

TEST REPORT

Report No.: BCTC2505530577E

Applicant: BEDIGITAL S.A.S.

Product Name: Smart Watch

Test Model: SW100

Tested Date: 2025-05-26 to 2025-06-05

Issued Date: 2025-06-05

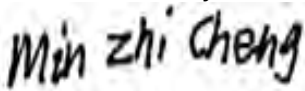
Shenzhen BCTC Testing Co., Ltd.



FCC ID: 2BPV3-SW100

Product Name: Smart Watch
Trademark: esenses
Model/Type Reference: SW100
Prepared For: BEDIGITAL S.A.S.
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13A. Colombia
Manufacturer: SHENZHEN DOMINO TIMES TECHNOLOGY CO., LTD.
Address: Rm806, Taibang Tech Bldg, Keji South 10th Rd, Nanshan Dist, Shenzhen, China
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Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China
Sample Received Date: 2025-05-26
Sample tested Date: 2025-05-26 to 2025-06-03
Issue Date: 2025-06-03
Test Standards: IEEE Std C95.1-2019
IEEE Std 1528-2013
FCC Part 2.1093
Test Results: PASS
Remark: This is SAR test report

Tested by:



Min Zhi Cheng / Project Handler

Approved by:



Zero Zhou / Reviewer

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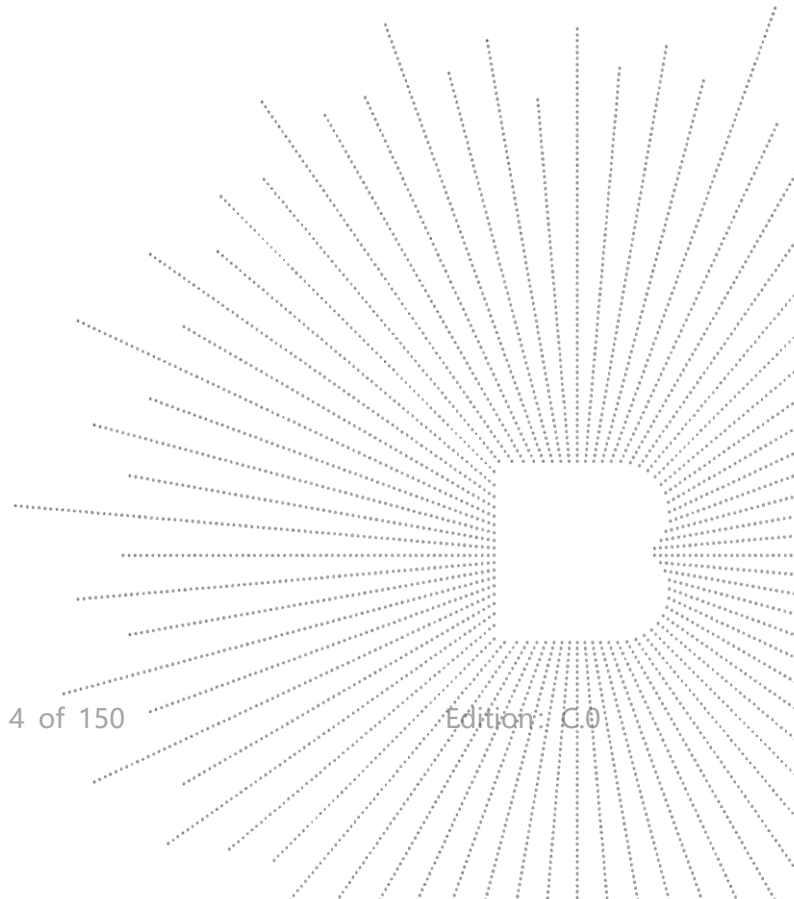
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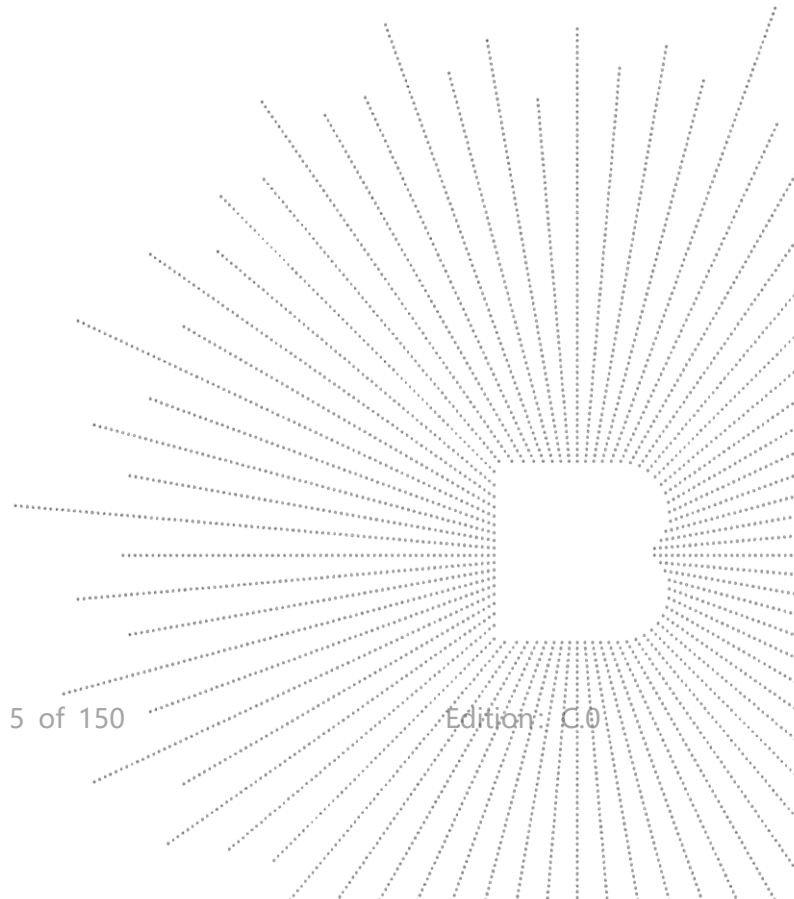
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1. Version

Report No.	Issue Date	Description	Approved
BCTC2505530577E	2025-06-05	Original	Valid



2. Test Standards

IEEE Std C95.1-2019: IEEE Standard for Safety Levels with Respect to Human Exposure to Electric, Magnetic, and Electromagnetic Fields, 0 Hz to 300 GHz. It specifies the maximum exposure limit of 1.6 W/kg as averaged over any 1 gram of tissue for portable devices being used within 20 cm of the user in the uncontrolled environment.

IEEE Std 1528-2013: IEEE Recommended Practice for Determining the Peak Spatial-Average Specific Absorption Rate (SAR) in the Human Head from Wireless Communications Devices: Measurement Techniques.

FCC Part 2.1093 Radiofrequency Radiation Exposure Evaluation: Portable Devices KDB 447498 D01 General RF Exposure Guidance v06: Mobile and Portable Device RF Exposure Procedures and Equipment Authorization Policies.

KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz v01r04: SAR Measurement Requirements for 100 MHz to 6 GHz.

KDB 865664 D02 RF Exposure Reporting v01r02: RF Exposure Compliance Reporting and Documentation Considerations.

KDB 248227 D01 802.11 Wi-Fi SAR v02r02: SAR GUIDANCE FOR IEEE 802.11 (Wi-Fi) TRANSMITTERS.

