SAR Test Report

For

Applicant Name:	**Shenzhen DOOGEE Hengtong Technology CO., LTD**
Address:	B, 2/F, Building A4, Silicon Valley Power Digital Industrial Park, No. 22, Dafu Industrial Zone, Guanlan Aobei Community, Guanlan Street, Longhua New District, Shenzhen, Guangdong, China
EUT Name:	**Tablet**
Brand Name:	DOOGEE
Model Number:	U10
Series Model Number:	Refer to section 2

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:	BTF230811R00401
Test Standards:	EN 50566: 2017 EN 50663: 2017 EN 62479: 2010 IEC/IEEE 62209-1528: 2020
Test Conclusion:	Pass
Test Date:	2023-08-17
Date of Issue:	2023-08-18
Prepared By:	Monica Zhou
	Monica Zhou / Project Engineer
Date:	2023-08-18
Approved By:	Ryan.CJ
	Ryan.CJ / EMC Manager
Date:	2023-08-18

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2023-08-18	Original
Note:	*Once the revision has been made, then previous versions reports are invalid.*	

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BTF Testing Lab (Shenzhen) Co., Ltd.
F101, 201 and 301, Building 1, Block 2, Tantou Industrial Park, Tantou Community, Songgang Street, Bao'an District, Shenzhen, China

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

1.3 Laboratory Condition

Ambient Temperature:	21℃ to 25℃
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:	Shenzhen DOOGEE Hengtong Technology CO., LTD
Address:	B, 2/F, Building A4, Silicon Valley Power Digital Industrial Park, No. 22, Dafu Industrial Zone, Guanlan Aobei Community, Guanlan Street, Longhua New District, Shenzhen, Guangdong, China

2.2 Manufacturer Information

Company Name:	Shenzhen DOOGEE Hengtong Technology CO., LTD
Address:	B, 2/F, Building A4, Silicon Valley Power Digital Industrial Park, No. 22, Dafu Industrial Zone, Guanlan Aobei Community, Guanlan Street, Longhua New District, Shenzhen, Guangdong, China

2.3 Factory Information

Company Name:	Shenzhen DOOGEE Hengtong Technology CO., LTD
Address:	B, 2/F, Building A4, Silicon Valley Power Digital Industrial Park, No. 22, Dafu Industrial Zone, Guanlan Aobei Community, Guanlan Street, Longhua New District, Shenzhen, Guangdong, China

2.4 General Description of Equipment under Test (EUT)

EUT Name	Tablet
Under Test Model Name	U10
Series Model Name	U10, U10Pro, U10Kid, U10Max, U10Ultra, U10Mini, U9, U9Kid, U9Pro, U9Max, U9Ultra
Description of Model name differentiation	Only the appearance color and size are different, others are the same.

2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Rechargeable Battery	
	Capacity	5060mAh
	Rated Voltage	3.8V

2.6 Technical Information

Network and Wireless connectivity	2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40), 802.11ax(HE20/40) 5G WIFI 802.11a, 802.11n(HT20/40), 802.11ac(VHT20/40/80), 802.11ax(HE20/40/80) Bluetooth (EDR+BLE)

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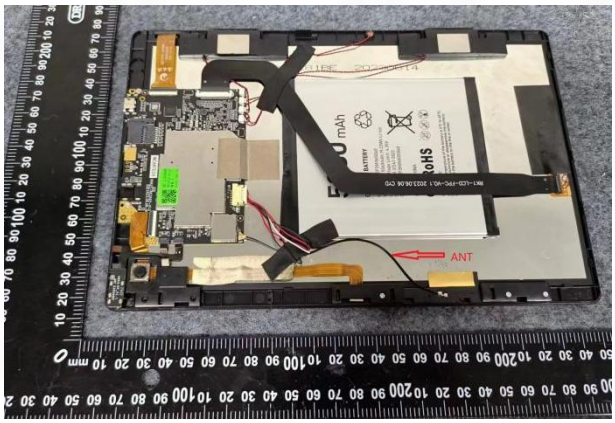
Antenna Information:



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

Operating Mode	WLAN, Bluetooth	
Frequency Range	802.11b/g/n(HT20)/ax(HE20)	2412 ~ 2472 MHz
	802.11n(HT40)/ax(HE20)	2422 ~ 2462 MHz
	802.11a	5150 ~ 5250 MHz
	802.11n(HT20/HT40)	5250 ~ 5350 MHz
	802.11ac(VHT20/VHT40/VHT80)	5470 ~ 5725 MHz
	802.11ax(HE20/HE40/HE80)	5725 ~ 5850 MHz
Antenna Type	WLAN: PIFA Antenna BT: PIFA Antenna	
Hotspot Function	Support	
Power Reduction	Not Support	
Exposure Category	General Population/Uncontrolled exposure	
EUT Stage	Portable Device	
Product	Type	
	☐ Production unit	☒ Identical prototype

3. Summary of Test Results

3.1 Test Standards

No.	Identity	Document Title
1	EN 50566: 2017	Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body (30 MHz - 6 GHz)
2	EN 50663: 2017	Generic standard for assessment of low power electronic and electrical equipment related to human exposure restrictions for electromagnetic fields (10 MHz- 300 GHz)
3	EN 62479: 2010	Assessment of the compliance of low power electronic and electrical equipment with the basic restrictions related to human exposure to electromagnetic fields (10 MHz to 300 GHz)
4	IEC/IEEE 62209-1528: 2020	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-worn wireless communication devices – Human models, instrumentation and procedures (Frequency range of 4 MHz to 10 GHz)
5	1999/519/EC	Council Recommendation of 12 July 1999 on the limitation of exposure of the general public to electromagnetic fields (0 Hz to 300 GHz)

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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
According to 1999/519/EC the limit for General Population/ Uncontrolled exposure should be applied for this device, it is 2.0 W/kg as averaged over any 10 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)	2.0	10.0
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

<Maximum Reported Standalone SAR>

Frequency Band		Maximum Report SAR (W/kg) 10 g	
		Body SAR (Separation 0 mm)	Limb SAR (Separation 0 mm)
WLAN	2.4G Wifi	0.322	0.322
	5.2G Wifi	0.632	0.632
	5.4G Wifi	0.305	0.305
	5.6G Wifi	0.351	0.351
	5.8G Wifi	0.319	0.319
Limits (W/kg)		2.0	4.0
Test Verdict		Pass	Pass

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3.4 Test Uncertainty

3.4.1 Measurement uncertainly evaluation for SAR test (300MHz to 6GHz)

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEC/IEEE 62209-1528: 2020. 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 (+- %)	10 g Ui (+-%)	Vi veff
Measurement System								
Probe calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	√3	√0.5	√0.5	1.43	1.43	∞
Hemispherical Isotropy	5.9	R	√3	√0.5	√0.5	2.41	2.41	∞
Boundary effect	1.0	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System detection limits	1.0	R	√3	1	1	0.58	0.58	∞
Modulation response	3.0	R	√3	1	1	1.73	1.73	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	√3	1	1	0.00	0.00	∞
Integration Time	1.4	R	√3	1	1	0.81	0.81	∞
RF ambient Conditions - Noise	3.0	R	√3	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	3.0	R	√3	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Test sample Related								
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	√3	1	1	2.89	2.89	∞
SAR scaling	2.0	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Shell Uncertainty - Shape,Thickness and Permittivity	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation in permittivity and conductivity	2.0	N	1	1	0.84	2.00	1.68	∞
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	√3	0.78	0.71	1.13	1.02	∞
Liquid permittivity - Temperature Uncertainty	2.5	R	√3	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty		RSS				10.47	10.34	
Expanded Uncertainty (95% Confidence interval)		k				20.95	20.69	

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3.4.2 Measurement uncertainly evaluation for system check

This measurement uncertainty budget is suggested by IEC/IEEE 62209-1528: 2020. The breakdown of the individual uncertainties is as follows:

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10 g)	1g Ui (+-%)	10 g Ui (+-%)	Vi veff
Measurement System								
Probe calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	√3	1	1	2.02	2.02	∞
Hemispherical Isotropy	5.9	R	√3	0	0	0.00	0.00	∞
Boundary effect	1	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System detection limits	1	R	√3	1	1	0.58	0.58	∞
Modulation response	0	N	√3	0	0	0.00	0.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	√3	0	0	0.00	0.00	∞
Integration Time	1.4	R	√3	0	0	0.00	0.00	∞
RF ambient Conditions - Noise	3	R	√3	1	1	1.73	1.73	∞
RF ambient Conditions - Reflections	3	R	√3	1	1	1.73	1.73	∞
Probe positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Dipole								
Deviation of experimental source from numerical source	5	N	1	1	1	5.00	5.00	∞
Input Power and SAR drift measurement	0.5	R	√3	1	1	0.29	0.29	∞
Dipole Axis to Liquid Dist.	2.0	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Shell Uncertainty - Shape,Thickness and Permittivity	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation in permittivity and conductivity	2.0	N	1	1	0.84	2.00	1.68	∞
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	√3	0.78	0.71	1.13	1.02	∞
Liquid permittivity - Temperature Uncertainty	2.5	R	√3	0.23	0.26	0.33	0.38	∞
Combined Standard Uncertainty		RSS				10.16	10.03	
Expanded Uncertainty (95% Confidence interval)		k				20.32	20.06	

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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 (ρ). The equation description is as below:

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

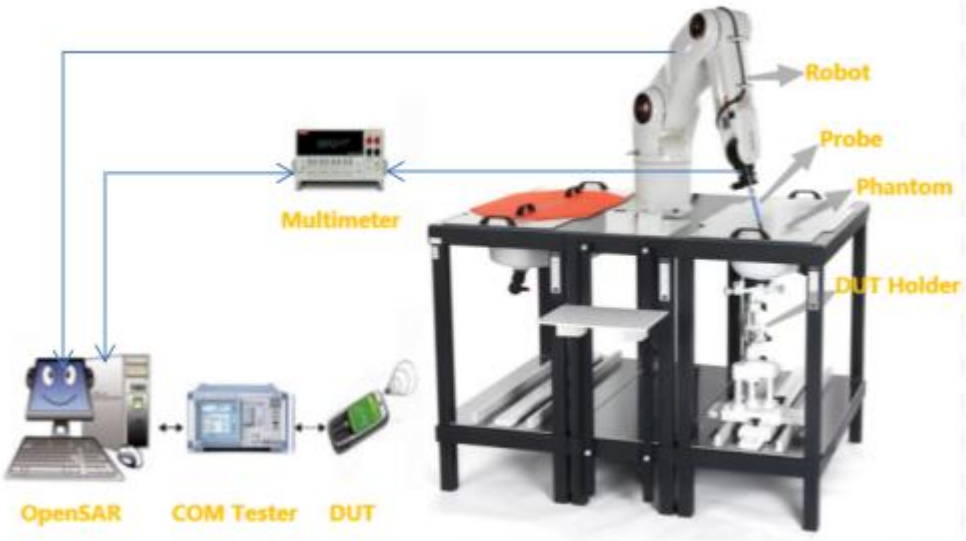
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

Where: σ is the conductivity of the tissue,
ρ 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 (±30°).
· Detects stresses on the probe and stop itself if necessary to keep the integrity of the probe.

4.2.3 E-Field Probe

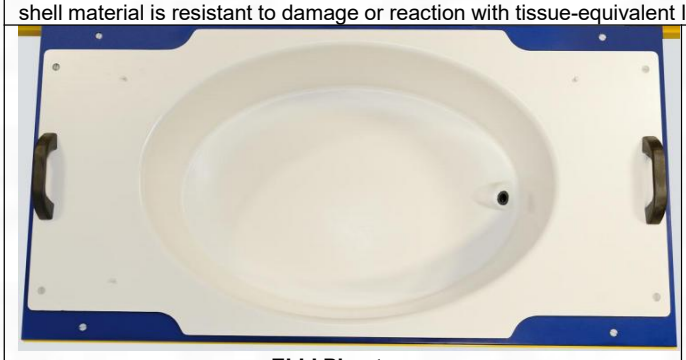
For the measurements, the Specific Dosimetric SSE2 E-Field Probe with following specifications is used:

- 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>=4GHz.
- 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°.

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.	
 **SAM Phantom**	The thickness of the phantom amounts to 2 mm±0.2 mm. The materials for the phantom do not affect the radiation of the device under test (DUT) : εr' <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±0.2 mm(except ear area)	Relative permittivity	3.4
Dimensions	1000 mm(L) x 500 mm(W) x 200 mm(H)	Loss tangent	0.02
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.	
 **ELLI Phantom**	The shape of the phantom is an ellipse with length 600mm±5mm and width 400mm±5mm. The phantom shell is made of low-loss and low-permittivity material, having loss tangent tanδ ≤ 0.05 and relative permittivity: εr' ≤ 5 for f ≤ 3 GHz 3 ≤εr' ≤ 5 for f > 3 GHz The thickness of the bottom-wall of the flat phantom is 2.0 mm with a tolerance of ± 0.2 mm.

