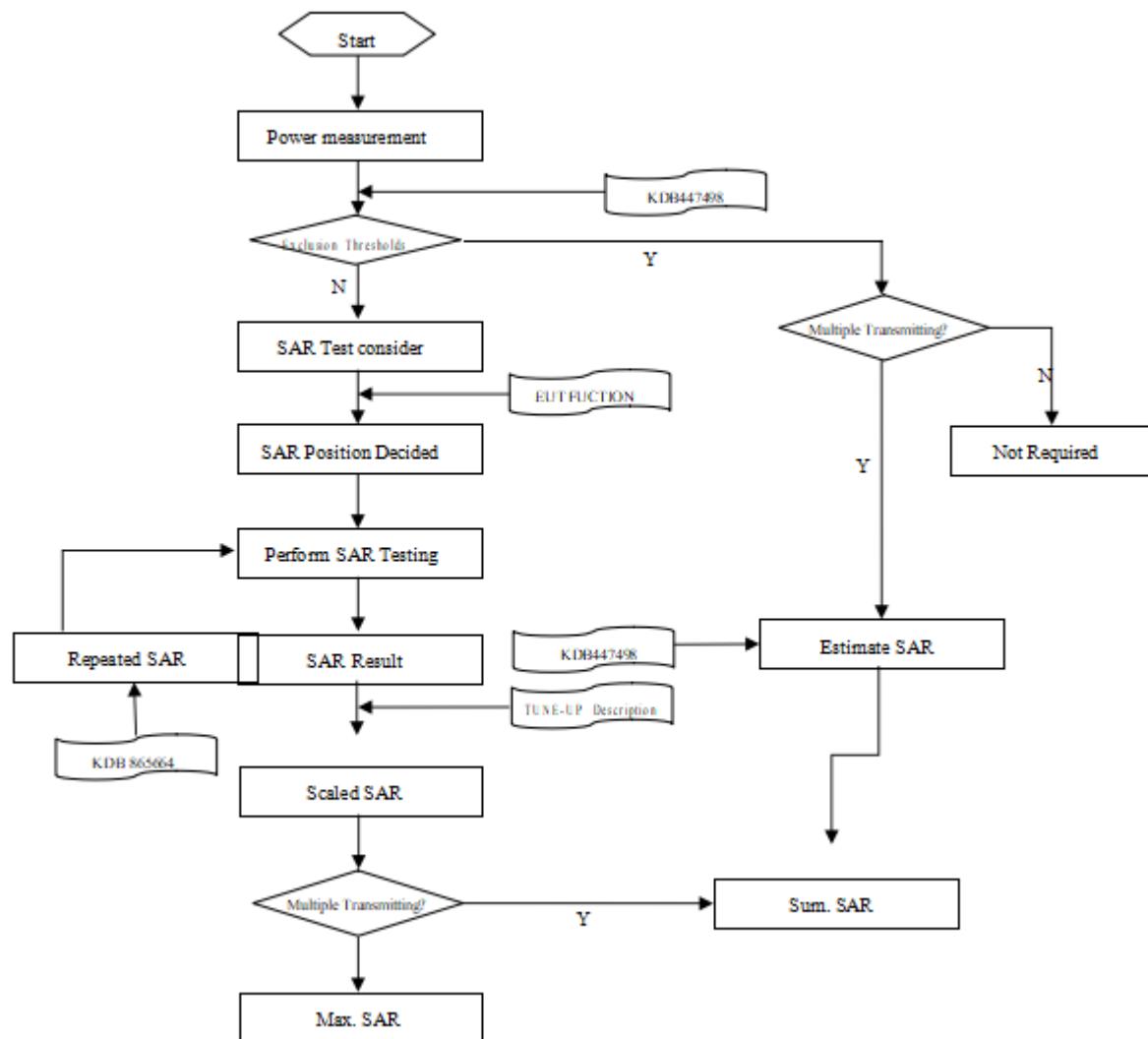
(3) For WLAN 5GHz, the initial test configuration was selected according to the transmission mode with the highest maximum output power. When the reported SAR of initial test configuration is  $> 0.8$  W/kg, SAR is required for the subsequent highest measured output power channel until the reported SAR result is  $\leq 1.2$  W/kg or all required channels are measured. For other transmission modes, SAR is not required when the highest reported SAR for initial test configuration is adjusted by the ratio of subsequent test configuration to initial test configuration specified maximum output power and it is  $\leq 1.2$  W/kg.

(4) For WLAN MIMO mode, the power-based standalone SAR test exclusion or the sum of SAR provision in KDB 447498 to determine simultaneous transmission SAR test exclusion should be applied. Otherwise, SAR for MIMO mode will be measured with all applicable antennas transmitting simultaneously at the specified maximum output power of MIMO operation.

## 7. Measurement Procedure

### 7.1 Measurement Process Diagram

Body SAR



## 7.2 SAR Scan General Requirement

Probe boundary effect error compensation is required for measurements with the probe tip closer than half a probe tip diameter to the phantom surface. Both the probe tip diameter and sensor offset distance must satisfy measurement protocols; to ensure probe boundary effect errors are minimized and the higher fields closest to the phantom surface can be correctly measured and extrapolated to the phantom surface for computing 1 g SAR. Tolerances of the post-processing algorithms must be verified by the test laboratory for the scan resolutions used in the SAR measurements, according to the reference distribution functions specified in IEEE Std 1528-2013.

		$\leq 3\text{GHz}$	$>3\text{GHz}$			
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface		$5\pm 1\text{ mm}$	$\frac{1}{2}\cdot\delta\cdot\ln(2)\pm 0.5\text{ mm}$			
Maximum probe angle from probe axis to phantom surface normal at the measurement location		$30^\circ\pm 1^\circ$	$20^\circ\pm 1^\circ$			
Maximum area scan spatial resolution: $\Delta x$ Area , $\Delta y$ Area		$\leq 2\text{ GHz: } \leq 15\text{ mm}$ $2 - 3\text{ GHz: } \leq 12\text{ mm}$	$3 - 4\text{ GHz: } \leq 12\text{ mm}$ $4 - 6\text{ GHz: } \leq 10\text{ mm}$			
		When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.				
Maximum zoom scan spatial resolution: $\Delta x$ Zoom , $\Delta y$ Zoom		$\leq 2\text{ GHz: } \leq 8\text{ mm}$ $2 - 3\text{ GHz: } \leq 5\text{ mm}^*$	$3 - 4\text{ GHz: } \leq 5\text{ mm}^*$ $4 - 6\text{ GHz: } \leq 4\text{ mm}^*$			
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z$ Zoom (n)	$\leq 5\text{ mm}$	$3 - 4\text{ GHz: } \leq 4\text{ mm}$			
			$4 - 5\text{ GHz: } \leq 3\text{ mm}$ $5 - 6\text{ GHz: } \leq 2\text{ mm}$			
Minimum zoom scan volume	x, y, z	$\leq 4\text{ mm}$	$3 - 4\text{ GHz: } \leq 3\text{ mm}$ $4 - 5\text{ GHz: } \leq 2.5\text{ mm}$			
			$5 - 6\text{ GHz: } \leq 2\text{ mm}$			
Note:						
1. $\delta$ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528- 2011 for details.						
2. * When zoom scan is required and the reported SAR from the area scan based 1 g SAR estimation procedures of KDB 447498 is $\leq 1.4\text{ W/kg}$ , $\leq 8\text{ mm}$ , $\leq 7\text{ mm}$ and $\leq 5\text{ mm}$ zoom scan resolution may be applied, respectively, for 2 GHz to 3GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.						

## 7.3 Measurement Procedure

The following steps are used for each test position

- a. 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
- b. Measurement of the local E-field value at a fixed location. This value serves as a reference value for calculating a possible power drift.
- c. 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.
- d. 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.

## 7.4 Area & Zoom Scan Procedure

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 D01v01r04 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.

## 8. Conducted RF Output Power

### 8.1 Wifi

#### 2.4G

Band (GHz)	Mode	Channel	Freq. (MHz)	Average Conducted Output Power (dBm)	Maximum Tune-up(dBm)	SAR Test Required.
2.4g (2.4~2.4835)	802.11b	1	2412	14.14	14.50	No
		6	2437	<b>15.02</b>	<b>15.50</b>	Yes
		11	2462	14.26	14.50	No
	802.11g	1	2412	14.30	14.50	No
		6	2437	14.60	15.00	No
		11	2462	14.16	14.50	No
	802.11n(HT20)	1	2412	14.21	14.50	No
		6	2437	14.62	15.00	No
		11	2462	14.21	14.50	No
	802.11n(HT40)	3	2422	12.67	13.00	No
		6	2437	14.32	14.50	No
		9	2452	13.00	13.00	No
Band (GHz)	Mode	Channel	Freq. (MHz)	Average Power (dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-1 (5.150~5.250)	802.11a	36	5180	9.29	9.50	No
		40	5200	9.09	9.50	No
		48	5240	9.54	10.00	No
	802.11n(HT20)	36	5180	9.15	9.50	No
		40	5200	9.15	9.50	No
		48	5240	9.45	9.50	No
	802.11ac(VHT20)	36	5180	9.32	9.50	No
		40	5200	9.26	9.50	No
		48	5240	9.60	10.00	No
	802.11n(HT40)	38	5190	10.08	10.50	No
		46	5230	10.16	10.50	No
	802.11ac(VHT40)	38	5190	10.14	10.50	No
		46	5230	<b>10.42</b>	<b>10.50</b>	Yes
	802.11ac(VHT80)	42	5210	10.29	10.50	No
Band (GHz)	Mode	Channel	Freq. (MHz)	Average Power (dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-3 (5.725~5.850)	802.11a	149	5745	10.43	10.50	No
		157	5785	10.55	11.00	No
		165	5825	10.14	10.50	No
	802.11n(HT20)	149	5745	10.38	10.50	No
		157	5785	10.58	11.00	No
		165	5825	10.21	10.50	No
	802.11ac(VHT20)	149	5745	10.41	10.50	No
		157	5785	10.61	11.00	No
		165	5825	10.23	10.50	No
	802.11n(HT40)	151	5755	10.68	11.00	No
		159	5795	10.34	10.50	No
	802.11ac(VHT40)	151	5755	<b>10.79</b>	<b>11.00</b>	Yes
		159	5795	10.57	11.00	No
	802.11ac(VHT80)	155	5775	10.54	11.00	No