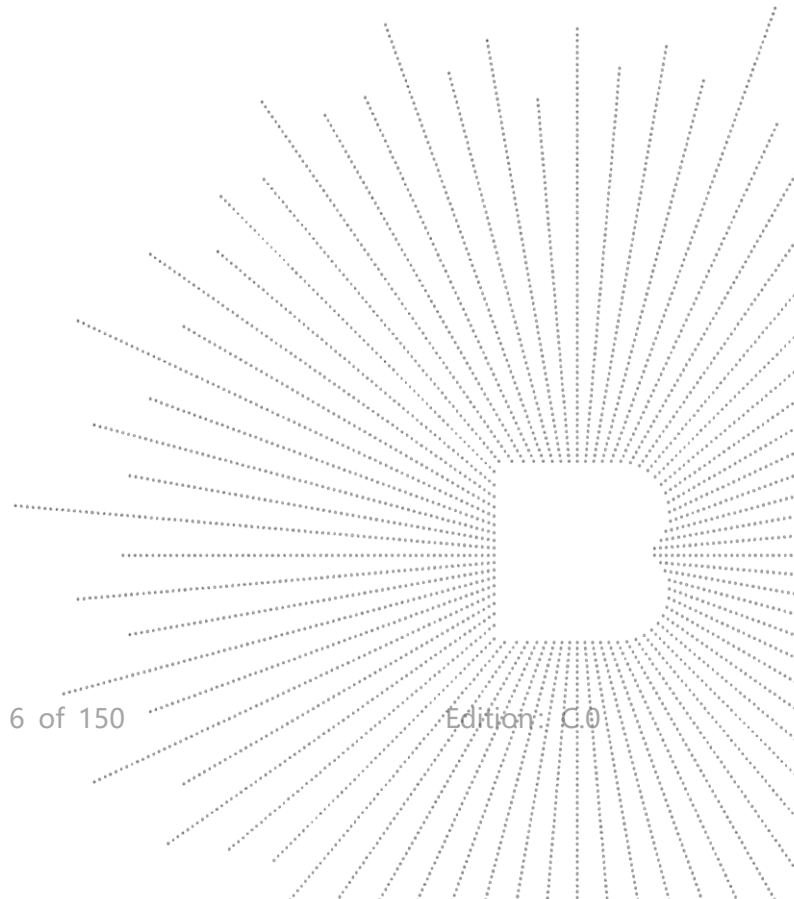
KDB 941225 D01 3G SAR Procedures: 3G SAR MEASUREMENT PROCEDURES.

KDB 941225 D05 SAR for LTE Devices: SAR EVALUATION CONSIDERATIONS FOR LTE DEVICES.

KDB 941225 D06 Hotspot Mode v02r01: SAR EVALUATION PROCEDURES FOR PORTABLE DEVICES WITH WIRELESS ROUTER CAPABILITIES.

KDB 648474 D04 Handset SAR v01r03: SAR EVALUATION CONSIDERATIONS FOR WIRELESS HANDSETS.

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3. Test Summary

The maximum results of Specific Absorption Rate (SAR) have found during testing are as follows:

Frequency Band	Maximum SAR _{1g} (W/kg)	Limit SAR _{1g} (W/kg)
	Front-of-face (10mm)	
Bluetooth	0.133	1.6
WIFI	0.188	
GSM	0.372	
WCDMA	0.481	
LTE	0.763	
Simultaneous Transmission	0.951	

Frequency Band	Maximum SAR _{10g} (W/kg)	Limit SAR _{10g} (W/kg)
	Limb-worn (0mm)	
Bluetooth	0.053	4.0
WIFI	0.075	
GSM	1.256	
WCDMA	1.249	
LTE	1.740	
Simultaneous Transmission	1.815	

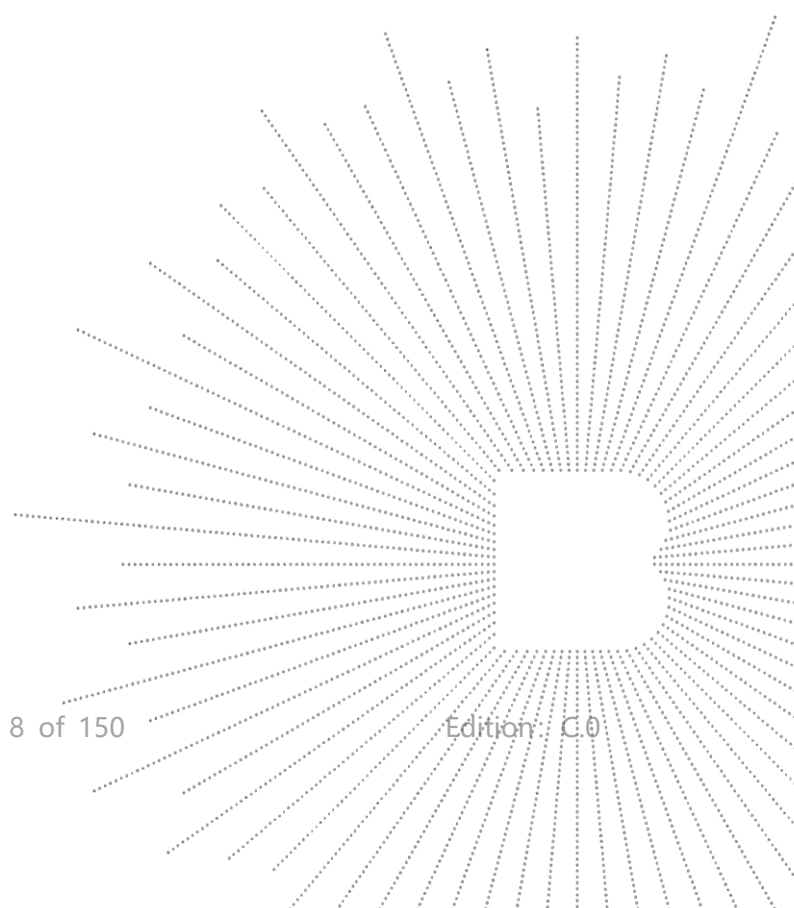
The device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR part 2 (2.1093) and ANSI/IEEE C95.1-2019, and had been tested in accordance with the measurement methods and procedure specified in IEEE 1528-2013.

4. SAR Limits

EXPOSURE LIMITS	FCC Limit (1g Tissue)	
	SAR (W/kg)	
	General Population / Uncontrolled Exposure Environment	Occupational / Controlled Exposure Environment
Spatial Average (averaged over the whole body)	0.08	0.4
Spatial Peak (averaged over any 1g of tissue)	1.6	8.0
Spatial Peak (hands/wrists/feet/ankles averaged over 10g)	4.0	20.0

Population/Uncontrolled Environments are defined as locations where there is the exposure of individual who have no knowledge or control of their exposure.