Technical & mechanical characteristics	
Shell thickness	2 mm ± 0.2 mm
Filling volume	25 L
Dimensions	600 mm x 400 mm x 200mm
Permittivity	4.4
Loss tangent	0.017

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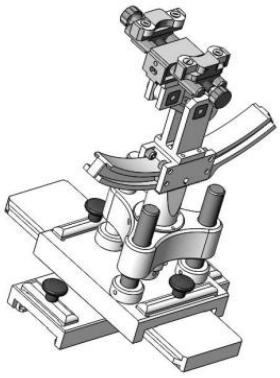
4.2.5 Device Holder



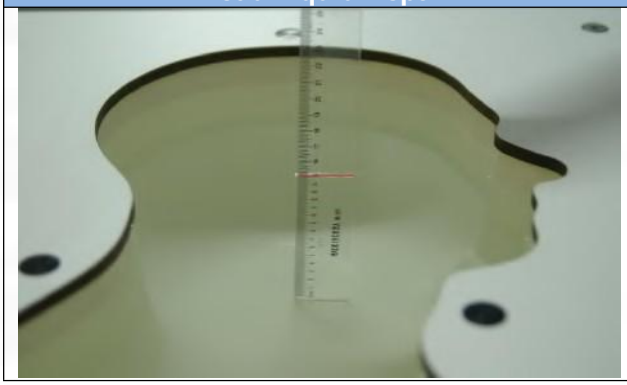
System Material	Permittivity	Loss tangent
Delrin	3.7	0.005

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°..

System Material	Permittivity	Loss tangent
PMMA	2.9	0.028

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%.

Head Liquid Depth	Body Liquid Depth
	

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 σ (S/m)	Permittivity ε
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 σ (S/m)	Permittivity ε
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 σ (S/m)	Permittivity ε
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 σ (S/m)	Permittivity ε
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.

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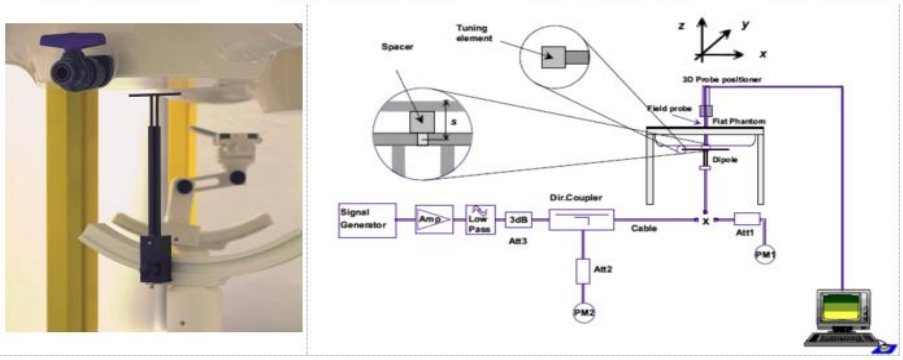
5.2 System Check Setup

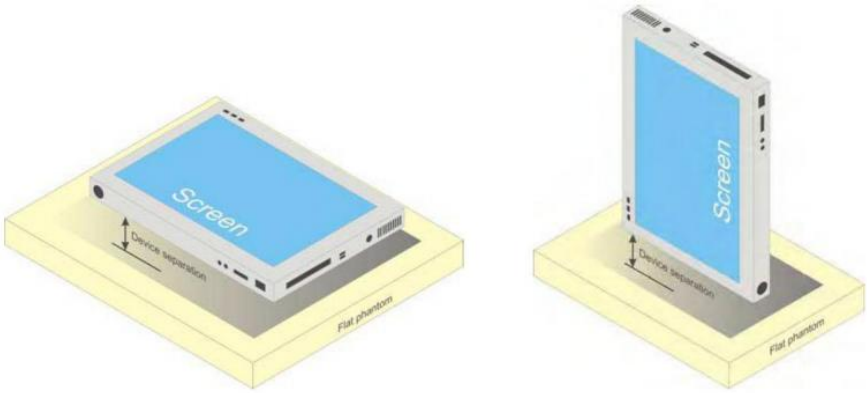


6. Test Position Configurations

According to IEC/IEEE 62209-1528: 2020, body-supported devices are tested for SAR compliance described in the following subsections.

6.1 Body-supported Position Conditions

Other devices that fall into this category include tablet type portable computers and credit card transaction authorization terminals, point-of-sale and/or inventory terminals. Where these devices may be torso or limb-supported, the same principles for body-supported devices are applied.



b) Tablet form factor portable computer

6.2 Limb Position Conditions

Limb-worn devices are strapped to the arm or leg of the user while transmitting.
These are similar to a body-worn device.
To assess this type of device, the following applies.
a. The test positions of devices used with body-worn accessories shall be applied.
b. The device shall be placed against the phantom such that the measured SAR is a conservative exposure (e.g. by opening or removing the strap as shown in Figure, if applicable).

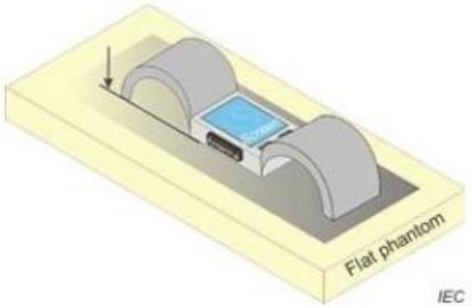
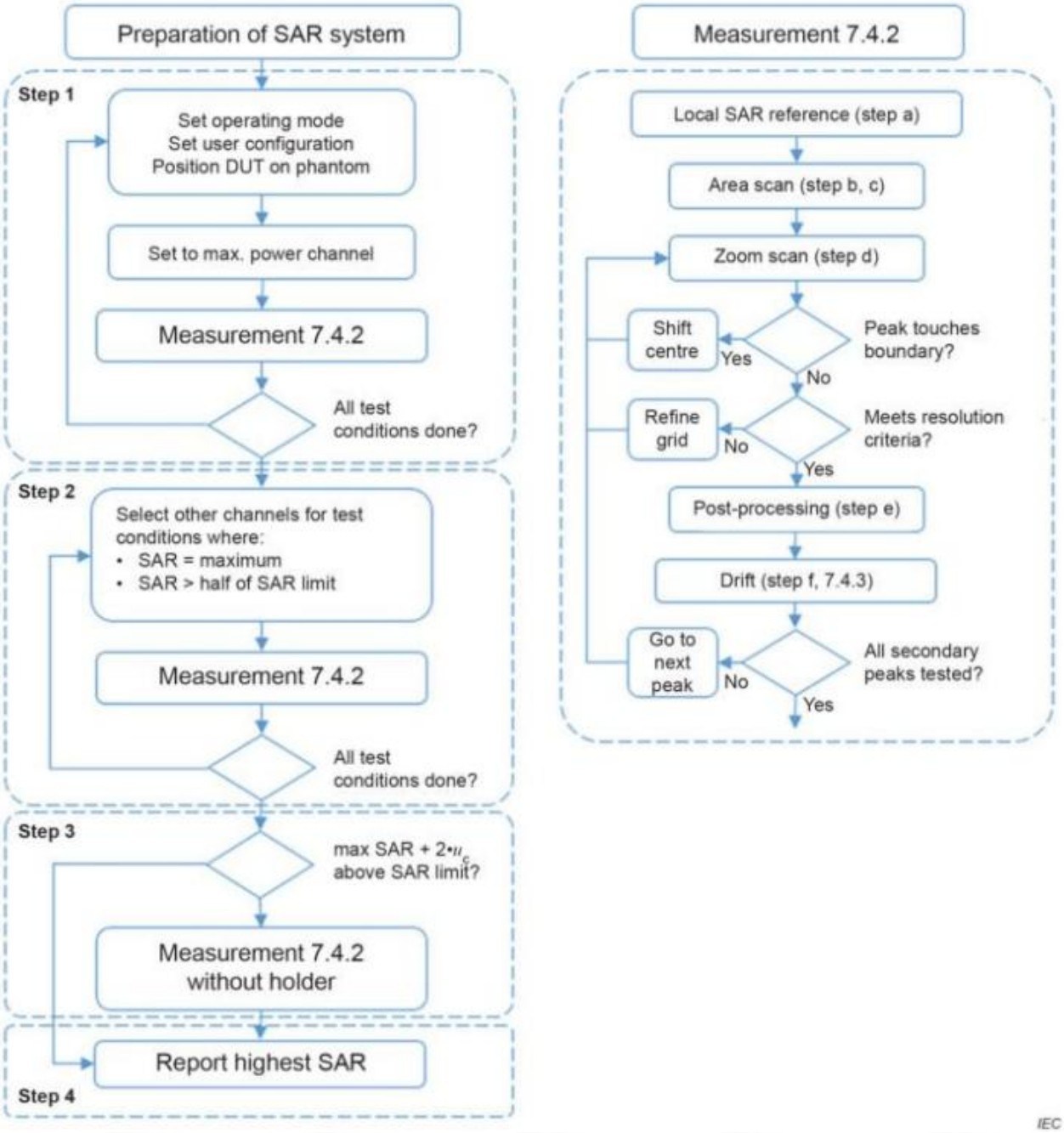


Figure 12 – Test position for limb-worn devices

7. Measurement Procedure

7.1 Measurement Process Diagram

Body SAR



7.2 Measurement Procedure

The following procedure shall be performed for each of the test conditions:
a. Measure the local SAR at a test point within 8 mm of the phantom inner surface that is closest to the DUT. The test point can be close to the ear;

b. Measure the SAR distribution within the phantom (area scan procedure). The SAR distribution is scanned along the inside surface of one side of the phantom head, at least for an area larger than the projection of the handset and antenna. The spatial grid step shall be less than 20 mm. The resolution accuracy can also be tested using the reference functions of 7.2.4. If surface scanning is used, then the distance between the geometrical centre of the probe dipoles and the inner surface of the phantom shall be 8,0 mm or less (±1,0 mm). At all measurement points, the angle of the probe with respect to the line normal to the surface is recommended but not required to be less than 30°;

c. From the scanned SAR distribution, identify the position of the maximum SAR value, as well as the positions of any local maxima with SAR values within 2 dB of the maximum value that are not within the zoom-scan volume; Additional peaks shall be measured only when the primary peak is within 2 dB of the SAR limit (i.e., 1 W/kg for a 1,6 W/kg 1 g limit, or 1,26 W/kg for a 2 W/kg 10 g limit). This is consistent with the 2 dB threshold already stated;

d. Measure SAR with a grid step of 8 mm or less in a volume with a minimum size of 30 mm by 30 mm and 30 mm in depth (zoom scan procedure). The grid step in the vertical direction shall be 5 mm or less (see C.3.3). Separate grids shall be centred on each of the local SAR maxima found in step c). Uncertainties due to field distortion between the media boundary and the dielectric cover/case of the probe should also be minimized, which is achieved if the distance between the phantom surface and physical tip of the probe is larger than half of the probe tip diameter. Other methods may utilize correction procedures for these boundary effects that enable high precision measurements closer than half the probe diameter. At all measurement points, the angle of the probe with respect to the line normal to the surface is recommended but not required to be less than 30°;

e. Use interpolation and extrapolation procedures defined described in IEC/IEEE 62209-1528, Annex C to determine the local SAR values at the spatial resolution needed for mass averaging;

f. The local SAR should be measured at exactly the same location as used in a). The absolute value of the measurement drift, i.e., the difference between the SAR measured in f) and a), shall be recorded in the uncertainty budget. It is recommended that the drift be kept within ±5 %. If this is not possible, even with repeat testing, additional information, e.g., data for local SAR versus time, should be used to demonstrate that the output power applied during the test is appropriate for testing the device. Power reference measurements can be taken after each zoom scan, if more than one zoom scan is needed. However, the drift should always be recorded as the difference between the device initial state with fully charged battery and all subsequent measurements using that battery.

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7.3 Area & Zoom Scan Procedure

For handsets operating above 300 MHz evaluated with the homogeneous head model, the SAR distribution is measured on a two-dimensional coarse grid at a fixed separation distance of less than 8 mm from the surface of the phantom shell. The scan region should cover all areas that are exposed and encompassed by the projection of the handset. In order to maintain a fixed distance of less than 8 mm from the surface to within ±1 mm, as required by the measurement protocol, the exact shape and dimensions of the phantom inner surface shall be known, pre-calibrated, or preferably detected during the SAR measurement with a mechanical or optical surface-detection mechanism that meets the probe positioning requirements. This evaluation technique determines the maximum spacing between the grid points, i.e., it has been found that a 20 mm × 20 mm grid is usually sufficient to achieve the required precision if two staggered one-dimensional cubic splines [55] are used to locate the maximum SAR location;

The maximum local SAR is evaluated on an interpolated grid at 1 mm to 2 mm resolution during the zoom scan. A zoom-scan volume of 32 mm x 32 mm x 30 mm, consisting of 5 x 5 x 7 points with the centre at the peak SAR location determined during the area scan, can be chosen. Although a scan resolution of 8 mm is sufficient for directions parallel to the surface, 5 mm is needed in the direction normal to the surface of the phantom to achieve the required extrapolation accuracy.