## 8.2 Bluetooth

EDR	Mode	Maximum Tune-up(dBm)	Average Conducted Output Power (dBm)		
			0	39	78
			2402MHz	2441MHz	2480MHz
BLE	GFSK	<b>7.00</b>	6.15	<b>6.85</b>	6.73
	$\pi/4$ QPSK	7.00	6.13	6.85	6.74
	8DPSK	7.00	6.14	6.83	6.72
BLE	Mode	Maximum Tune-up(dBm)	Average Conducted Output Power (dBm)		
			0	19	39
			2402MHz	2440MHz	2480MHz
	GFSK	6.50	5.41	6.03	5.84

Channel	Frequency (GHz)	Max. Tune-up Power (dBm)	Max. Power (mW)	Test distance (mm)	Exclusion thresholds for 1-g SAR(mW)	RF exposure evaluation required
39	2.441	7.00	5.01	0	2.75	Yes

**Note**

1. Per KDB 447498 D04 Interim General RF Exposure Guidance v01, the 1-g SAR test exclusion thresholds for 300 MHz to 6 GHz at *test separation distances*  $\leq 40$  cm are determined by:

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

where

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

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

and  $f$  is in GHz,  $d$  is the separation distance (cm), and  $ERP_{20\text{cm}}$  is per Formula (B.1).

\*When the minimum test separation distance is  $< 5$  mm, a distance of 5 mm is applied to determine estimated SAR.

2. Per KDB 248227 D01 v02r02, choose the highest output power channel to test SAR and determine further SAR exclusion.

3. The output power of all data rate were prescan, just the worst case (the lowest data rate) of all mode were shown in report.

## 9. Test Exclusion Consideration

Antenna information:



Positions for SAR test						
Antenna	Front Side	Back Side	Left Edge	Right Edge	Top Edge	Bottom Edge
BT/WLAN	No	No	No	No	No	Yes

### 9.1 SAR Test Exclusion Consideration Table

Per KDB 447498 requires when the standalone SAR test exclusion of section 4.3.1 is applied to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to the following format to determine simultaneous transmission SAR test exclusion:

(max.power of channel, including tune-up tolerance, mW) / (min. test separation distance, mm)] · [ $\sqrt{f(\text{GHz})} / x$ ]  
W/kg for test separation distances  $\leq 50$  mm;  
where  $x = 7.5$  for 1-g SAR, and  $x = 18.75$  for 10-g SAR.

0.4 W/Kg for 1-g SAR and 1.0 W/kg for 10-g SAR, when the test separation distances is  $> 50$  mm  
Per FCC KDB 447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific physical test configuration is  $\leq 1.6$  W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

$$\text{Ratio} = \frac{(\text{SAR}_1 + \text{SAR}_2)^{1.5}}{(\text{peak location separation, mm})} < 0.04$$

## 10. Test Result

### General Notes:

The maximum SAR Value of each test band is marked bold.

The SAR test shall be performed at the high, middle and low frequency channels of each operating mode. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (<1.0 W/kg), testing at the high and low channels is optional apart for the worst-case configuration.

SAR plot is provided only for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.

The calculated SAR is obtained by the following formula:

$$\text{Reported SAR} = \text{Measured SAR} * 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Scaling factor} = 10^{(P_{\text{target}} - P_{\text{measured}})/10}$$

$$\text{Reported SAR} = \text{Measured SAR} * \text{Scaling factor}$$

Where

Ptarget is the power of manufacturing upper limit;

Pmeasured is the measured power;

Measured SAR is measured SAR at measured power which including power drift.

Reported(Scaled) SAR which including Power Drift and Scaling factor.

Body (0mm Gap)													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (dB)	1g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	1g Scaled SAR (W/kg)	Meas. No.
2.4g Wifi 802.11b	Bottom	0	6	2437	-3.030	0.158	100.00	1.000	15.02	15.50	1.117	0.176	1#
5.2g Wifi 802.11ac(VHT40)	Bottom	0	46	5230	-1.070	0.121	100.00	1.000	10.42	10.50	1.019	0.123	2#
5.8g Wifi 802.11ac(VHT40)	Bottom	0	151	5755	1.750	0.183	100.00	1.000	10.79	11.00	1.050	0.192	3#
Bluetooth EDR-GFSK	Bottom	0	39	2441	-1.800	0.049	100.00	1.000	6.85	7.00	1.035	0.051	4#

Remark:

1. The value with bold black color is the maximum SAR Value of each test band.
2. Per FCC KDB Publication 447498 D01, if the reported (scaled) SAR measured at the middle channel or highest output power channel for each test configuration is  $\leq 0.8$  W/Kg then testing at the other channels is optional for such test configuration(s).

## 11. Simultaneous Transmission

Per KDB447498 D01, simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. When the sum of SAR 1g of all simultaneously transmitting antennas in an operating mode and exposure condition combination is within the SAR limit (SAR 1g 1.6 W/kg), the simultaneous transmission SAR is not required. When the sum of SAR 1g is greater than the SAR limit (SAR 1g 1.6 W/kg), SAR test exclusion is determined by the SAR to Peak Location Ratio (SPLSR).

The simultaneous transmitting antennas in each operating mode and exposure condition combination must be considered one pair at a time to determine the SAR to peak location separation ratio to qualify for test exclusion. The ratio is determined by  $(\text{SAR1} + \text{SAR2})^{1.5}/\text{R}_i$ , rounded to two decimal digits, and must be  $\leq 0.04$  for all antenna pairs in the configuration to qualify for 1-g SAR test exclusion. SAR1 and SAR2 are the highest reported or estimated SAR for each antenna in the pair, and  $\text{R}_i$  is the separation distance between the peak SAR locations for the antenna pair in mm. When standalone test exclusion applies, SAR is estimated; the peak location is assumed to be at the feed-point or geometric center of the antenna.

### 11.1 Simultaneous Transmission Mode Considerations

Simultaneous transmission SAR test exclusion is determined for each operating configuration and exposure condition according to the reported standalone SAR of each applicable simultaneous transmitting antenna. The device has 1 antenna, WLAN/BT Ant. supports 2.4G/5G Wi-Fi and BT.

Simultaneous transmitting configurations	Body
WLAN + BT	Yes

### 11.2 Sum SAR of Simultaneous Transmission

#### 11.2.1 Body-Worn Simultaneous Transmission SAR Evaluation for Ant. 0 with Wifi & BT and Ant. 1 with Wifi

Position	Standalone SAR (Reported SAR 1-g (W/Kg))			Sum SAR1-g (W/Kg) Wlan-2.4g Wifi + Bluetooth	Sum SAR1-g (W/Kg) Wlan-5g Wifi + Bluetooth	SAR1-g Limit (W/Kg)	Peak location separation ratio (PLSR)	Simultaneous Meas. Required
	Wlan-2.4g Wifi	Wlan-5g Wifi	Bluetooth					
Bottom	0.176	0.192	0.051	0.227	<b>0.243</b>	1.6	no	no

## 12. SAR Measurement Variability

According to KDB 865664 D01, SAR measurement variability was assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. When both head and body tissue-equivalent media are required for SAR measurements in a frequency band, the variability measurement procedures should be applied to the tissue medium with the highest measured SAR, using the highest measured SAR configuration for that tissue-equivalent medium. Alternatively, if the highest measured SAR for both head and body tissue-equivalent media are  $\leq 1.45$  W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is  $\leq 1.10$ , the highest SAR configuration for either head or body tissue-equivalent medium may be used to perform the repeated measurement. These additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

SAR repeated measurement procedure:

1. When the highest measured SAR is  $< 0.80$  W/kg, repeated measurement is not required.
2. When the highest measured SAR is  $\geq 0.80$  W/kg, repeat that measurement once.
3. If the ratio of largest to smallest SAR for the original and first repeated measurements is  $> 1.20$ , or when the original or repeated measurement is  $\geq 1.45$  W/kg, perform a second repeated measurement.
4. If the ratio of largest to smallest SAR for the original, first and second repeated measurements is  $> 1.20$ , and the original, first or second repeated measurement is  $\geq 1.5$  W/kg, perform a third repeated measurement.

Note: For 1g SAR, the highest measured 1g SAR is 0.183  $< 0.80$  W/kg, repeated measurement is not required.

