SAR Test Report

For

Applicant Name:	**Tractive GmbH**
Address:	Poststrasse 4, 4061 Pasching, AUSTRIA
EUT Name:	Tractive Dog 6
Model Number:	TG6A

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:	BTF240712R01401
Test Standards:	FCC 47 CFR§2.1093 IEC/IEEE 62209-1528: 2020 IEEE C95.1-2019 KDB447498 D04 KDB865664 D01 KDB865664 D02 KDB941225 D05 KDB248227 D01 KDB941225 D06 KDB648474 D04 KDB690783 D01
FCC ID:	2AVE6TG6A
Test Conclusion:	Pass
Test Date:	2024-07-15 to 2024-09-04
Date of Issue:	2024-09-05

Tested By: Jim Yin

Jim Yin / Tester

Prepared By: Zoey Zhang

Zoey Zhang / Project Engineer

Date: 2024-09-05

Approved By: Ryan.CJ

Ryan.CJ / EMC Manager

Date: 2024-09-05

BTF Testing Lab (Shenzhen) Co., Ltd.

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Revision History		
Version	Issue Date	Revisions Content
R_V0	2024-09-05	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
FCC Registration Number	518915
Designation Number	CN1330

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:	Tractive GmbH
Address:	Poststrasse 4, 4061 Pasching, AUSTRIA

2.2 Manufacturer Information

Company Name:	Tractive GmbH
Address:	Poststrasse 4, 4061 Pasching, AUSTRIA

2.3 Factory Information

Company Name:	Tractive GmbH
Address:	Poststrasse 4, 4061 Pasching, AUSTRIA

2.4 General Description of Equipment under Test (EUT)

EUT Name	Tractive Dog 6
Under Test Model Name	TG6A
Sample No.	BTFSN240712016/1-001
Software Version	TRV6-005
Hardware Version	v.5

2.5 Equipment under Test Ancillary Equipment

Ancillary Equipment 1	Rechargeable Battery	
	Capacity	930mAh
	Nominal Voltage	3.87V

2.6 Technical Information

Network and Wireless connectivity	2G Network GPRS/EGPRS 850/1900 4G Network FDD eMTC Band 2/4/5/12/13 2.4G WIFI 802.11b, 802.11g, 802.11n(HT20/40) BT (BLE) LoRa

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

Operating Mode	GSM, eMTC, WLAN, Bluetooth, LoRa		
Frequency Range	GSM 850	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	GSM 1900	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	eMTC Band 2	TX: 1850 ~ 1910 MHz	RX: 1930 ~ 1990 MHz
	eMTC Band 4	TX: 1710 ~ 1755 MHz	RX: 2110 ~ 2155 MHz
	eMTC Band 5	TX: 824 ~ 849 MHz	RX: 869 ~ 894 MHz
	eMTC Band 12	TX: 698 ~ 716 MHz	RX: 728 ~ 746 MHz
	eMTC Band 13	TX: 777 ~ 787 MHz	RX: 746 ~ 756 MHz
	802.11b/g/n(HT20/40)	2412 ~ 2462 MHz 2422 ~ 2452 MHz	
	Bluetooth	2402 ~ 2480 MHz	
	LoRa	904 MHz	
Antenna Type	WWAN: FPC Antenna WLAN: FPC Antenna BT: FPC Antenna LoRa: FPC Antenna		
Hotspot Function	Not 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	47 CFR Part 2.1093	Radiofrequency radiation exposure evaluation: portable devices
2	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-mounted wireless communication devices - Part 1528: Human models, instrumentation, and procedures (Frequency range of 4 MHz to 10 GHz)
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	KDB447498 D04	Interim General RF Exposure Guidance v01
5	KDB865664 D01	SAR measurement 100MHz to 6GHz v01r04
6	KDB865664 D02	RF Exposure Reporting v01r02
7	KDB941225 D05	SAR for LTE Devices v02r05
8	KDB248227 D01	802.11 Wi-Fi SAR v02r02
9	KDB941225 D06	Hotspot Mode v02r01
10	KDB648474 D04	Handset SAR v01r03
11	KDB690783 D01	SAR Listings on Grant v01r03

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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. 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)	GSM 850	**0.833**	PCB	**0.833**
	GSM 1900	0.635		
	eMTC Band 2	0.332		
	eMTC Band 4	0.171		
	eMTC Band 5	0.168		
	eMTC Band 12	0.071		
	eMTC Band 13	0.019		
	WLAN 2.4 GHz	0.220	DTS	
	Bluetooth	0.086	DSS	
	LoRa	0.049	/	

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 IEC/IEEE 62209-1528: 2020.

<Highest Reported Simultaneous SAR>

Exposure Position	Simultaneous Configuration	Highest Reported Simultaneous Transmission SAR (W/kg)	Limit (W/kg)	Verdict
Body 1-g SAR (0 mm Gap)	GPRS 850 + 2.4G WIFI	1.053	1.6	Pass

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3.4 Test Uncertainty

3.4.1 Measurement uncertainly evaluation for SAR test

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

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10g)	1g Ui (+- %)	10 g Ui (+-%)	Vi veff
Measurement System								
Probe calibration	6.1	N (k = 2)	2	1	1	3.05	3.05	∞
Probe calibration drift	1.9	R	√3	1	1	1.10	1.10	∞
Probe linearity and detection limit	0.8	R	√3	1	1	0.46	0.46	∞
Broadband signal	0.9	R	√3	1	1	0.52	0.52	∞
Probe isotropy	2.1	R	√3	1	1	1.21	1.21	∞
Other probe and data acquisition errors	1.1	N	1	1	1	1.10	1.10	∞
RF ambient and noise	2.8	R	√3	1	1	1.62	1.62	∞
Probe positioning errors	0.4	N	1	0.31	0.31	0.12	0.12	∞
Data processing errors	4.3	R	√3	1	1	2.48	2.48	∞
Phantom and Device								
Measurement of phantom conductivity(σ)	2.1	N	1	0.72	0.68	1.51	1.43	0.72
Temperature effects (medium)	1.8	R	√3	0.72	0.68	0.75	0.71	0.72
Shell permittivity	6.2	R	√3	0.5	0.5	1.79	1.79	0.5
Distance between the radiating element of the DUT and the phantom medium	2.9	N	1	2	2	5.80	5.80	2
Repeatability of positioning the DUT or source against the phantom	3.2	N	1	1	1	3.20	3.20	1
Device holder effects	3.0	N	1	1	1	3.00	3.00	1
Effect of operating mode on probe sensitivity	3.1	R	√3	1	1	1.79	1.79	1
Time-average SAR	0	R	√3	1	1	0.00	0.00	1
Variation in SAR due to drift in output of DUT	2.7	N	1	1	1	2.70	2.70	1
Corrections to the SAR result								
Phantom deviation from target (ε',σ)	2.3	N	1	1	0.87	2.30	2.00	∞
SAR scaling	3.1	R	√3	1	1	1.79	1.79	∞
Combined Standard Uncertainty		RSS				10.02	9.94	
Expanded Uncertainty (95% Confidence interval)		k				20.04	19.88	

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

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3.4.2 Measurement uncertainly evaluation for system check

Uncertainty Component	Tol (+- %)	Prob. Dist.	Div.	Ci (1g)	Ci (10 g)	1g Ui (+- %)	10 g Ui (+-%)	Vi veff
Measurement System								
Probe calibration	6.1	N (k = 2)	2	1	1	3.05	3.05	∞
Probe calibration drift	1.9	R	√3	1	1	1.10	1.10	∞
Probe linearity and detection limit	0.8	R	√3	1	1	0.46	0.46	∞
Probe isotropy	2.1	R	√3	1	1	1.21	1.21	∞
Other probe and data acquisition errors	1.1	N	1	1	1	1.10	1.10	∞
RF ambient and noise	2.8	R	√3	1	1	1.62	1.62	∞
Probe positioning errors	0.4	N	1	0.31	0.31	0.12	0.12	∞
Data processing errors	4.3	R	√3	1	1	2.48	2.48	∞
Phantom and Device								
Measurement of phantom conductivity(σ)	2.1	N	1	0.72	0.68	1.51	1.43	∞
Temperature effects (medium)	1.8	R	√3	0.72	0.68	0.75	0.71	∞
Shell permittivity	6.2	R	√3	0.5	0.5	1.79	1.79	∞
Distance between the radiating element of the DUT and the phantom medium	2.9	N	1	2	2	5.80	5.80	2
Variation in SAR due to drift in output of DUT	2.7	N	1	1	1	2.70	2.70	∞
Validation antenna uncertainty (validation measurement only)	5.5	N	1	1	1	5.50	5.50	∞
Uncertainty in accepted power (validation measurement only)	0.8	N	1	1	1	0.80	0.80	∞
Corrections to the SAR result								
Phantom deviation from target (ε',σ)	2.3	N	1	1	0.87	2.30	2.00	∞
Combined Standard Uncertainty		RSS				10.26	10.19	
Expanded Uncertainty (95% Confidence interval)		k				20.53	20.37	

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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:

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

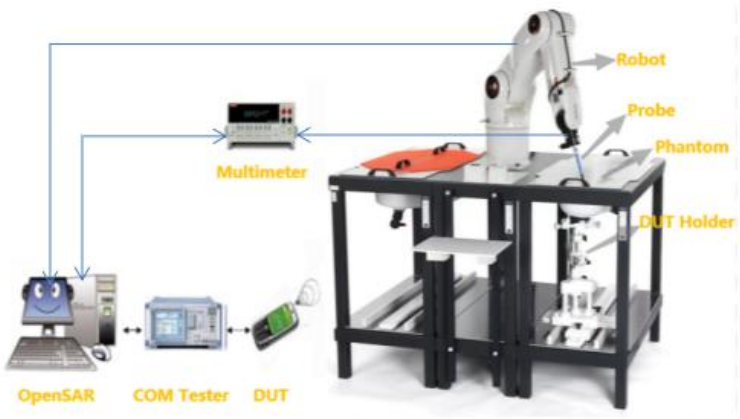
SAR is expressed in units of Watts per kilogram (W/kg) SAR measurement can be related to the electrical field in the tissue by

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

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.

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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.

SAM Phantom

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.

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.

ELLI Phantom

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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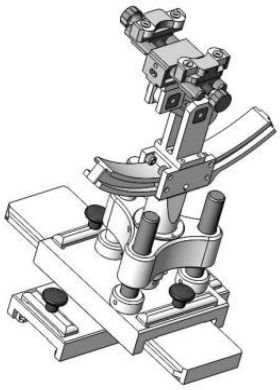
4.2.5 Device Holder



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

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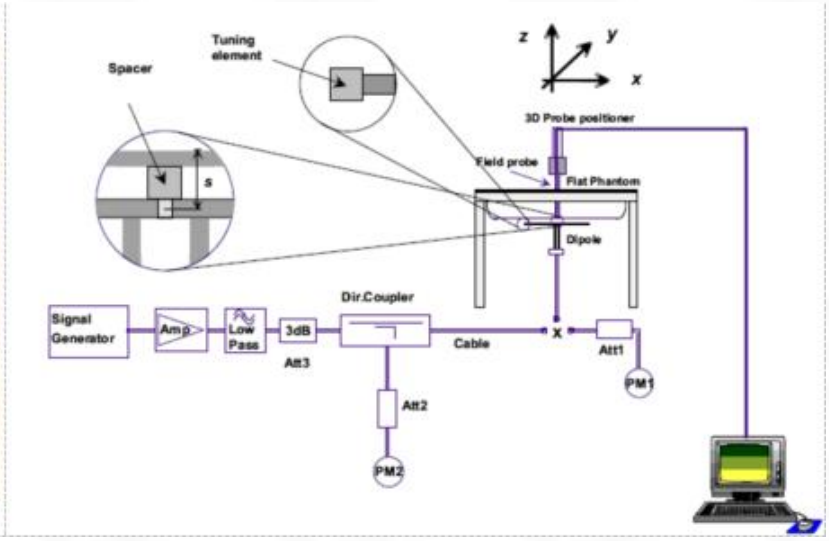
5. System Verification

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

According to KDB 648474 D04 Handset, handsets are tested for SAR compliance in head, body-worn accessory and other use configurations described in the following subsections.

6.1 Head Exposure Conditions

Head exposure is limited to next to the ear voice mode operations. Head SAR compliance is tested according to the test positions defined in IEC IEEE 62209-1528:2020 using the SAM phantom illustrated as below.

6.1.1 Definition of the cheek position

The cheek position is established using steps a) to j) as follows.

(a) Configure the DUT for voice operation, if necessary. For example, for a DUT with a flip.a)swivel, or slide cover piece, open the cover if this is consistent with voice operation. If the DUT can also be used with the cover closed, both configurations shall be tested.

(b) Define two imaginary lines on the DUT, the vertical centreline and the horizontal line, relative to the DUT in vertical orientation as shown in Figure 15.

(c) The vertical centreline passes through two points on the front side of the DUT: the midpoint of the width w of the DUT at the level of the acoustic output (Point A in Figure 15), and the midpoint of the width w_t at the bottom of the DUT (Point B). The horizontal line is perpendicular to the vertical centerline, and passes through the centre of the acoustic output (Figure 15). The two lines intersect at Point A. Note that for many DUTs, Point A coincides with the centre of the acoustic output. However, the acoustic output could be located elsewhere on the horizontal line. Also note that the vertical centreline is not necessarily parallel to the front face of the DUT, especially for clamshell DUTs, DUTs with flip cover pieces, and other irregularly shaped DUTs.

(d) Position the DUT close to the surface of the phantom such that Point A is on the (virtual) extension of the line passing through points RE (right-ear ear reference point) and LE left-ear ear reference point) on the phantom (see Figure 16a) and Figure 16b)). The plane determined by the vertical centreline and the horizontal line of the DUT shall be parallel to the sagittal plane of the phantom.

(e) Translate the DUT towards the phantom along the line passing through RE and LE until the DUT touches the ear (see Figure 16c)).

(f) Rotate the DUT around the (virtual) LE-RE Line until the DUT vertical centreline is in the)reference plane(see Figure 16d)).

(g) Rotate the DUT around its vertical centreline until the plane established by the DUT vertical centreline and horizontal line is parallel to the N-F line (see Annex G), and then translate the DUT towards the phantom along the LE-RE line until DUT Point A touches the ear at the ERP (ear reference point) (see Figure 16e))

(h) While keeping Point A on the line passing through RE and LE and maintaining the DUT in contact with the pinna, rotate the DUT about the N-F line until any point on the DUT is in contact with a phantom point below the pinna (cheek) (see Figure 16f)). The physical angles of rotation shall be documented.

(i) While keeping DUT Point A in contact with the ERP rotate the DUT around a line perpendicular to the plane established by the DUT vertical centreline and horizontal line and passing through DUT Point A, until the DUT vertical centreline is in the reference plane(see Figure 16g)).

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(j) Verify that the cheek position is correct as follows:
1) the N-F line is in the plane established by the DUT vertical centreline and horizontal line;
2) DUT Point A touches the pinna at the ERP
3) the DUT vertical centreline is in the reference plane.

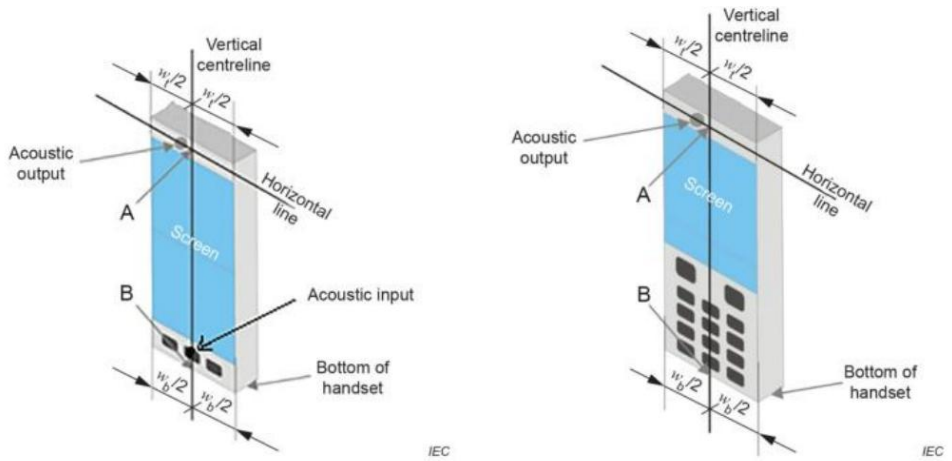
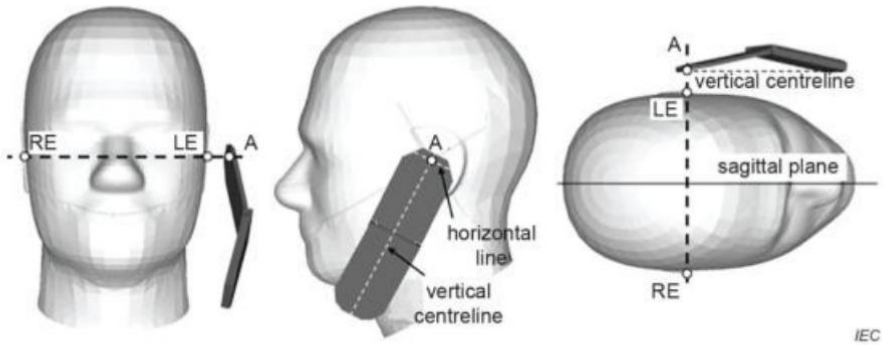


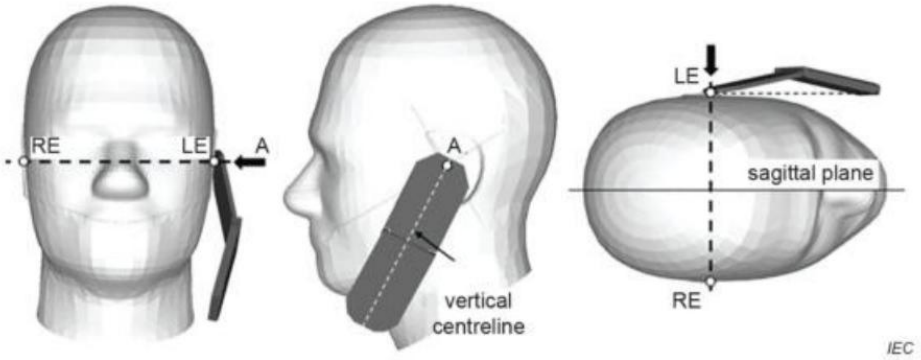
Figure 15 - Vertical and horizontal reference lines and reference points A and B on two example device types: a full touch-screen smart phone (left) and a DUT with a keypad (right)

NOTE The reference points for the right-ear ear reference point (RE), left-ear ear reference point (LE), and mouth (M), which establish the reference plane for DUT positioning, are indicated. This device position shall be maintained for the sagittal phantom test set-up shown in Figure G.4.

a) Phone position 1 – cheek position

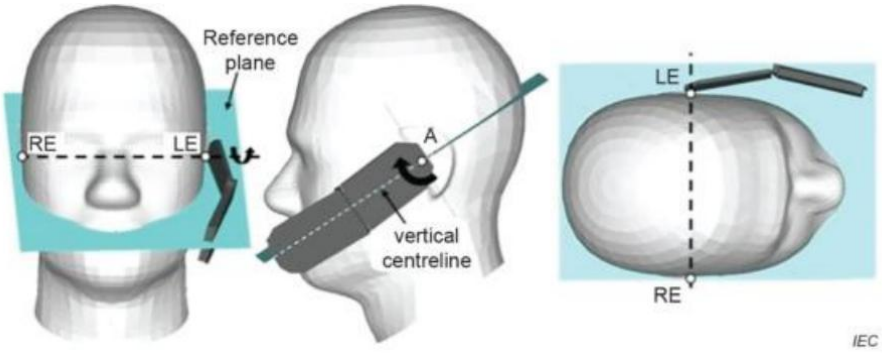


b) One possible DUT position against the head after applying 7.2.4.2.2 c)