7.4 Test Reduction Procedure

IEC/IEEE 62209-1528 provides a reproducible and conservative measurement methodology to measure the SAR of handheld and body-mounted wireless communication devices, which can be used to determine compliance of such equipment with the human exposure basic restrictions. Clearly, there is a point where the power generated by wireless devices is at such a level that it is incapable of exceeding the basic restriction. Measurements following the procedure of IEC/IEEE 62209-1528 might then not be necessary.
There may be DUTs that generate power at such a level that it is incapable of exceeding the basic restriction of the respective exposure guideline. That level can be determined by a variety of techniques which do not require the actual exposure level measurements. Determining this level would speed up the process without compromising technical accuracy. EN 62479 proposes techniques for such purposes and may be applied.

7.4.1 Example 1

The maximum power level, Pma x, m, that can be transmitted by a device before the SAR averaged over a mass, m, exceeds a given limit, SARlim, can be defined. Any device transmitting at power levels
below Pma x, m can then be excluded from SAR testing. The lowest possible value for Pmax, m is:

$$P_{max,m} = SAR_{lim} \times m$$

For example, an exposure limit of SARlim = 2 W /kg and an averaging mass of m = 10 g give a total transmitting power of Pma x, m = 20 mW that would conservatively meet this exposure limit. For an exposure limit of SARlim = 1,6 W /kg and an averaging mass of m = 1 g, a total transmitting power of Pma x, m = 1,6 mW would conservatively meet the exposure limit. This assessment is based on the
unrealistic assumption that all of the conducted power is radiated by the antenna and then absorbed in the body (i.e. none of the power is transmitted for communication) and all of the absorbed power is concentrated in the averaging mass. EN 62479 gives less restrictive power thresholds that may be
applied in certain cases.

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7.4.2 Example 2

Simultaneous multi-band transmission means that the device can transmit multiple transmission modes at the same time, e.g., a WCDMA transmission at 2GHz and a WLAN transmission at 2.45GHz. The time-averaged output power of a secondary transmitter (i.e. the lower power transmitter, e.g. Bluetooth, WLAN) may be much lower than that of the primary transmitter can be excluded from SAR testing when used alone. However, when the primary and secondary transmitter are used together, the SAR limit may still be exceeded. A means of determining the threshold power for the secondary transmitter that allows it to be excluded from SAR testing is needed.
One way of determining the threshold power level available to the secondary transmitter (Pavailable) is to calculate it from the measured peak spatial-average SAR of the primary transmitter (SAR1) according to the equation:

$$P_{available} = P_{th,m} \times (SAR_{lim}-SAR_1)/SAR_{lim}$$

Where:

$P_{th,m}$ is the threshold exclusion power level taken from EN 62479 Annex B for the frequency of the secondary transmitter at the separation distance used in the testing.

If the output power of the secondary transmitter is less than $P_{available}$, SAR measurement for the secondary transmitter is not necessary.

The above formula can be easily generalized to the case where more than two transmitters are communicating simultaneously. If there are N simultaneous transmitters and the peak spatial-average SAR of the first N-1 transmitter are known (SAR_i), then the threshold power level available to the Nth transmitter can be found from

$$P_{available} = P_{max,m} \times (SAR_{lim} - \sum_{i=1}^{N-1} SAR_i) / SAR_{lim}$$

Alternatively, $P_{th,m}$ can be replaced by $P_{max,m}$, which is an easier approach but leads to more restrictive power threshold.

8. Conducted RF Output Power

8.1 Wifi

2.4G

Band (GHz)	Mode	Channel	Freq. (MHz)	EIRP(dBm)	Maximum Tune-up(dBm)	SAR Test Required.
2.4g (2.4~2.4835)	802.11b	1	2412	11.52	12.00	No
		7	2442	10.68	11.00	No
		13	2472	**13.84**	**14.00**	Yes
	802.11g	1	2412	11.54	12.00	No
		7	2442	12.62	13.00	No
		13	2472	11.98	12.00	No
	802.11n(HT20)	1	2412	11.73	12.00	No
		7	2442	13.19	13.50	No
		13	2472	12.27	12.50	No
	802.11ax(HE20)	1	2412	12.16	12.50	No
		7	2442	12.00	12.50	No
		13	2472	12.47	12.50	No
	802.11n(HT40)	3	2422	11.46	11.50	No
		7	2442	13.90	14.00	No
		11	2462	11.62	12.00	No
	802.11ax(HE40)	3	2422	13.18	13.50	No
		7	2442	12.46	12.50	No
		11	2462	12.77	13.00	No

Notes:
1) For WiFi 2.4GHz, SAR tests at higher order modulations (including 802.11g/n) were not required since the maximum average output power for each of these configurations is not more than 1/4dB higher than the tested channel for the lowest data rate of 802.11b mode; When 802.11g/n SAR test is required, 802.11g/n SAR was evaluated based on the highest 802.11b SAR configuration in each exposure condition.

5G

Band (GHz)	Mode	Channel	Freq. (MHz)	EIRP(dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-1 (5.150~5.250)	802.11a	36	5180	17.02	17.50	No
		40	5200	16.31	16.50	No
		48	5240	16.68	17.00	No
	802.11n(HT20)	36	5180	16.48	16.50	No
		40	5200	16.61	17.00	No
		48	5240	17.25	17.50	No
	802.11ac(VHT20)	36	5180	17.18	17.50	No
		40	5200	17.43	17.50	No
		48	5240	17.99	18.00	No
	802.11ax(HE20)	36	5180	15.65	16.00	No
		40	5200	16.15	16.50	No
		48	5240	15.78	16.00	No
	802.11n(HT40)	38	5190	17.31	17.50	No
		46	5230	17.59	**18.00**	Yes
	802.11ac(VHT40)	38	5190	17.11	17.50	No
		46	5230	16.88	17.00	No
	802.11ax(HE40)	38	5190	15.60	16.00	No
		46	5230	15.91	16.00	No
	802.11ac(VHT80)	42	5210	17.09	17.50	No
	802.11ax(HE80)	42	5210	15.72	16.00	No

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Band (GHz)	Mode	Channel	Freq. (MHz)	EIRP(dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-2a (5.250~5.350)	802.11a	52	5260	16.56	17.00	No
		56	5280	16.83	17.00	No
		64	5320	17.44	17.50	No
	802.11n(HT20)	52	5260	17.48	17.50	No
		56	5280	16.75	17.00	No
		64	5320	17.08	17.50	No
	802.11ac(VHT20)	52	5260	17.26	17.50	No
		56	5280	17.27	17.50	No
		64	5320	16.61	17.00	No
	802.11ax(HE20)	52	5260	17.30	17.50	No
		56	5280	17.07	17.50	No
		64	5320	16.76	17.00	No
	802.11n(HT40)	54	5270	17.29	17.50	No
		62	5310	16.75	17.00	No
	802.11ac(VHT40)	54	5270	16.92	17.00	No
		62	5310	17.47	17.50	No
	802.11ax(HE40)	54	5270	17.39	17.50	No
		62	5310	16.58	17.00	No
	802.11ac(VHT80)	58	5290	**17.33**	**17.50**	Yes
	802.11ax(HE80)	58	5290	17.22	17.50	No

Band (GHz)	Mode	Channel	Freq. (MHz)	EIRP(dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-2c (5.470~5.725)	802.11a	100	5500	17.41	17.50	No
		120	5600	17.34	17.50	No
		140	5700	17.39	17.50	No
	802.11n(HT20)	100	5500	16.95	17.00	No
		120	5600	17.14	17.50	No
		140	5700	17.43	17.50	No
	802.11ac(VHT20)	100	5500	16.51	17.00	No
		120	5600	17.40	17.50	No
		140	5700	16.67	17.00	No
	802.11ax(HE20)	100	5500	16.96	17.00	No
		120	5600	16.73	17.00	No
		140	5700	17.12	17.50	No
	802.11n(HT40)	102	5510	16.77	17.00	No
		134	5670	17.48	17.50	No
	802.11ac(VHT40)	102	5510	16.53	17.00	No
		134	5670	17.12	17.50	No
	802.11ax(HE40)	102	5510	17.05	17.50	No
		134	5670	16.91	17.00	No
	802.11ac(VHT80)	106	5530	**17.03**	**17.50**	Yes
	802.11ax(HE80)	106	5530	16.74	17.00	No

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Band (GHz)	Mode	Channel	Freq. (MHz)	EIRP(dBm)	Maximum Tune-up(dBm)	SAR Test Require.
U-NII-3 (5.725~5.850)	802.11a	149	5745	13.15	13.50	No
		157	5785	12.85	13.00	No
		165	5825	12.46	12.50	No
	802.11n(HT20)	149	5745	13.11	13.50	No
		157	5785	12.53	13.00	No
		165	5825	**13.57**	**14.00**	Yes
	802.11ac(VHT20)	149	5745	12.60	13.00	No
		157	5785	13.08	13.50	No
		165	5825	13.35	13.50	No
	802.11ax(HE20)	149	5745	13.67	14.00	No
		157	5785	13.87	14.00	No
		165	5825	13.05	13.50	No
	802.11n(HT40)	151	5755	13.19	13.50	No
		159	5795	12.26	12.50	No
	802.11ac(VHT40)	151	5755	12.58	13.00	No
		159	5795	12.91	13.00	No
	802.11ax(HE40)	151	5755	12.67	13.00	No
		159	5795	13.11	13.50	No
	802.11ac(VHT80)	155	5775	12.64	13.00	No
	802.11ax(HE80)	155	5775	12.90	13.00	No

Note:
1) For WiFi 5G 802.11a/n/ac/ax SAR tests, a communication link is set up with the test mode software for WiFi mode test. The EUT is operated at the RF continuous emission mode. Each channel should be tested at the lowest data rate.
2) When multiple channel bandwidth configurations in a frequency band have the same maximum tune-up output power, the test configuration is determined by applying the following steps sequentially.
a. The largest channel bandwidth configuration is selected among the multiple configurations in a frequency band with the same maximum tune-up output power.
b. When multiple transmission modes (802.11a/g/n/ac/ax) have the same maximum tune-up output power, largest channel bandwidth, lowest order modulation, the lowest order 802.11 mode is selected; i.e., 802.11a is chosen over 802.11n then 802.11ac.

8.2 Bluetooth

	Mode	Maximum Tune-up(dBm)	EIRP(dBm)		
EDR			0	39	78
			2402MHz	2441MHz	2480MHz
	GFSK	**3.50**	2.83	3.02	**3.20**
	π/4QPSK	2.50	2.01	0.62	0.94
	8DPSK	2.00	1.66	0.53	1.20
BLE	Mode	Maximum Tune-up(dBm)	EIRP(dBm)		
			0	19	39
			2402MHz	2440MHz	2480MHz
	BLE_1M	4.00	3.77	2.76	2.55
	BLE_2M	3.50	3.19	2.95	2.85

Note:
Because the output power(eirp) of Bluetooth of the EUT is less than 20mW(13dBm), so standalone SAR are exempt according EN62479.

9. 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.

Body/Limb													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	10g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	10g Scaled SAR (W/kg)	Meas. No.
2.4g Wifi 802.11b	Back	0	13	2472	1.620	0.310	100.00	1.000	13.84	14.00	1.038	**0.322**	1#
	Left	0	13	2472	-1.005	0.059	100.00	1.000	13.84	14.00	1.038	0.061	/
	Right	0	13	2472	-2.084	0.214	100.00	1.000	13.84	14.00	1.038	0.222	/
	Top	0	13	2472	3.507	0.150	100.00	1.000	13.84	14.00	1.038	0.156	/
	Bottom	0	13	2472	2.658	0.087	100.00	1.000	13.84	14.00	1.038	0.090	/

Notes:
1. The distance of the Body/Limb test is 0mm.
2. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst-case configuration.
3. Refer to ANNEX C for the detailed test data for each test configuration.

Body/Limb													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	10g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	10g Scaled SAR (W/kg)	Meas. No.
5g Wifi U-NII-1 802.11n(HT40)	Back	0	46	5230	2.660	0.575	100.00	1.000	17.59	18.00	1.099	**0.632**	2#
	Left	0	46	5230	-0.410	0.156	100.00	1.000	17.59	18.00	1.099	0.171	/
	Right	0	46	5230	1.407	0.507	100.00	1.000	17.59	18.00	1.099	0.557	/
	Top	0	46	5230	-1.785	0.323	100.00	1.000	17.59	18.00	1.099	0.355	/
	Bottom	0	46	5230	2.114	0.265	100.00	1.000	17.59	18.00	1.099	0.291	/

Notes:
1. The distance of the Body/Limb test is 0mm.
2. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst-case configuration.
3. Refer to ANNEX C for the detailed test data for each test configuration.