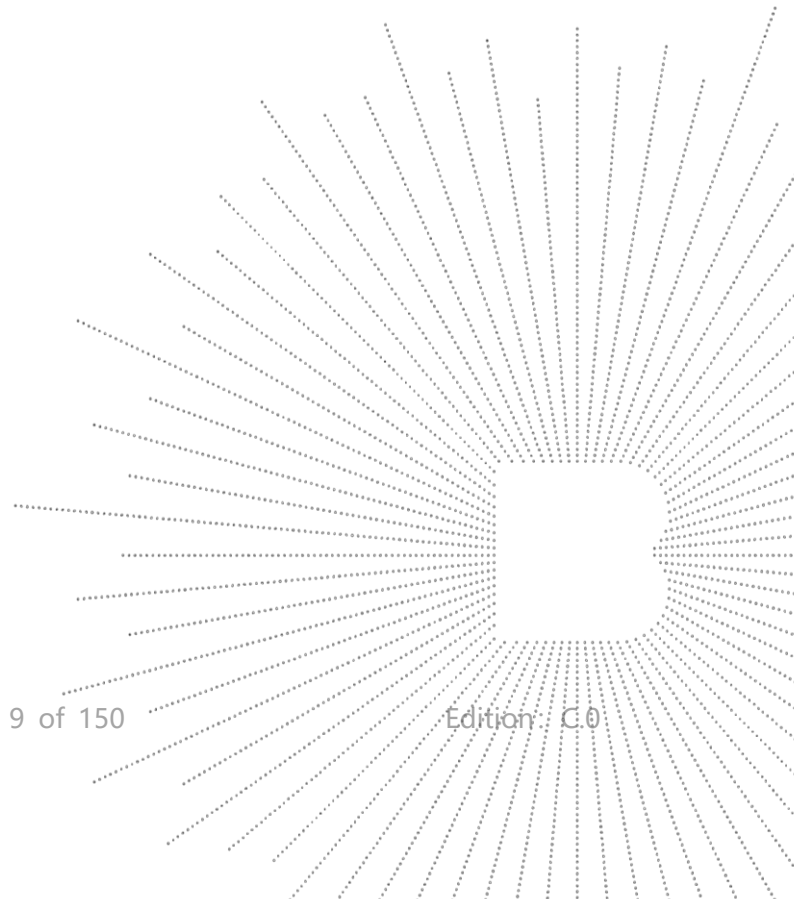
Occupational/Controlled Environments are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure (i.e. as a result of employment or occupation).



5. Measurement Uncertainty

Per KDB 865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg and the measured 10-g SAR within a frequency band is < 3.75 W/kg. The expanded SAR measurement uncertainty must be $\leq 30\%$, for a confidence interval of $k=2$. If these conditions are met, extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval.

Therefore, the measurement uncertainty is not required.



6. Product Information and Test Setup

6.1 Product Information

Model/Type reference: SW100
Model differences: N/A
Hardware Version: N/A
Software Version: N/A
Ratings: DC 3.87V from battery, DC 5V from USB

Bluetooth

Operation Frequency: 2402-2480MHz
Type of Modulation: GFSK, $\pi/4$ DQPSK, 8DPSK
Number Of Channel: 79CH
Antenna installation: External antenna

Antenna Gain: -4.6 dBi
Remark:
☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

BLE

Operation Frequency: 2402-2480MHz
Type of Modulation: GFSK
Number Of Channel: 40CH
Antenna installation: External antenna

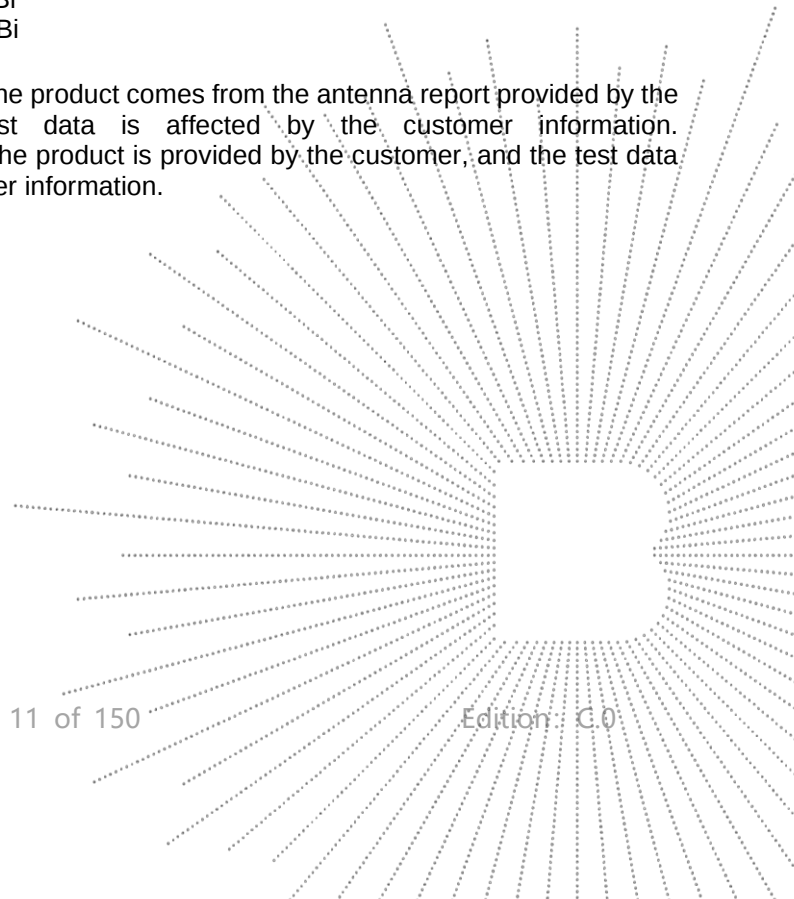
Antenna Gain: -4.6 dBi
Remark:
☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

WIFI 2.4G

Operation Frequency: 802.11b/g/n20MHz:2412~2462 MHz
802.11b:11/5.5/2/1 Mbps
Bit Rate of Transmitter 802.11g:54/48/36/24/18/12/9/6Mbps
802.11n Up to 75Mbps
Type of Modulation: OFDM/DSSS
Number Of Channel 802.11b/g/n20MHz:11 CH
Antenna installation: External antenna
-4.6 dBi
Antenna Gain: Remark:
☒ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
☐ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.

2G,3G

Operation Frequency: GSM/GPRS/EGPRS 850: TX: 824~849MHz; RX: 869~894MHz;
GSM/GPRS/EGPRS 1900: TX:1850~1910MHz; RX:1930~1990MHz;
WCDMA Band II: TX: 1852.40~1907.60MHz; Rx: 1932.60~1987.40MHz;
WCDMA Band V: TX: 826.40~846.60MHz; RX: 871.40~ 891.60MHz;
GPRS Class: Class 12
Max RF Output Power: GSM/GPRS/EGPRS 850: 33.47 dBm,
GSM/GPRS/EGPRS 1900: 29.88 dBm
WCDMA Band II: 22.88 dBm
WCDMA Band V: 22.97 dBm
Type of Modulation: GSM with GMSK Modulation, EGPRS with 8PSK Modulation
WCDMA Mode with BPSK Modulation
HSDPA Mode with QPSK, 16QAM Modulation
HSUPA Mode with QPSK, 16QAM Modulation
Antenna installation: External antenna
GSM850: -7.46 dBi
GSM1900: -6.09 dBi
WCDMA Band II: -6.09 dBi
WCDMA Band V: -7.46 dBi
Antenna Gain: Remark:
☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information.
☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.



4G

Tx Frequency:	LTE Band 2: 1850 MHz ~ 1910 MHz LTE Band 4: 1710 MHz ~ 1755 MHz LTE Band 5: 824 MHz ~ 849 MHz LTE Band 7: 2500MHz-2570MHz
Rx Frequency:	LTE Band 2: 1930 MHz ~ 1990 MHz LTE Band 4: 2110 MHz ~ 2155 MHz LTE Band 5: 869 MHz ~ 894 MHz LTE Band 7: 2620MHz ~ 2690MHz
Bandwidth:	LTE Band 2: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 4: 1.4MHz /3MHz /5MHz /10MHz /15MHz /20MHz LTE Band 5: 1.4MHz /3MHz /5MHz /10MHz LTE Band 7: 5MHz /10MHz /15MHz /20MHz
The Max RF Output Power (EIRP/ERP)	LTE Band 2: 17.63 dBm LTE Band 4: 16.84 dBm LTE Band 5: 14.1 dBm LTE Band 7: 19.38 dBm
99% Occupied Bandwidth:	LTE Band 2: 18M1W7D LTE Band 4: 18M1G7D LTE Band 5: 9M01G7D LTE Band 7: 18M1G7D
Type of Modulation:	QPSK/16QAM
Antenna Type:	External Antenna
Antenna Gain:	LTE Band 2: -6.09 dBi LTE Band 4: -6.84 dBi LTE Band 5: -7.46 dBi LTE Band 7: -4.21 dBi
Remark: ☐ The antenna gain of the product comes from the antenna report provided by the customer, and the test data is affected by the customer information. ☒ The antenna gain of the product is provided by the customer, and the test data is affected by the customer information.	