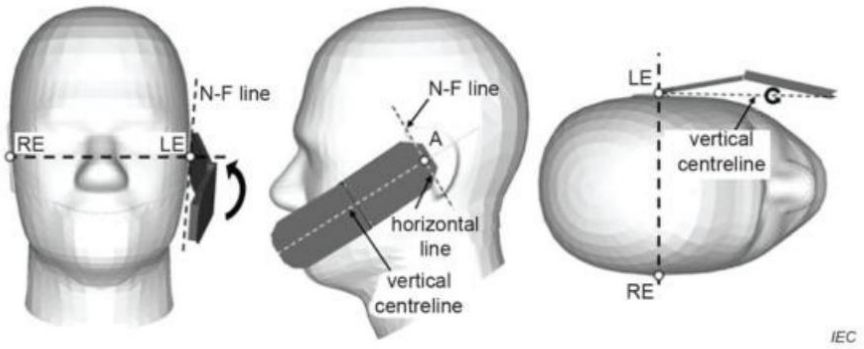
NOTE The black arrows show the direction of translation of the DUT for 7.2.4.2.2 d).

c) DUT position after applying 7.2.4.2.2 d)



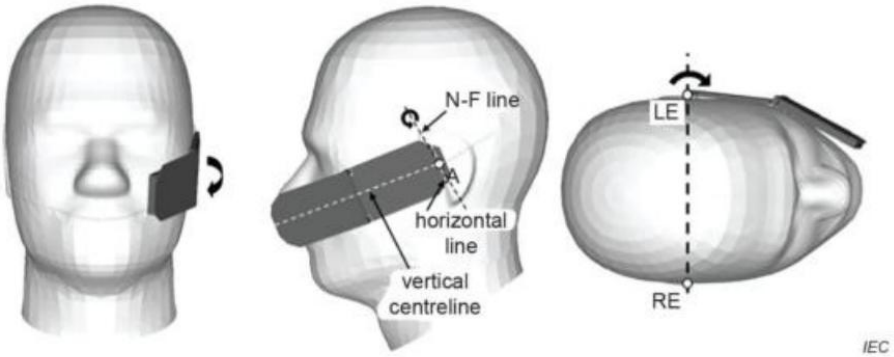
NOTE The curved black arrows show the direction of rotation of the DUT for 7.2.4.2.2 e).

d) DUT position after applying 7.2.4.2.2 e)



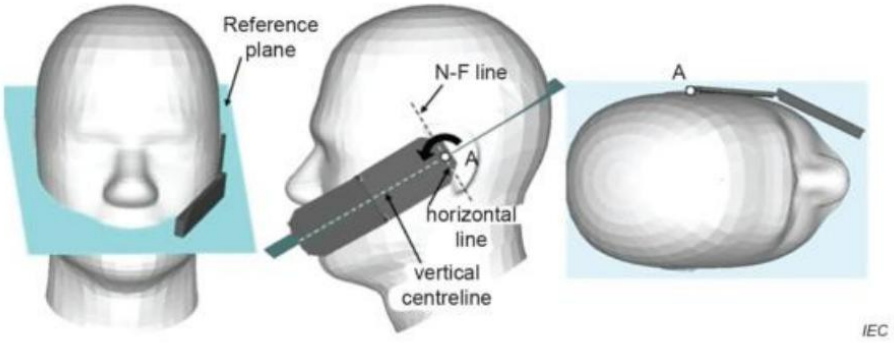
NOTE The curved black arrows show the direction of rotation of the DUT for 7.2.4.2.2 f).

e) DUT position after applying 7.2.4.2.2 f)



NOTE The curved black arrows show the direction of rotation of the DUT for 7.2.4.2.2 g)

f) DUT position after applying 7.2.4.2.2 g)



NOTE The curved black arrows show the direction of rotation of the DUT for 7.2.4.2.2 h).

g) DUT position after applying 7.2.4.2.2 h)

Figure 16 – Cheek position of the DUT on the left side of SAM where the device position shall be maintained for the phantom test set-up

6.1.2 Definition of the tilt position

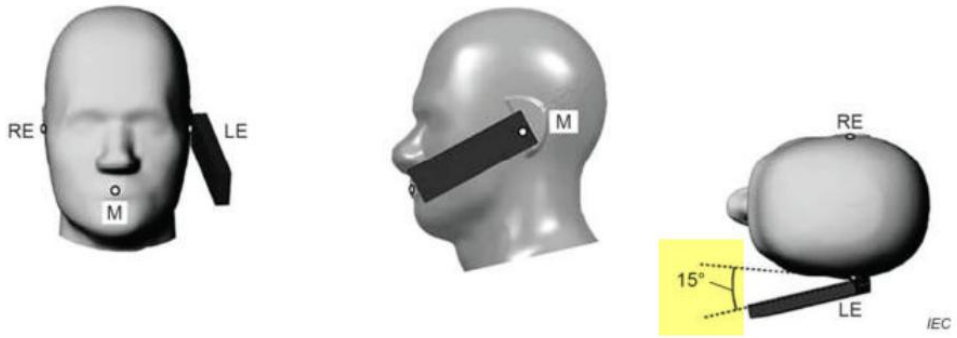
The tilt position is established using steps a) through d) as follows.

(a) Repeat steps a) through j) of 7.2.4.2.2 to place the DUT in the cheek position)(see Figure16).

(b) While maintaining the orientation of the DUT, move the DUT away from the pinna along the line passing through RE and LE far enough to allow a rotation of the DUT away from the cheek by 15°.

(c) Rotate the DUT around the horizontal line by 15°(see Figure 17).

(d) While maintaining the orientation of the DUT. move the DUT towards the phantom on a line passing through RE and LE until any part of the DUT touches the ear. The tilt position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, e.g. an extended antenna in contact with the back of the head phantom, the angle of the DUT shall be reduced. in this case, the tilt position is obtained if any part of the DUT is in contact with the pinna and a second point on the DUT is in contact with the phantom,e.g.the antenna in contact with the back of the head.



Key

M Mouth reference point

LE Left-ear ear reference point

RE Right-ear ear reference point

This device position shall be maintained for the phantom test set-up.

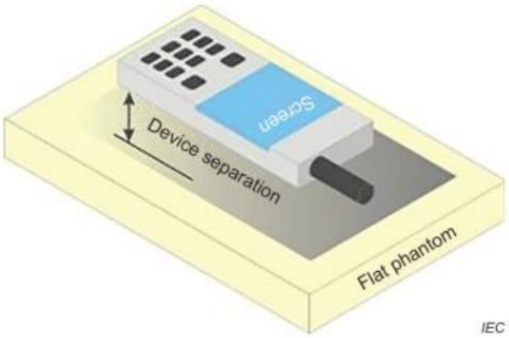
Figure 17 – Tilt position of the DUT on the left side of SAM

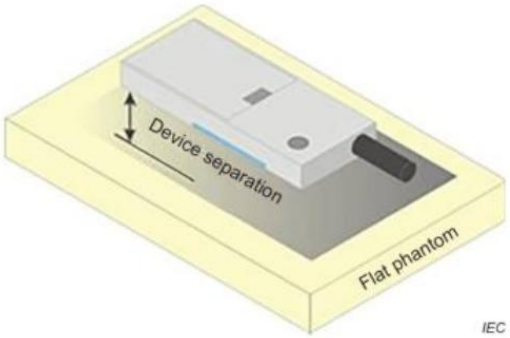
6.2 Body-worn Position Conditions

Body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in KDB 447498 are used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode. When the reported SAR for a body-worn accessory.

Body-worn accessories that do not contain metallic or conductive components may be tested according to worst-case exposure configurations, typically according to the smallest test separation distance required for the group of body-worn accessories with similar operating and exposure characteristics. All body-worn accessories containing metallic components are tested in conjunction with the host device.

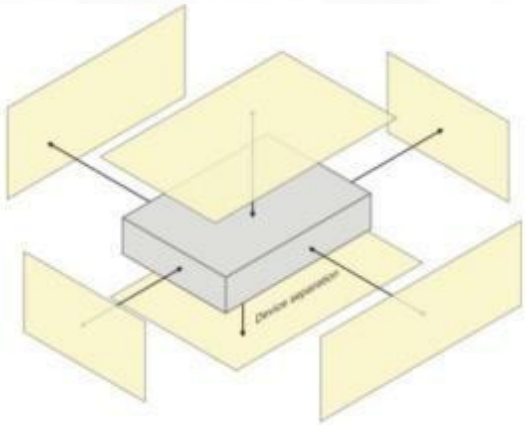
Body-worn accessory SAR compliance is based on a single minimum test separation distance for all wireless and operating modes applicable to each body-worn accessory used by the host, and according to the relevant voice and/or data mode transmissions and operations. If a body-worn accessory supports voice only operations in its normal and expected use conditions, testing of data mode for body-worn compliance is not required. A conservative minimum test separation distance for supporting off-the-shelf body-worn accessories that may be acquired by users of consumer handsets is used to test for body-worn accessory SAR compliance. This distance is determined by the handset manufacturer, according to the requirements of Supplement C 01-01. Devices that are designed to operate on the body of users using lanyards and straps, or without requiring additional body-worn accessories, will be tested using a conservative minimum test separation distance <= 5 mm to support compliance.





6.3 Hotspot Mode Exposure Position Conditions

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



6.4 Product Specific 10g Exposure Consideration

According with FCC KDB 648474 D04, for smart phones with a display diagonal dimension > 15.0 cm or an overall diagonal dimension > 16.0 cm that provide similar mobile web access and multimedia support found in mini-tablets or UMPC mini-tablets that support voice calls next to the ear, unless it is confirmed otherwise through KDB inquiries, the following phablet procedures should be applied to evaluate SAR compliance for each applicable wireless modes and frequency band. Devices marketed as phablets, regardless of form factors and operating characteristics must be tested as a phablet to determine SAR compliance;

The UMPC mini-tablet procedures must also be applied to test the SAR of all surfaces and edges with an antenna located at ≤ 25 mm from that surface or edge, in direct contact with a flat phantom, for 10-g extremity SAR according to the body-equivalent tissue dielectric parameters in KDB 865664 to address interactive hand use exposure conditions. The UMPC mini-tablet 1-g SAR at 5 mm is not required. When hotspot mode applies, 10-g extremity SAR is required only for the surfaces and edges with hotspot mode 1-g reported SAR > 1.2 W/kg.

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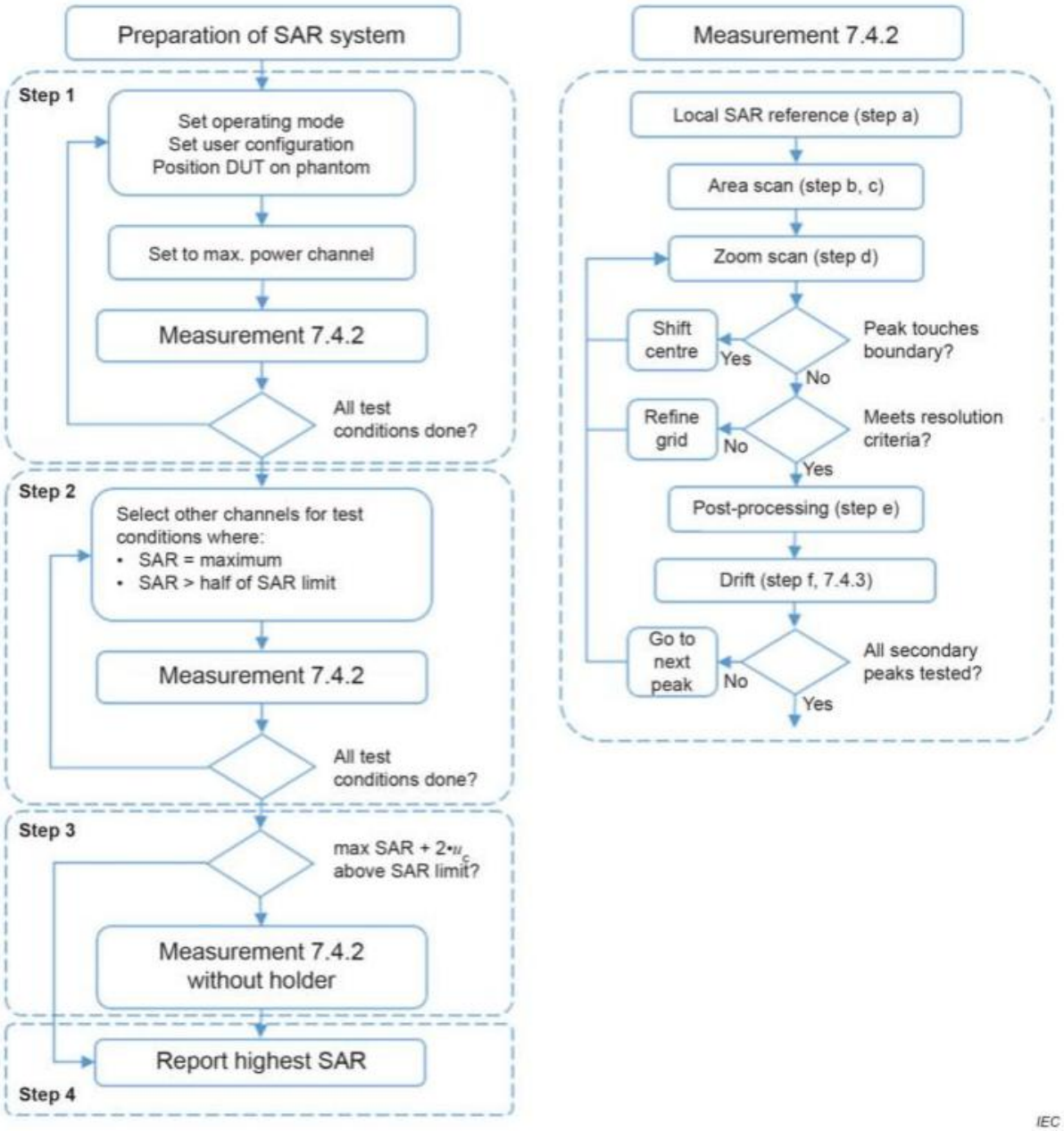
7. Measurement Procedure

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 IEC/IEEE 62209-1528: 2020.

Table 3 – Area scan parameters

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the measured points (geometric centre of the sensors) and the inner phantom surface (z_{M1} in Figure 20 in mm)	5 ± 1	$\delta \ln(2)/2 \pm 0,5$ [a]
Maximum spacing between adjacent measured points in mm (see O.8.3.1)[b]	20, or half of the corresponding zoom scan length, whichever is smaller	$60/f$, or half of the corresponding zoom scan length, whichever is smaller
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)[c]	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] See Clause O.8 on how Δx and Δy may be selected for individual area scan requirements.

[c] The probe angle relative to the phantom surface normal is restricted due to the degradation in the measurement accuracy in fields with steep spatial gradients. The measurement accuracy decreases with increasing probe angle and increasing frequency. This is the reason for the tighter probe angle restriction at frequencies above 3 GHz.

Table 4 – Zoom scan parameters

Parameter	DUT transmit frequency being tested	
	$f \leq 3$ GHz	3 GHz < $f \leq 10$ GHz
Maximum distance between the closest measured points and the phantom surface (z_{M1} in Figure 20 and Table 3, in mm)	5	$\delta \ln(2)/2$ [a]
Maximum angle between the probe axis and the phantom surface normal (α in Figure 20)	5° (flat phantom only) 30° (other phantoms)	5° (flat phantom only) 20° (other phantoms)
Maximum spacing between measured points in the x- and y-directions (Δx and Δy, in mm)	8	$24/f$ [b]
For uniform grids: Maximum spacing between measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	5	$10/(f - 1)$
For graded grids: Maximum spacing between the two closest measured points in the direction normal to the phantom shell (Δz_1 in Figure 20, in mm)	4	$12/f$
For graded grids: Maximum incremental increase in the spacing between measured points in the direction normal to the phantom shell ($R_z = \Delta z_2/\Delta z_1$ in Figure 20)	1,5	1,5
Minimum edge length of the zoom scan volume in the x- and y-directions (L_z in O.8.3.2, in mm)	30	22
Minimum edge length of the zoom scan volume in the direction normal to the phantom shell (L_h in O.8.3.2 in mm)	30	22
Tolerance in the probe angle	1°	1°

[a] δ is the penetration depth for a plane-wave incident normally on a planar half-space.

[b] This is the maximum spacing allowed, which might not work for all circumstances.

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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 to16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme.

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.

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.

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8. Conducted RF Output Power

8.1 GSM

Mode: GSM850		Maximum Tune-up(dBm)	Burst Average Power (dBm)			Division Factors	Frame-Average Power (dBm)		
			CH128	CH190	CH251		CH128	CH190	CH251
			824.2MHz	836.6MHz	848.8MHz		824.2MHz	836.6MHz	848.8MHz
GPRS (GMSK)	1Tx slot	33.00	32.76	32.68	32.77	-9.03	23.73	23.65	23.74
	2Tx slots	31.50	31.17	31.28	31.23	-6.02	25.15	25.26	25.21
	3Tx slots	30.00	29.58	29.62	29.62	-4.26	25.32	25.36	25.36
	4Tx slots	**29.00**	28.82	28.85	**28.89**	-3.01	25.81	25.84	**25.88**
EGPRS (8PSK)	1Tx slot	27.00	26.79	26.83	26.82	-9.03	17.76	17.80	17.79
	2Tx slots	27.00	26.62	26.65	26.57	-6.02	20.60	20.63	20.55
	3Tx slots	26.50	26.41	26.42	26.38	-4.26	22.15	22.16	22.12
	4Tx slots	26.50	26.13	26.11	26.08	-3.01	23.12	23.10	23.07
Mode: GSM1900		**Maximum Tune-up(dBm)**	**Burst Average Power (dBm)**			**Division Factors**	**Frame-Average Power (dBm)**		
			CH512	CH661	CH810		CH512	CH661	CH810
			1850.2MHz	1880.0MHz	1909.8MHz		1850.2MHz	1880.0MHz	1909.8MHz
GPRS (GMSK)	1Tx slot	29.50	29.23	29.00	29.07	-9.03	20.20	19.97	20.04
	2Tx slots	28.00	27.69	27.55	27.57	-6.02	21.67	21.53	21.55
	3Tx slots	26.00	25.79	25.80	25.77	-4.26	21.53	21.54	21.51
	4Tx slots	**25.00**	24.75	**24.77**	24.63	-3.01	21.74	**21.76**	21.62
EGPRS (8PSK)	1Tx slot	25.50	25.31	25.18	25.16	-9.03	16.28	16.15	16.13
	2Tx slots	25.50	25.33	25.08	25.12	-6.02	19.31	19.06	19.10
	3Tx slots	25.50	25.23	24.99	25.03	-4.26	20.97	20.73	20.77
	4Tx slots	25.50	25.01	24.85	24.92	-3.01	22.00	21.84	21.91

Note:
1) Division Factors
To average the power, the division factor is as follows:
1Tx-slot = 1 transmit time slot out of 8 time slots=> conducted power divided by (8/1) => -9.03dB
2Tx-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.02dB
3Tx-slots = 3 transmit time slots out of 8 time slots=> conducted power divided by (8/3) => -4.26dB
4Tx-slots = 4 transmit time slots out of 8 time slots=> conducted power divided by (8/4) => -3.01dB

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8.2 eMTC

Band 2

eMTC Band 2				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB Size	RB Start		18607	18900	19193
					1850.7MHz	1880.0MHz	1909.3MHz
1.4MHz	QPSK	1	0	24.00	23.82	23.75	23.81
			5	24.00	23.74	23.65	23.80
		6	0	22.00	21.70	21.71	21.81
	16QAM	1	0	23.00	22.61	22.55	22.83
			5	23.00	22.66	22.59	22.87
		6	0	22.00	21.69	21.73	21.81
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	18615	18900	19185
					1851.5MHz	1880.0MHz	1908.5MHz
3MHz	QPSK	1	0	24.00	23.64	23.76	23.88
			5	24.00	23.76	23.79	23.84
		6	0	22.00	21.71	21.68	21.79
	16QAM	1	0	23.00	22.52	22.52	22.83
			5	23.00	22.69	22.63	22.80
		6	0	22.00	21.71	21.69	21.79
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	18625	18900	19175
					1852.5MHz	1880.0MHz	1907.5MHz
5MHz	QPSK	1	0	24.00	23.45	23.49	23.70
			5	24.00	23.60	23.54	23.70
		6	0	23.00	22.39	22.49	22.58
	16QAM	1	0	24.00	23.56	23.66	23.82
			13	24.00	23.68	23.64	23.80
		6	0	23.00	22.49	22.49	22.57
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	18650	18900	19150
					1855.0MHz	1880.0MHz	1905.0MHz
10MHz	QPSK	1	0	24.00	23.48	23.57	23.71
			5	24.00	23.49	23.53	23.77
		6	0	23.00	22.39	22.38	22.66
	16QAM	1	0	24.00	23.68	23.63	23.82
			5	24.00	23.65	23.62	23.84
		25	0	23.00	22.37	22.37	22.65
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	18675	18900	19125
					1857.5MHz	1880.0MHz	1902.5MHz
15MHz	QPSK	1	0	24.00	23.49	23.48	23.72
			5	24.00	23.44	23.46	23.79
		6	0	24.00	23.36	23.33	23.61
	16QAM	1	0	24.00	23.73	23.58	23.80
			5	24.00	23.58	23.54	23.87
		6	0	24.00	23.33	23.31	23.61
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	18700	18900	19100
					1860.0MHz	1880.0MHz	1900.0MHz
20MHz	QPSK	1	0	24.00	23.48	23.52	23.68
			5	**24.00**	23.33	23.52	**23.69**
		6	0	24.00	23.28	23.44	23.53
	16QAM	1	0	24.00	23.64	23.60	23.73
			5	24.00	23.42	23.71	23.79
		6	0	24.00	23.26	23.43	23.61