Body/Limb													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	10g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	10g Scaled SAR (W/kg)	Meas. No.
5g Wifi U-NII-2a 802.11ac(VHT80)	Back	0	58	5290	0.668	0.293	100.00	1.000	17.33	17.50	1.040	**0.305**	3#
	Left	0	58	5290	-1.084	0.102	100.00	1.000	17.33	17.50	1.040	0.106	/
	Right	0	58	5290	2.309	0.277	100.00	1.000	17.33	17.50	1.040	0.288	/
	Top	0	58	5290	-1.604	0.228	100.00	1.000	17.33	17.50	1.040	0.237	/
	Bottom	0	58	5290	-2.097	0.187	100.00	1.000	17.33	17.50	1.040	0.194	/

Notes:
1. The distance of the Body/Limb test is 0mm.
2. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst-case configuration.
3. Refer to ANNEX C for the detailed test data for each test configuration.

Body/Limb													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	10g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	10g Scaled SAR (W/kg)	Meas. No.
5g Wifi U-NII-2c 802.11ac(VHT80)	Back	0	106	5530	1.878	0.315	100.00	1.000	17.03	17.50	1.114	**0.351**	4#
	Left	0	106	5530	0.126	0.116	100.00	1.000	17.03	17.50	1.114	0.129	/
	Right	0	106	5530	3.519	0.304	100.00	1.000	17.03	17.50	1.114	0.339	/
	Top	0	106	5530	-0.394	0.268	100.00	1.000	17.03	17.50	1.114	0.299	/
	Bottom	0	106	5530	-0.887	0.199	100.00	1.000	17.03	17.50	1.114	0.222	/

Notes:
1. The distance of the Body/Limb test is 0mm.
2. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst-case configuration.
3. Refer to ANNEX C for the detailed test data for each test configuration.

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Body/Limb													
Mode	Position	Dist. (mm)	Ch.	Freq. (MHz)	Power Drift (%)	10g Meas. SAR (W/kg)	Duty cycle (%)	Duty cycle Factor	Meas. Power (dBm)	Max. tune-up power (dBm)	Scaling Factor	10g Scaled SAR (W/kg)	Meas. No.
5g Wifi U-NII-3 802.11n(HT20)	Back	0	165	5825	3.052	0.289	100.00	1.000	13.57	14.00	1.104	**0.319**	3#
	Left	0	165	5825	-2.680	0.043	100.00	1.000	13.57	14.00	1.104	0.047	/
	Right	0	165	5825	1.128	0.212	100.00	1.000	13.57	14.00	1.104	0.234	/
	Top	0	165	5825	-0.927	0.143	100.00	1.000	13.57	14.00	1.104	0.158	/
	Bottom	0	165	5825	1.749	0.076	100.00	1.000	13.57	14.00	1.104	0.084	/

Notes:
1. The distance of the Body/Limb test is 0mm.
2. If the SAR measured at mid-band channel for each test configuration is at least 3.0 dB lower than the SAR limit (< 1 W/kg), testing at the high and low channels is optional, apart from the worst-case configuration.
3. Refer to ANNEX C for the detailed test data for each test configuration.

10. Simultaneous Transmission

The device contains one transmitters (Bluetooth/Wifi) can not transmit multiple transmission modes at the same time. Also give the determination for your reference: determining the threshold power level available to the secondary transmitter (Pavailable) is to calculate it from the measured peak spatial-average SAR of the primary transmitter (SAR1) according to the equation:

Pavailable = Pth,m·(SARlim - SAR1)/SARlim
where Pth,m is the threshold exclusion power level taken from Annex B of IEC 62479 for the frequency of the secondary transmitter at the separation distance used in the testing.

f GHz	*BW* %	*Exemple d'interface air*	P_{max}' mW			
			s = 5 mm		*s* = 25 mm	
			m = 1 g	*m* = 10 g	*m* = 1 g	*m* = 10 g
2,442	3,4	802.11b	7,3	32	130	328
5,250	3,8	WiMAX	6,8	53	258	845
5,788	1,3	WiMAX	6,2	52	164	564

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11. 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	2023/03/24	2024/03/23
EPM Series Power Meter	KEYSIGHT	E4418B	MY41293435	2023/03/24	2024/03/23
10dB Attenuator	MIDWEST MICROWAVE	263-10dB	/	2023/03/24	2024/03/23
Coupler	MERRIMAC	CWM-10R-10.8G	LOT-83391	2023/03/24	2024/03/23
2450MHz Validation Dipole	MVG	SID2450	07/22 DIP 2G450-662	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	2023/03/24	2024/03/23
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 in within 20% of calibrated measurement.
4. Impedance (real or imaginary parts) in within 5 Ohms of calibrated measurement.

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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.

Dielectric performance of tissue simulating liquid									
Frequency (MHz)	εr		σ(s/m)		Delta (εr)	Delta (σ)	Limit	Temp (℃)	Date
	Target	Measured	Target	Measured					
2450	39.20	39.08	1.80	1.81	0.31%	-0.56%	±5%	20.0	17/8/2023
5200	36.00	35.88	4.66	4.70	0.33%	-0.86%	±5%	20.5	17/8/2023
5400	35.80	35.68	4.86	4.90	0.34%	-0.82%	±5%	20.0	17/8/2023
5600	35.50	35.38	5.07	5.11	0.34%	-0.79%	±5%	20.0	17/8/2023
5800	41.50	41.41	5.27	5.31	0.34%	-0.76%	±5%	20.5	17/8/2023
NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 ℃ 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 10 g).

Frequency (MHz)	Input Power (mW)	10g SAR (W/Kg)	1g SAR (W/Kg)	10g SAR 1W input power normalized (W/Kg)	1g SAR 1W input power normalized (W/Kg)	10g SAR Standard target (1W) (W/Kg)	1g SAR Standard target (1W) (W/Kg)	10g SAR Deviation	1g SAR Deviation
2450	16	0.352	0.793	22.21	50.03	24.00	52.40	7.46%	4.52%
5200	13	0.294	0.998	23.35	79.27	21.60	76.50	-7.97%	1.19%
5400	13	1.120	0.327	86.15	25.15	81.47	23.23	5.75%	8.28%
5600	13	1.084	0.314	83.38	24.15	78.71	22.64	5.94%	6.69%
5800	13	0.280	1.023	22.24	81.25	21.90	78.00	-4.09%	-3.50%

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System Performance Check Data (2450 MHz)

System check at 2450 MHz

Date of measurement: 17/8/2023

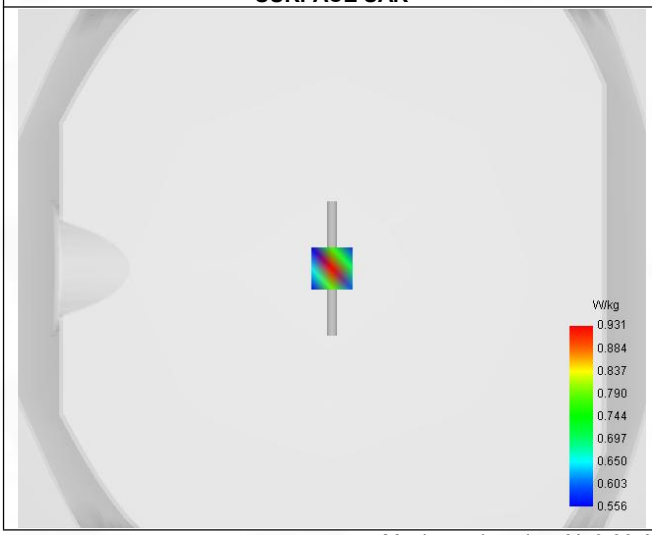
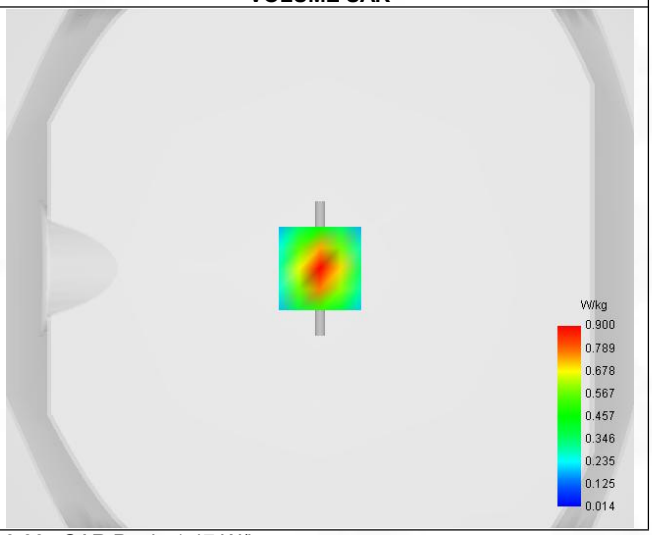
A. Experimental conditions.

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. Permitivity

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

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

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

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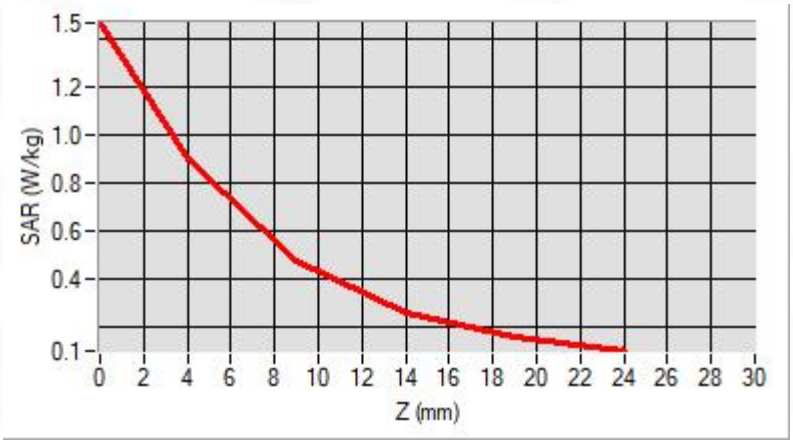
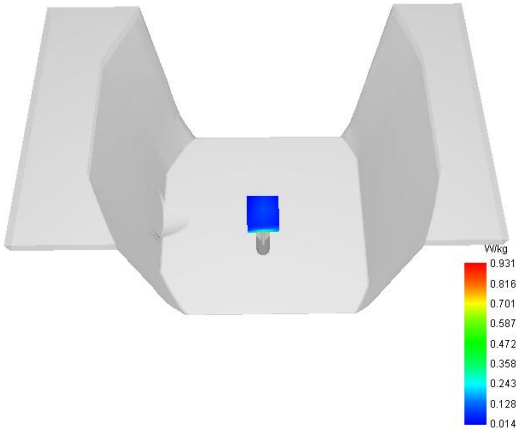
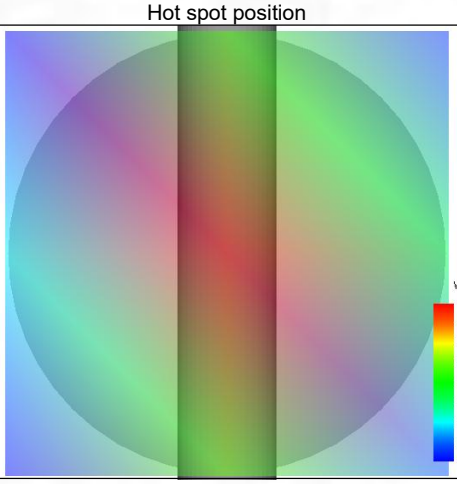


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (5200 MHz)

System check at 5200 MHz

Date of measurement: 17/8/2023

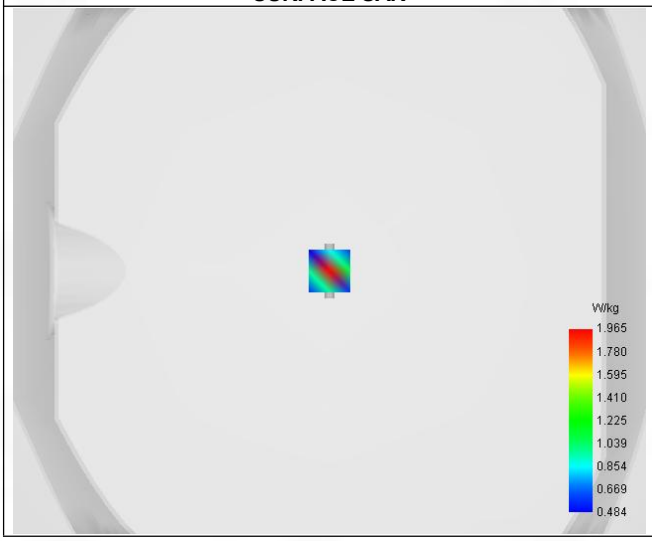
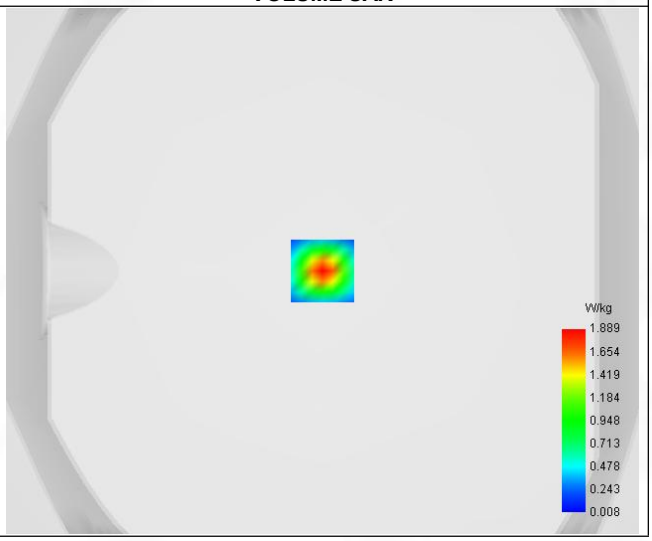
A. Experimental conditions.