## 13. Test Equipment List

Description	Manufacturer	Model	Serial No./Version	Cal. Date	Cal. Due
E-Field Probe	MVG	SSE2	04/22 EPGO365	2023/02/06	2024/02/05
6 1/2 Digital Multimeter	Keithley	DMM6500	4527164	2022/11/24	2023/11/23
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	161997	2022/11/24	2023/11/23
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2022/11/24	2023/11/23
E-Series Avg. Power Sensor	KEYSIGHT	E9300A	MY55050017	2022/03/26	2023/03/25
EPM Series Power Meter	KEYSIGHT	E4418B	MY41293435	2022/03/26	2023/03/25
10dB Attenuator	MIDWEST MICROWAVE	263-10dB	/	2022/03/26	2023/03/25
Coupler	MERRIMAC	CWM-10R-10.8G	LOT-83391	2022/03/26	2023/03/25
2450MHz Validation Dipole	MVG	SID2450	07/22 DIP 2G450-662	2023/02/06	2024/02/05
2600MHz Validation Dipole	MVG	SID2600	07/22 DIP 2G600-663	2023/02/06	2024/02/05
5200MHz-5800MHz Validation Dipole	MVG	SID5000	07/22 DIP5G000-670	2023/02/06	2024/02/05
LIMESAR Dielectric Probe	MVG	SCLMP	06/22 OCPG88	/	/
ENA Series Network Analyzer	Agilent	E5071B	MY42301221	2022/11/24	2023/11/23
Thermometer	Riters	DT-232	21A11	2022/03/26	2023/03/25
Antenna network emulator	MVG	ANTA 74	07/22 ANTA 74	/	/
SAM Phantom	MVG	SAM	07/22 SAM149	/	/
Mobile Phone Positioning System	MVG	MSH 118	07/22 MSH 118	/	/
Mechanical Calibration Kit	PNA	/	/	/	/
Open SAR test software	MVG	/	V5.3.5	/	/

Note: For dipole antennas, BTF has adopted 3 years as calibration intervals, and on annual basis, every measurement dipole has been evaluated and is in compliance with the following criteria:

1. There is no physical damage on the dipole;
2. System validation with specific dipole is within 10% of calibrated value;
3. Return-loss is within 20% of calibrated measurement.
4. Impedance (real or imaginary parts) is within 5 Ohms of calibrated measurement.

## ANNEX A Simulating Liquid Verification Result

The dielectric parameters of the liquids were verified prior to the SAR evaluation using an SCLMP Dielectric Probe Kit.

Frequency (MHz)	Dielectric performance of tissue simulating liquid							
	$\epsilon_r$		$\sigma$ (s/m)		Delta ( $\epsilon_r$ )	Delta ( $\sigma$ )	Limit	Temp (°C)
	Target	Measured	Target	Measured				
2450	39.20	39.08	1.80	1.81	0.31%	-0.56%	±5%	20.0
2600	39.00	38.88	1.96	1.97	0.31%	-0.51%	±5%	20.0
5200	36.00	35.88	4.66	4.70	0.33%	-0.86%	±5%	20.0
5800	35.30	35.18	5.27	5.31	0.34%	-0.76%	±5%	20.0

NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

## ANNEX B System Check Result

Comparing to the original SAR value provided by MVG, the validation data should be within its specification of 10 %(for 1 g).

Frequency (MHz)	Input Power (mW)	1g SAR (W/Kg)	10g SAR (W/Kg)	1g SAR 1W input power normalized (W/Kg)	10g SAR 1W input power normalized (W/Kg)	1g SAR Standard target (1W) (W/Kg)	10g SAR Standard target (1W) (W/Kg)	1g SAR Deviation	10g SAR Deviation
2450	16	0.793	0.352	49.56	22.00	54.4	23.86	-8.89%	-7.80%
2600	16	0.866	0.421	54.13	26.31	57.14	24.48	-5.28%	7.49%
5200	13	0.998	0.294	76.77	22.62	73.88	21.29	3.91%	6.23%
5800	13	1.023	0.280	78.69	21.54	74.21	21.5	6.04%	0.18%

### System Performance Check Data (2450 MHz)

## System check at 2450 MHz

Date of measurement: 24/3/2023

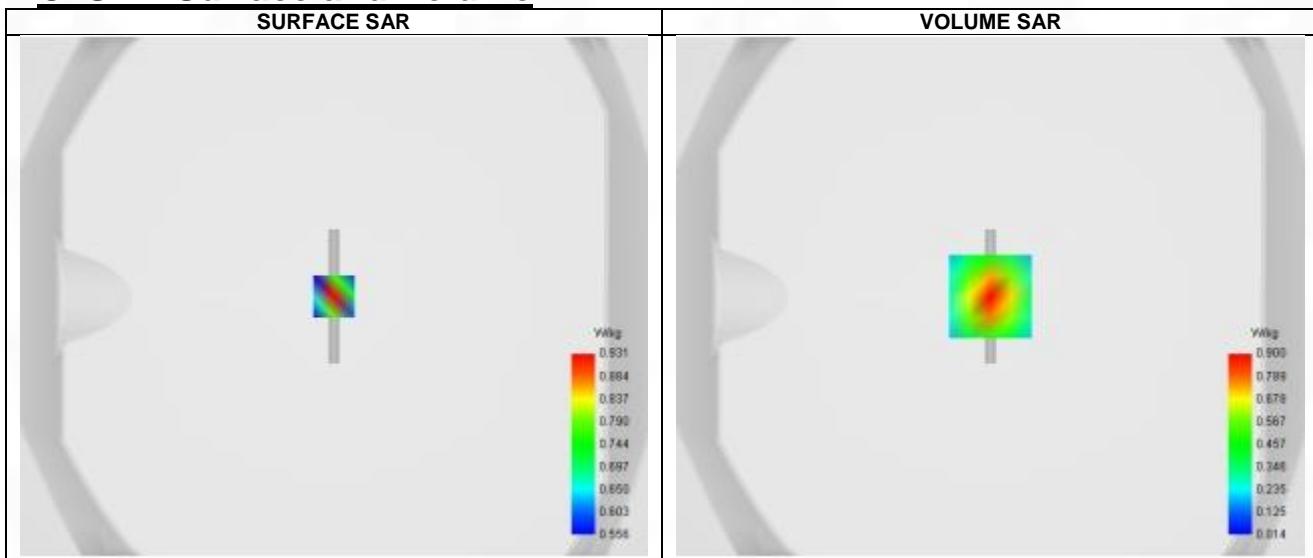
### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.36
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Channels	Middle
Signal	CW

### B. Permittivity

Frequency (MHz)	2450.000
Relative permittivity (real part)	39.080
Relative permittivity (imaginary part)	13.340
Conductivity (S/m)	1.810

### C. SAR Surface and Volume



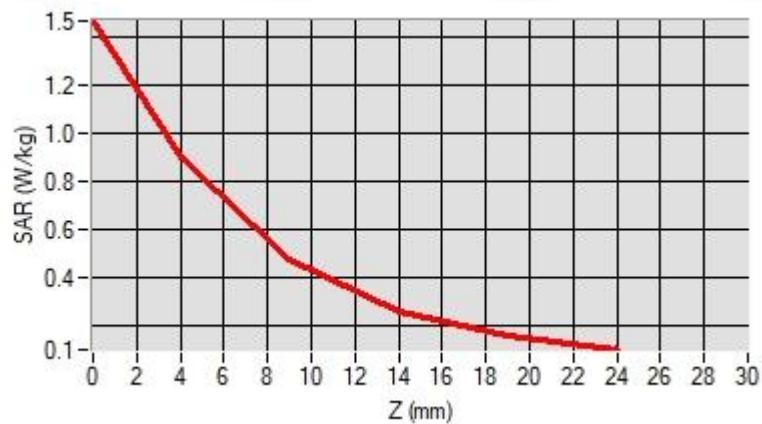
Maximum location: X=0.00, Y=0.00 ; SAR Peak: 1.47 W/kg

### D. SAR 1g & 10g

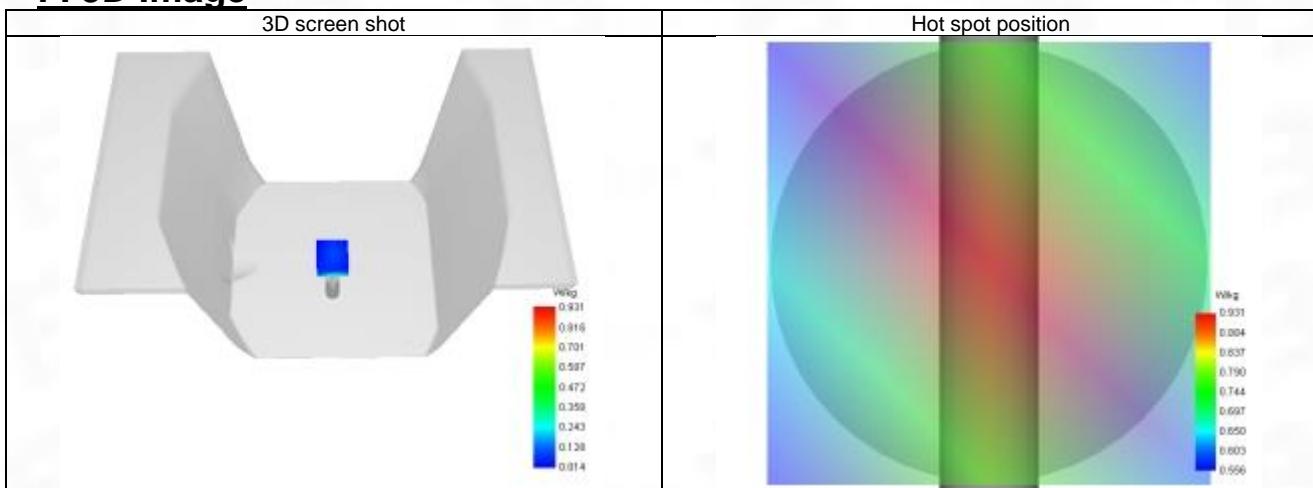
SAR 10g (W/Kg)	0.352
SAR 1g (W/Kg)	0.793
Variation (%)	-2.570
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