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Band 4

eMTC Band 4				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB Size	RB Start		19957	20175	20393
					1710.7MHz	1732.5MHz	1754.3MHz
1.4MHz	QPSK	1	0	22.50	21.59	22.29	22.37
			5	22.50	21.63	22.11	22.09
		6	0	20.50	19.62	20.06	20.13
	16QAM	1	0	21.50	20.34	21.24	21.37
			5	21.50	20.48	20.94	21.06
		6	0	20.50	19.60	20.13	20.12
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	19965	20175	20385
					1711.5MHz	1732.5MHz	1753.5MHz
3MHz	QPSK	1	0	23.00	21.63	22.56	22.55
			5	22.50	21.61	22.49	22.36
		6	0	21.00	19.60	20.51	20.34
	16QAM	1	0	22.00	20.42	21.47	21.51
			5	21.50	20.55	21.30	21.33
		6	0	20.50	19.60	20.49	20.41
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	19976	20175	20375
					1712.5MHz	1732.5MHz	1752.5MHz
5MHz	QPSK	1	0	23.00	21.68	22.57	22.16
			5	22.50	21.70	22.44	22.26
		6	0	21.50	20.72	21.34	21.13
	16QAM	1	0	23.00	21.81	22.66	22.25
			5	23.00	21.78	22.54	22.40
		6	0	21.50	20.70	21.43	21.13
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20000	20175	20350
					1715.0MHz	1732.5MHz	1750.0MHz
10MHz	QPSK	1	0	22.50	21.76	21.94	22.16
			5	22.50	21.66	22.22	22.12
		6	0	21.50	20.69	21.03	21.05
	16QAM	1	0	22.50	21.91	22.03	22.35
			5	22.50	21.86	22.34	22.23
		6	0	21.50	20.67	21.11	21.05
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20025	20175	20325
					1717.5MHz	1732.5MHz	1747.5MHz
15MHz	QPSK	1	0	23.00	22.24	22.55	22.57
			5	23.00	22.14	22.53	22.64
		6	0	22.50	22.01	22.37	22.46
	16QAM	1	0	23.00	22.35	22.70	22.74
			5	23.00	22.22	22.66	22.82
		6	0	22.50	22.09	22.37	22.46
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20050	20175	20300
					1720.0MHz	1732.5MHz	1745.0MHz
20MHz	QPSK	1	0	**23.00**	22.29	22.05	**22.85**
			5	23.00	22.07	22.21	22.57
		6	0	23.00	22.01	22.09	22.53
	16QAM	1	0	23.50	22.36	22.12	23.06
			5	23.00	22.20	22.32	22.75
		6	0	23.00	21.99	22.09	22.53

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Band 5

eMTC Band 5				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB Size	RB Start		20407	20525	20643
					824.7MHz	836.5MHz	848.3MHz
1.4MHz	QPSK	1	0	24.50	24.38	24.44	24.37
			5	24.50	24.34	24.35	24.25
		6	0	22.50	22.31	22.36	22.31
	16QAM	1	0	23.50	23.21	23.23	23.25
			5	23.50	23.11	23.16	23.17
		6	0	22.50	22.38	22.34	22.30
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20415	20525	20635
					825.5MHz	836.5MHz	847.5MHz
3MHz	QPSK	1	0	24.50	24.41	24.45	24.38
			5	24.50	24.37	24.37	24.27
		6	0	22.50	22.35	22.40	22.35
	16QAM	1	0	23.50	23.18	23.24	23.31
			5	23.50	23.15	23.19	23.20
		6	0	22.50	22.33	22.41	22.34
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20425	20525	20625
					826.5MHz	836.5MHz	846.5MHz
5MHz	QPSK	1	0	24.50	24.00	23.96	23.94
			5	24.00	23.94	23.94	23.79
		6	0	23.00	22.85	22.88	22.74
	16QAM	1	0	24.50	24.12	24.02	23.96
			5	24.50	23.99	24.00	23.88
		6	0	23.00	22.83	22.86	22.73
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	20450	20525	20600
					829.0MHz	836.5MHz	844.0MHz
10MHz	QPSK	1	0	**24.50**	24.07	**24.07**	23.94
			5	24.50	23.98	24.00	23.81
		6	0	23.00	22.87	22.92	22.76
	16QAM	1	0	24.50	24.07	24.08	24.02
			5	24.50	24.02	24.06	23.87
		6	0	23.00	22.84	22.91	22.76

Band 12

eMTC Band 12				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB Size	RB Start		23017	23095	23173
					699.7MHz	707.5MHz	715.3MHz
1.4MHz	QPSK	1	0	24.00	23.43	23.50	23.43
			5	23.50	23.47	23.44	23.37
		6	0	21.50	21.42	21.45	21.31
	16QAM	1	0	22.50	22.35	22.47	22.27
			5	22.50	22.34	22.43	22.18
		6	0	21.50	21.42	21.45	21.29
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	23025	23095	23165
					700.5MHz	707.5MHz	714.5MHz
3MHz	QPSK	1	0	24.00	23.40	23.48	23.52
			5	23.50	23.32	23.32	23.47
		6	0	21.50	21.27	21.24	21.46
	16QAM	1	0	23.00	22.21	22.29	22.50
			5	22.50	22.19	22.16	22.42
		6	0	21.50	21.35	21.31	21.42

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Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	23035	23095	23155
					701.5MHz	707.5MHz	713.5MHz
5MHz	QPSK	1	0	23.50	23.16	23.19	23.32
			5	23.50	23.18	23.13	23.24
		6	0	22.50	22.14	22.19	22.16
	16QAM	1	0	23.50	23.23	23.27	23.32
			5	23.50	23.26	23.30	23.29
		6	0	22.50	22.12	22.18	22.15
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	23060	23095	23130
					704.0MHz	707.5MHz	711.0MHz
10MHz	QPSK	1	0	**23.50**	23.19	23.27	**23.33**
			5	23.50	23.08	23.19	23.20
		6	0	22.50	22.01	22.13	22.21
	16QAM	1	0	23.50	23.24	23.33	23.42
			5	23.50	23.17	23.27	23.35
		6	0	22.50	22.00	22.12	22.20

Band 13

eMTC Band 13				Maximum Tune-up(dBm)	Conducted Power(dBm)		
Bandwidth	Modulation	RB Size	RB Start		23205	23230	23255
					779.5MHz	782.0MHz	784.5MHz
5MHz	QPSK	1	0	24.50	24.01	24.04	24.17
			5	24.50	24.01	23.93	24.08
		6	0	23.50	22.99	22.94	23.04
	16QAM	1	0	24.50	24.23	24.24	24.45
			5	24.50	24.25	24.19	24.37
		6	0	23.50	22.98	22.93	23.04
Bandwidth	Modulation	RB Size	RB Start	Maximum Tune-up(dBm)	23230		
					782.0MHz		
10MHz	QPSK	1	0	**24.50**	**24.17**		
			5	24.50	24.03		
		6	0	23.00	22.98		
	16QAM	1	0	24.50	24.36		
			5	24.50	24.26		
		6	0	23.50	23.07		

8.3 Wi-Fi

Band (GHz)	Mode	Channel	Freq. (MHz)	Average Power (dBm)	Maximum Tune-up(dBm)	SAR Test Require.
2.4g Wifi (2.4~2.4835)	802.11b	1	2412	13.91	14.00	No
		6	2437	**14.38**	**14.50**	Yes
		11	2462	13.81	14.00	No
	802.11g	1	2412	14.17	14.50	No
		6	2437	16.18	16.50	No
		11	2462	16.03	16.50	No
	802.11n(HT20)	1	2412	14.18	14.50	No
		6	2437	16.11	16.50	No
		11	2462	14.92	15.00	No
	802.11n(HT40)	3	2422	14.07	14.50	No
		6	2437	14.96	15.00	Yes
		9	2452	14.45	15.00	No
Note: SAR is not required for the following 2.4 GHz OFDM conditions as the highest reported SAR for DSSS is adjusted by the ratio of OFDM to DSSS specified maximum output power and the adjusted SAR is ≤ 1.2W/kg.						

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8.4 Lora

Lora	Maximum Tune-up(dBm)	Conducted Power (dBm)
		904MHz
	16.50	**16.22**

8.5 Bluetooth

BLE	Mode	Maximum Tune-up(dBm)	Peak Output Power (dBm)		
			0	20	39
			2402MHz	2440MHz	2480MHz
	1Mbps	**5.00**	4.72	4.83	**4.98**
	2Mbps	4.50	3.83	4.11	4.25

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	2.480	5.00	3.16	0	2.72	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* ≤ 40 cm are determined by:

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

where

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

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

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

*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.

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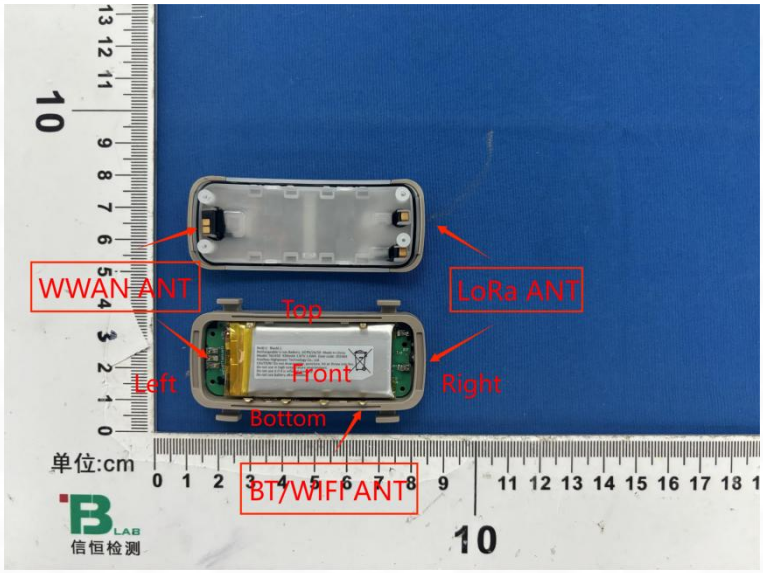
9. Test Exclusion Consideration

Antenna information:



WWAN Main Antenna	GSM/eMTC TX/RX
WLAN/BT Antenna	WLAN/BT TX/RX
LoRa Antenna	LoRa TX/RX
Note: 1. Per KDB648474 D04,10-g extremity SAR is not required when Body-Worn mode 1-g reported SAR<1.2W/Kg.	

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)] · [√f(GHz) / x] W/kg for test separation distances ≤ 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

10. Test Result

Body(0mm Gap)												
Mode	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
GPRS 850+4slots	Front	128	824.2	-3.150	0.747	100.00	1.000	28.82	29.00	1.042	0.778	/
	Front	190	836.6	-0.520	0.763	100.00	1.000	28.85	29.00	1.035	0.790	/
	Front	251	848.8	-4.670	0.812	100.00	1.000	28.89	29.00	1.026	**0.833**	1#
	Front(repeated)	251	848.8	2.440	0.788	100.00	1.000	28.89	29.00	1.026	0.808	/
	Back	251	848.8	0.850	0.522	100.00	1.000	28.89	29.00	1.026	0.536	/
	Left	251	848.8	-1.770	0.294	100.00	1.000	28.89	29.00	1.026	0.302	/
	Right	251	848.8	0.530	0.106	100.00	1.000	28.89	29.00	1.026	0.109	/
	Top	251	848.8	2.160	0.245	100.00	1.000	28.89	29.00	1.026	0.251	/
	Bottom	251	848.8	3.420	0.218	100.00	1.000	28.89	29.00	1.026	0.224	/

Body(0mm Gap)												
Mode	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
GPRS 1900+4slots	Front	661	1880.0	-1.330	0.602	100.00	1.000	24.77	25.00	1.054	**0.635**	2#
	Back	661	1880.0	0.360	0.413	100.00	1.000	24.77	25.00	1.054	0.435	/
	Left	661	1880.0	-2.690	0.235	100.00	1.000	24.77	25.00	1.054	0.248	/
	Right	661	1880.0	2.110	0.094	100.00	1.000	24.77	25.00	1.054	0.099	/
	Top	661	1880.0	-3.650	0.184	100.00	1.000	24.77	25.00	1.054	0.194	/
	Bottom	661	1880.0	4.570	0.116	100.00	1.000	24.77	25.00	1.054	0.122	/

Body(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Band 2 (BW: 20MHz)	1RB	Front	19100	1900.0	-2.950	0.309	100.00	1.000	23.69	24.00	1.074	**0.332**	3#
		Back	19100	1900.0	1.410	0.143	100.00	1.000	23.69	24.00	1.074	0.154	/
		Left	19100	1900.0	-0.970	0.102	100.00	1.000	23.69	24.00	1.074	0.110	/
		Right	19100	1900.0	-2.130	0.062	100.00	1.000	23.69	24.00	1.074	0.067	/
		Top	19100	1900.0	4.280	0.088	100.00	1.000	23.69	24.00	1.074	0.095	/
		Bottom	19100	1900.0	-0.370	0.074	100.00	1.000	23.69	24.00	1.074	0.079	/
	50%RB	Front	19100	1900.0	3.110	0.294	100.00	1.000	23.53	24.00	1.114	0.328	/
		Back	19100	1900.0	-2.790	0.135	100.00	1.000	23.53	24.00	1.114	0.150	/
		Left	19100	1900.0	0.680	0.092	100.00	1.000	23.53	24.00	1.114	0.102	/
		Right	19100	1900.0	-1.330	0.055	100.00	1.000	23.53	24.00	1.114	0.061	/
		Top	19100	1900.0	-2.890	0.081	100.00	1.000	23.53	24.00	1.114	0.090	/
		Bottom	19100	1900.0	4.100	0.068	100.00	1.000	23.53	24.00	1.114	0.076	/

Body(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Band 4 (BW: 20MHz)	1RB	Front	20300	1745.0	-2.210	0.165	100.00	1.000	22.85	23.00	1.035	**0.171**	4#
		Back	20300	1745.0	-0.620	0.104	100.00	1.000	22.85	23.00	1.035	0.108	/
		Left	20300	1745.0	2.730	0.090	100.00	1.000	22.85	23.00	1.035	0.093	/
		Right	20300	1745.0	1.230	0.057	100.00	1.000	22.85	23.00	1.035	0.059	/
		Top	20300	1745.0	-4.100	0.082	100.00	1.000	22.85	23.00	1.035	0.085	/
		Bottom	20300	1745.0	-3.430	0.065	100.00	1.000	22.85	23.00	1.035	0.067	/
	50%RB	Front	20300	1745.0	0.660	0.150	100.00	1.000	22.53	23.00	1.114	0.167	/
		Back	20300	1745.0	-1.560	0.089	100.00	1.000	22.53	23.00	1.114	0.099	/
		Left	20300	1745.0	-4.920	0.082	100.00	1.000	22.53	23.00	1.114	0.091	/
		Right	20300	1745.0	-0.960	0.052	100.00	1.000	22.53	23.00	1.114	0.058	/
		Top	20300	1745.0	3.450	0.071	100.00	1.000	22.53	23.00	1.114	0.079	/
		Bottom	20300	1745.0	1.590	0.058	100.00	1.000	22.53	23.00	1.114	0.065	/

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Body(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Band 5 (BW: 10MHz)	1RB	Front	20525	836.5	-3.840	0.152	100.00	1.000	24.07	24.50	1.104	**0.168**	5#
		Back	20525	836.5	1.800	0.052	100.00	1.000	24.07	24.50	1.104	0.057	/
		Left	20525	836.5	4.170	0.039	100.00	1.000	24.07	24.50	1.104	0.043	/
		Right	20525	836.5	-2.610	0.020	100.00	1.000	24.07	24.50	1.104	0.022	/
		Top	20525	836.5	1.850	0.032	100.00	1.000	24.07	24.50	1.104	0.035	/
		Bottom	20525	836.5	-4.230	0.025	100.00	1.000	24.07	24.50	1.104	0.028	/
	50%RB	Front	20525	836.5	3.120	0.097	100.00	1.000	22.92	23.00	1.019	0.099	/
		Back	20525	836.5	-2.060	0.042	100.00	1.000	22.92	23.00	1.019	0.043	/
		Left	20525	836.5	4.280	0.029	100.00	1.000	22.92	23.00	1.019	0.030	/
		Right	20525	836.5	-3.660	0.014	100.00	1.000	22.92	23.00	1.019	0.014	/
		Top	20525	836.5	4.520	0.023	100.00	1.000	22.92	23.00	1.019	0.023	/
		Bottom	20525	836.5	-0.690	0.019	100.00	1.000	22.92	23.00	1.019	0.019	/

Body(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Band 12 (BW: 10MHz)	1RB	Front	23130	711.0	-1.930	0.068	100.00	1.000	23.33	23.50	1.040	**0.071**	6#
		Back	23130	711.0	4.890	0.049	100.00	1.000	23.33	23.50	1.040	0.051	/
		Left	23130	711.0	-3.250	0.041	100.00	1.000	23.33	23.50	1.040	0.043	/
		Right	23130	711.0	0.120	0.017	100.00	1.000	23.33	23.50	1.040	0.018	/
		Top	23130	711.0	-1.600	0.036	100.00	1.000	23.33	23.50	1.040	0.037	/
		Bottom	23130	711.0	3.460	0.031	100.00	1.000	23.33	23.50	1.040	0.032	/
	50%RB	Front	23130	711.0	-2.650	0.053	100.00	1.000	22.21	22.50	1.069	0.057	/
		Back	23130	711.0	2.940	0.040	100.00	1.000	22.21	22.50	1.069	0.043	/
		Left	23130	711.0	0.740	0.032	100.00	1.000	22.21	22.50	1.069	0.034	/
		Right	23130	711.0	-2.310	0.011	100.00	1.000	22.21	22.50	1.069	0.012	/
		Top	23130	711.0	-0.880	0.024	100.00	1.000	22.21	22.50	1.069	0.026	/
		Bottom	23130	711.0	4.210	0.020	100.00	1.000	22.21	22.50	1.069	0.021	/

Body(0mm Gap)													
Mode	Channel Type	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Band 13 (BW: 10MHz)	1RB	Front	23230	782.0	1.790	0.018	100.00	1.000	24.17	24.50	1.079	**0.019**	7#
		Back	23230	782.0	-3.970	0.015	100.00	1.000	24.17	24.50	1.079	0.016	/
		Left	23230	782.0	4.230	0.014	100.00	1.000	24.17	24.50	1.079	0.015	/
		Right	23230	782.0	-0.980	0.010	100.00	1.000	24.17	24.50	1.079	0.011	/
		Top	23230	782.0	2.460	0.013	100.00	1.000	24.17	24.50	1.079	0.014	/
		Bottom	23230	782.0	3.780	0.011	100.00	1.000	24.17	24.50	1.079	0.012	/
	50%RB	Front	23230	782.0	-0.110	0.013	100.00	1.000	22.98	23.00	1.005	0.013	/
		Back	23230	782.0	2.540	0.011	100.00	1.000	22.98	23.00	1.005	0.011	/
		Left	23230	782.0	3.490	0.010	100.00	1.000	22.98	23.00	1.005	0.010	/
		Right	23230	782.0	-2.680	0.009	100.00	1.000	22.98	23.00	1.005	0.009	/
		Top	23230	782.0	-0.570	0.012	100.00	1.000	22.98	23.00	1.005	0.012	/
		Bottom	23230	782.0	4.700	0.007	100.00	1.000	22.98	23.00	1.005	0.007	/

Body(0mm Gap)												
Mode	Position	Ch.	Freq. (MHz)	Power Drift (%)	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 (2.4~2.4835) 802.11b	Front	6	2437	3.440	0.214	100.00	1.000	14.38	14.50	1.028	**0.220**	8#
	Back	6	2437	2.310	0.112	100.00	1.000	14.38	14.50	1.028	0.115	/
	Left	6	2437	-3.050	0.091	100.00	1.000	14.38	14.50	1.028	0.094	/
	Right	6	2437	4.800	0.048	100.00	1.000	14.38	14.50	1.028	0.049	/
	Top	6	2437	2.180	0.080	100.00	1.000	14.38	14.50	1.028	0.082	/
	Bottom	6	2437	-1.360	0.068	100.00	1.000	14.38	14.50	1.028	0.070	/

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Body(0mm Gap)												
Mode	Position	Ch.	Freq. (MHz)	Power Drift (%)	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.
Bluetooth	Front	39	2480	3.320	0.086	100.00	1.000	4.98	5.00	1.005	**0.086**	9#
	Back	39	2480	-2.450	0.071	100.00	1.000	4.98	5.00	1.005	0.071	/
	Left	39	2480	1.730	0.066	100.00	1.000	4.98	5.00	1.005	0.066	/
	Right	39	2480	-3.640	0.031	100.00	1.000	4.98	5.00	1.005	0.031	/
	Top	39	2480	4.580	0.054	100.00	1.000	4.98	5.00	1.005	0.054	/
	Bottom	39	2480	0.420	0.048	100.00	1.000	4.98	5.00	1.005	0.048	/

Body(0mm Gap)											
Mode	Position	Freq. (MHz)	Power Drift (%)	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.
LoRa	Front	904.0	1.530	0.046	100.00	1.000	16.22	16.50	1.067	**0.049**	10#
	Back	904.0	2.780	0.031	100.00	1.000	16.22	16.50	1.067	0.033	/
	Left	904.0	-4.260	0.025	100.00	1.000	16.22	16.50	1.067	0.027	/
	Right	904.0	-0.330	0.012	100.00	1.000	16.22	16.50	1.067	0.013	/
	Top	904.0	3.590	0.020	100.00	1.000	16.22	16.50	1.067	0.021	/
	Bottom	904.0	-1.410	0.017	100.00	1.000	16.22	16.50	1.067	0.018	/

Note:

1. The maximum SAR Value of each test band is marked bold.
2. SAR plot is provided only for the highest measured SAR in each exposure configuration, wireless mode and frequency band combination.
3. Per KDB 447498 D04 v01, for each exposure position, if the highest output power channel Reported SAR ≤ 0.8W/kg, other channels SAR testing is not necessary.
4. Per KDB 447498 D04 v01, head/body-worn use is evaluated with the device positioned at 0mm/10 mm from a head/flat phantom respectively filled with head tissue-equivalent medium.
5. Per KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10 mm from the front, back and edges of the device with antennas 2.5 cm or closer to the edge of the device, determined from general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.
6. Per KDB 447498 D04 v01, the report SAR is measured SAR value adjusted for maximum tune-up tolerance. Scaling Factor=10^[(tune-up limit power(dBm) - Ave.power power (dBm))/10], where tune-up limit is the maximum rated power among all production units.
   Reported SAR(W/kg)=Measured SAR (W/kg)*Scaling Factor.