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. Permitivity

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

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

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

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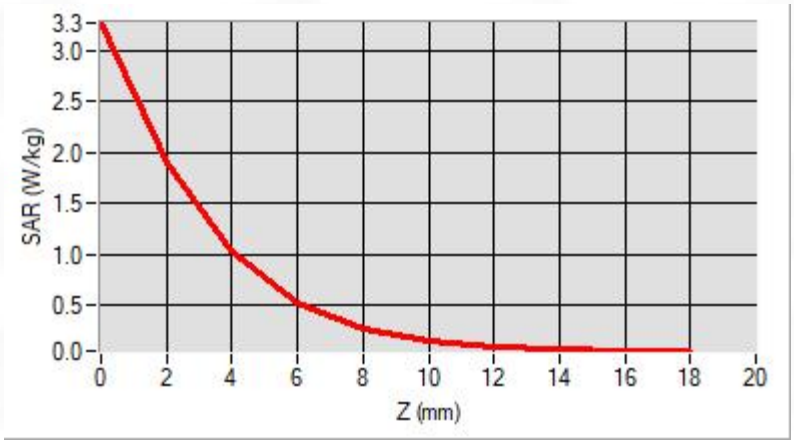
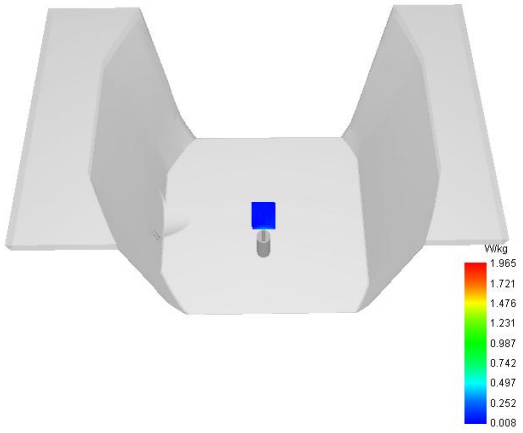
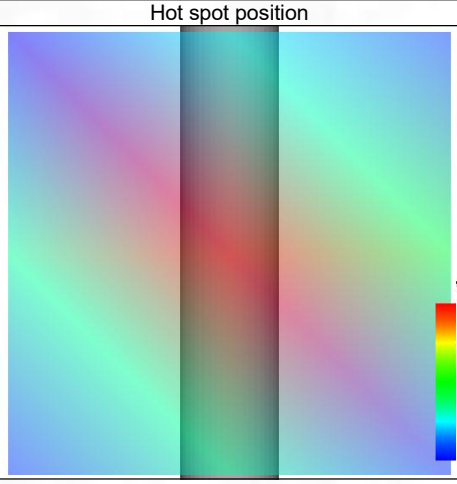


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (5400 MHz)

System check at 5400 MHz

Date of measurement: 17/8/2023

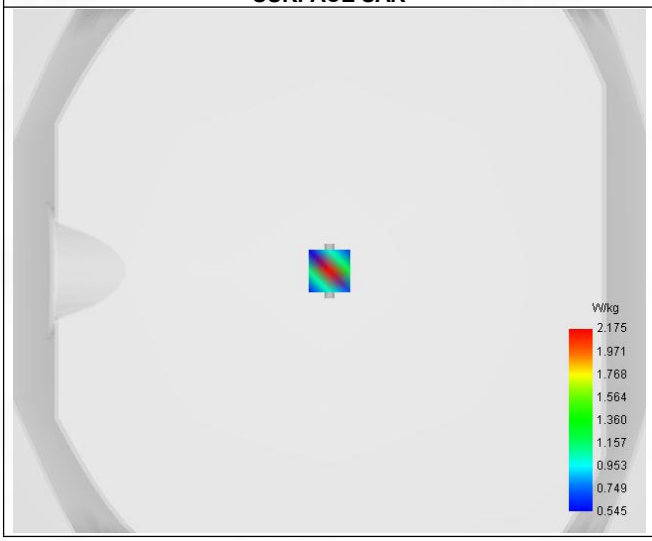
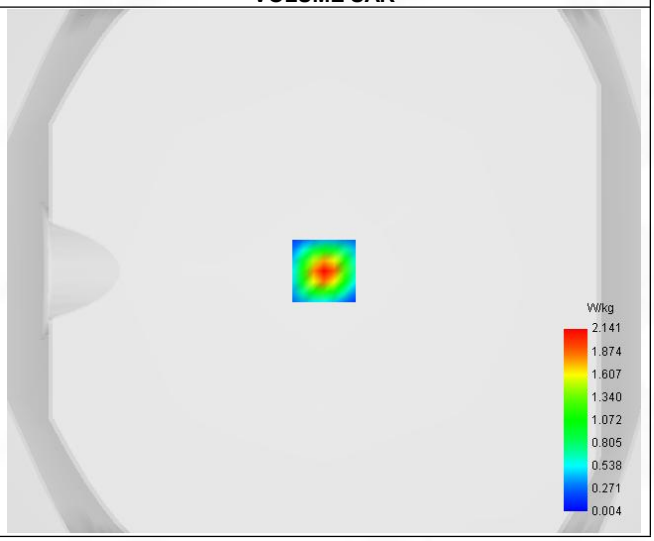
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.12
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	CW5400
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	5400.000
Relative permitivity (real part)	35.800
Relative permitivity (imaginary part)	16.200
Conductivity (S/m)	4.860

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=0.00 ; SAR Peak: 3.78 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.327
SAR 1g (W/Kg)	1.120
Variation (%)	-4.610
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)	3.660	2.141	1.177	0.614	0.317	0.169	0.098	0.065	0.050

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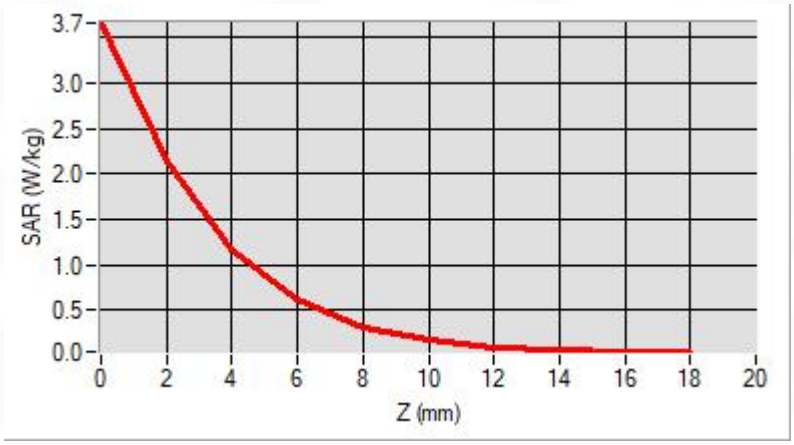
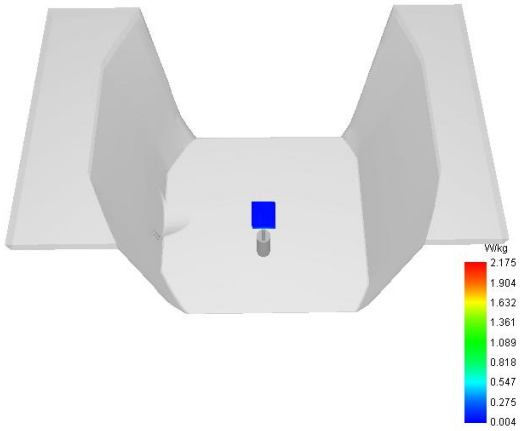
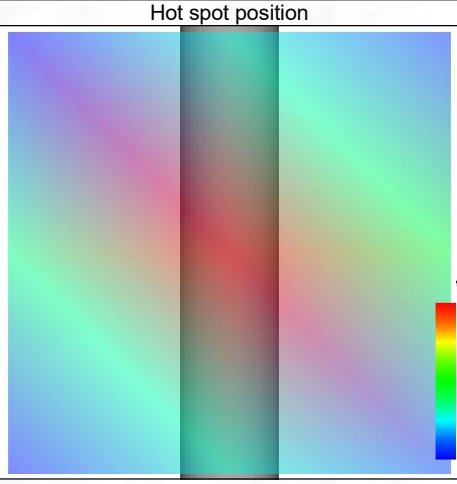


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (5600 MHz)

System check at 5600 MHz

Date of measurement: 17/8/2023

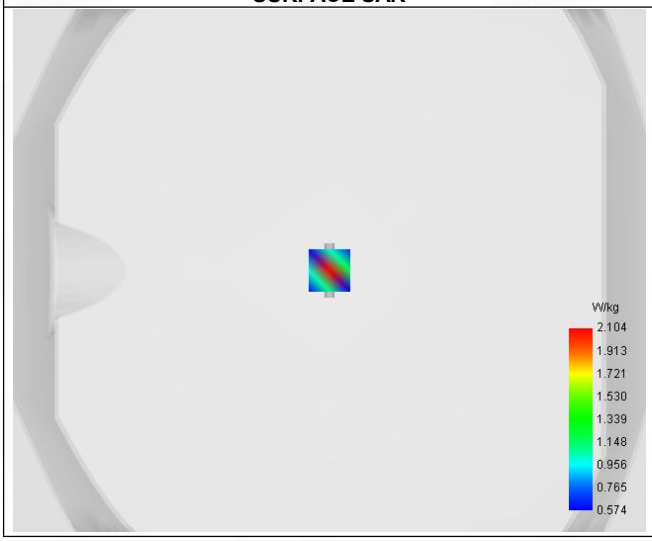
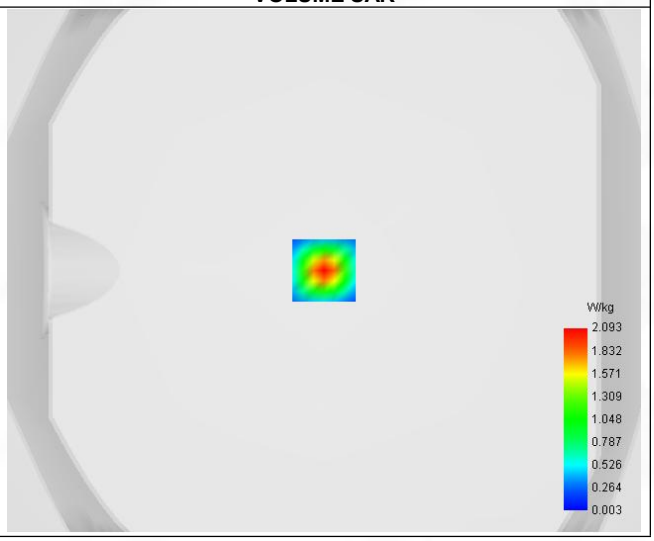
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.18
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	CW5600
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	5600.000
Relative permitivity (real part)	35.500
Relative permitivity (imaginary part)	16.300
Conductivity (S/m)	5.071

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=0.00 ; SAR Peak: 3.90 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.314
SAR 1g (W/Kg)	1.084
Variation (%)	-0.190
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)	3.748	2.093	1.074	0.514	0.243	0.122	0.072	0.056	0.056