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6.2 Test Setup Configuration

See test photographs attached in EUT TEST SETUP PHOTOGRAPHS for the actual connections between Product and support equipment.

6.3 Support Equipment

Cable of Product

No.	Cable Type	Quantity	Provider	Length (m)	Shielded	Note
1	--	--	Applicant	---	Yes/No	--
2	--	--	BCTC	--	Yes/No	--

No.	Device Type	Brand	Model	Series No.	Note
1.	---	---	---	---	---
2.	--	--	--	--	--

Notes:

1. All the equipment/cables were placed in the worst-case configuration to maximize the emission during the test.
2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

6.4 Test Environment

1. Normal Test Conditions:

Humidity(%):	35-75
Atmospheric Pressure(kPa):	95-105
Temperature(°C):	18-25

2. Extreme Test Conditions:

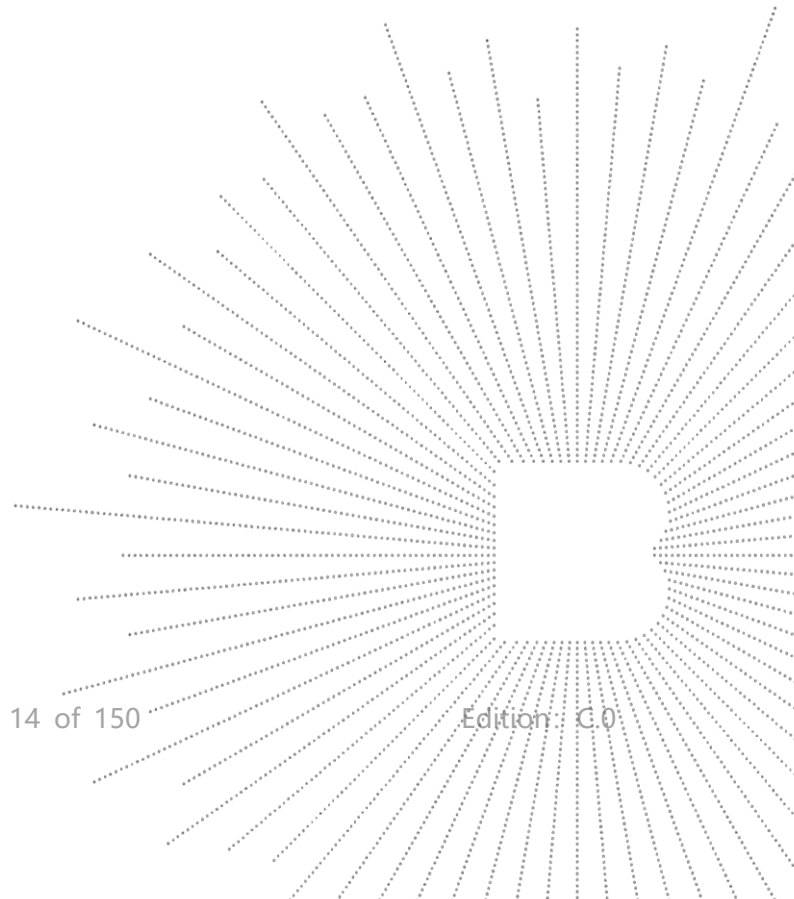
N/A

7. Test Facility and Test Instrument Used

7.1 Test Facility

All measurement facilities used to collect the measurement data are located at Shenzhen BCTC Testing Co., Ltd. Address: 1-2/F., Building B, Pengzhou Industrial Park, No.158, Fuyuan 1st Road, Zhancheng, Fuhai Subdistrict, Bao'an District, Shenzhen, Guangdong, China. The site and apparatus are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-1 other equivalent standards.

FCC Test Firm Registration Number: 712850
A2LA certificate registration number is: CN1212
ISED Registered No.: 23583
ISED CAB identifier: CN0017



7.2 Test Instrument Used

Equipment	Manufacturer	Model#	Serial#	Last Cal.	Next Cal.
PC	DELL	\	\	N/A	N/A
SAR Measurement system	SATIMO	\	\	N/A	N/A
Signal Generator	Keysight	83711B	US37100131	May 14, 2025	May 13, 2026
Multimeter	Keithley	1160271	\	Nov. 10, 2024	Nov 09, 2025
S-parameter Network Analyzer	R&S	ZVB 8	101353	Dec. 07, 2024	Dec. 06, 2025
Wideband Radio Communication Tester	R&S	CMW500	\	Nov. 10, 2024	Nov 09, 2025
E SAR PROBE 6GHz	MVG	SSE2	2623-EPGO-420	July 18, 2024	July 17, 2025
DIPOLE 835	SATIMO	SID 835	SN 47/21 DIP 0G835-621	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 1800	SATIMO	SID 1800	SN 47/21 DIP 1G800-623	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 1900	SATIMO	SID 1900	SN 47/21 DIP 1G900-624	Nov. 25, 2024	Nov. 24, 2027
DIPOLE 2600	SATIMO	SID 2600	SN 47/21 DIP 2G600-628	Nov. 25, 2024	Nov. 24, 2027
COMOSAR OPEN Coaxial Probe	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
SAR Locator	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
Communication Antenna	SATIMO	\	\	Nov. 18, 2024	Nov. 17, 2025
FEATURE PHONEPOSITIONING DEVICE	SATIMO	\	\	N/A	N/A
DUMMY PROBE	SATIMO	\	\	N/A	N/A
SAM Phantom	MVG	\	SN 13/09 SAM68	N/A	N/A
Liquid measurement Kit	HP	85033D	3423A08186	N/A	N/A
Power meter	Keysight	E4419	A00065	May 14, 2025	May 13, 2026
Power sensor	Keysight	E9300A	US39211659	May 14, 2025	May 13, 2026
Power sensor	Keysight	E9300A	US39211305	May 14, 2025	May 13, 2026
Directional Coupler	Krytar 158020	131467	\	N/A	N/A
Thermometer	BTE	\	\	N/A	N/A
Broad Band Tissue Simulation Liquid	Schmid	\	\	N/A	N/A

Note:

Per KDB865664D01 requirements for dipole calibration, the test laboratory has adopted three year extended calibration interval. Each measured dipole is expected to evaluate with following criteria at least on annual interval.

1. There is no physical damage on the dipole;
2. System check with specific dipole is within 10% of calibrated values;
3. The most recent return-loss results, measured at least annually, deviates by no more than 20% from the previous measurement;
4. The most recent measurement of the real or imaginary parts of the impedance, measured at least annually is within 5Ω from the previous measurement.

8. Specific Absorption Rate (SAR)

8.1 Introduction

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.

8.2 SAR Definition

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:

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

SAR is expressed in units of Watts per kilogram (W/kg)

SAR measurement can be either related to the temperature elevation in tissue by

$$\text{SAR} = C \left(\frac{\delta T}{\delta t} \right)$$

Where: C is the specific heat capacity, δT is the temperature rise and δt is the exposure duration, or related to the

electrical field in the tissue by

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

Where: σ is the conductivity of the tissue, ρ is the mass density of the tissue and E is the RMS electrical field strength.

However for evaluating SAR of low power transmitter, electrical field measurement is typically applied.