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11. 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 ≤ 1.45 W/kg and the ratio of these highest SAR values, i.e., largest divided by smallest value, is ≤ 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 >= 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 >= 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 >= 1.5 W/kg, perform a third repeated measurement.

Note: For 1g SAR, the highest measured 1g SAR is 0.812 > 0.80 W/kg, repeated measurement is as below.

Mode	Position	Ch.	Freq. (MHz)	1g Meas SAR (W/kg)	the ratio of largest to smallest SAR for the original and first repeated measurements
GPRS 850+4slots	Front	251	848.8	0.812	1.030
	Front(repeated)	251	848.8	0.788	

According to the above ratio result, we don’t need to perform a second repeated measurement for these bands.

12. Simultaneous Transmission

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).

12.1 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 3 Tx antennas, WWAN main antenna, LoRa antenna, Wifi/BT antenna supports 2.4G Wi-Fi and BT. The 3 antennas can always transmit simultaneously. The work mode combination is showed as below table.

Application Simultaneous Transmission information:

NO.	Configuration	Body-worn
1	WWAN+WIFI(2.4g)	Yes
2	WWAN+BT	Yes
3	WWAN+LoRa	Yes
4	LoRa+WIFI(2.4g)	Yes
5	LoRa+BT	Yes

12.2 Sum SAR of Simultaneous Transmission

Body-worn

Band	Test Position	Scaled				Σ SAR (W/kg) WWAN + WIFI 2.4G	Σ SAR (W/kg) WWAN + BT	Σ SAR (W/kg) WWAN+ LoRa	Σ SAR (W/kg) LoRa+ WIFI(2.4g)	Σ SAR (W/kg) LoRa+BT	SPLSR	Remark
		WWAN	WIFI 2.4G	Bluetooth	LoRa							
GPRS 850+4slots	Front	0.833	0.220	0.086	0.049	**1.053**	0.919	0.882	0.269	0.135	N/A	N/A
	Back	0.536	0.115	0.071	0.033	0.651	0.607	0.569	0.148	0.104	N/A	N/A
	Left	0.302	0.094	0.066	0.027	0.396	0.368	0.329	0.121	0.093	N/A	N/A
	Right	0.109	0.049	0.031	0.013	0.158	0.140	0.122	0.062	0.044	N/A	N/A
	Top	0.251	0.082	0.054	0.021	0.333	0.305	0.272	0.103	0.075	N/A	N/A
	Bottom	0.224	0.070	0.048	0.018	0.294	0.272	0.242	0.088	0.066	N/A	N/A

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13. Test Equipment List

Description	Manufacturer	Model	Serial No./Version	Cal. Date	Cal. Due
E-Field Probe	MVG	SSE2	04/22 EPGO365	2024/02/06	2025/02/05
6 1/2 Digital Multimeter	Keithley	DMM6500	4527164	2023/11/16	2024/11/15
Wideband Radio Communication Tester	ROHDE & SCHWARZ	CMW500	161997	2023/11/16	2024/11/15
MXG Vector Signal Generator	Agilent	N5182A	MY46240163	2023/11/16	2024/11/15
E-Series Avg. Power Sensor	KEYSIGHT	E9300A	MY55050017	2024/03/20	2025/03/19
EPM Series Power Meter	KEYSIGHT	E4418B	MY41293435	2024/03/20	2025/03/19
MXA Signal Analyzer MXA	KEYSIGHT	N9020A	MY54410409	2023/11/16	2024/11/15
Preamplifier (18GHz ~ 40GHz)	Sket	LNPA_1840G-50	SK2022032902	2023/11/13	2024/11/12
Filter	COM-MW	ZLPF6-L0-1000-530	/	2023/11/13	2024/11/12
10dB Attenuator	MIDWEST MICROWAVE	263-10dB	/	2024/03/20	2025/03/19
3dB Attenuator	MIDWEST MICROWAVE	SMA-JK6G-3DB	/	/	/
Coupler	MERRIMAC	CWM-10R-10.8G	LOT-83391	2024/03/20	2025/03/19
750MHz Validation Dipole	MVG	SID750	07/22 DIP 0750-655	2023/02/06	2025/02/05
835MHz Validation Dipole	MVG	SID835	07/22 DIP 0G835-656	2023/02/06	2025/02/05
1800MHz Validation Dipole	MVG	SID1800	07/22 DIP 1G800-657	2023/02/06	2025/02/05
1900MHz Validation Dipole	MVG	SID1900	07/22 DIP 1G900-658	2023/02/06	2025/02/05
2450MHz Validation Dipole	MVG	SID2450	07/22 DIP 2G450-662	2023/02/06	2025/02/05
LIMESAR Dielectric Probe	MVG	SCLMP	06/22 OCPG88	2024/02/02	2025/02/01
ENA Series Network Analyzer	Agilent	E5071B	MY42301221	2023/11/16	2024/11/15
Thermometer	Riters	DT-232	21A11	2024/03/20	2025/03/19
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	/	/	2023/11/16	2024/11/15
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.
5. "/" Means this instrument does not require calibration.
6. Only one 3db attenuator is shown in the equipment list, but three are actually used.

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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					
750	41.90	41.80	0.89	0.86	-0.24%	-3.37%	±5%	20.0	15/7/2024
835	41.50	41.41	0.90	0.87	-0.22%	-3.33%	±5%	20.0	16/7/2024
1800	40.00	39.91	1.40	1.37	-0.23%	-2.14%	±5%	20.0	17/7/2024
1900	40.00	39.88	1.40	1.41	-0.30%	0.71%	±5%	20.0	18/7/2024
2450	39.20	39.08	1.80	1.81	-0.31%	0.56%	±5%	20.0	19/7/2024
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
750	16	0.092	0.138	5.75	8.63	5.38	8.25	6.88%	4.55%
835	16	0.106	0.163	6.63	10.19	6.17	9.79	7.37%	4.06%
1800	16	0.312	0.588	19.50	36.75	20.61	39.33	-5.39%	-6.56%
1900	16	0.322	0.630	20.13	39.38	20.7	40.97	-2.78%	-3.89%
2450	16	0.352	0.793	22.00	49.56	23.86	54.4	-7.80%	-8.89%

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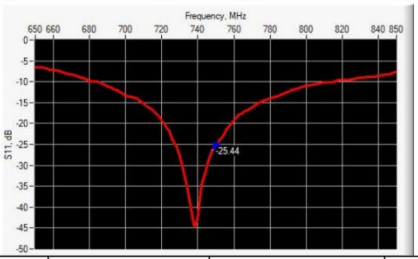
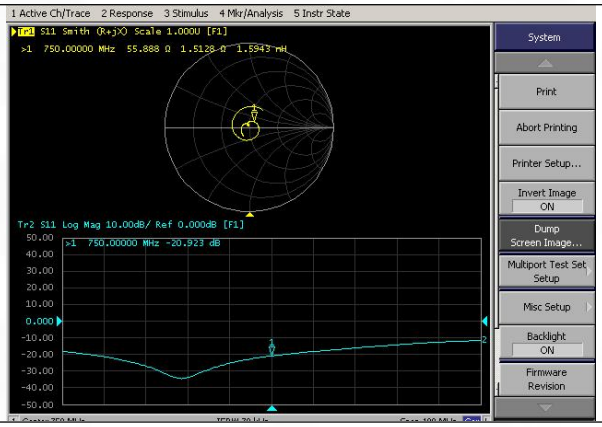
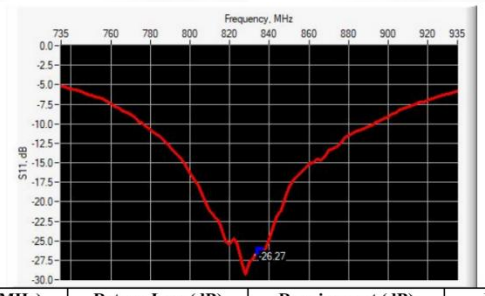
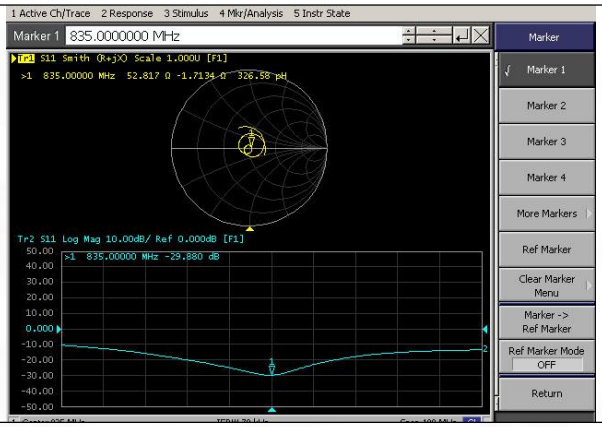
ANNEX C SAR Dipole Calibrations

Justification for Extended SAR Dipole Calibrations

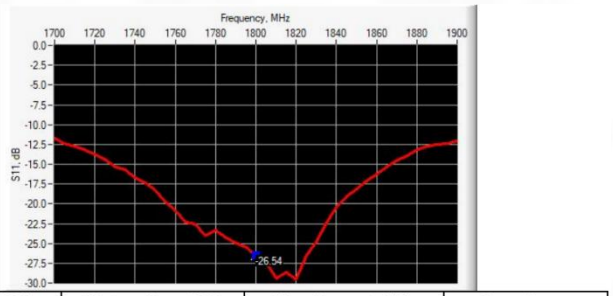
Referring to KDB 865664D01V01r04, if dipoles are verified in return loss (<-20dB, within 20% of prior calibration)and in impedance (within 5 ohm of prior calibration). the annual calibration is not necessary and the calibrationinterval can be extended.While calibration intervals not exceed 3 years.

Frequency (MHz)	Return loss(dB)		Impedance(Ω)				error range（%）		Results	Date of Measurement
	measurement	target	measurement		target		Return loss(±20%)	Impedance(±5 Ω)	(P/F)	
			real part	imaginary part	real part	imaginary part				
CW750	-20.92	-25.44	55.89	1.5	55.2	-1.2	-17.77%	3.4	P	2/5/2024
CW835	-29.88	-26.27	52.8	-1.7	52.5	-4.2	13.74%	2.8	P	2/5/2024
CW1800	-24.55	-26.54	52.4	-0.2	52.8	+3.8	-7.50%	4.4	P	2/5/2024
CW1900	-25.67	-23.01	51.9	-5.3	51.0	-7.0	11.56%	2.6	P	2/5/2024
CW2450	-24.37	-21.23	48.3	5.7	49.4	+8.6	14.79%	4.0	P	2/5/2024

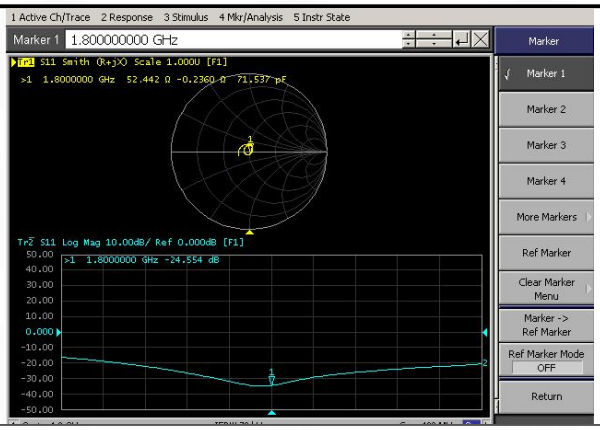
Dipole calibration report data	Self-examination data
750MHz Dipole	
	
835MHz Dipole	
	
1800MHz Dipole	

Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-25.44	-20	55.2 Ω - 1.2 jΩ

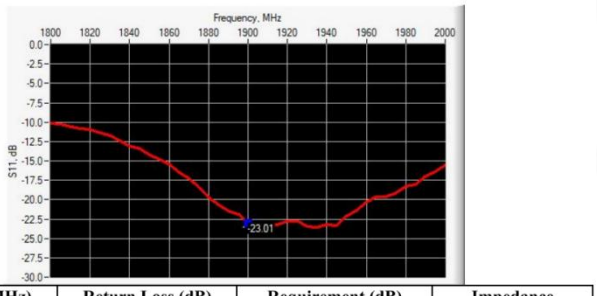
Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-26.27	-20	52.5 Ω - 4.2 jΩ



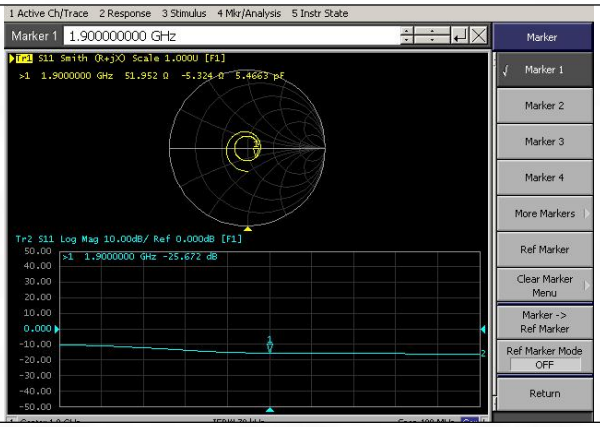
Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-26.54	-20	52.8 Ω + 3.8 jΩ



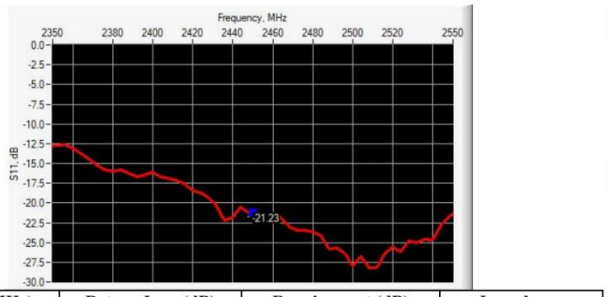
1900MHz Dipole



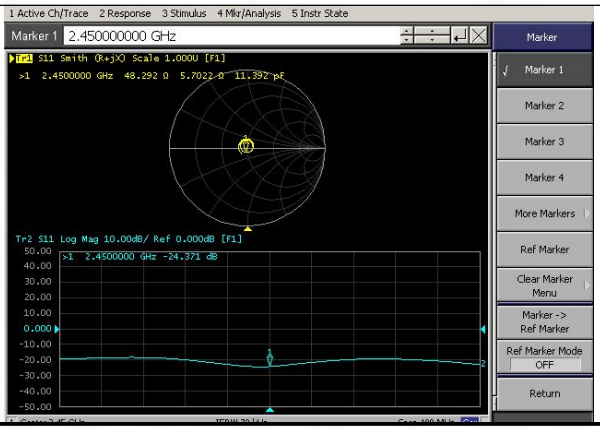
Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1900	-23.01	-20	51.0 Ω - 7.0 jΩ



2450MHz Dipole



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-21.23	-20	49.4 Ω + 8.6 jΩ



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System Performance Check Data (750 MHz)

System check at 750 MHz

Date of measurement: 15/7/2024

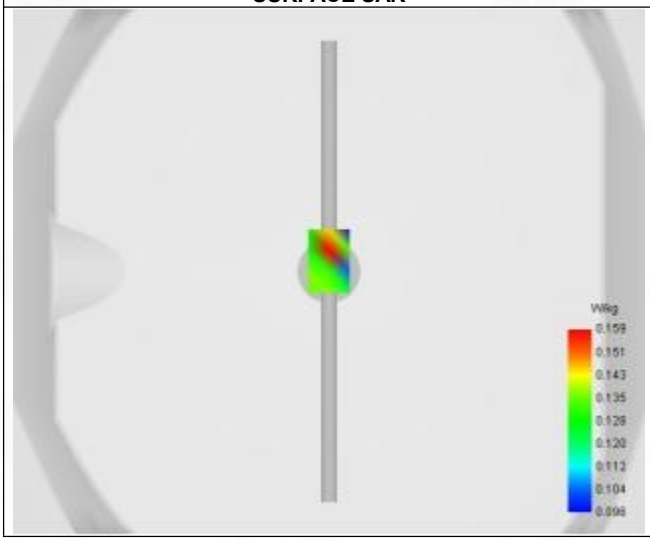
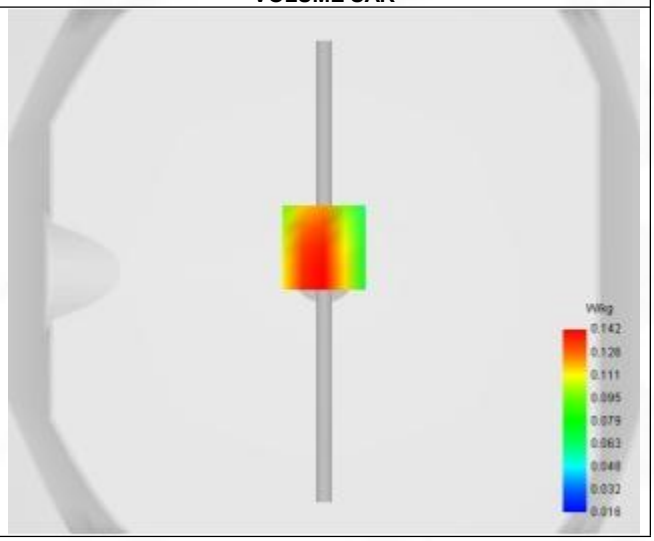
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.65
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	CW750
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	750.000
Relative permitivity (real part)	41.800
Relative permitivity (imaginary part)	21.460
Conductivity (S/m)	0.860