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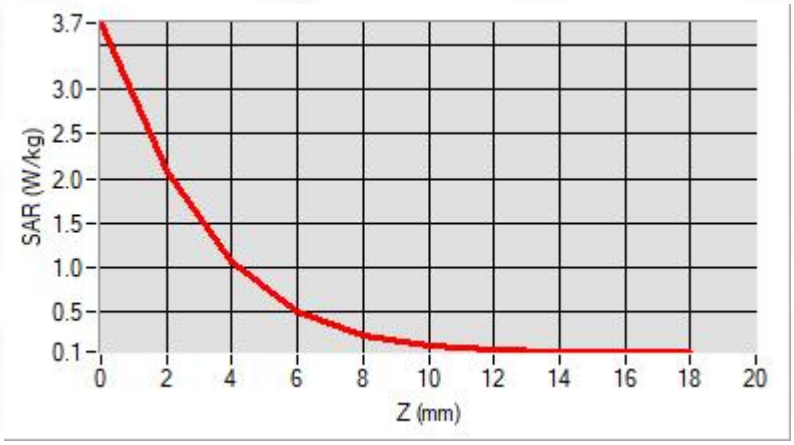
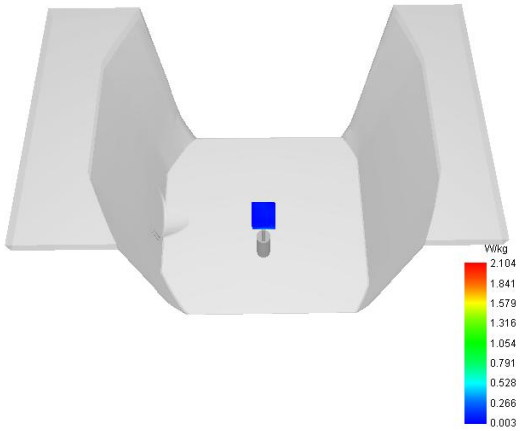
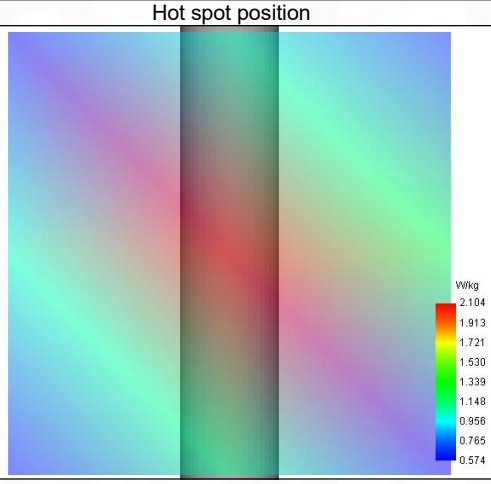


F. 3D Image

3D screen shot	Hot spot position
	

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System Performance Check Data (5800 MHz)

System check at 5800 MHz

Date of measurement: 17/8/2023

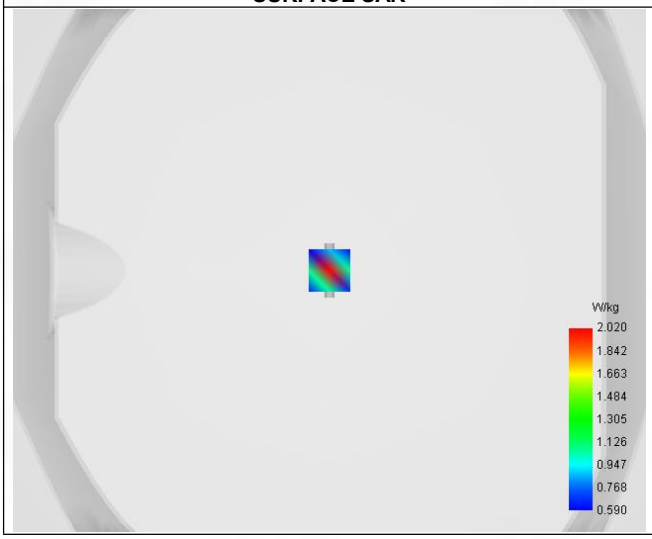
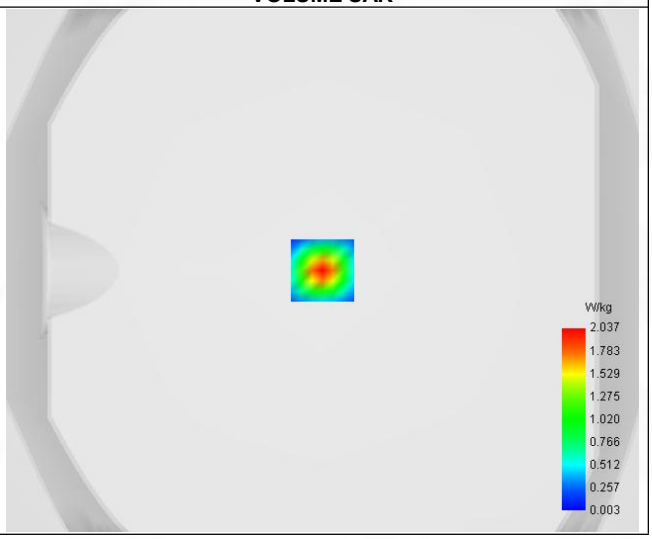
A. Experimental conditions.

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. Permitivity

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

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=0.00 ; SAR Peak: 4.17 W/kg

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

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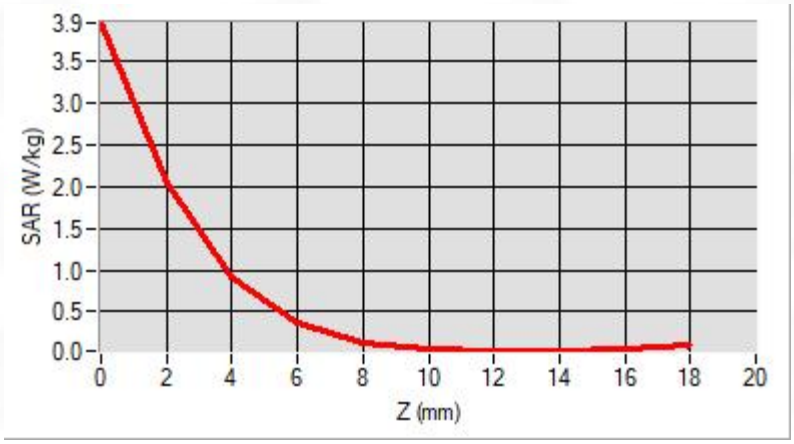
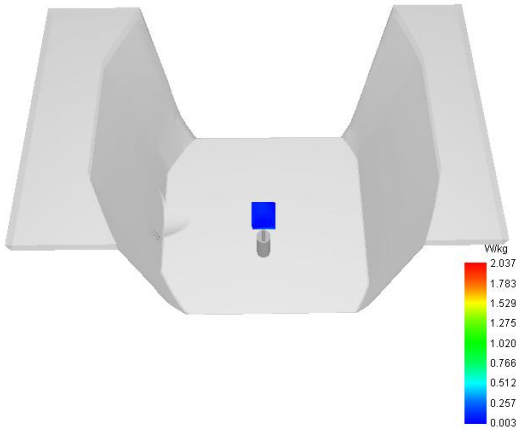
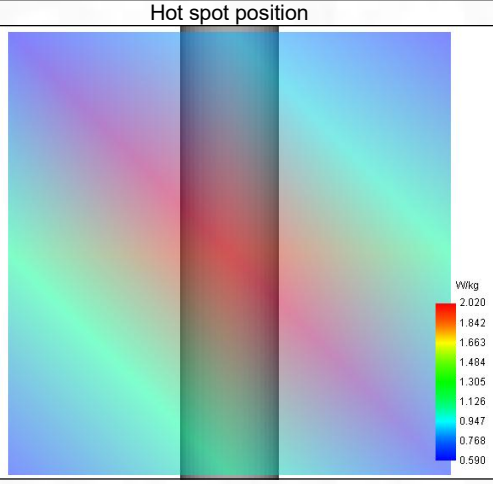


F. 3D Image

3D screen shot	Hot spot position
	

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ANNEX C Test Data

1-Body/Limb with Back position in dist. 0mm on Channel 13 in IEEE 802.11b ISM

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

Date of measurement: 17/8/2023

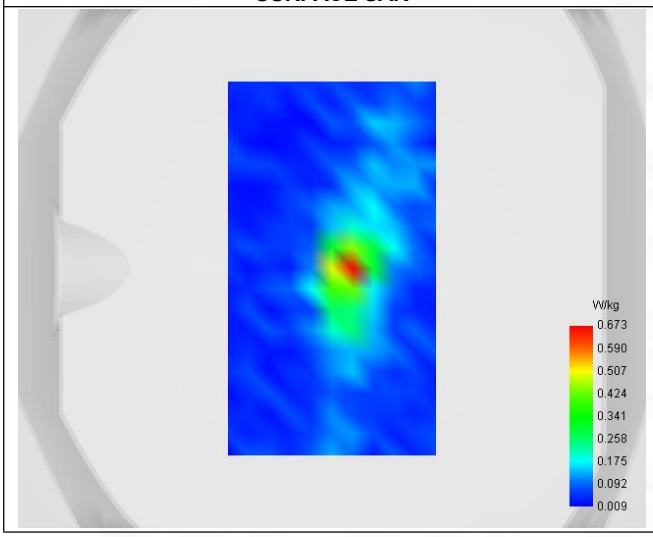
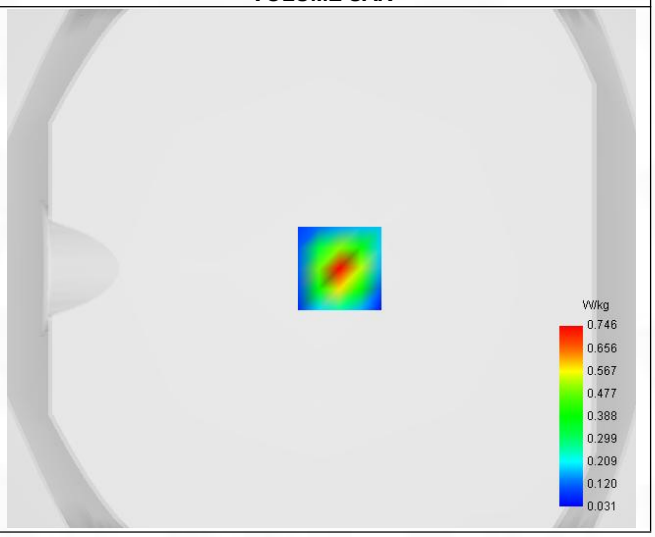
A. Experimental conditions.

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	IEEE 802.11b ISM
Channels	Higher (13)
Signal	IEEE 802.11

B. Permitivity

Frequency (MHz)	2472.000
Relative permitivity (real part)	39.051
Relative permitivity (imaginary part)	13.245
Conductivity (S/m)	1.833

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=7.00, Y=0.00 ; SAR Peak: 1.41 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.310
SAR 1g (W/Kg)	0.654
Variation (%)	1.620
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)	1.415	0.746	0.308	0.128	0.066

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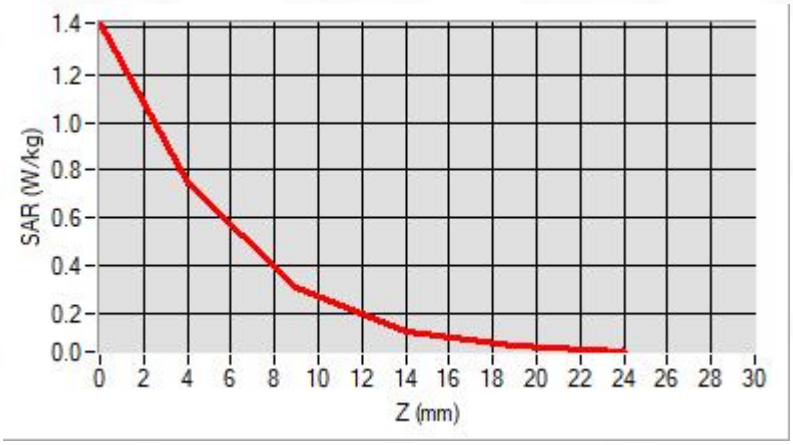
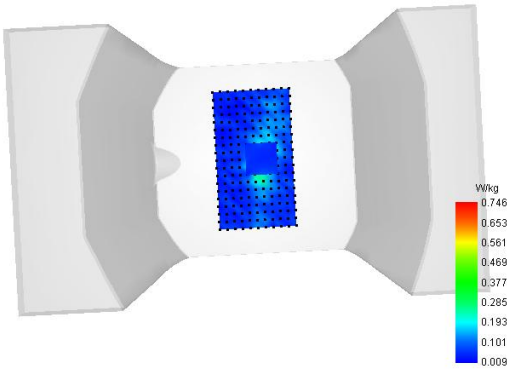
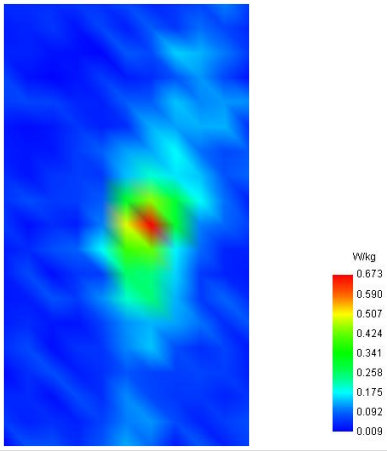


F. 3D Image

3D screen shot	Hot spot position
	

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2-Body/Limb with Back position in dist. 0mm on Channel 46 in IEEE 802.11n U-NII