9. SAR Measurement System

9.1 The Measurement System

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

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

The following figure shows the system.



The EUT under test operating at the maximum power level is placed in the phone holder, under the phantom, which is filled with head simulating liquid. The E-Field probe measures the electric field inside the phantom. The Open SAR software computes the results to give a SAR value in a 1g or 10g mass.

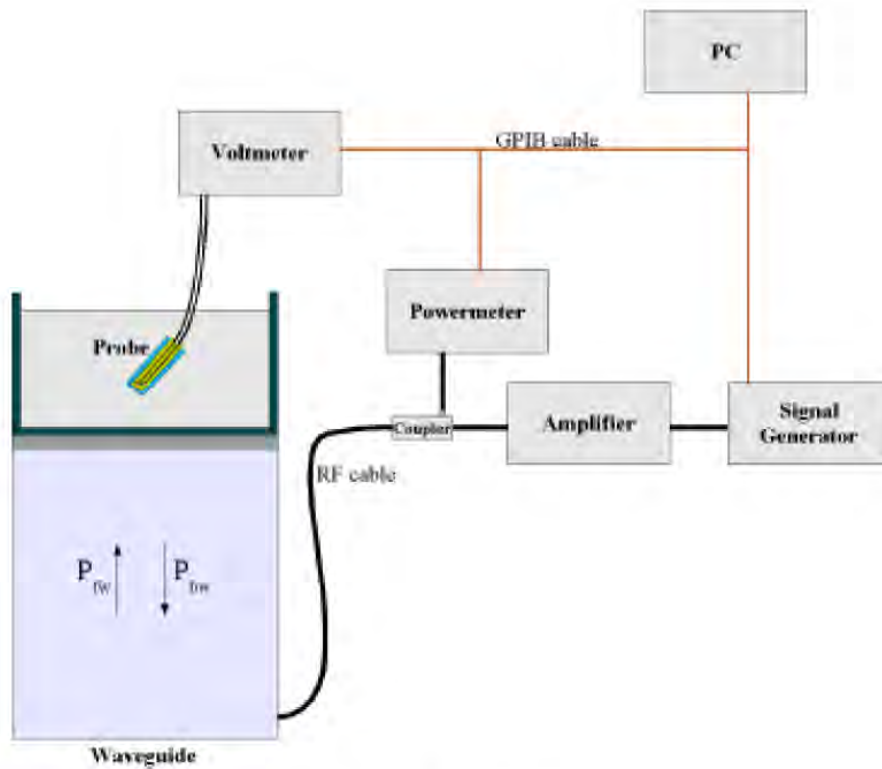
9.2 Probe

For the measurements the Specific Dosimetric E-Field Probe SN 26/23 EPGO420 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter: 5mm
- Distance between probe tip and sensor center: 2.10mm
- Distance between sensor center and the inner phantom surface: 4mm (repeatability better than +/- 1mm)
- Probe linearity: <0.25 dB
- Axial Isotropy: <0.25 dB
- Spherical Isotropy: <0.50 dB
- Calibration range: 835 to 2500MHz for head & body simulating liquid.

Angle between probe axis (evaluation axis) and surface normal line: less than 30°

Probe calibration is realized, in compliance with EN 62209-1 and IEEE 1528 STD, with CALISAR, Antennas a proprietary calibration system. The calibration is performed with the EN 62209-1 annex technique using reference guide at the five frequencies.



$$SAR = \frac{4(p_{fw} - p_{pbw})}{ab\delta} \cos^2 \left(\pi \frac{y}{a} \right) e^{(2\pi/\delta)}$$

Where :

P_{fw} = Forward Power

P_{bw} = Backward Power

a and b = Waveguide dimensions

δ = Skin depth

Keithley configuration:

Rate = Medium; Filter = ON; RDGS = 10; Filter type = Moving Average; Range auto after each calibration, a SAR measurement is performed on a validation dipole and compared with a NPL calibrated probe, to verify it.

The calibration factors, CF(N), for the 3 sensors corresponding to dipole 1, dipole 2 and dipole 3 are:

$$CF(N) = SAR(N)/V_{lin}(N) \quad (N=1,2,3)$$

The linearised output voltage $V_{lin}(N)$ is obtained from the displayed output voltage $V(N)$ using

$$V_{lin}(N) = V(N) * (1 + V(N)/DCP(N)) \quad (N=1,2,3)$$

where DCP is the diode compression point in mV.

9.3 Probe Calibration Process

Dosimetric Assessment Procedure

Each E-Probe/Probe Amplifier combination has unique calibration parameters. SATIMO Probe calibration procedure is conducted to determine the proper amplifier settings to enter in the probe parameters. The amplifier settings are determined for a given frequency by subjecting the probe to a known E-field density (1 mW/cm²) using an with CALISAR, Antenna proprietary calibration system.

Free Space Assessment Procedure

The free space E-field from amplified probe outputs is determined in a test chamber. This calibration can be performed in a TEM cell if the frequency is below 1 GHz and in a waveguide or other methodologies above 1 GHz for free space. For the free space calibration, the probe is placed in the volumetric center of the cavity and at the proper orientation with the field. The probe is rotated 360 degrees until the three channels show the maximum reading. The power density readings equates to 1mW/cm².

Temperature Assessment Procedure

E-field temperature correlation calibration is performed in a flat phantom filled with the appropriate simulated head tissue. The E-field in the medium correlates with the temperature rise in the dielectric medium. For temperature correlation calibration a RF transparent thermistor-based temperature probe is used in conjunction with the E-field probe.

Where:

$$SAR = C \frac{\Delta T}{\Delta t}$$

Δt = exposure time (30 seconds),

C = heat capacity of tissue (brain or muscle),

ΔT = temperature increase due to RF exposure.

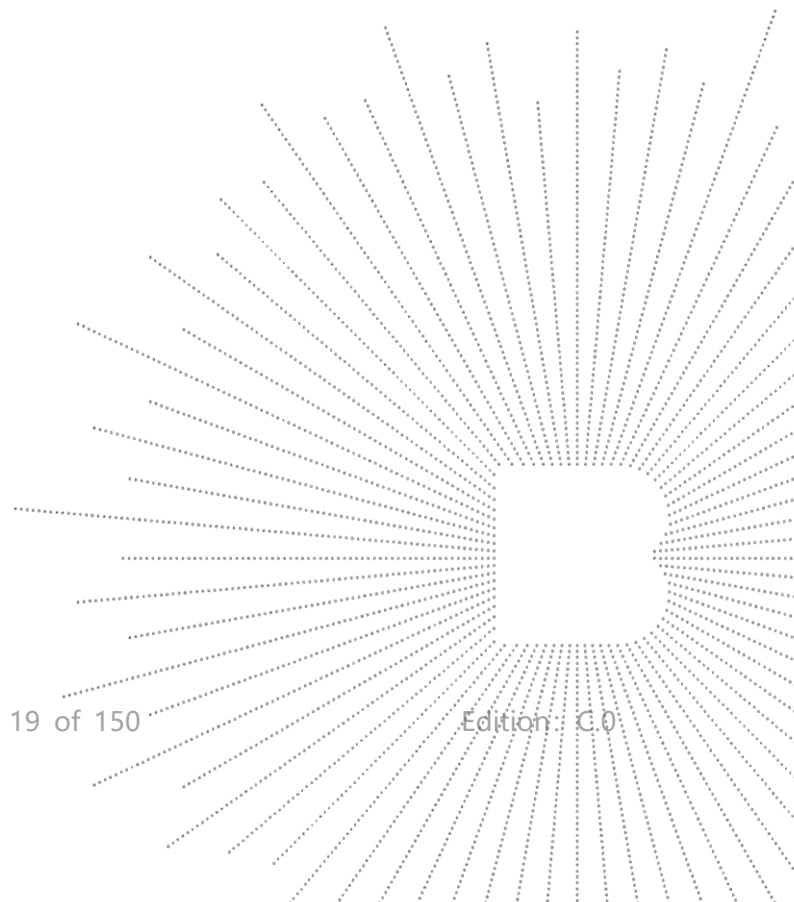
SAR is proportional to $\Delta T/\Delta t$, the initial rate of tissue heating, before thermal diffusion takes place. The electric field in the simulated tissue can be used to estimate SAR by equating the thermally derived SAR to that with the E- field component.