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=9.00 ; SAR Peak: 0.20 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.092
SAR 1g (W/Kg)	0.138
Variation (%)	-2.190
Horizontal validation criteria: minimum distance (mm)	9.285
Vertical validation criteria: SAR ratio M2/M1 (%)	64.79%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.287	0.142	0.092	0.073	0.042

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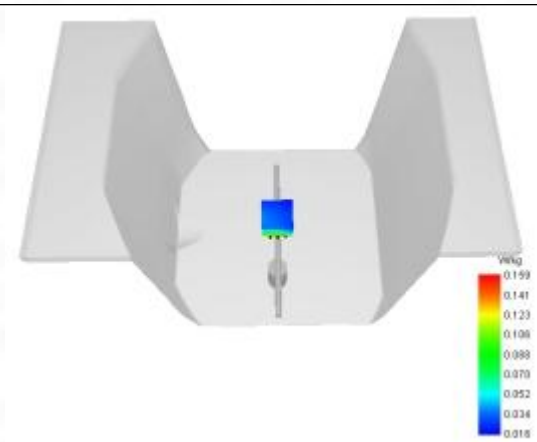
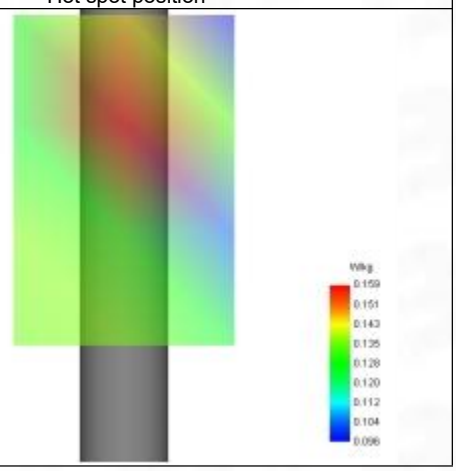
F. 3D Image

3D screen shot	Hot spot position
	

System Performance Check Data (835 MHz)

System check at 835 MHz

Date of measurement: 16/7/2024

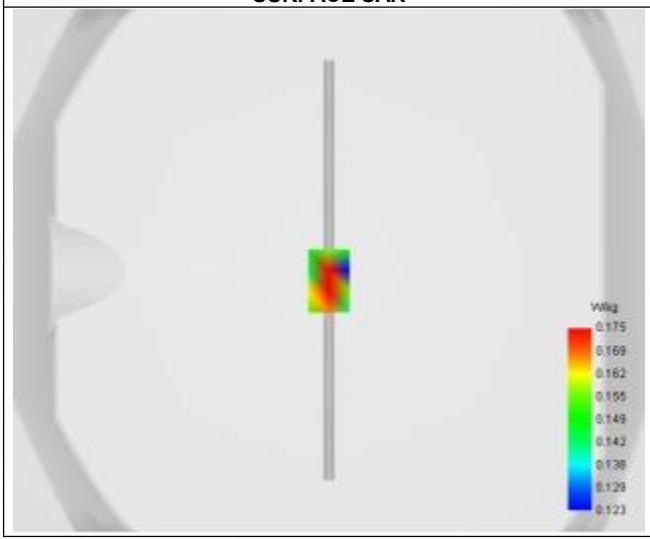
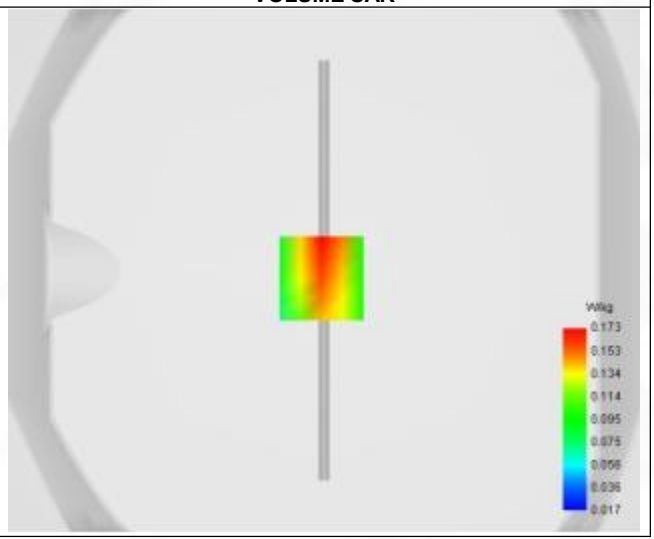
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.68
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	CW835
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	835.000
Relative permitivity (real part)	41.410
Relative permitivity (imaginary part)	19.490
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=-3.00 ; SAR Peak: 0.26 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.106
SAR 1g (W/Kg)	0.163
Variation (%)	-3.390
Horizontal validation criteria: minimum distance (mm)	8.487
Vertical validation criteria: SAR ratio M2/M1 (%)	66.47%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.059	0.173	0.115	0.061	0.072

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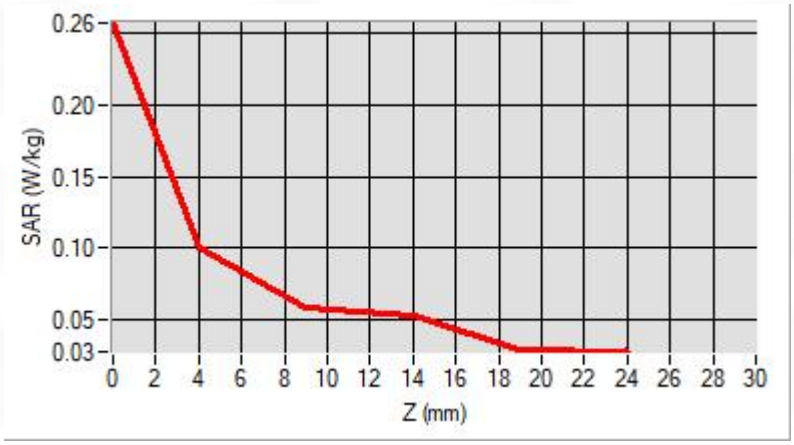
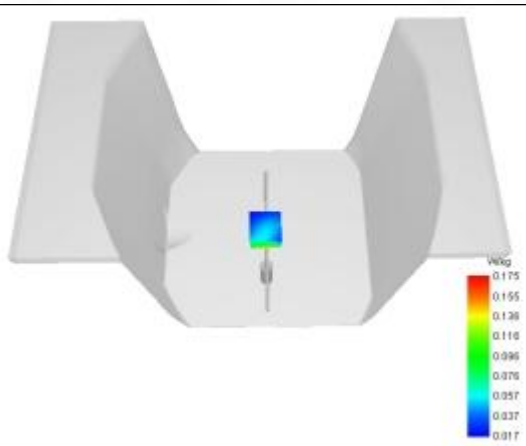
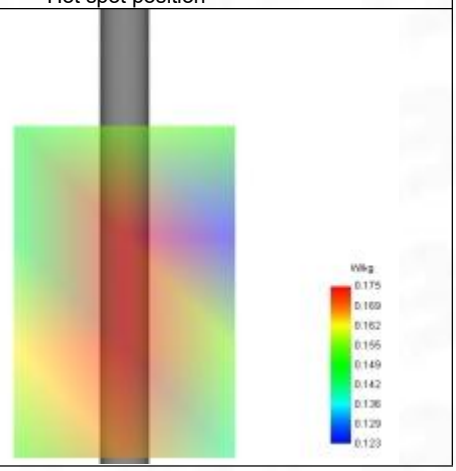


F. 3D Image

3D screen shot	Hot spot position
	

System Performance Check Data (1800 MHz)

System check at 1800 MHz

Date of measurement: 17/7/2024

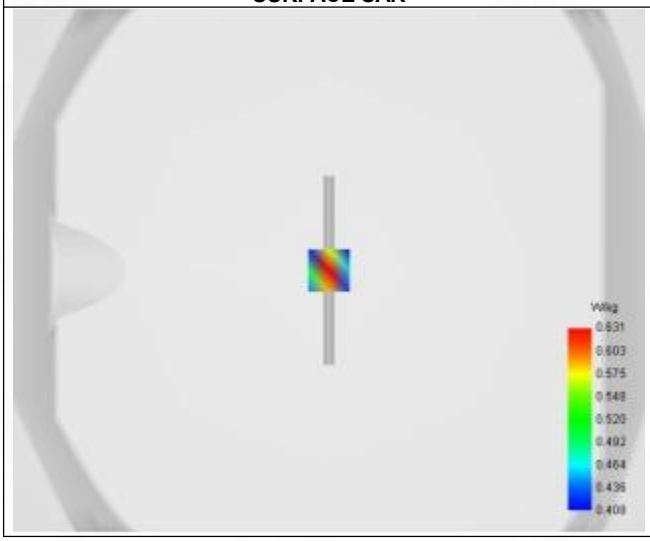
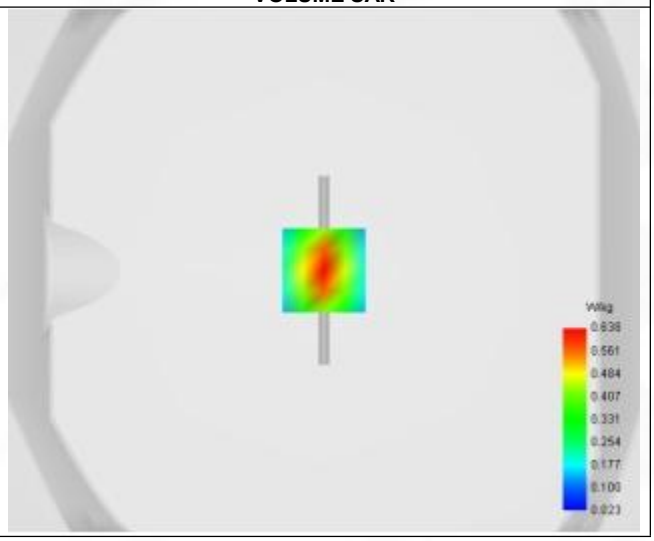
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.96
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	CW1800
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	1800.000
Relative permitivity (real part)	39.910
Relative permitivity (imaginary part)	14.090
Conductivity (S/m)	1.370

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=0.00 ; SAR Peak: 1.00 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.312
SAR 1g (W/Kg)	0.588
Variation (%)	-0.250
Horizontal validation criteria: minimum distance (mm)	8.698
Vertical validation criteria: SAR ratio M2/M1 (%)	55.80%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.003	0.638	0.356	0.204	0.127

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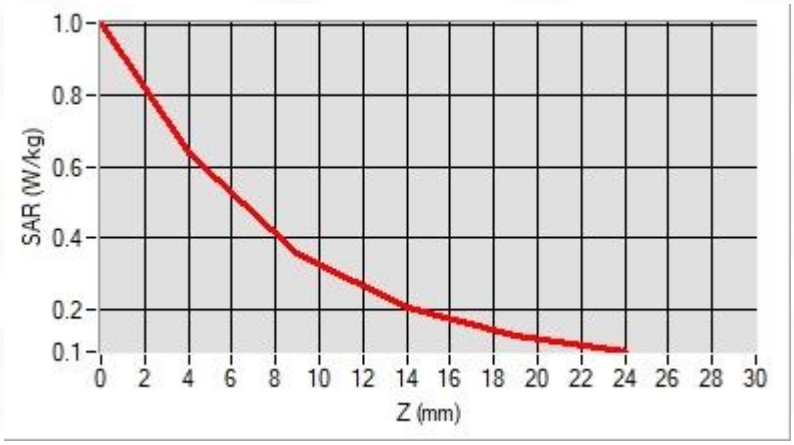
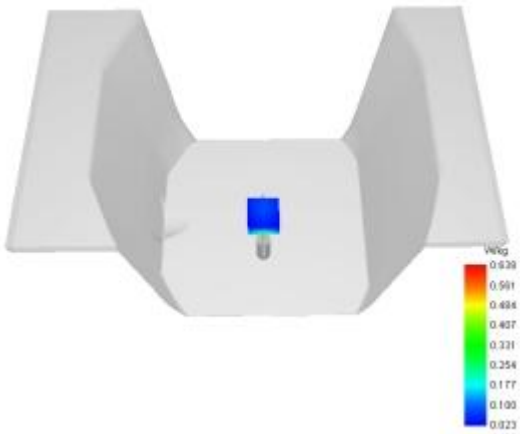
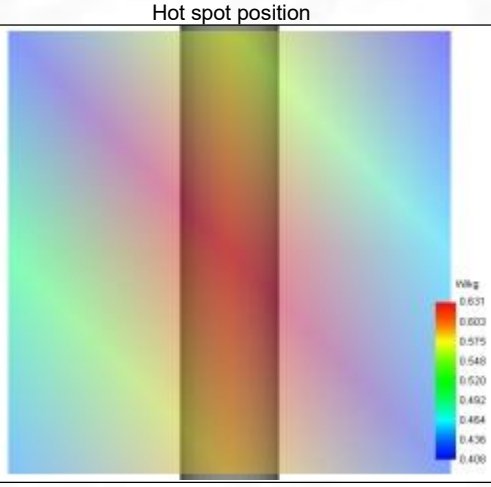


F. 3D Image

3D screen shot	Hot spot position
	

System Performance Check Data (1900 MHz)

System check at 1900 MHz

Date of measurement: 18/7/2024

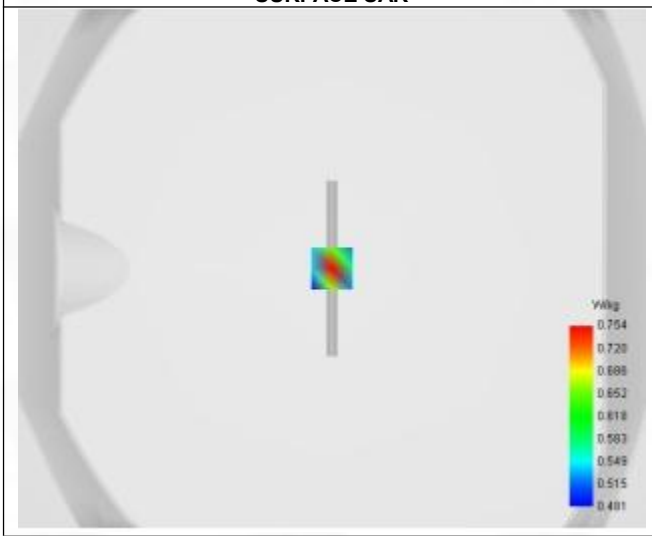
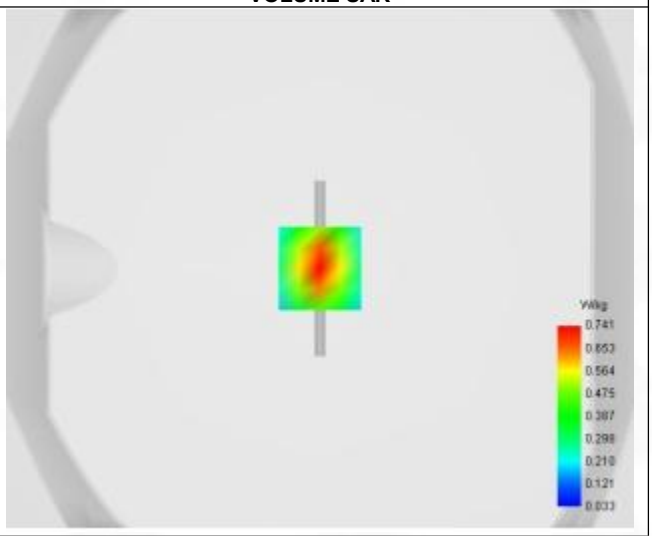
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.24
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	CW1900
Channels	Middle
Signal	CW

B. Permitivity

Frequency (MHz)	1900.000
Relative permitivity (real part)	39.880
Relative permitivity (imaginary part)	13.380
Conductivity (S/m)	1.410

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=0.00 ; SAR Peak: 1.18 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.322
SAR 1g (W/Kg)	0.630
Variation (%)	-2.080
Horizontal validation criteria: minimum distance (mm)	8.699
Vertical validation criteria: SAR ratio M2/M1 (%)	52.96%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.201	0.759	0.402	0.239	0.156

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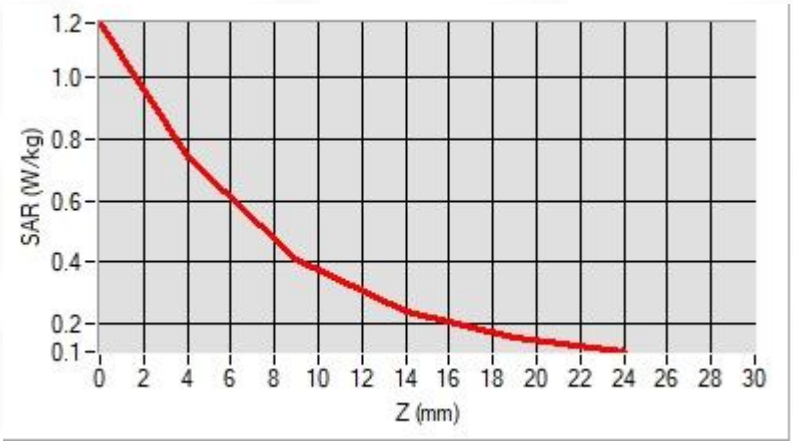
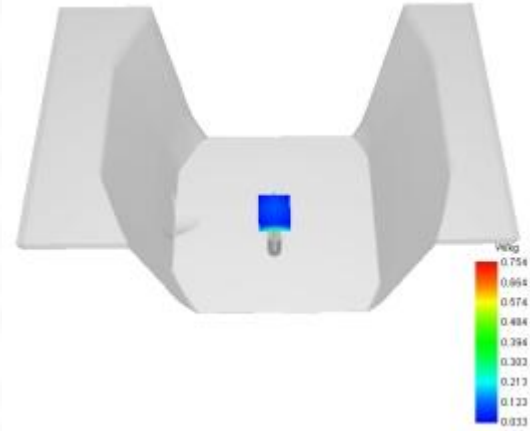
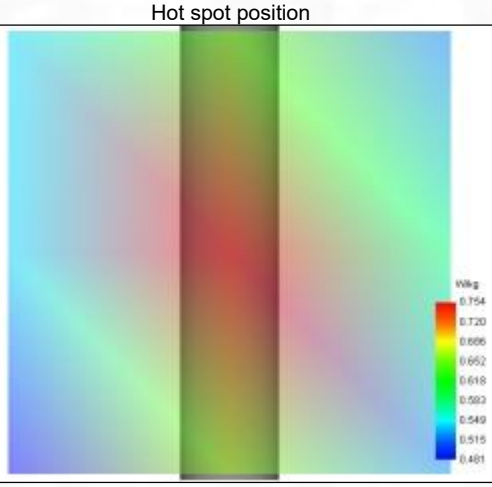


F. 3D Image

3D screen shot	Hot spot position
	

System Performance Check Data (2450 MHz)

System check at 2450 MHz

Date of measurement: 19/7/2024

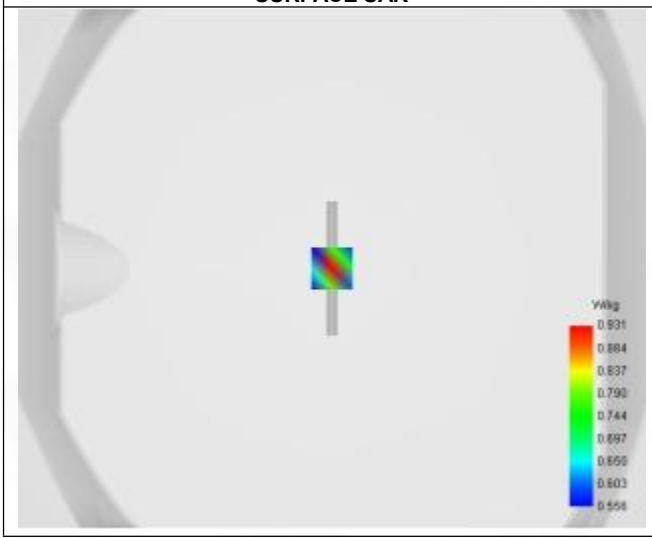
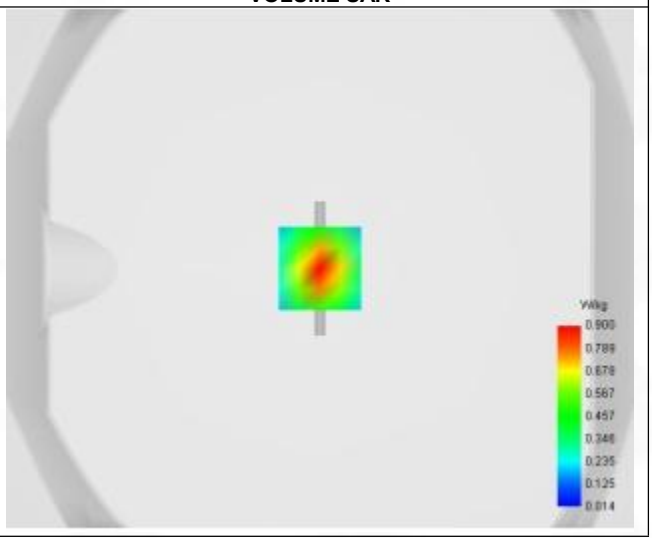
A. Experimental conditions.