### E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.466	0.900	0.477	0.261	0.158



### F. 3D Image



## System Performance Check Data (2600 MHz)

### System check at 2600 MHz

Date of measurement: 24/3/2023

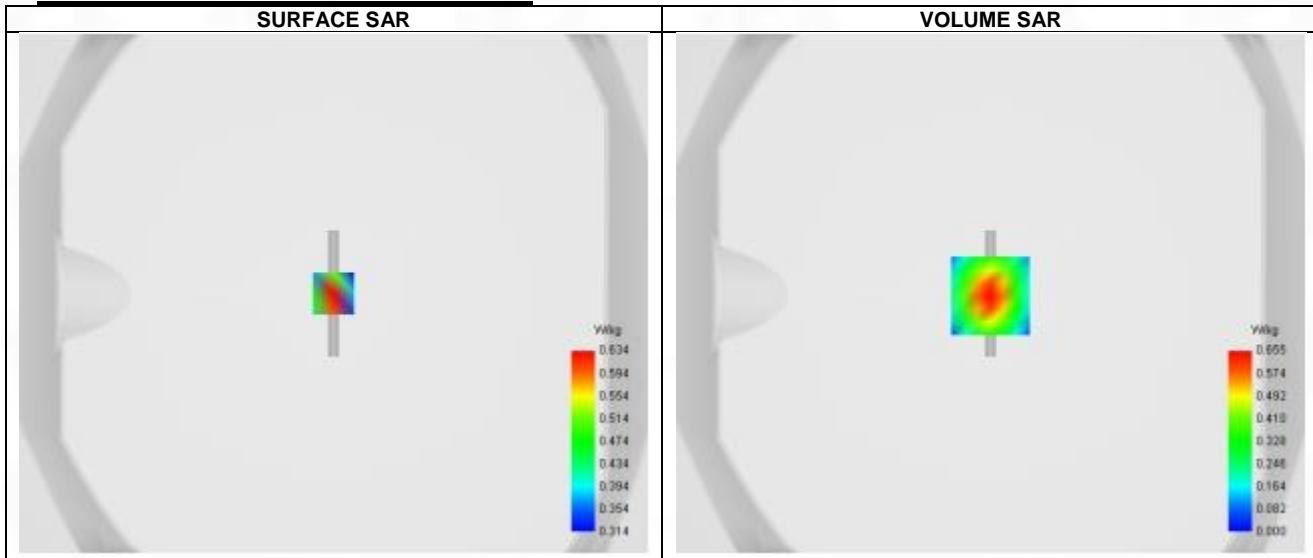
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.40
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Channels	Middle
Signal	CW

#### B. Permittivity

Frequency (MHz)	2600.000
Relative permitivity (real part)	38.880
Relative permitivity (imaginary part)	12.690
Conductivity (S/m)	1.970

#### C. SAR Surface and Volume

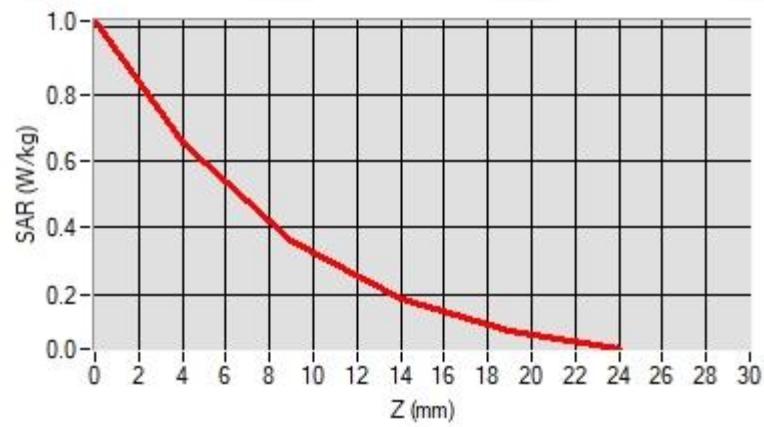


#### D. SAR 1g & 10g

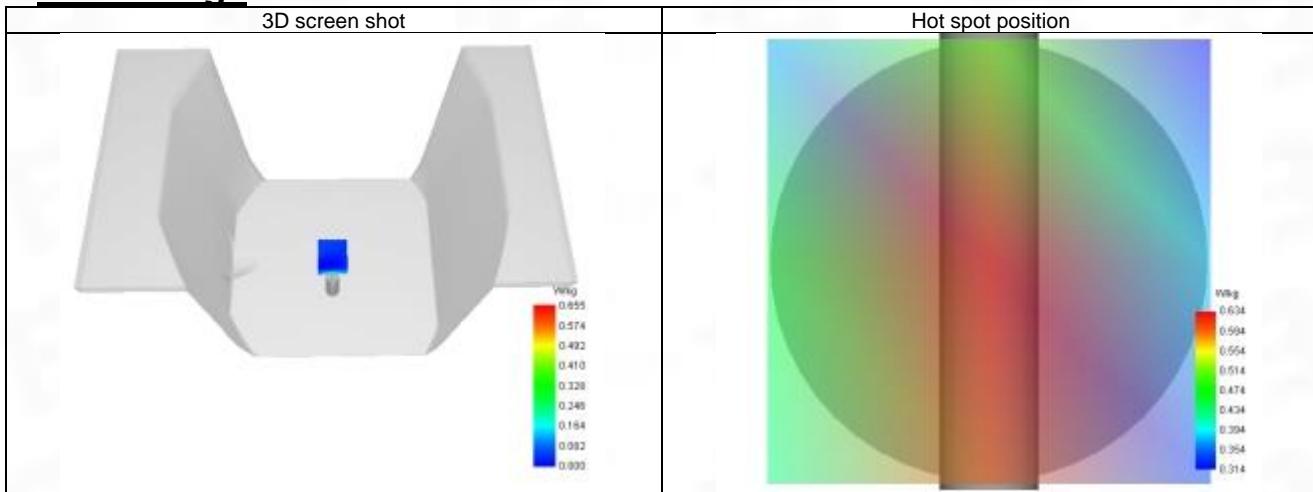
SAR 10g (W/Kg)	0.421
SAR 1g (W/Kg)	0.866
Variation (%)	2.980
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.020	0.655	0.359	0.187	0.091



### F. 3D Image



## System Performance Check Data (5200 MHz)

### System check at 5200 MHz

Date of measurement: 24/3/2023

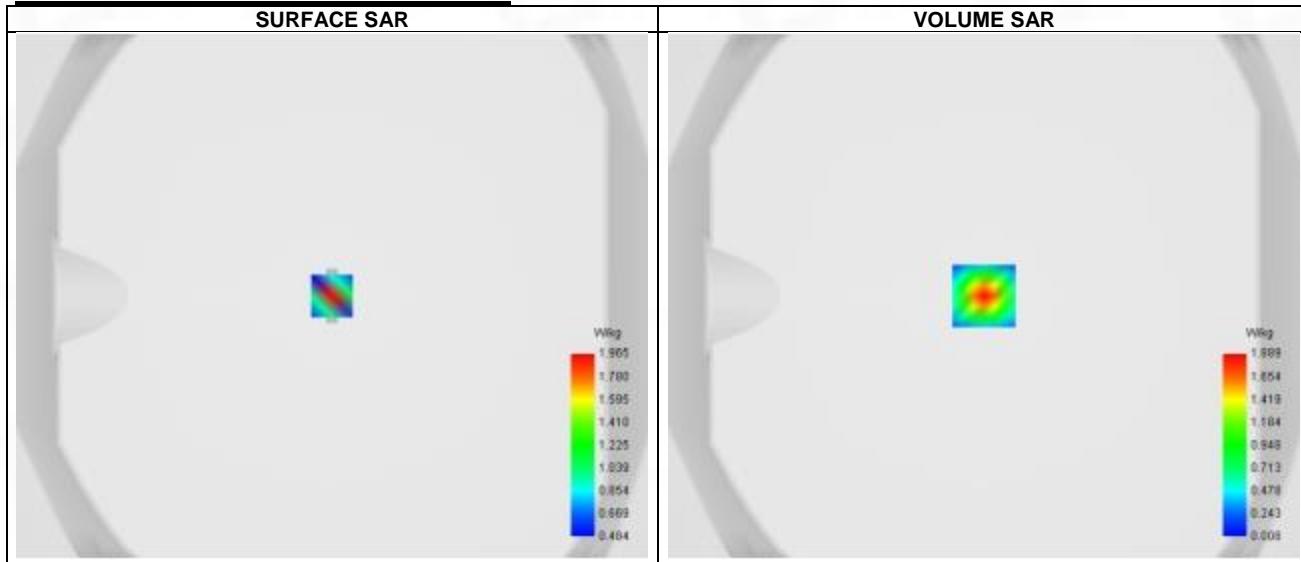
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.24
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Channels	Middle
Signal	CW