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

Where:

σ = simulated tissue conductivity,

ρ = Tissue density (1.25 g/cm³ for brain tissue)

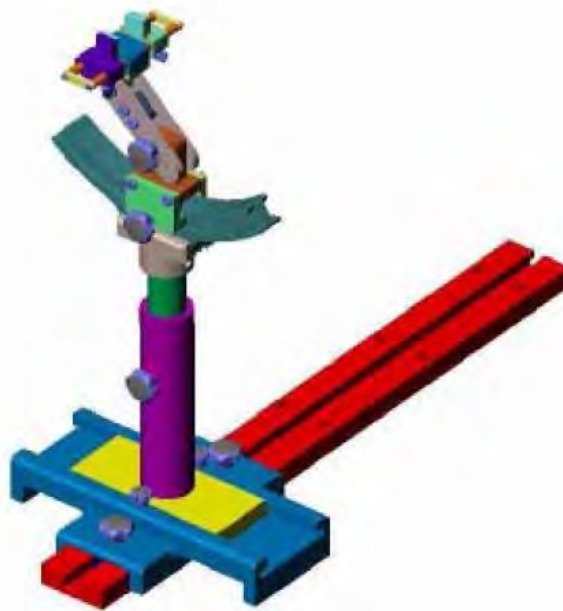


9.4 Phantom

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

9.5 Device Holder

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
Delrin	3.7	0.005

10. Tissue Simulating Liquids

10.1 Composition of Tissue Simulating Liquid

For the measurement of the field distribution inside the SAM phantom with SMTIMO, the phantom must be filled with around 25 liters of homogeneous body tissue simulating liquid. 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. Please see the following photos for the liquid height.



Liquid Height for Body SAR

The Composition of Tissue Simulating Liquid

Frequency (MHz)	Water (%)	Salt (%)	1,2-Propane diol (%)	HEC (%)	Preventol (%)	DGBE (%)
Head/Body						
835	40.3	1.4	57.9	0.2	0.2	0
900	40.3	1.4	57.9	0.2	0.2	0
1800-2000	55.2	0.3	0	0	0	44.5
2450	55.0	0.1	0	0	0	44.9
2600	54.9	0.1	0	0	0	45.0

Frequency (MHz)	Water (%)	Hexyl Carbitol (%)	Triton X-100 (%)
Head/Body			
5000-6000	65.52	17.24	17.24

10.2 Limit

The head tissue dielectric parameters recommended by the IEEE SCC-34/SC-2 in P1528 have been incorporated in the following table. These head parameters are derived from planar layer models simulating the highest expected SAR for the dielectric properties and tissue thickness variations in a human head. Other head and body tissue parameters that have not been specified in P1528 are derived from the tissue dielectric parameters

computed from the 4-Cole-Cole equations described in Reference [12] and extrapolated according to the head parameters specified in P1528.

Target Frequency (MHz)	Head	
	Conductivity (σ)	Permittivity (ϵ_r)
150	0.76	52.3
300	0.87	45.3
450	0.87	43.5
750	0.89	41.9
835	0.90	41.5
900	0.97	41.5
915	0.98	41.5
1450	1.20	40.5
1610	1.29	40.3
1800-2000	1.40	40.0
2450	1.80	39.2
2600	1.96	39.0
3000	2.40	38.5
5200	4.66	36.0
5400	4.86	35.8
5600	5.07	35.5
5800	5.27	35.3

10.3 Tissue Calibration Result

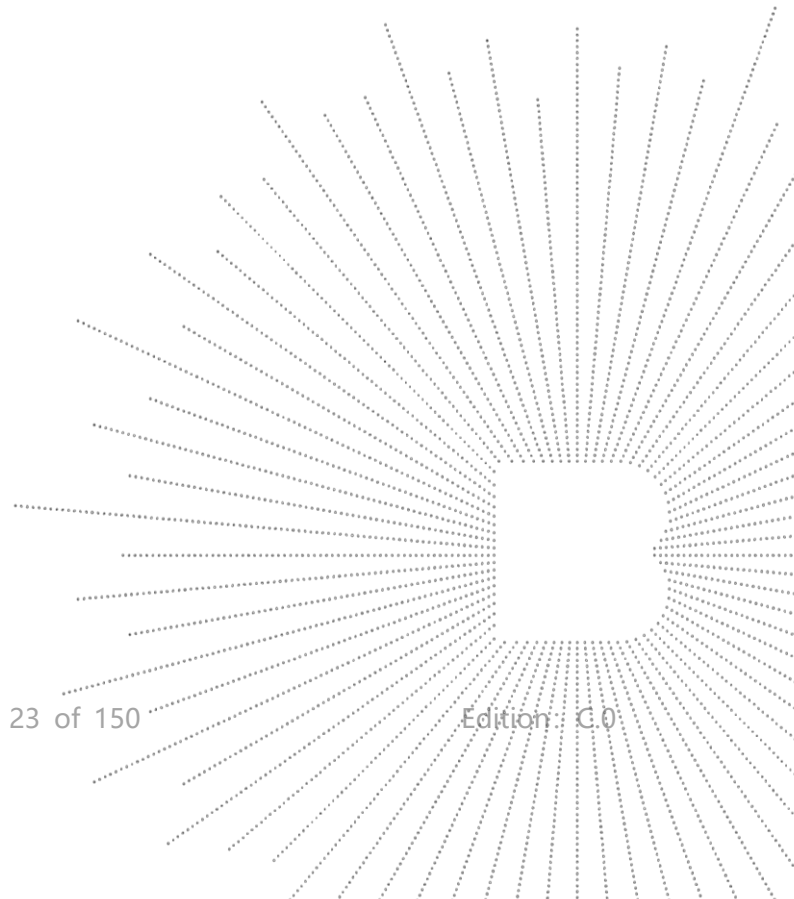
The dielectric parameters of the liquids were verified prior to the SAR evaluation using an R&S ZVB 8. Dielectric Probe Kit and an Agilent Network Analyzer.

Calibration Result for Dielectric Parameters of Tissue Simulating Liquid

Frequency (MHz)	Liquid	Target (σ)	Target (ϵ_r)	Measured (σ)	Measured (ϵ_r)	Delta (σ)%	Delta (ϵ_r)%	Limit (%)	Air (°C)	Date
835	Head	0.90	41.50	0.927	42.435	3.00	2.25	±5	23.1	26/5/2025
1800	Head	1.40	40.00	1.349	41.696	-3.64	4.24	±5	22.9	27/5/2025
1900	Head	1.40	40.00	1.412	38.557	0.86	-3.61	±5	22.9	27/5/2025
2600	Head	1.96	39.00	1.886	38.261	-3.78	-1.89	±5	23.1	26/5/2025

Remark:

1. The temperature of the tissue-equivalent medium used during measurement must also be within 18°C to 25°C and within $\pm 2^\circ\text{C}$ of the temperature when the tissue parameters are characterized.
2. The dielectric parameters must be measured before the tissue-equivalent medium is used in a series of SAR measurements. The parameters should be re-measured after each 3 – 4 days of use; or earlier if the dielectric parameters can become out of tolerance; for example, when the parameters are marginal at the beginning of the measurement series.