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)	9.787
Vertical validation criteria: SAR ratio M2/M1 (%)	53.00%

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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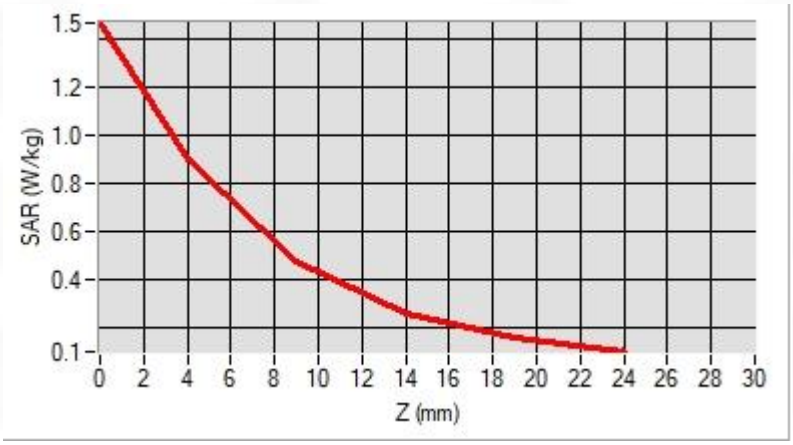
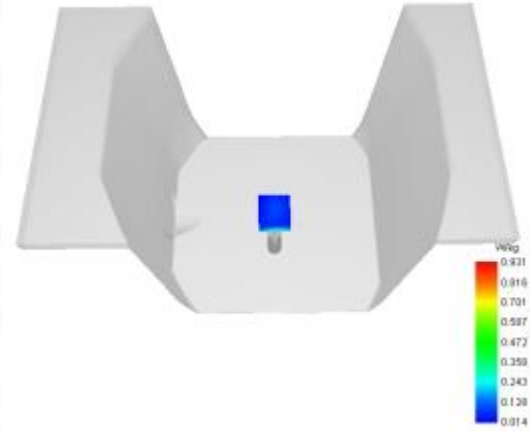
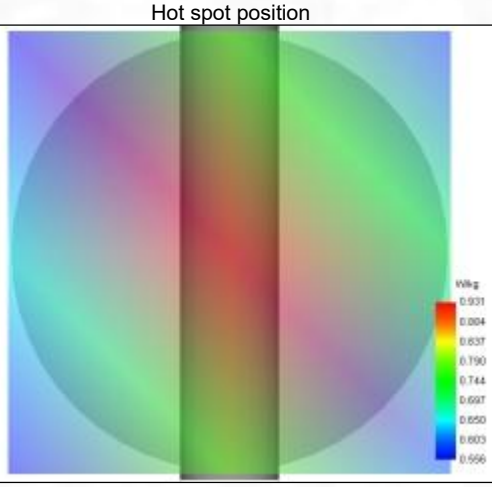


F. 3D Image

3D screen shot	Hot spot position
	

ANNEX D Test Data

1-Body with front position in dist. 0mm on Channel 251 in GPRS850+4slots

SAR Measurement at GPRS850 (Body, Validation Plane)

Date of measurement: 16/7/2024

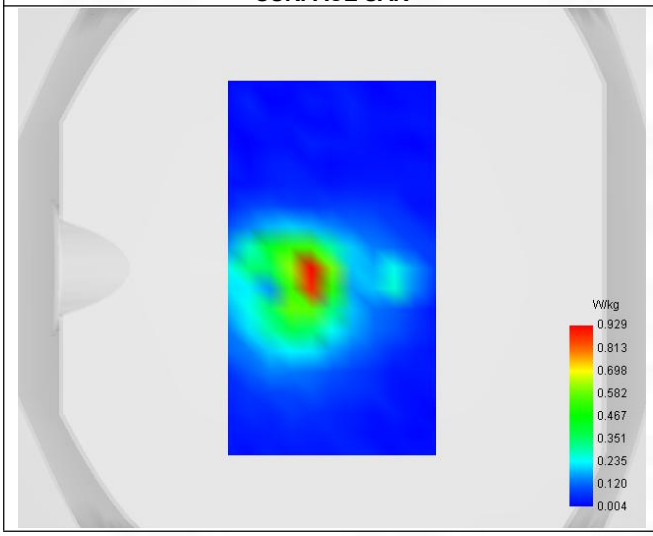
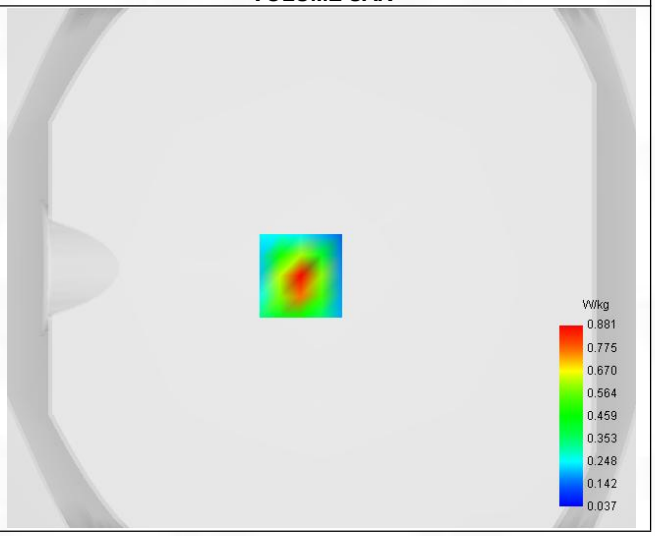
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.68
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GPRS850
Channels	Higher (251)
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)
TX-slots	4

B. Permitivity

Frequency (MHz)	848.800
Relative permitivity (real part)	41.389
Relative permitivity (imaginary part)	19.413
Conductivity (S/m)	0.877

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-8.00, Y=-3.00 ; SAR Peak: 1.66 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.367
SAR 1g (W/Kg)	0.812
Variation (%)	-4.670
Horizontal validation criteria: minimum distance (mm)	8.749
Vertical validation criteria: SAR ratio M2/M1 (%)	43.02%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00

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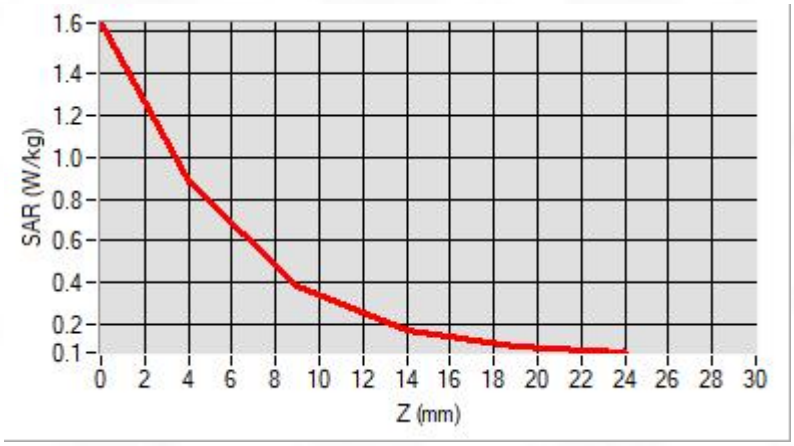
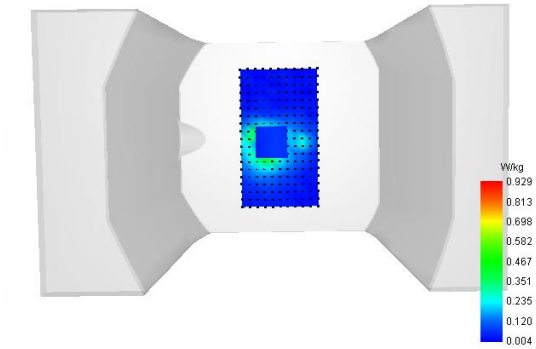
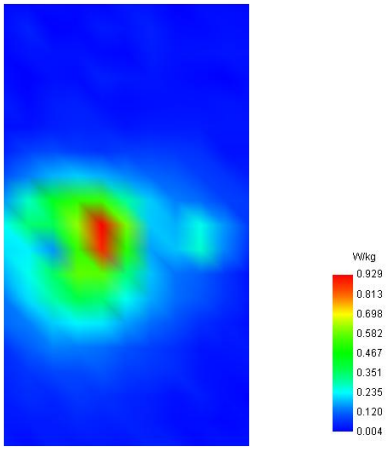
SAR (W/Kg)	1.639	0.881	0.379	0.170	0.096



F. 3D Image

3D screen shot	Hot spot position
	

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2-Body with front position in dist. 0mm on Channel 661 in GPRS1900+4slots

SAR Measurement at GPRS1900 (Body, Validation Plane)

Date of measurement: 18/7/2024

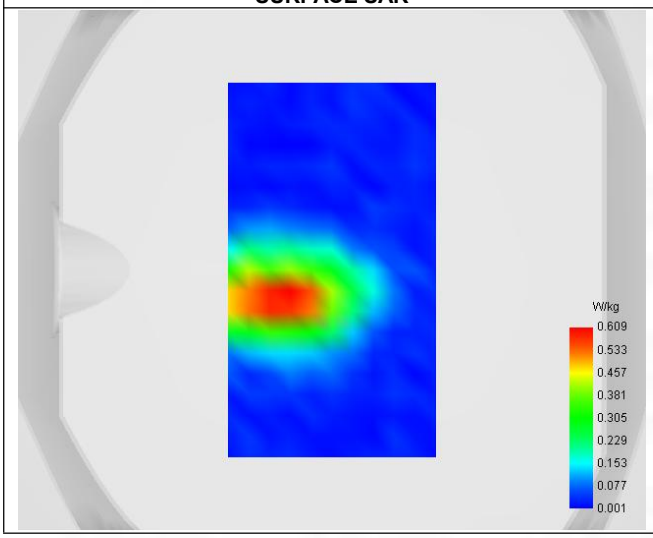
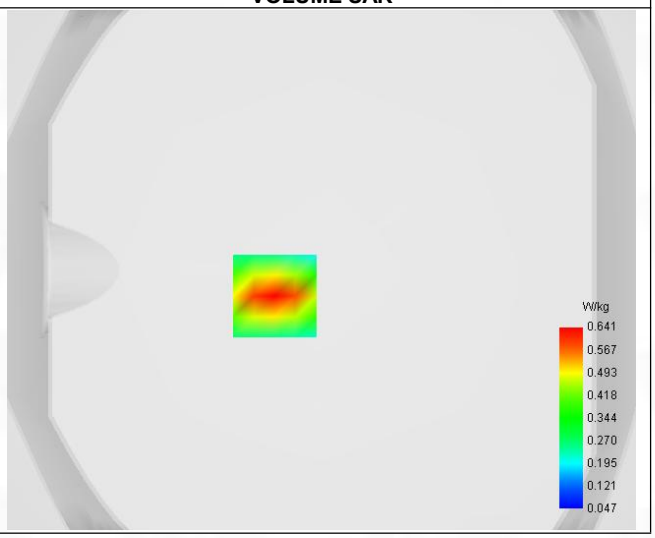
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.24
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Channels	Middle (661)
Signal	TDMA (GPRS)
Modulation	GMSK (CS-1)
TX-slots	4

B. Permitivity

Frequency (MHz)	1880.000
Relative permitivity (real part)	39.886
Relative permitivity (imaginary part)	13.522
Conductivity (S/m)	1.402

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-18.00, Y=-10.00 ; SAR Peak: 0.98 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.338
SAR 1g (W/Kg)	0.602
Variation (%)	-1.330
Horizontal validation criteria: minimum distance (mm)	8.498
Vertical validation criteria: SAR ratio M2/M1 (%)	58.19%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.982	0.641	0.373	0.225	0.147

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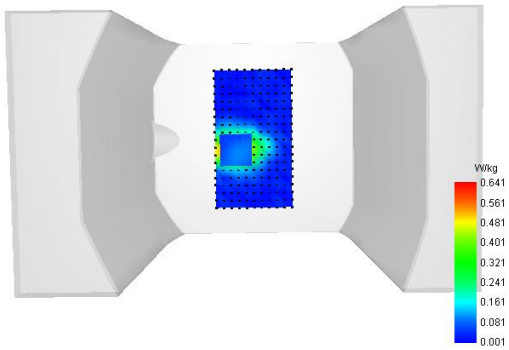
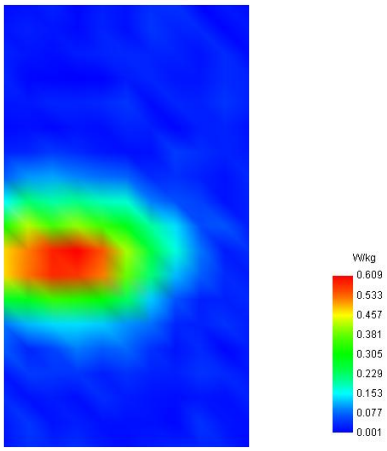
F. 3D Image

3D screen shot	Hot spot position
	

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3-Body with front position in dist. 0mm on Channel 19100 in eMTC band 2

SAR Measurement at eMTC band 2 (Body, Validation Plane)

Date of measurement: 18/7/2024

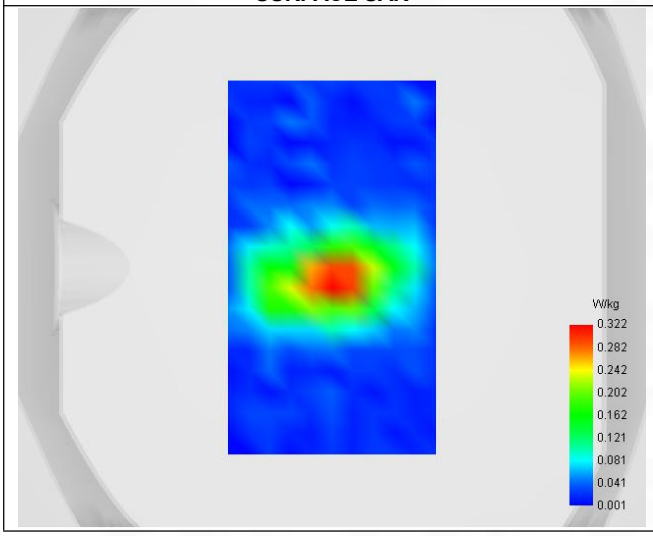
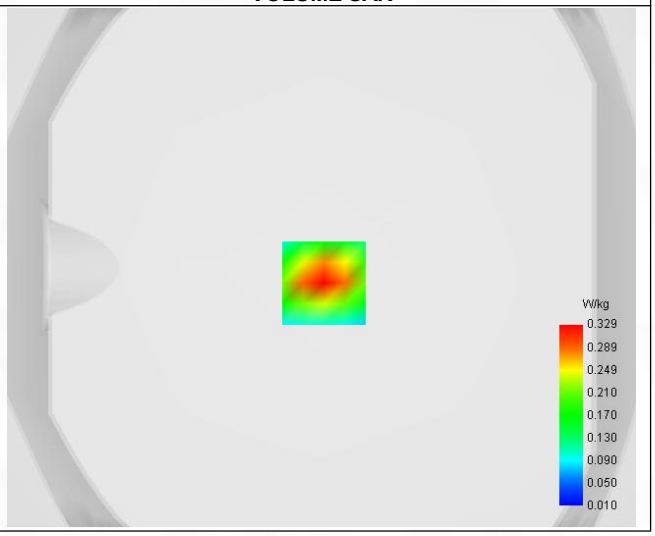
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	2.24
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	eMTC band 2
Channels	Higher (19100)
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	1

B. Permitivity

Frequency (MHz)	1891.990
Relative permitivity (real part)	39.882
Relative permitivity (imaginary part)	13.437
Conductivity (S/m)	1.407

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-6.00 ; SAR Peak: 0.45 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.182
SAR 1g (W/Kg)	0.309
Variation (%)	-2.950
Horizontal validation criteria: minimum distance (mm)	8.246
Vertical validation criteria: SAR ratio M2/M1 (%)	67.48%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00

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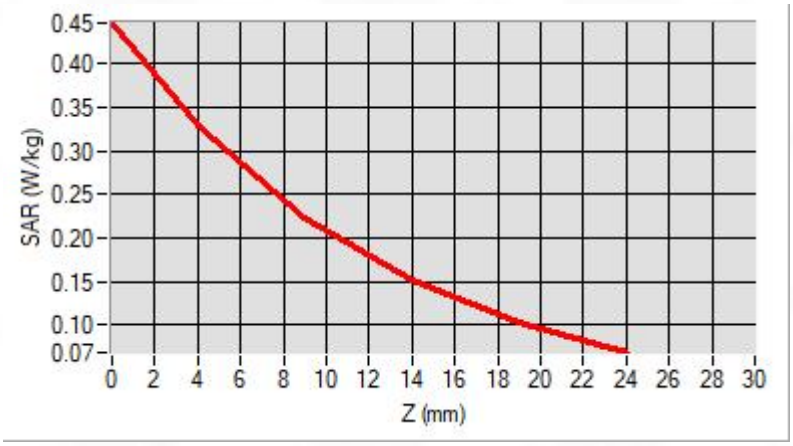
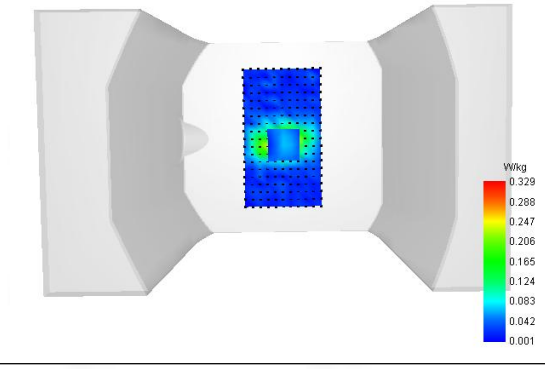
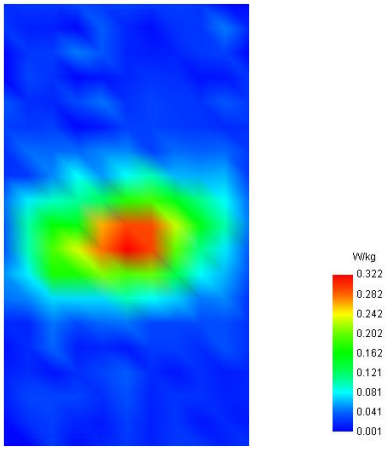
SAR (W/Kg)	0.447	0.329	0.222	0.151	0.103



F. 3D Image

3D screen shot	Hot spot position
	

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4-Body with front position in dist. 0mm on Channel 20300 in eMTC band 4

SAR Measurement at eMTC band 4 (Body, Validation Plane)