#### B. Permittivity

Frequency (MHz)	5200.000
Relative permittivity (real part)	35.880
Relative permittivity (imaginary part)	16.250
Conductivity (S/m)	4.700

#### C. SAR Surface and Volume



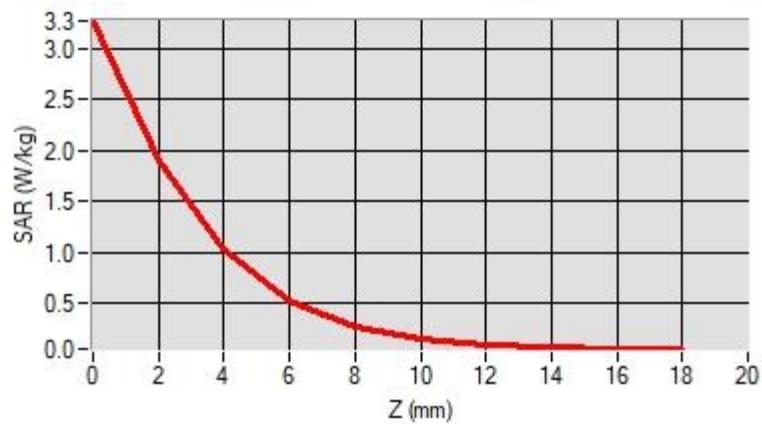
Maximum location: X=0.00, Y=0.00 ; SAR Peak: 3.38 W/kg

#### D. SAR 1g & 10g

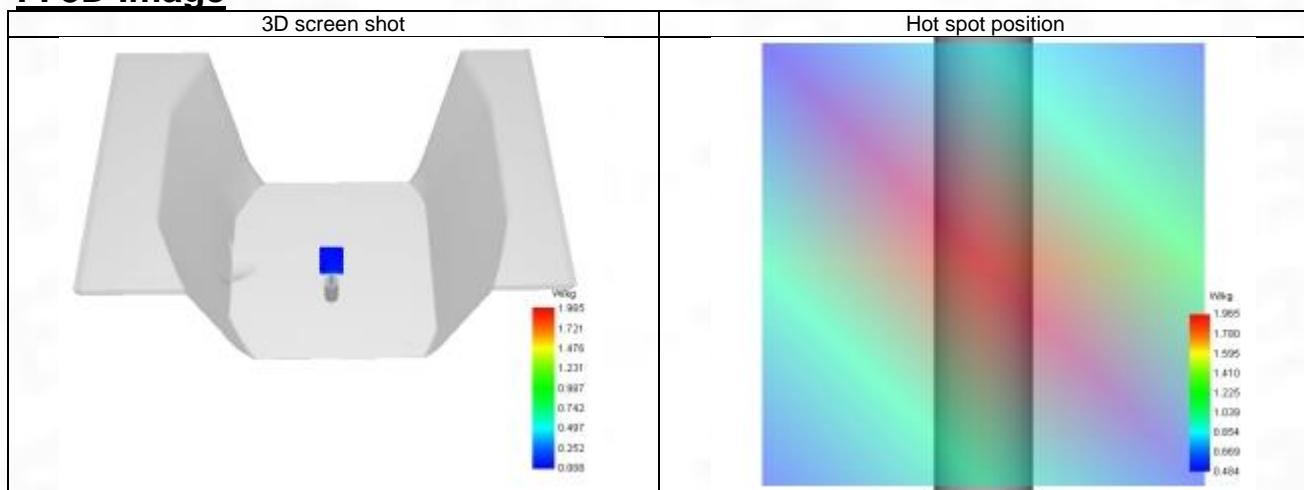
SAR 10g (W/Kg)	0.294
SAR 1g (W/Kg)	0.998
Variation (%)	-3.400
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	3.268	1.889	1.021	0.523	0.266	0.142	0.085	0.060	0.052



## F. 3D Image



## System Performance Check Data (5800 MHz)

### System check at 5800 MHz

Date of measurement: 24/3/2023

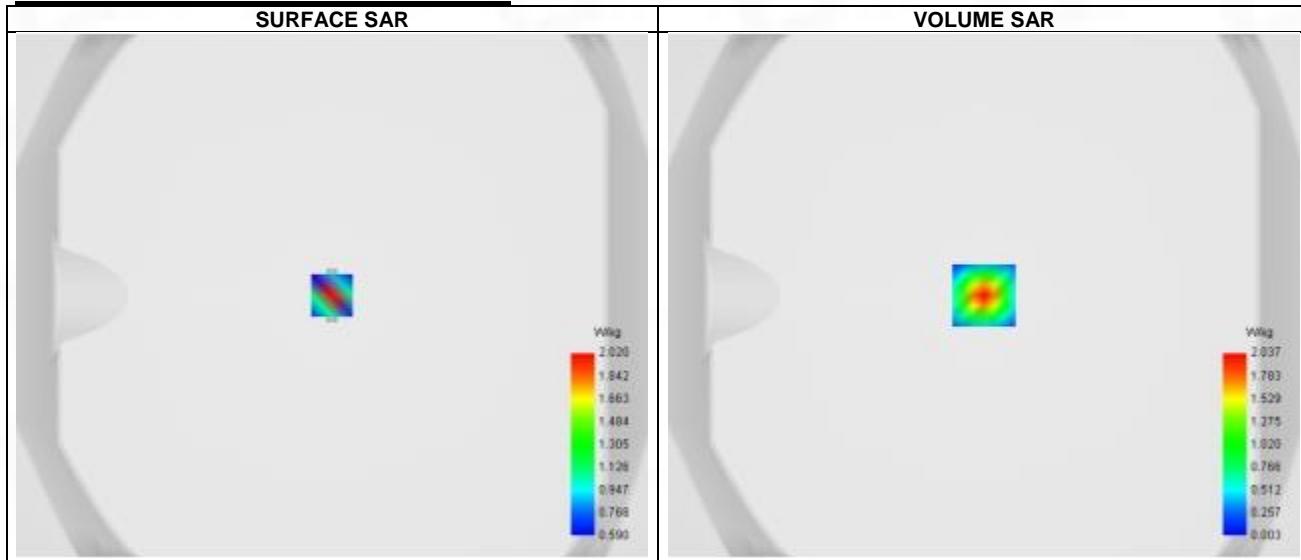
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.04
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Channels	Middle
Signal	CW

#### B. Permittivity

Frequency (MHz)	5800.000
Relative permittivity (real part)	35.180
Relative permittivity (imaginary part)	16.480
Conductivity (S/m)	5.310

#### C. SAR Surface and Volume

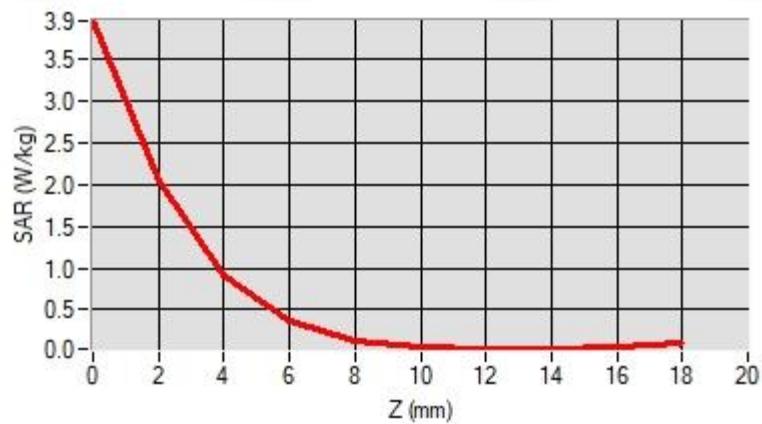


#### D. SAR 1g & 10g

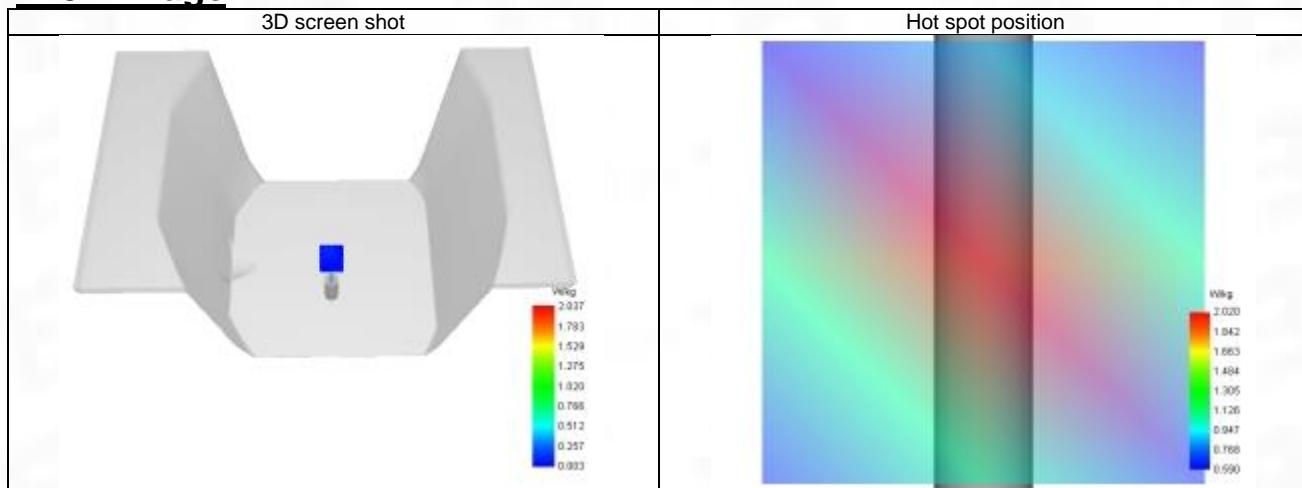
SAR 10g (W/Kg)	0.280
SAR 1g (W/Kg)	1.023
Variation (%)	0.490
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
SAR (W/Kg)	3.948	2.037	0.915	0.361	0.135	0.055	0.033	0.037	0.059