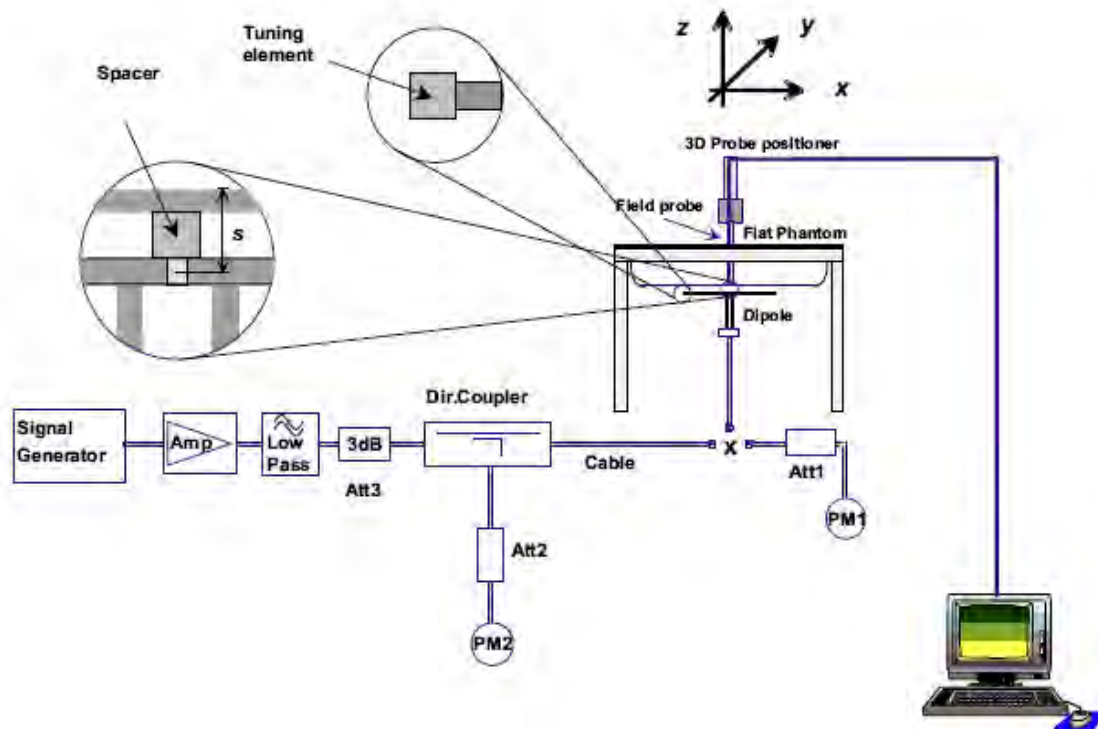
11. System Check

11.1 Purpose of System Performance Check

At the device test frequencies. System check verifies the measurement repeatability of a SAR system before compliance testing and is not a validation of all system specifications. The latter is not required for testing a device but is mandatory before the system is deployed. The system check detects possible short-term drift and unacceptable measurement errors or uncertainties in the system.

11.2 System Setup

In the simplified setup for system evaluation, the EUT is replaced by a calibrated dipole and the power source is replaced by a continuous wave which comes from a signal generator at frequency 600MHz-6000MHz. The calibrated dipole must be placed beneath the flat phantom section of the SAM twin phantom with the correct distance holder. The distance holder should touch the phantom surface with a light pressure at the reference marking and be oriented parallel to the long side of the phantom. The output power on dipole port must be calibrated to 20 dBm (100 mW) before dipole is connected.



System Verification Setup Block Diagram



Setup Photo of Dipole Antenna

11.3 Validation Results

Comparing to the original SAR value provided by SATIMO, the validation data should be within its specification of 10 %. The following table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance check can meet the variation criterion.

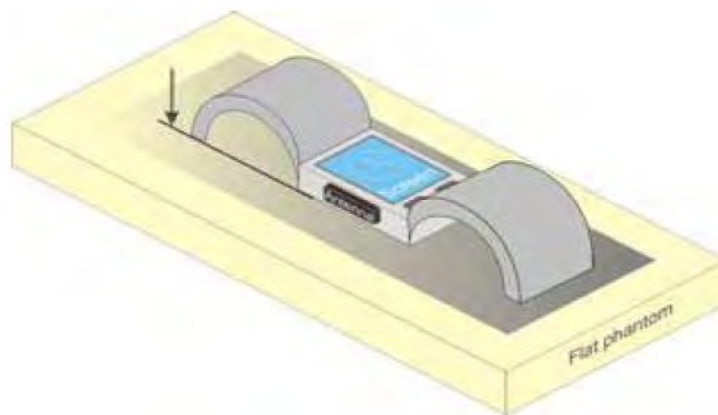
Frequency (MHz)	Power	Measured SAR _{1g} (W/Kg)	Normalize to 1 Watt	Drift (%)	1W Target SAR _{1g} (W/Kg)	Difference Percentage (%)	Limit (%)	Liquid (°C)	Date
835	250mW	2.472	9.889	3.702	10.01	-1.209	±10	22.9	26/5/2025
1800	250mW	10.262	41.046	-3.445	39.74	3.286	±10	23.1	27/5/2025
1900	250mW	10.522	42.088	1.744	41.26	2.007	±10	23.1	27/5/2025
2600	250mW	13.921	55.683	-3.056	56.50	-1.446	±10	22.9	26/5/2025

Frequency (MHz)	Power	Measured SAR _{10g} (W/Kg)	Normalize to 1 Watt	Drift (%)	1W Target SAR _{10g} (W/Kg)	Difference Percentage (%)	Limit (%)	Liquid (°C)	Date
835	250mW	1.553	6.212	3.702	6.32	-1.709	±10	22.9	26/5/2025
1800	250mW	5.291	21.164	-3.445	20.82	1.652	±10	23.1	27/5/2025
1900	250mW	5.405	21.620	1.744	20.94	3.247	±10	23.1	27/5/2025
2600	250mW	6.038	24.152	-3.056	24.18	-0.116	±10	22.9	26/5/2025

12. EUT Testing Position

Limb-worn Device

A limb-worn device is a unit whose intended use includes being strapped to the arm or leg of the user while transmitting (except in idle mode). It is similar to a body-worn device. The strap shall be opened so that it is divided into two parts as shown in Figure. The device shall be positioned directly against the phantom surface with the strap straightened as much as possible and the back of the device towards the phantom. If the strap cannot normally be opened to allow placing in direct contact with the phantom surface, it may be necessary to break the strap of the device but ensuring to not damage the antenna.



Test position for limb-worn devices

13. SAR Measurement Procedures

13.1 Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the highest power channel.
- (b) Keep EUT to radiate maximum output power or 100% factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as Annex D demonstrates.
- (e) Set scan area, grid size and other setting on the SATIMO software.
- (f) Measure SAR results for the highest power channel on each testing position.
- (g) Find out the largest SAR result on these testing positions of each band
- (h) Measure SAR results for other channels in worst SAR testing position if the SAR of highest power channel is larger than 0.8 W/kg

According to the test standard, the recommended procedure for assessing the peak spatial-average SAR value consists of the following steps:

- (a) Power reference measurement
- (b) Area scan
- (c) Zoom scan
- (d) Power drift measurement

13.2 Spatial Peak SAR Evaluation

The procedure for spatial peak SAR evaluation has been implemented according to the test standard. It can be conducted for 1g and 10g, as well as for user-specific masses. The SATIMO software includes all numerical procedures necessary to evaluate the spatial peak SAR value.