Date of measurement: 17/7/2024

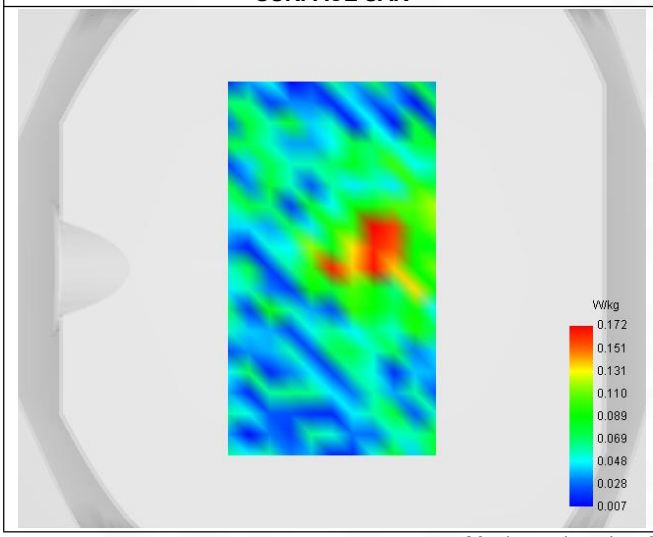
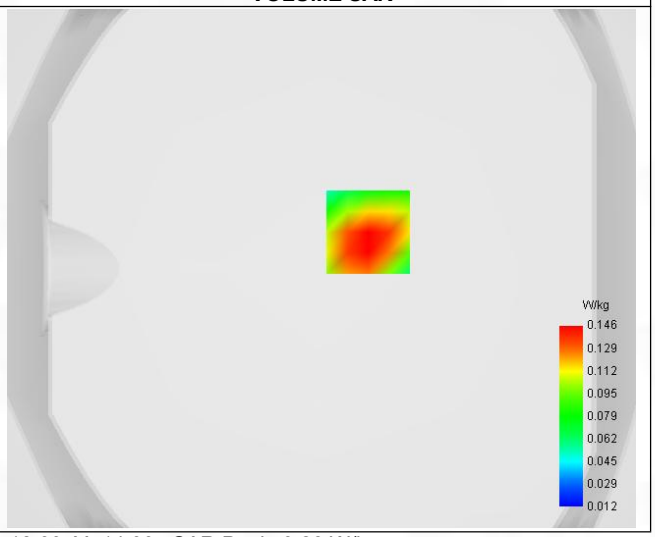
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.96
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	eMTC band 4
Channels	Higher (20300)
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permitivity

Frequency (MHz)	1745.000
Relative permitivity (real part)	39.995
Relative permitivity (imaginary part)	14.398
Conductivity (S/m)	1.342

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=18.00, Y=14.00 ; SAR Peak: 0.26 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.097
SAR 1g (W/Kg)	0.165
Variation (%)	-2.210
Horizontal validation criteria: minimum distance (mm)	8.275
Vertical validation criteria: SAR ratio M2/M1 (%)	67.81%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.196	0.146	0.099	0.065	0.042

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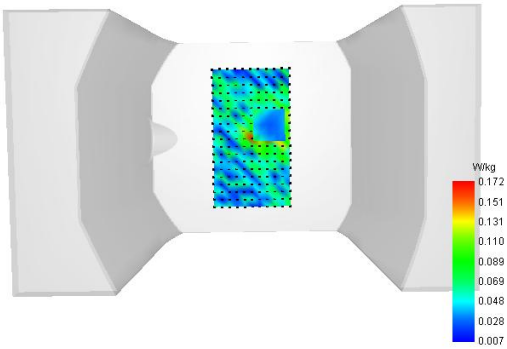
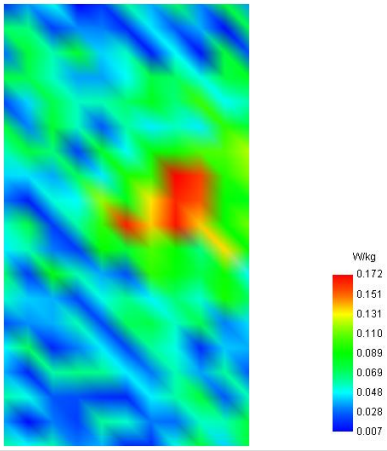
F. 3D Image

3D screen shot	Hot spot position
	

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5-Body with front position in dist. 0mm on Channel 20525 in eMTC band 5

SAR Measurement at eMTC band 5 (Body, Validation Plane)

Date of measurement: 16/7/2024

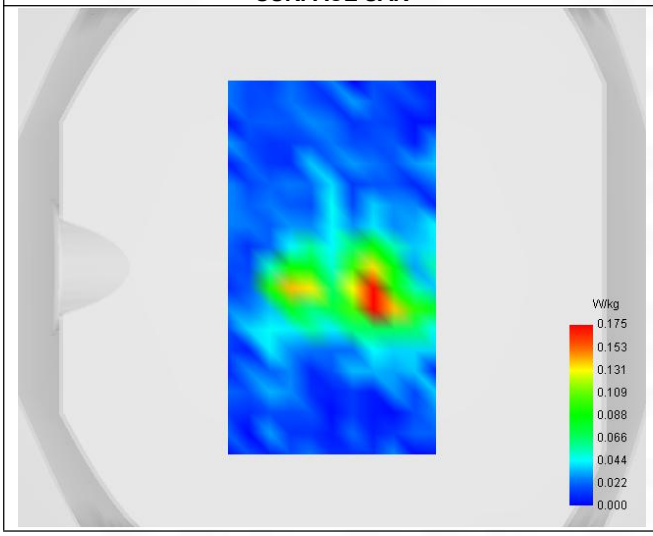
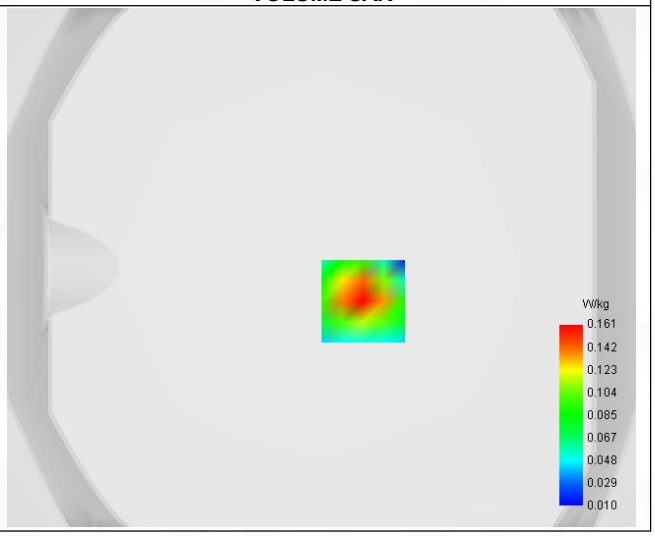
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.68
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	eMTC band 5
Channels	Middle (20525)
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permitivity

Frequency (MHz)	832.090
Relative permitivity (real part)	41.423
Relative permitivity (imaginary part)	19.557
Conductivity (S/m)	0.870

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=16.00, Y=-13.00 ; SAR Peak: 0.28 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.080
SAR 1g (W/Kg)	0.152
Variation (%)	-3.840
Horizontal validation criteria: minimum distance (mm)	8.443
Vertical validation criteria: SAR ratio M2/M1 (%)	50.31%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00

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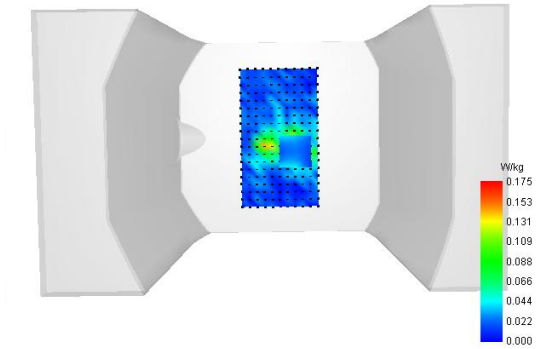
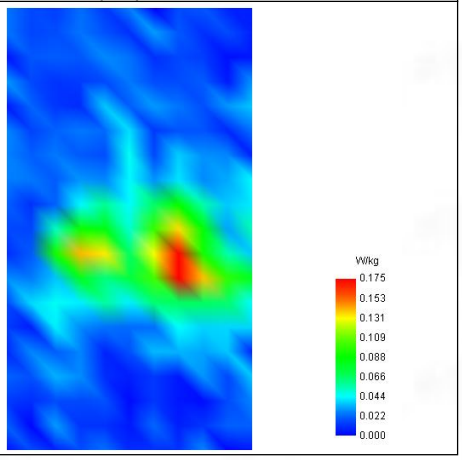
SAR (W/Kg)	0.276	0.161	0.081	0.044	0.030

F. 3D Image

3D screen shot	Hot spot position
	

6-Body with front position in dist. 0mm on Channel 23130 in eMTC band 12

SAR Measurement at eMTC band 12 (Cheek, Validation Plane)

Date of measurement: 15/7/2024

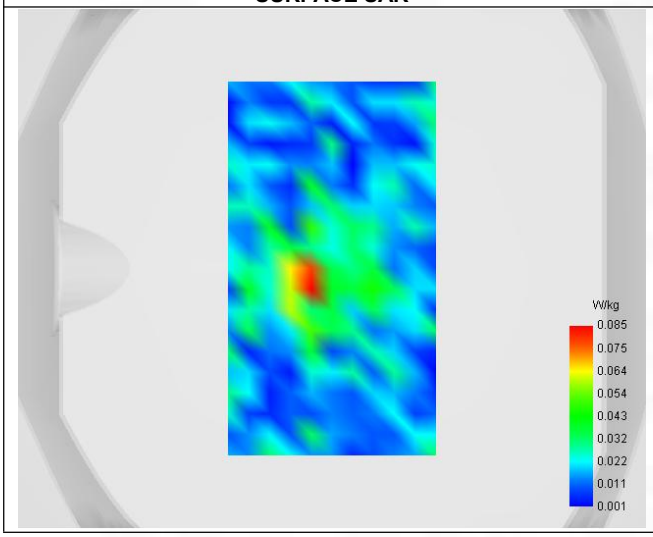
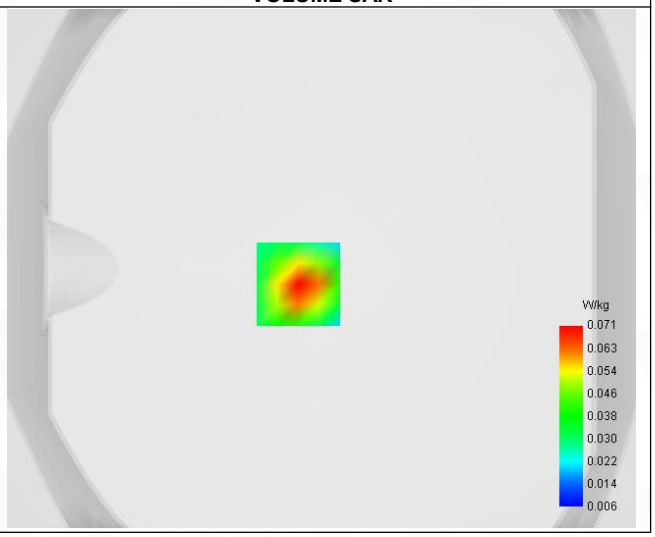
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.65
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	eMTC band 12
Channels	Higher (23130)
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permitivity

Frequency (MHz)	706.590
Relative permitivity (real part)	41.999
Relative permitivity (imaginary part)	22.466
Conductivity (S/m)	0.855

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-9.00, Y=-6.00 ; SAR Peak: 0.13 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.040
SAR 1g (W/Kg)	0.068
Variation (%)	-1.930
Horizontal validation criteria: minimum distance (mm)	8.316
Vertical validation criteria: SAR ratio M2/M1 (%)	47.89%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.130	0.071	0.034	0.022	0.023

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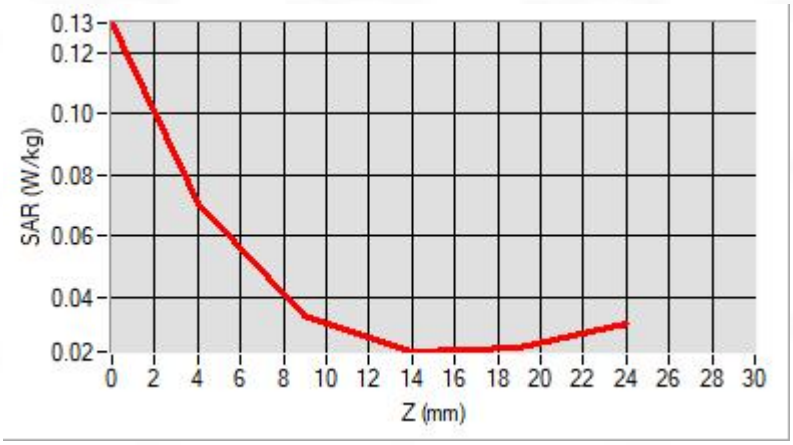
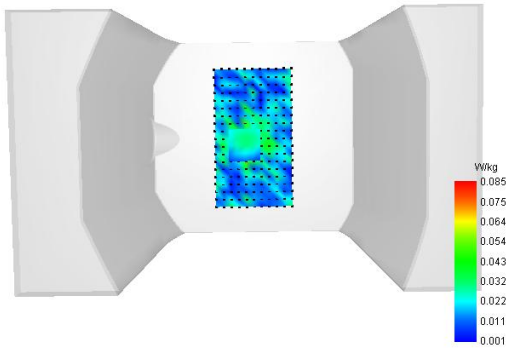
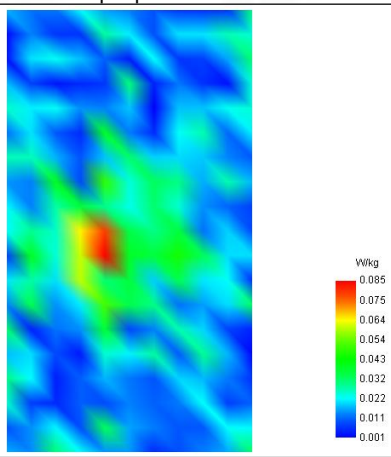


F. 3D Image

3D screen shot	Hot spot position
	

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7-Body with front position in dist. 0mm on Channel 23230 in eMTC band 13

SAR Measurement at eMTC band 13 (Body, Validation Plane)

Date of measurement: 15/7/2024

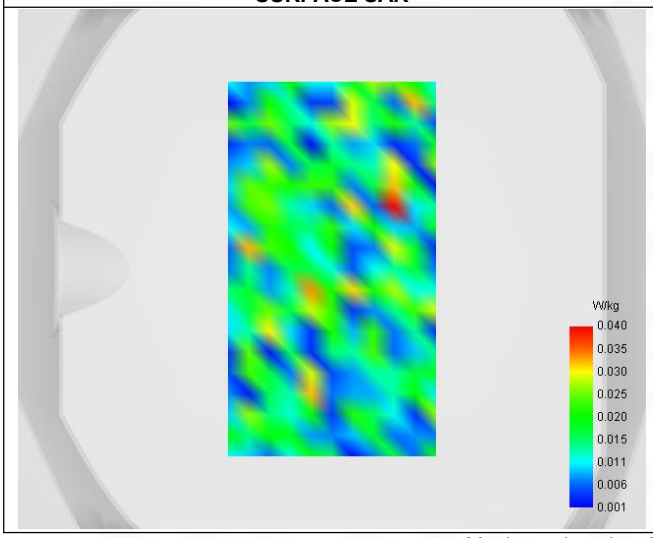
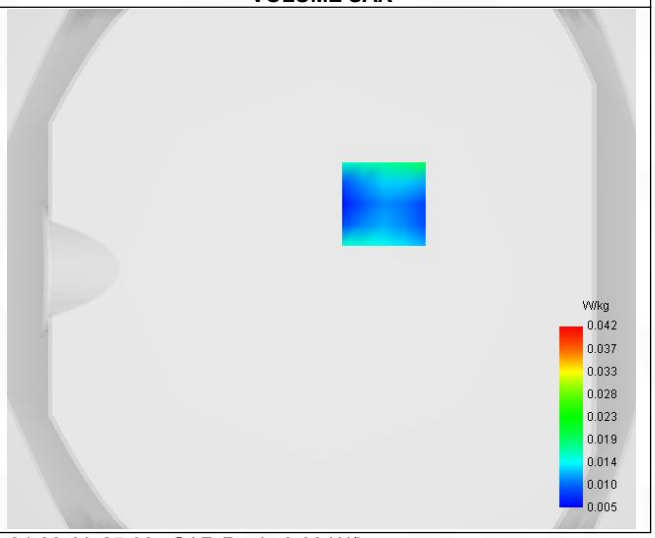
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.65
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	eMTC band 13
Channels	Middle (23230)
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	0
RB size	1

B. Permitivity

Frequency (MHz)	777.590
Relative permitivity (real part)	41.673
Relative permitivity (imaginary part)	20.821
Conductivity (S/m)	0.863

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=24.00, Y=25.00 ; SAR Peak: 0.03 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.017
SAR 1g (W/Kg)	0.018
Variation (%)	1.790
Horizontal validation criteria: minimum distance (mm)	8.435
Vertical validation criteria: SAR ratio M2/M1 (%)	52.63%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.051	0.019	0.010	0.011	0.010

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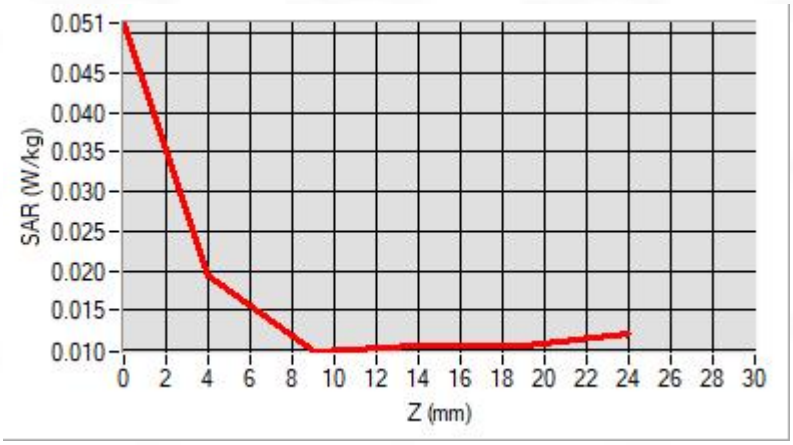
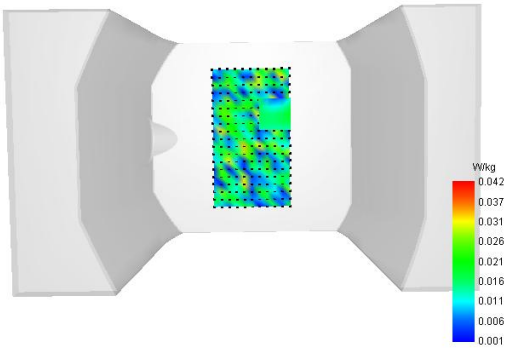
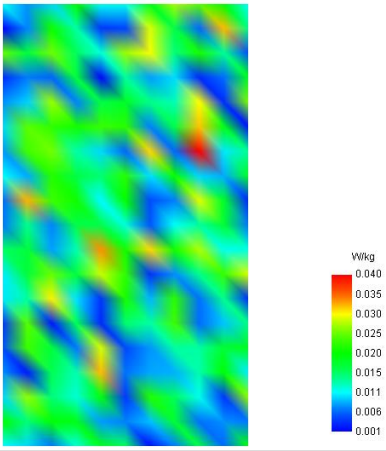


F. 3D Image

3D screen shot	Hot spot position
	

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8-Body with front 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: 19/7/2024

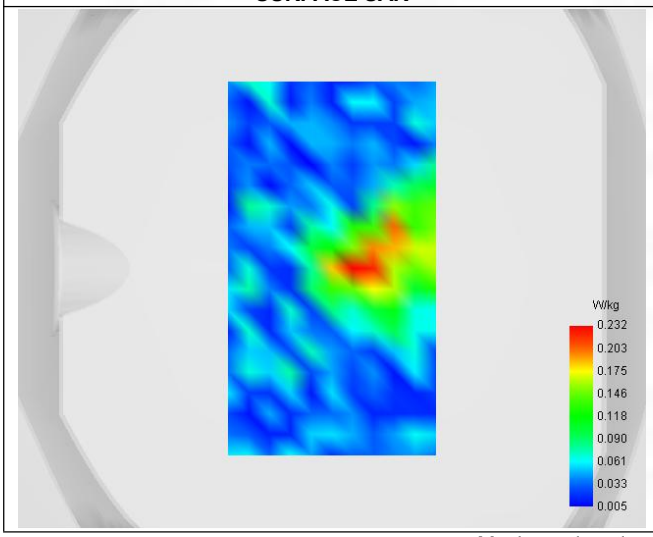
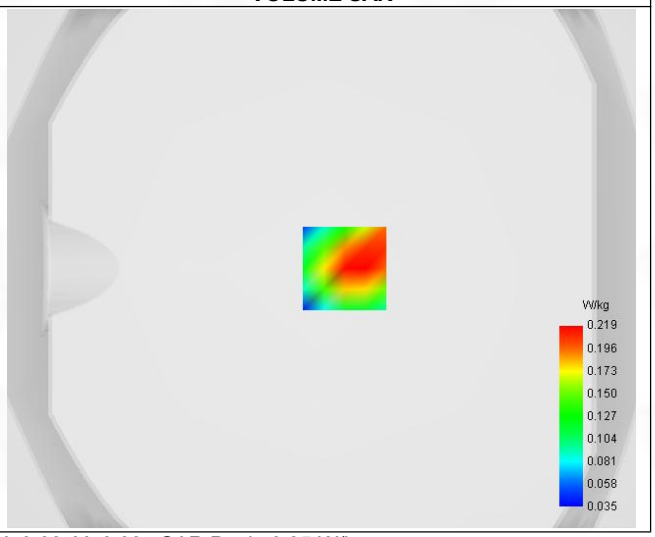
A. Experimental conditions.