### F. 3D Image



## ANNEX C Test Data

### 1-Body with bottom position in dist. 0mm on Channel 6 in IEEE 802.11b ISM

#### SAR Measurement at IEEE 802.11b ISM (Body, Validation Plane)

Date of measurement: 24/3/2023

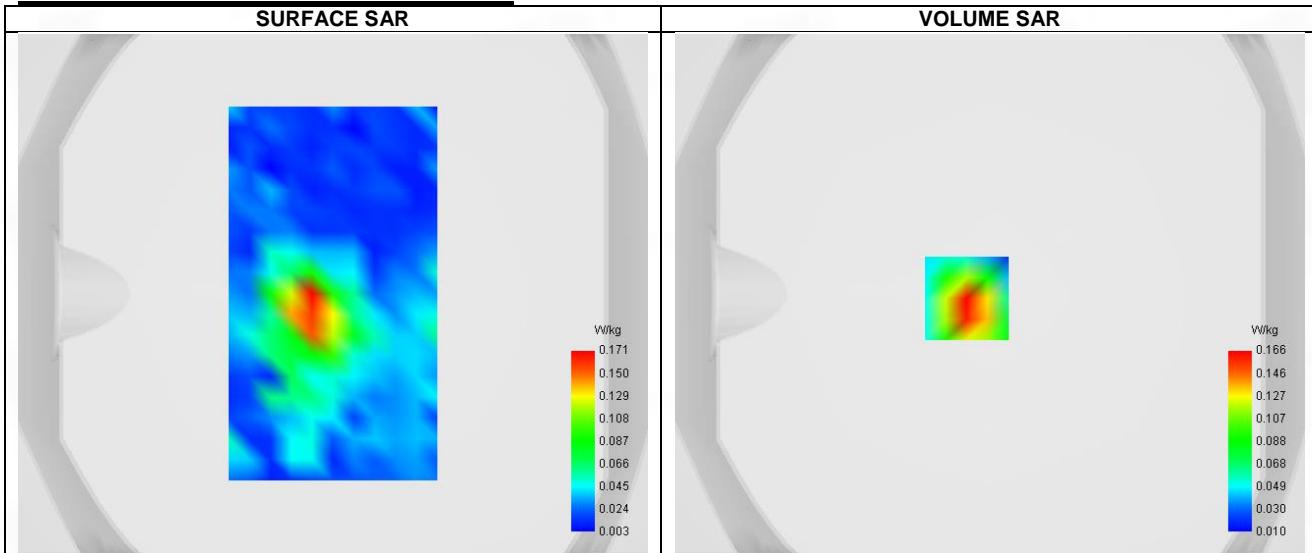
#### A. Experimental conditions.

Probe	SN 04/22 EPG0365
ConvF	2.36
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11b ISM
Channels	Middle (6)
Signal	IEEE 802.11

#### B. Permittivity

Frequency (MHz)	2437.000
Relative permittivity (real part)	39.097
Relative permittivity (imaginary part)	13.396
Conductivity (S/m)	1.796

#### C. SAR Surface and Volume

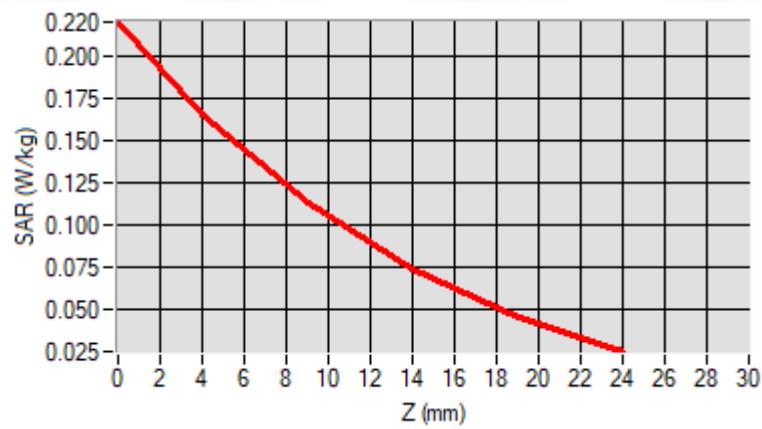


#### D. SAR 1g & 10g

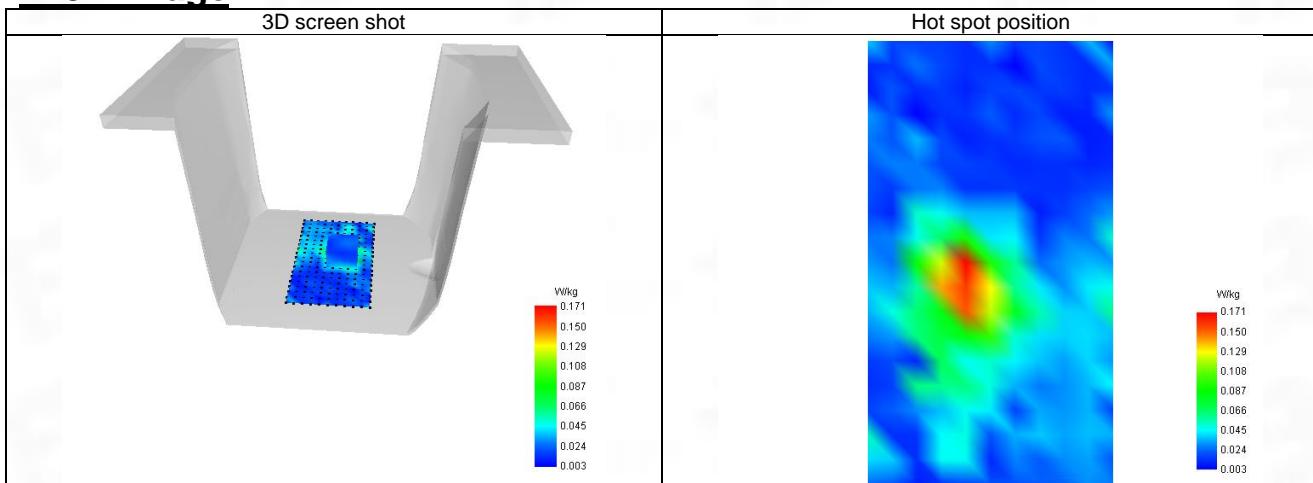
SAR 10g (W/Kg)	0.091
SAR 1g (W/Kg)	0.158
Variation (%)	-3.030
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.220	0.166	0.113	0.074	0.046



## F. 3D Image



## 2-Body with bottom position in dist. 0mm on Channel 46 in IEEE 802.11ac U-NII

### SAR Measurement at IEEE 802.11ac U-NII (Body, Validation Plane)

Date of measurement: 24/3/2023

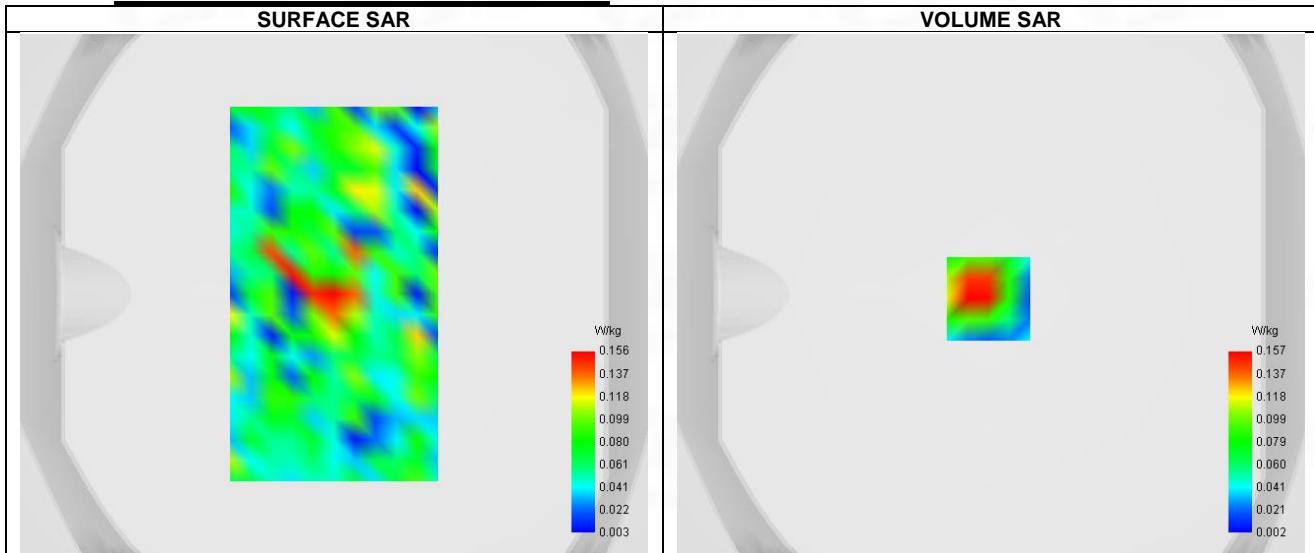
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.24
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11ac U-NII
Channels	Higher (46)
Signal	IEEE 802.11