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

Date of measurement: 17/8/2023

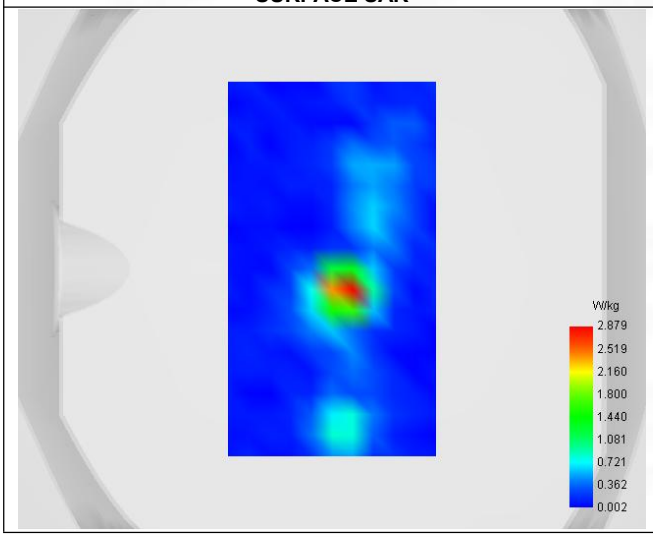
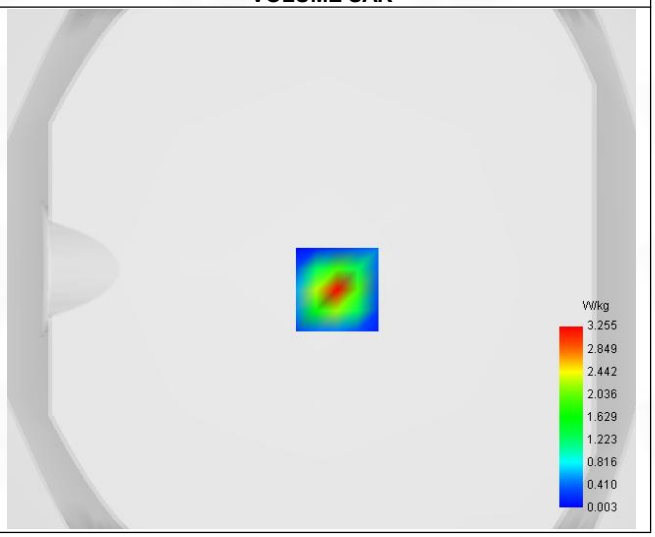
A. Experimental conditions.

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 802.11n U-NII
Channels	Middle (46)
Signal	IEEE 802.11

B. Permitivity

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

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=6.00, Y=-8.00 ; SAR Peak: 5.44 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.575
SAR 1g (W/Kg)	1.210
Variation (%)	2.660
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)	5.249	3.255	0.757	0.135	0.054

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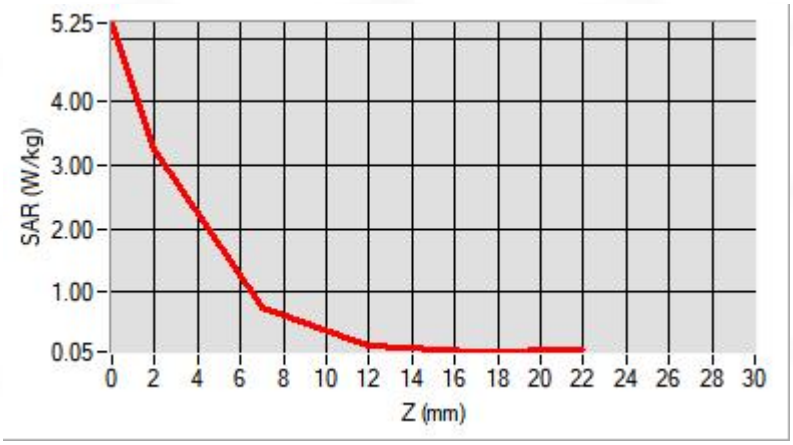
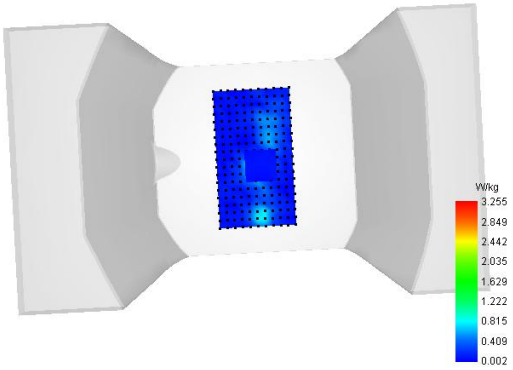
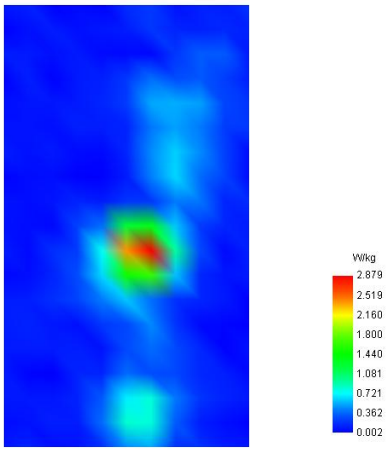


F. 3D Image

3D screen shot	Hot spot position
	

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3-Body/Limb with back position in dist. 0mm on Channel 58 in IEEE 802.11ac U-NII

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

Date of measurement: 17/8/2023

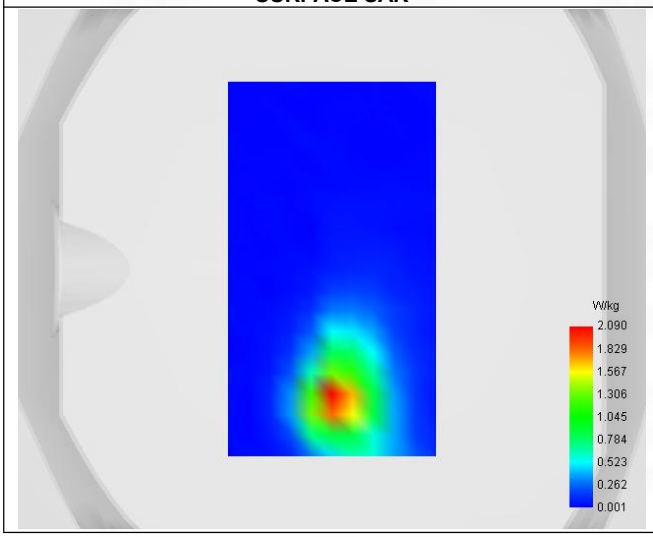
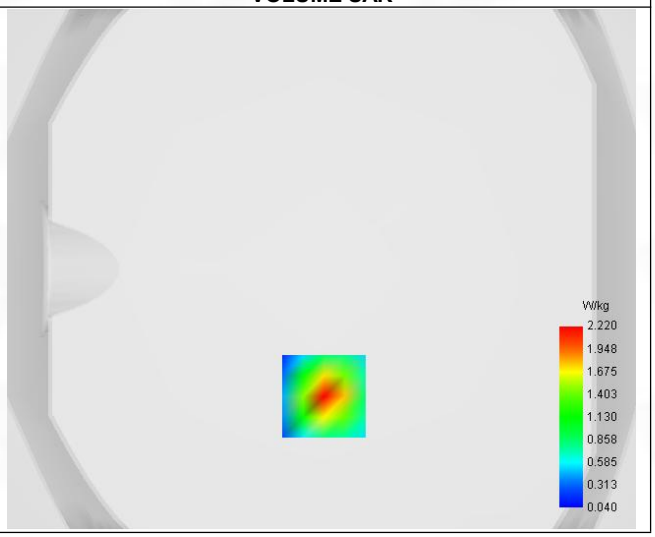
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.12
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 (58)
Signal	IEEE 802.11

B. Permitivity

Frequency (MHz)	5290.000
Relative permitivity (real part)	35.790
Relative permitivity (imaginary part)	16.340
Conductivity (S/m)	4.790

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-49.00 ; SAR Peak: 4.37 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.293
SAR 1g (W/Kg)	0.951
Variation (%)	0.668
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)	4.378	2.220	0.851	0.319	0.150

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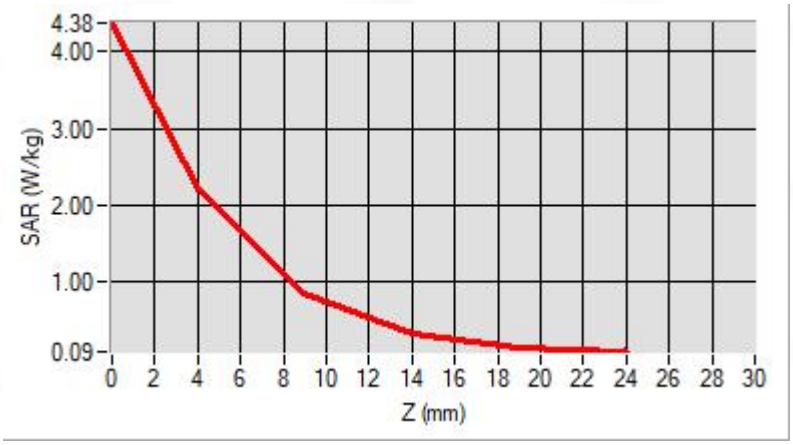
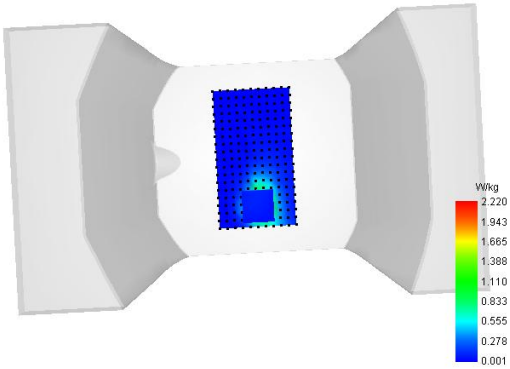
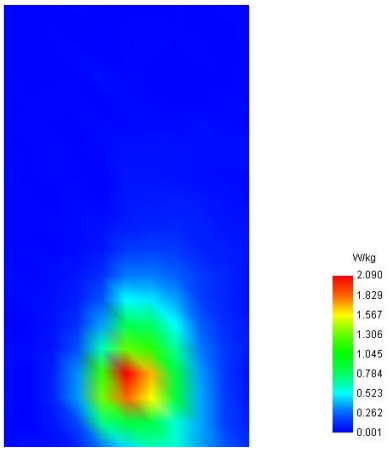


F. 3D Image

3D screen shot	Hot spot position
	

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4-Body/Limb with back position in dist. 0mm on Channel 106 in IEEE 802.11ac U-NII

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

Date of measurement: 17/8/2023

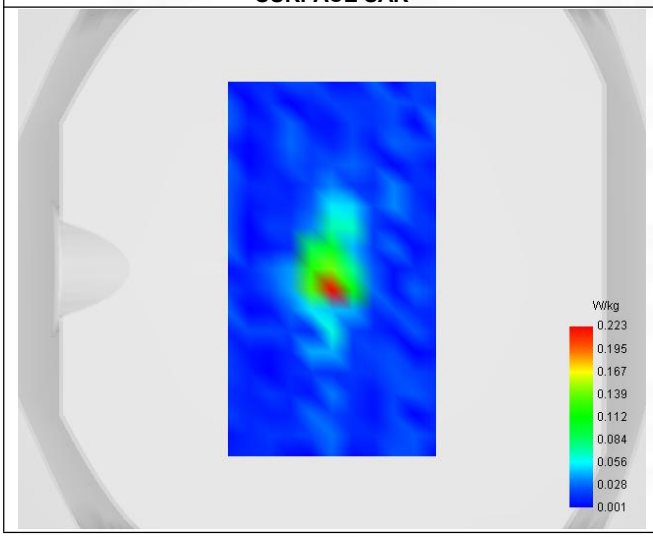
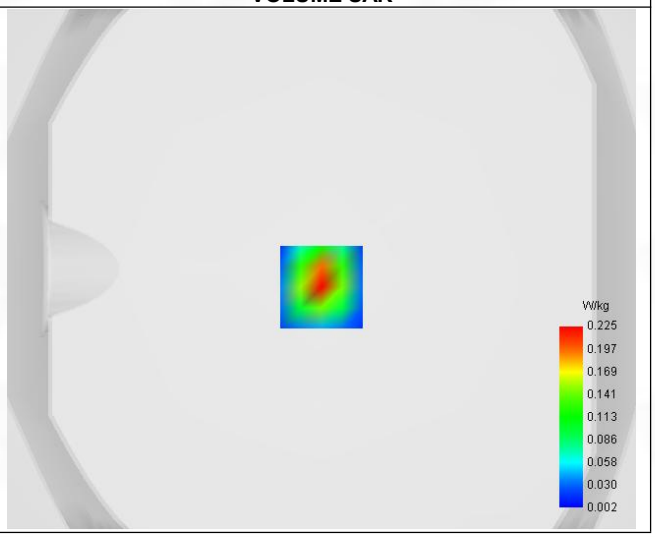
A. Experimental conditions.