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	Body
Band	IEEE 802.11b ISM
Channels	Middle (6)
Signal	IEEE 802.11

B. Permitivity

Frequency (MHz)	2437.000
Relative permitivity (real part)	39.099
Relative permitivity (imaginary part)	13.341
Conductivity (S/m)	1.801

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=9.00, Y=0.00 ; SAR Peak: 0.35 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.132
SAR 1g (W/Kg)	0.214
Variation (%)	3.440
Horizontal validation criteria: minimum distance (mm)	8.249
Vertical validation criteria: SAR ratio M2/M1 (%)	49.77%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.433	0.219	0.109	0.082	0.075

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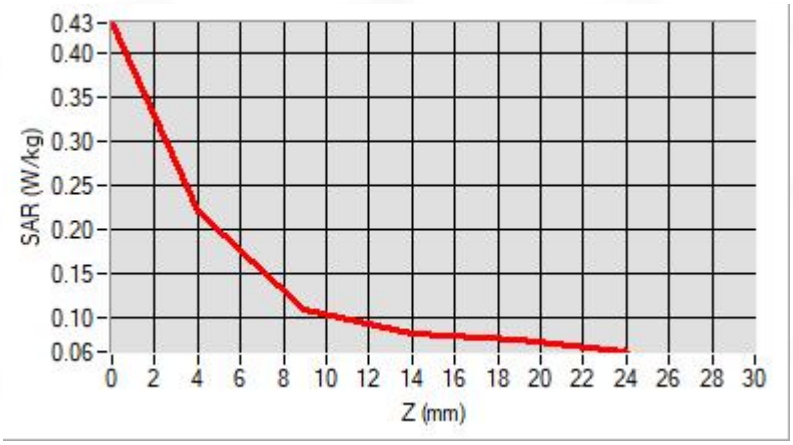
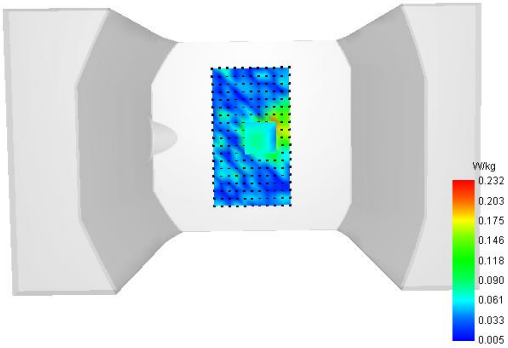
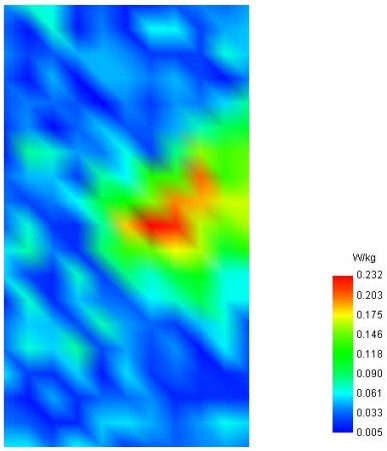


F. 3D Image

3D screen shot	Hot spot position
	

9-Body with front position in dist. 0mm on Channel 39 in Bluetooth

SAR Measurement at Bluetooth (Body, Validation Plane)

Date of measurement: 19/7/2024

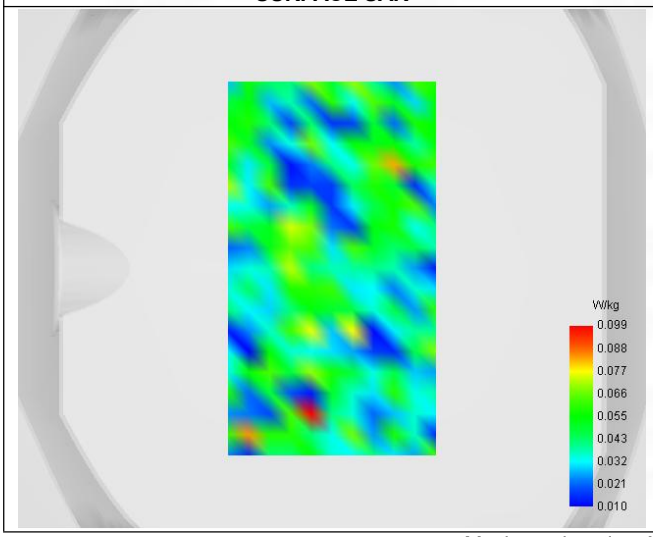
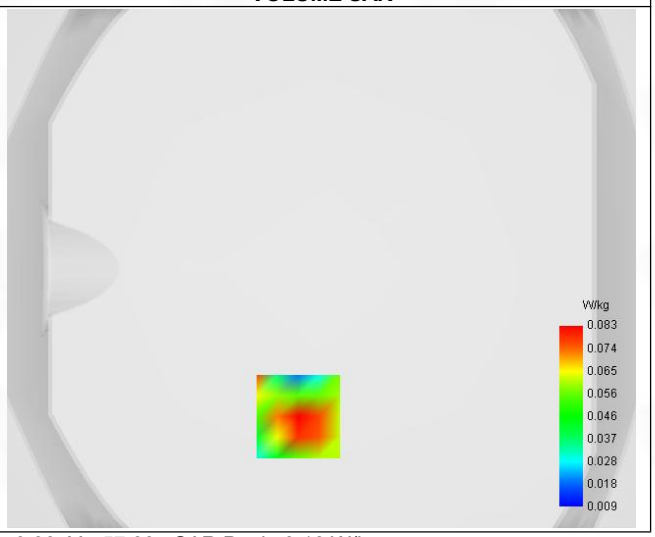
A. Experimental conditions.

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	Body
Band	Bluetooth
Channels	Higher (39)
Signal	Bluetooth

B. Permitivity

Frequency (MHz)	2480.000
Relative permitivity (real part)	39.040
Relative permitivity (imaginary part)	13.210
Conductivity (S/m)	1.842

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-9.00, Y=-57.00 ; SAR Peak: 0.16 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.066
SAR 1g (W/Kg)	0.086
Variation (%)	3.320
Horizontal validation criteria: minimum distance (mm)	8.163
Vertical validation criteria: SAR ratio M2/M1 (%)	93.98%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.086	0.083	0.078	0.069	0.059

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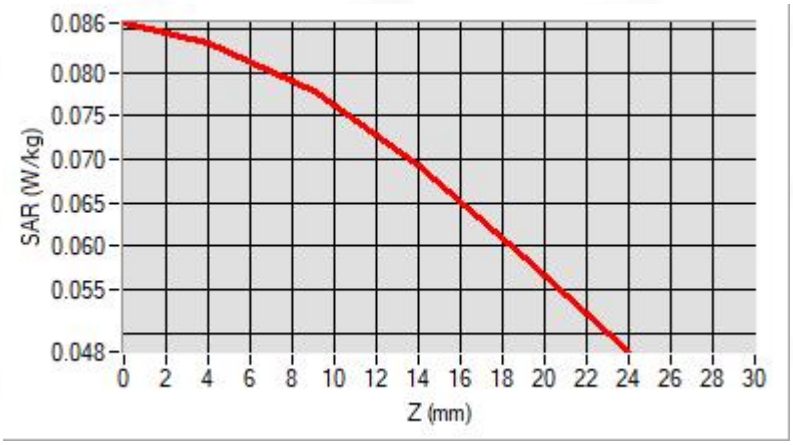
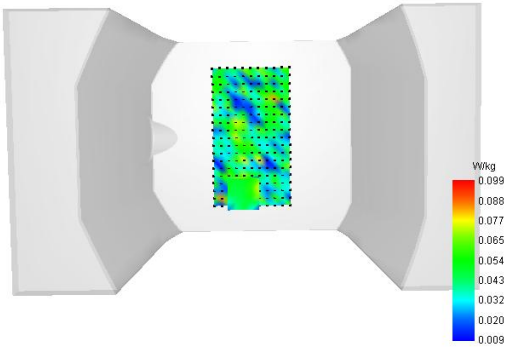
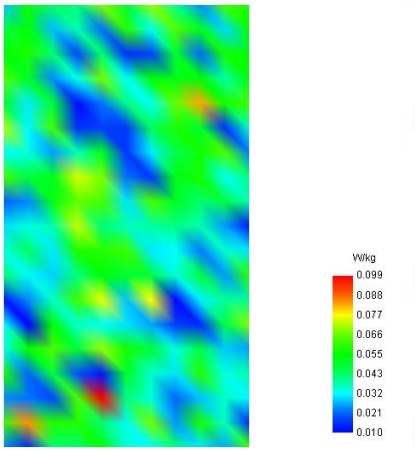


F. 3D Image

3D screen shot	Hot spot position
	

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10-Body with front position in dist. 0mm on 904 MHz in LoRa

SAR Measurement at LoRa (Body, Validation Plane)

Date of measurement: 4/9/2024

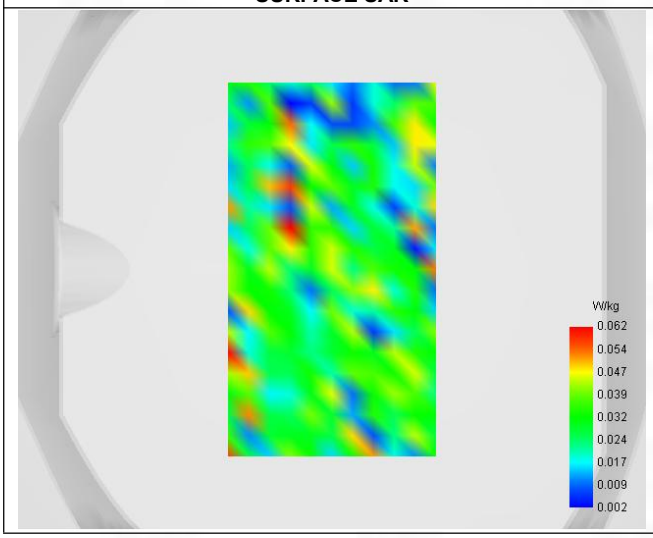
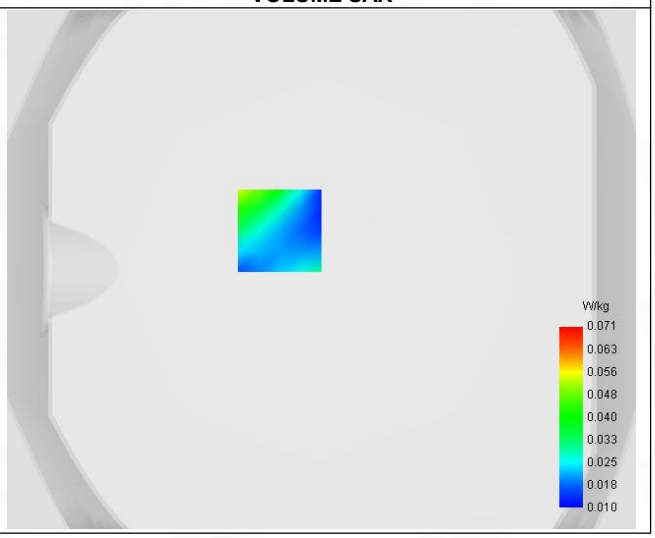
A. Experimental conditions.

Probe	SN 04/22 EPGO365
ConvF	1.68
Area Scan	dx=8mm dy=8mm, Adaptative 1 max
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm,Complete
Phantom	Validation plane
Device Position	Body
Signal	LoRa

B. Permitivity

Frequency (MHz)	904.000
Relative permitivity (real part)	41.303
Relative permitivity (imaginary part)	19.104
Conductivity (S/m)	0.906

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-16.00, Y=15.00 ; SAR Peak: 0.07 W/kg

D. SAR 1g & 10g

SAR 10g (W/Kg)	0.045
SAR 1g (W/Kg)	0.046
Variation (%)	1.530
Horizontal validation criteria: minimum distance (mm)	8.553
Vertical validation criteria: SAR ratio M2/M1 (%)	85.19%

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.077	0.054	0.046	0.043	0.040

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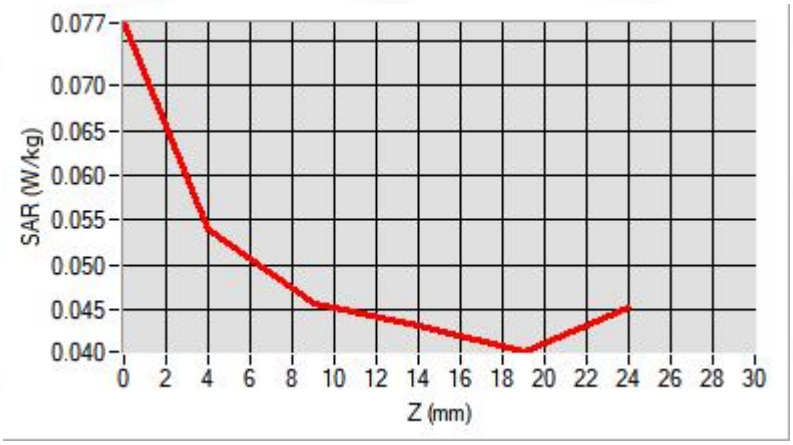
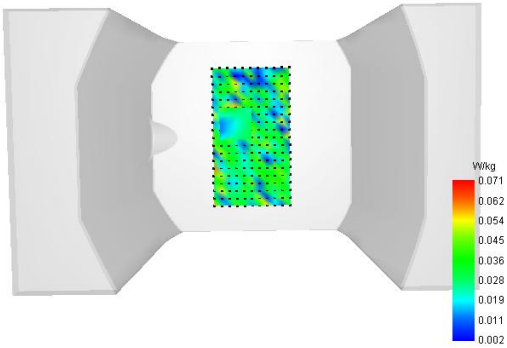
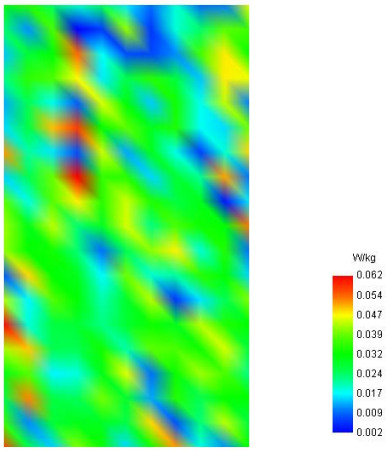


F. 3D Image

3D screen shot	Hot spot position
	

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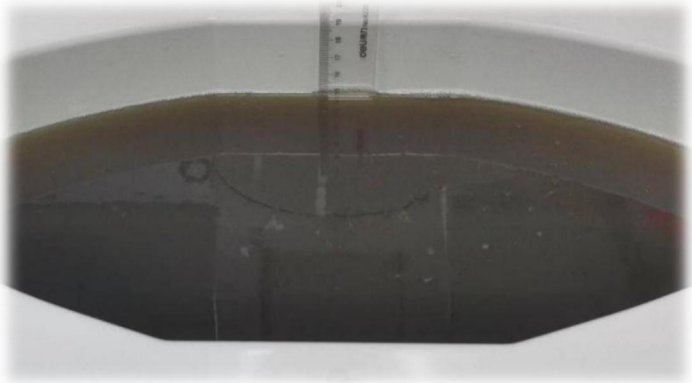
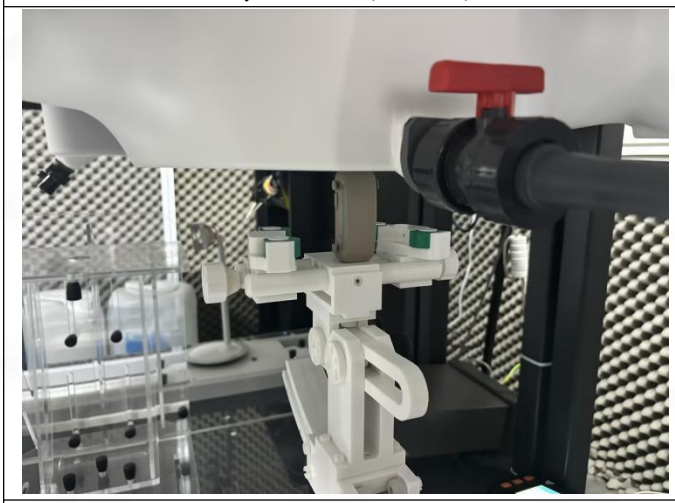
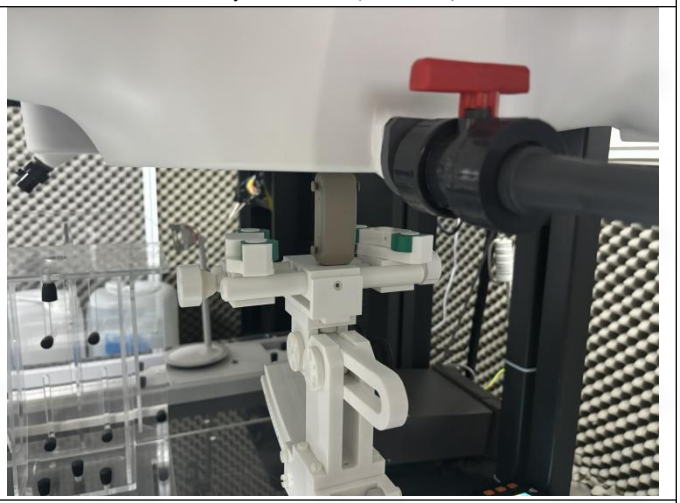
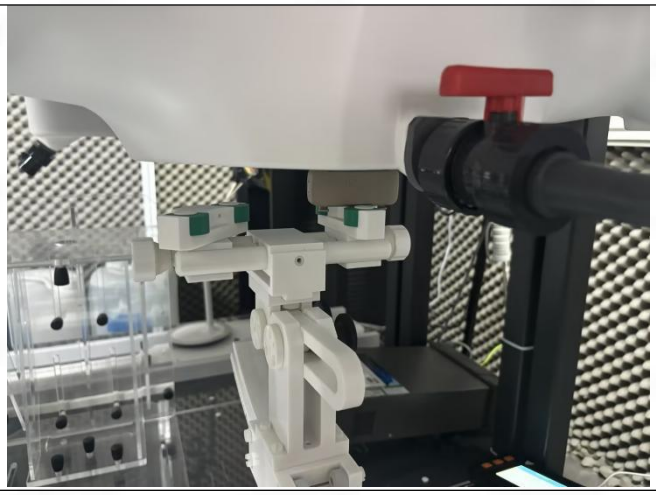
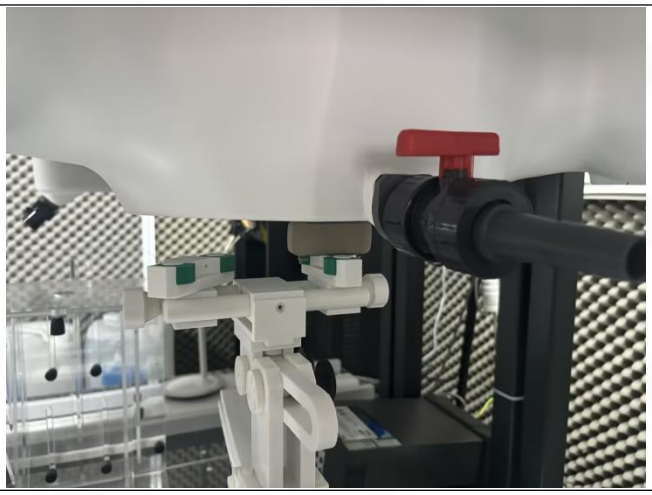
ANNEX E SAR Test Setup Photos

Reference Photo: simulation liquid depth 15cm


Reference Photos	
	
Body-worn Front（dist. 0mm）	Body-worn Back（dist. 0mm）
	
Body-worn Left（dist. 0mm）	Body-worn Right（dist. 0mm）

	
Body-worn Top（dist. 0mm）	Body-worn Bottom（dist. 0mm）

ANNEX F EUT External and Internal Photos

Please refer to RF Report.

ANNEX G Calibration Information

Please refer to the document “Calibration.pdf”.

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