#### B. Permittivity

Frequency (MHz)	5230.000
Relative permittivity (real part)	35.850
Relative permittivity (imaginary part)	16.280
Conductivity (S/m)	4.730

#### C. SAR Surface and Volume



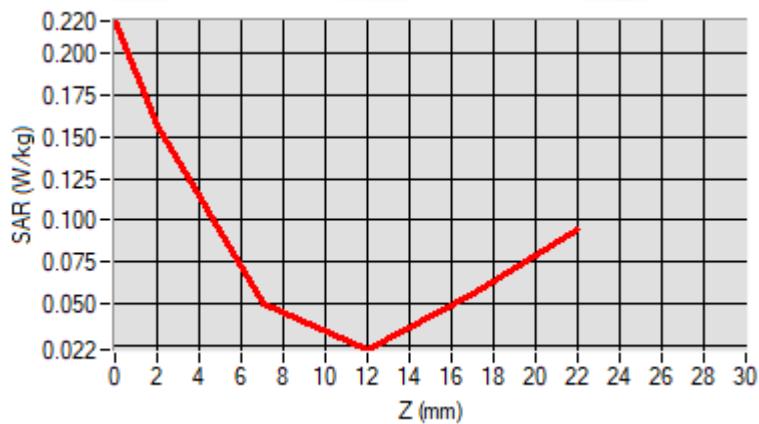
Maximum location: X=-1.00, Y=-2.00 ; SAR Peak: 0.29 W/kg

#### D. SAR 1g & 10g

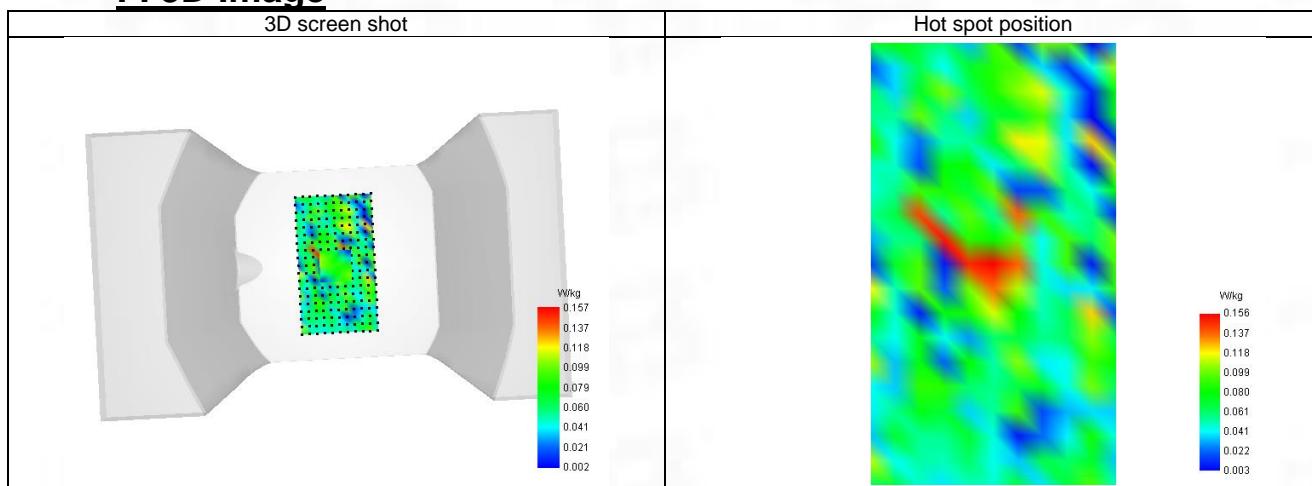
SAR 10g (W/Kg)	0.082
SAR 1g (W/Kg)	0.121
Variation (%)	-1.070
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	2.00	7.00	12.00	17.00
SAR (W/Kg)	0.220	0.157	0.049	0.022	0.056



### F. 3D Image



## 3-Body with bottom position in dist. 0mm on Channel 151 in IEEE 802.11ac U-NII

### SAR Measurement at IEEE 802.11ac U-NII (Body, Validation Plane)

Date of measurement: 24/3/2023

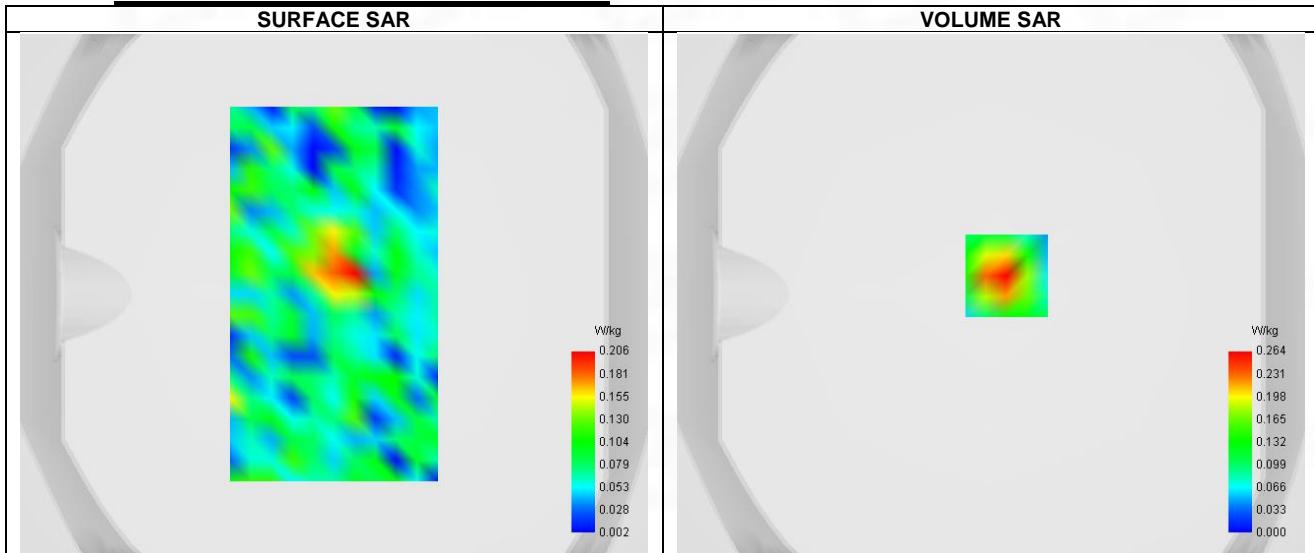
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	IEEE 802.11ac U-NII
Channels	Lower (151)
Signal	IEEE 802.11

#### B. Permittivity

Frequency (MHz)	5755.000
Relative permittivity (real part)	35.225
Relative permittivity (imaginary part)	16.575
Conductivity (S/m)	5.265

#### C. SAR Surface and Volume



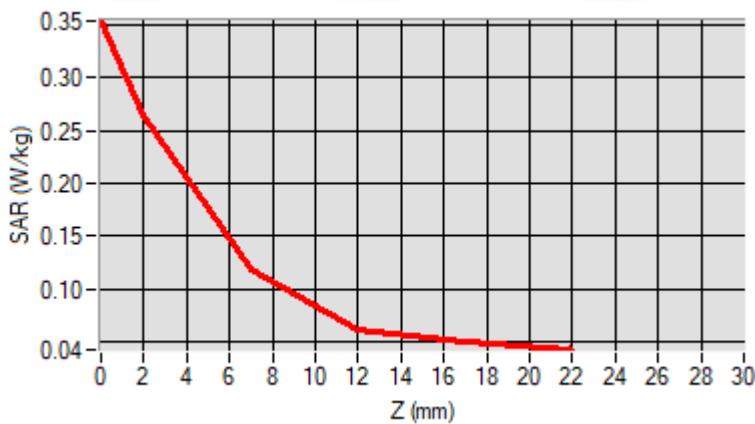
Maximum location: X=6.00, Y=7.00 ; SAR Peak: 0.37 W/kg