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	IEEE 802.11ac ISM
Channels	Higher (106)
Signal	IEEE 802.11

B. Permitivity

Frequency (MHz)	5530.000
Relative permitivity (real part)	35.485
Relative permitivity (imaginary part)	16.515
Conductivity (S/m)	5.037

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=-7.00 ; SAR Peak: 0.57 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.315
SAR 1g (W/Kg)	0.537
Variation (%)	1.878
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)	0.555	0.225	0.054	0.012	0.007

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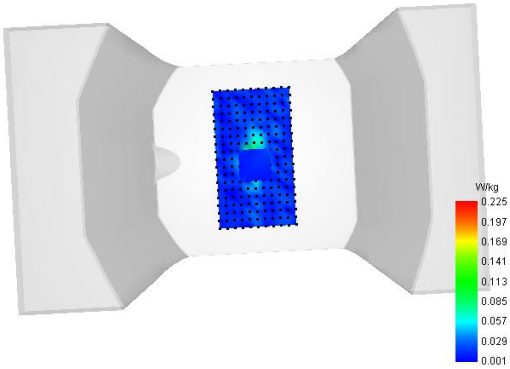
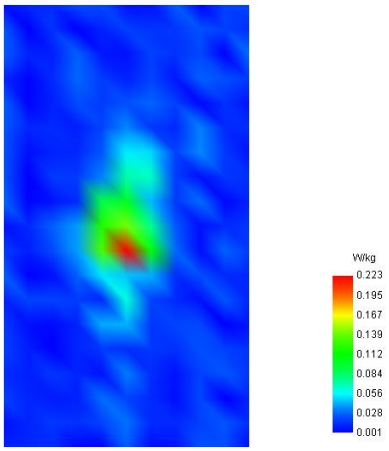
F. 3D Image

3D screen shot	Hot spot position
	

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5-Body/Limb with Back position in dist. 0mm on Channel 165 in IEEE 802.11n U-NII

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

Date of measurement: 17/8/2023

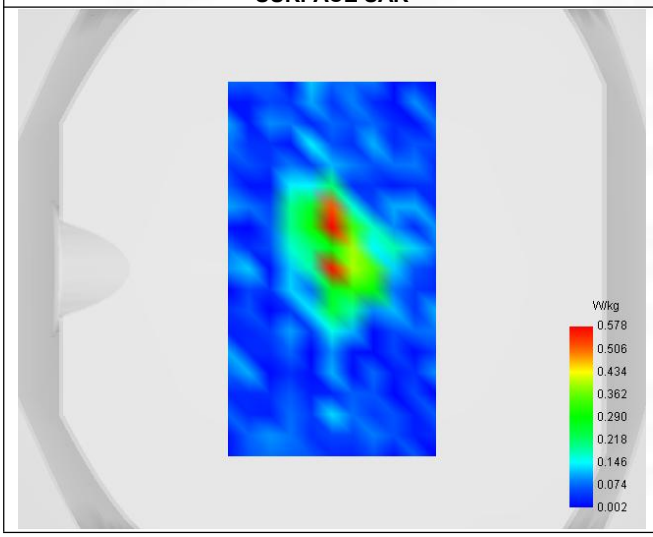
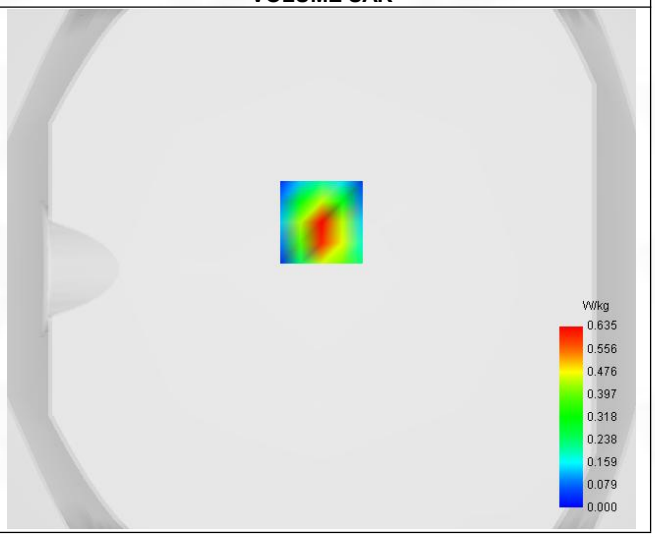
A. Experimental conditions.

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 802.11n U-NII
Channels	Higher (165)
Signal	IEEE 802.11

B. Permitivity

Frequency (MHz)	5775.000
Relative permitivity (real part)	35.205
Relative permitivity (imaginary part)	16.595
Conductivity (S/m)	5.285

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=18.00 ; SAR Peak: 1.05 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.289
SAR 1g (W/Kg)	0.611
Variation (%)	3.052
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)	0.996	0.635	0.180	0.057	0.039

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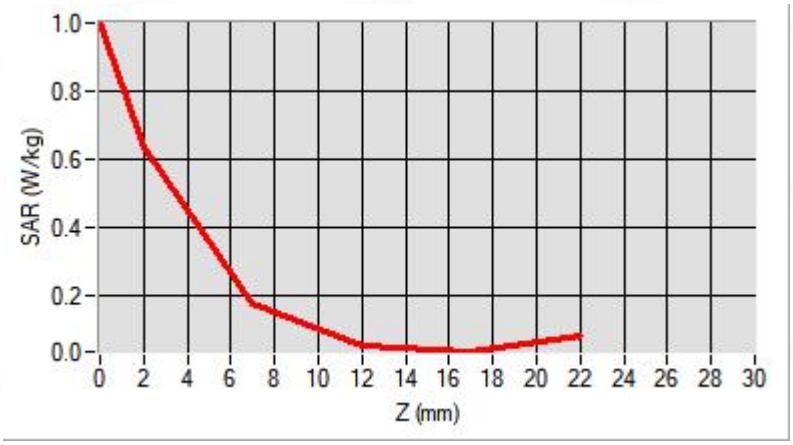
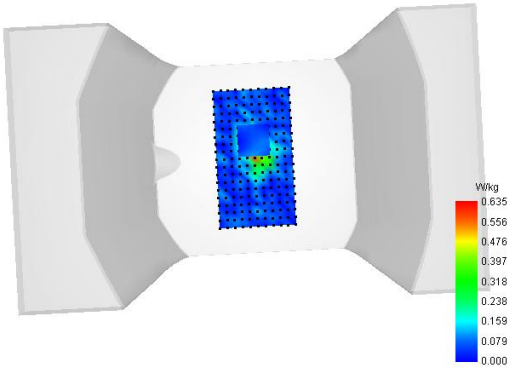
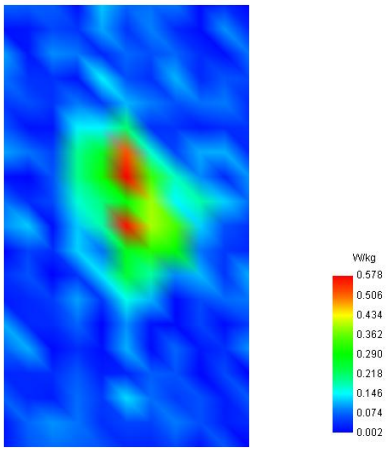


F. 3D Image

3D screen shot	Hot spot position
	

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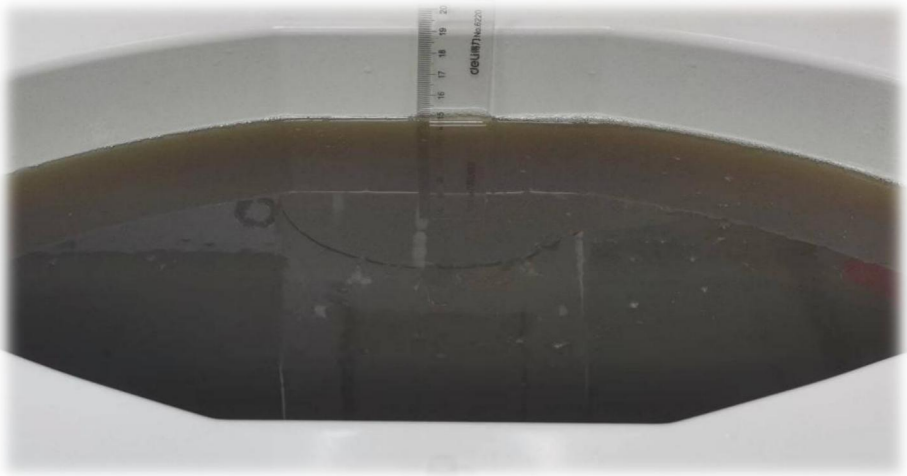
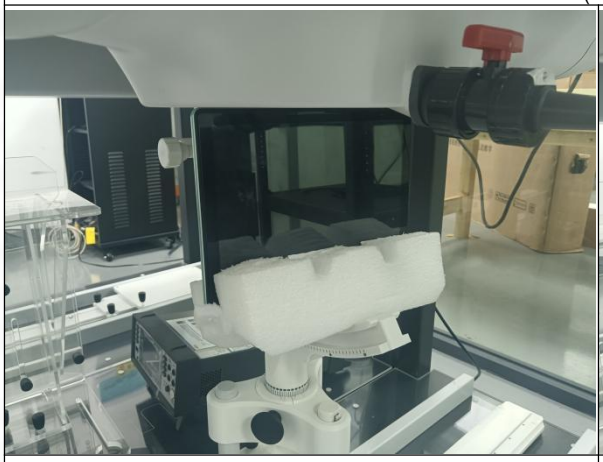
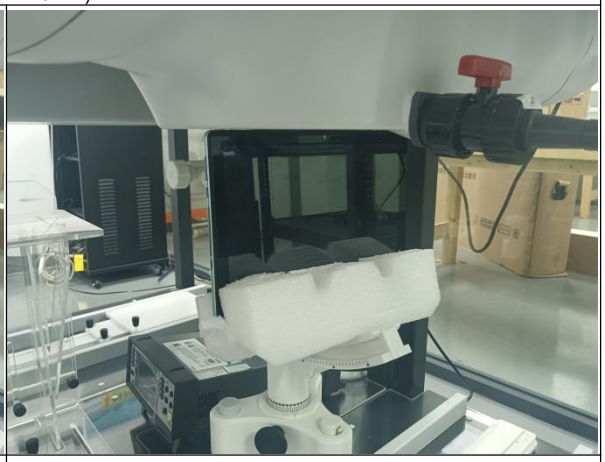
ANNEX D SAR Test Setup Photos

Reference Photo: simulation liquid depth 15cm

Test position

Back (dist. 0mm)

Left (dist. 0mm)

Right (dist. 0mm)

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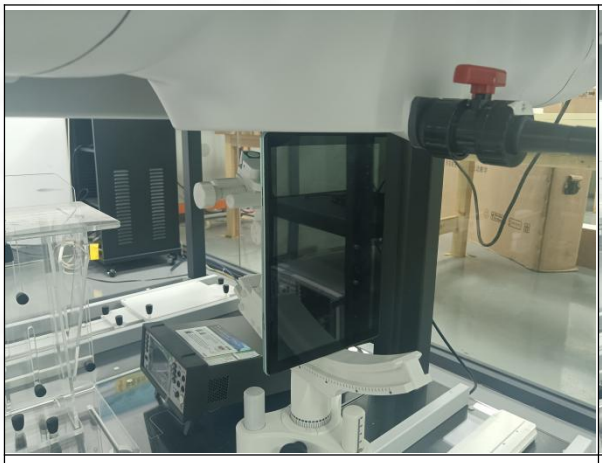	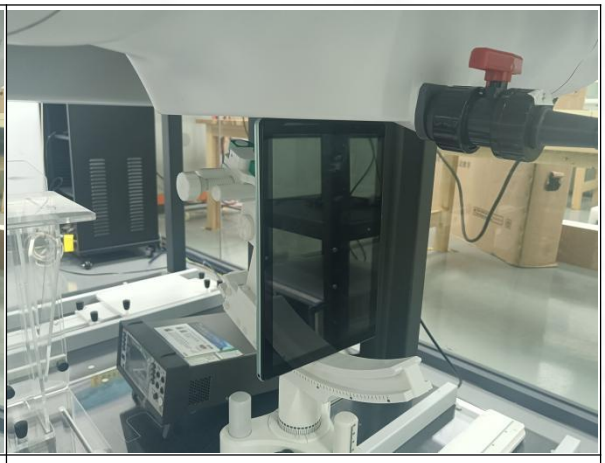
Top (dist. 0mm)	Bottom (dist. 0mm)

ANNEX E EUT External and Internal Photos

Please refer to RF Report.

ANNEX F Calibration Information

Please refer to the document “Calibration.pdf”.

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