#### D. SAR 1g & 10g

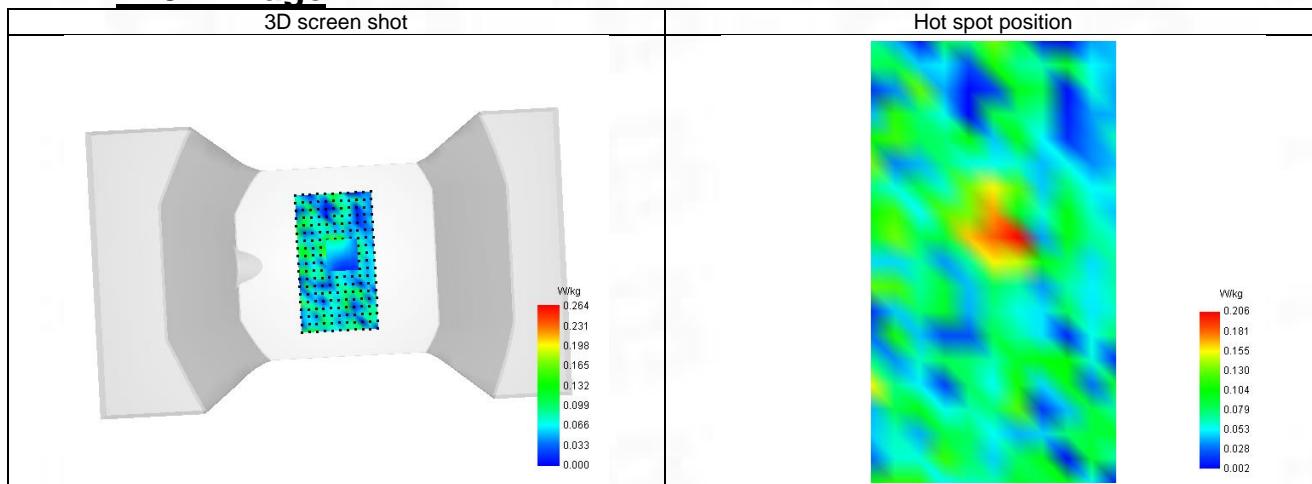
SAR 10g (W/Kg)	0.103
SAR 1g (W/Kg)	0.183
Variation (%)	1.750
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	2.00	7.00	12.00	17.00
SAR (W/Kg)	0.354	0.264	0.119	0.061	0.050



### F. 3D Image



## 4-Body with bottom position in dist. 0mm on Channel 39 in Bluetooth

### SAR Measurement at Bluetooth (Body, Validation Plane)

Date of measurement: 24/3/2023

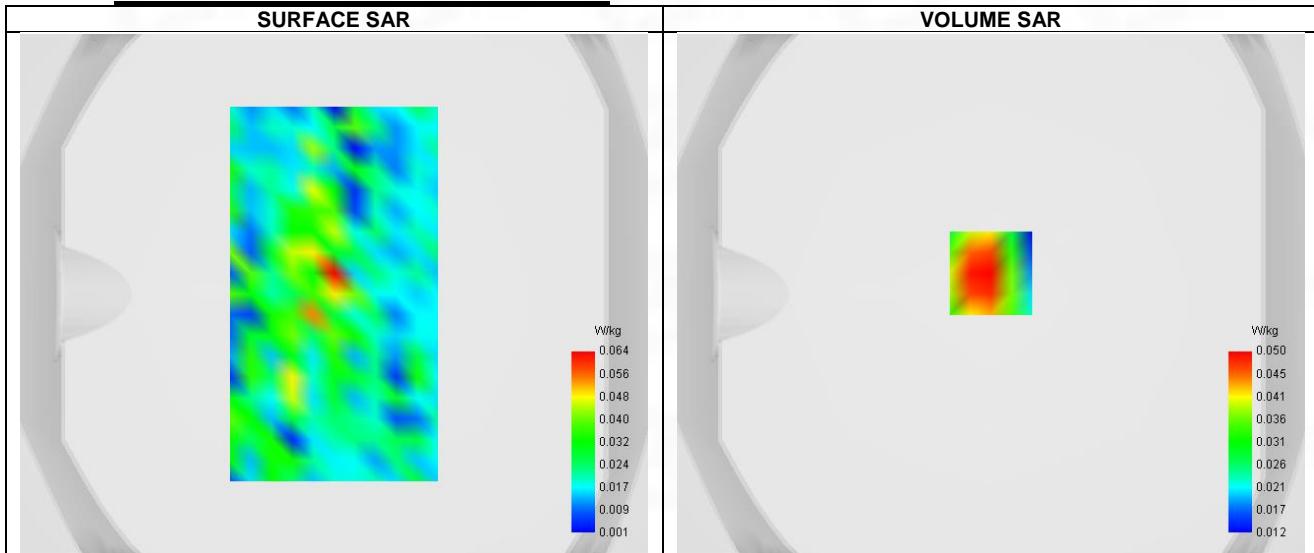
#### A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.36
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Bluetooth
Channels	Middle (39)
Signal	Bluetooth

#### B. Permittivity

Frequency (MHz)	2441.000
Relative permittivity (real part)	39.092
Relative permittivity (imaginary part)	13.379
Conductivity (S/m)	1.800

#### C. SAR Surface and Volume

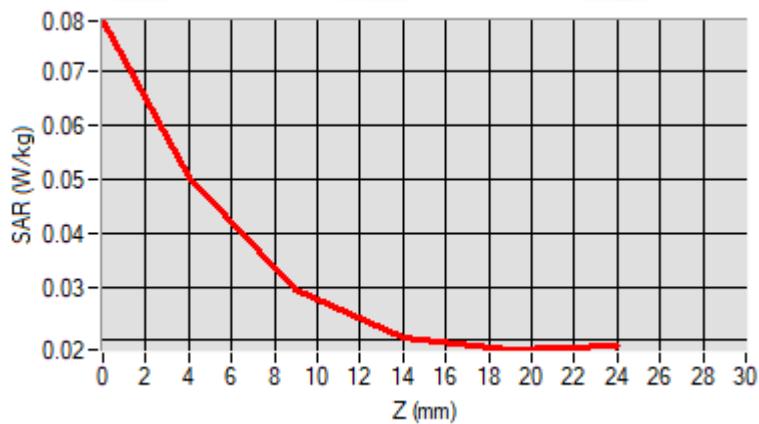


#### D. SAR 1g & 10g

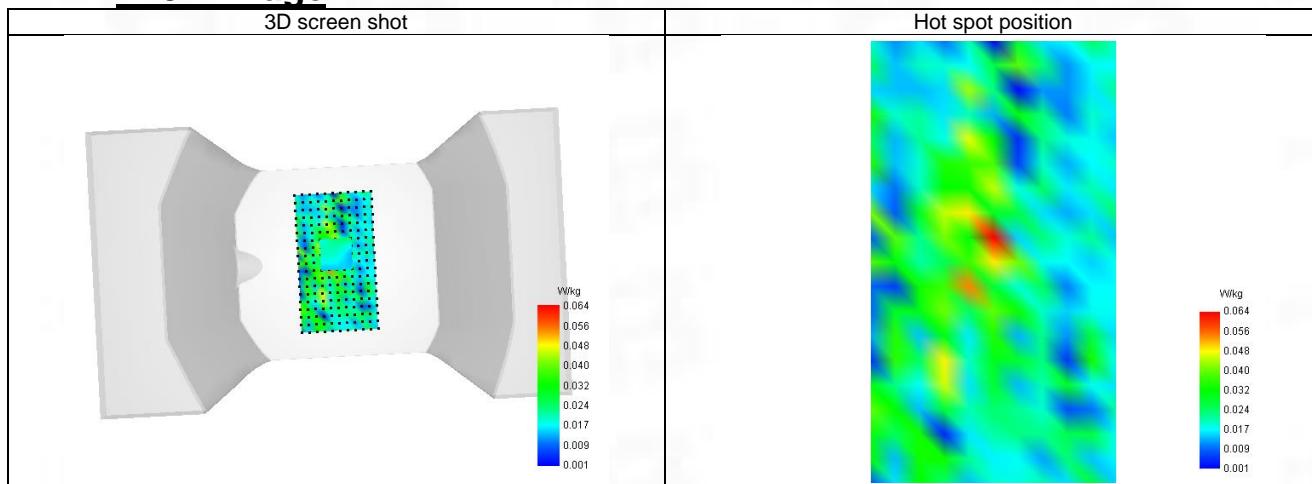
SAR 10g (W/Kg)	0.032
SAR 1g (W/Kg)	0.049
Variation (%)	-1.800
Horizontal validation criteria: minimum distance (mm)	0.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	0.000000

#### E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.079	0.050	0.029	0.020	0.018

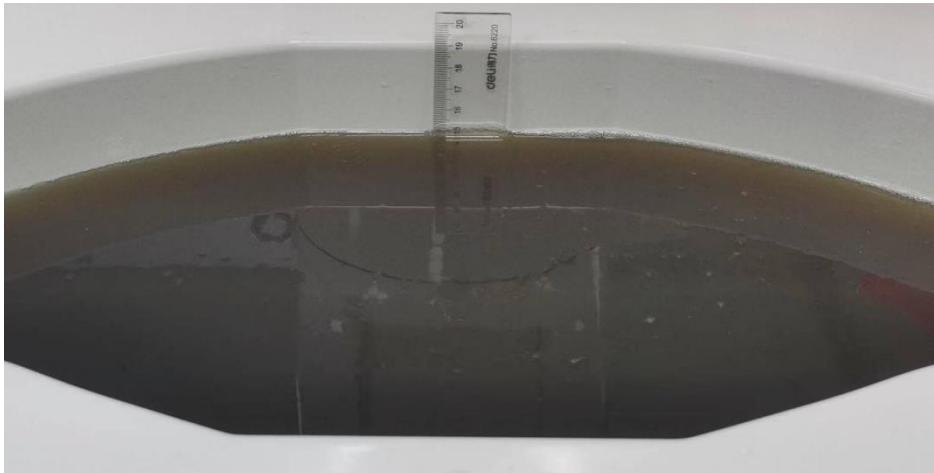


### F. 3D Image



## ANNEX D SAR Test Setup Photos

Reference Photo: simulation liquid depth 15cm



Test Position: Bottom (Gap 0mm)



## ANNEX E EUT External & Internal Photos

Please refer to RF Report.

## ANNEX F Calibration Report

Please refer the document "Calibration Report.pdf".



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**--END OF REPORT--**