The base for the evaluation is a "cube" measurement. The measured volume must include the 1g and 10g cubes with the highest averaged SAR values. For that purpose, the center of the measured volume is aligned to the interpolated peak SAR value of a previously performed area scan.

The entire evaluation of the spatial peak values is performed within the post-processing engine. The system always gives the maximum values for the 1g and 10g cubes. The algorithm to find the cube with highest averaged SAR is divided into the following stages:

- (a) Extraction of the measured data (grid and values) from the Zoom Scan
- (b) Calculation of the SAR value at every measurement point based on all stored data
- (c) Generation of a high-resolution mesh within the measured volume
- (d) Interpolation of all measured values from the measurement grid to the high-resolution grid
- (e) Extrapolation of the entire 3D field distribution to the phantom surface over the distance from sensor to surface
- (f) Calculation of the averaged SAR within masses of 1g and 10g

13.3 Area & Zoom Scan Procedures

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 measures 5x5x7 points with step size 8, 8 and 5 mm for 300 MHz to 3 GHz, and 8x8x8 points with step size 4, 4 and 2.5 mm for 3 GHz to 6 GHz. The Zoom Scan is performed around the highest E-field value to determine the averaged SAR-distribution over 10 g.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 mm $\pm$ 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2)$ mm $\pm$ 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° $\pm$ 1°	20° $\pm$ 1°
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be $\leq$ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	$\leq 1.5 \cdot \Delta z_{Zoom}(n-1)$ mm	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see IEEE Std 1528-2013 for details.				
* When zoom scan is required and the <u>reported</u> SAR from the <u>area scan based 1-g SAR estimation</u> procedures of KDB Publication 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

13.4 Volume Scan Procedures

The volume scan is used for assess overlapping SAR distributions for antennas transmitting in different frequency bands. It is equivalent to an oversized zoom scan used in standalone measurements. The measurement volume will be used to enclose all the simultaneous transmitting antennas. For antennas transmitting simultaneously in different frequency bands, the volume scan is measured separately in each frequency band. In order to sum correctly to compute the 1g aggregate SAR, the EUT remain in the same test position for all measurements and all volume scan use the same spatial resolution and grid spacing (step-size is 4, 4 and 2.5 mm). When all volume scan were completed, the software can combine and subsequently superpose these measurement data to calculating the multiband SAR.

13.5 SAR Averaged Methods

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimize measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10g and 1 g requires a very fine resolution in the three dimensional scanned data array.

13.6 Power Drift Monitoring

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In SATIMO measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in dB. If the power drift more than 5%, the SAR will be retested.

14. SAR Test Result

14.1 Conducted RF Output Power

Bluetooth			
Modulation	Frequency (MHz)	Output Power (dBm)	Tune-up power (dBm)
1-DH1	2402	3.72	4.0
	2441	1.82	
	2480	1.01	
2-DH1	2402	4.38	4.5
	2441	2.23	
	2480	1.43	
3-DH1	2402	4.68	5.0
	2441	2.67	
	2480	1.75	

BLE			
Mode	Frequency (MHz)	Output Power (dBm)	Tune-up power (dBm)
BLE 1M	2402	-3.15	-3.0
	2440	-5.08	
	2480	-5.60	

Note:

Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

Turn-up Power (dBm)	Turn-up Power (mW)	Separation Distance (mm)	Frequency (MHz)	Result	Exclusion Thresholds
5.0	3.16	≤ 5.0	2480	1.00	3.0

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

According to the calculation results in the table above, Bluetooth SAR does not need to be tested.

WIFI 2.4G			
Mode	Frequency (MHz)	Output Power (dBm)	Tune-up power (dBm)
b	2412	6.47	6.5
b	2437	5.40	
b	2462	5.92	
g	2412	5.41	5.5
g	2437	4.74	
g	2462	5.18	
n20	2412	4.88	5.0
n20	2437	4.38	
n20	2462	4.72	

Note:

Per KDB 447498 D01v06, the 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}]$
 ≤ 3.0 for 1-g SAR and ≤ 7.5 for 10-g extremity SAR

$f(\text{GHz})$ is the RF channel transmit frequency in GHz

Power and distance are rounded to the nearest mW and mm before calculation

The result is rounded to one decimal place for comparison

Turn-up Power (dBm)	Turn-up Power (mW)	Separation Distance (mm)	Frequency (MHz)	Result	Exclusion Thresholds
6.5	4.47	≤ 5.0	2480	1.41	3.0

Per KDB 447498 D01v06, when the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

According to the calculation results in the table above, WIFI 2.4G SAR does not need to be tested.

GSM - Burst Average Power (dBm)								
Band	GSM850				GSM1900			
Channel	128	190	251	Tune-up	512	661	810	Tune-up
Frequency (MHz)	824.2	836.6	848.8		1850.2	1880	1909.8	
GSM	33.22	33.10	32.91	33.5	29.79	29.29	28.50	30.0
GPRS slots-1	33.05	32.94	32.80	33.5	29.88	29.38	28.61	30.0
GPRS slots-2	31.13	30.90	30.70	31.5	27.59	27.11	26.63	28.0
GPRS slots-3	29.28	29.05	28.83	29.5	26.01	25.42	25.02	26.5
GPRS slots-4	27.14	26.98	26.71	27.5	23.94	23.47	22.97	24.0
EGPRS slots-1	33.47	33.32	33.14	33.5	29.77	29.31	28.47	30.0
EGPRS slots-2	31.42	31.22	30.98	31.5	27.49	26.89	26.45	27.5
EGPRS slots-3	29.52	29.41	29.09	30.0	25.96	25.25	24.90	26.0
EGPRS slots-4	27.37	27.22	26.94	27.5	23.80	23.13	22.72	24.0

GSM - Source-Based Time-Average Power (dBm)						
Band	GSM850			GSM1900		
Channel	128	190	251	512	661	810
Frequency (MHz)	824.2	836.6	848.8	1850.2	1880	1909.8
GSM	24.22	24.10	23.91	20.79	20.29	19.50
GPRS slots-1	24.05	23.94	23.80	20.88	20.38	19.61
GPRS slots-2	25.13	24.90	24.70	21.59	21.11	20.63
GPRS slots-3	25.03	24.80	24.58	21.76	21.17	20.77
GPRS slots-4	24.14	23.98	23.71	20.94	20.47	19.97
EGPRS slots-1	24.47	24.32	24.14	20.77	20.31	19.47
EGPRS slots-2	25.42	25.22	24.98	21.49	20.89	20.45
EGPRS slots-3	25.27	25.16	24.84	21.71	21.00	20.65
EGPRS slots-4	24.37	24.22	23.94	20.80	20.13	19.72

Notes:

1. Division Factors

To average the power, the division factor is as follows:

1TX-slots = 1 transmit time slots out of 8 time slots=> conducted power divided by (8/1) => -9.00dB

2TX-slots = 2 transmit time slots out of 8 time slots=> conducted power divided by (8/2) => -6.00dB

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) => -3.00dB

Band	WCDMA Band II				WCDMA Band V			
Channel	9262	9400	9538	Tune-up	4132	4182	4233	Tune-up
Frequency (MHz)	1852.4	1880.0	1907.6		826.4	836.4	846.6	
WCDMA RMC 12.2K	22.88	22.46	22.18	23.0	22.49	22.80	22.97	23.0
HSDPA Subtest-1	22.82	21.92	21.85	23.0	22.32	22.36	22.26	22.5
HSDPA Subtest-2	22.35	21.79	21.59		21.98	22.14	21.95	
HSDPA Subtest-3	22.19	21.45	21.44		21.48	21.67	21.81	
HSDPA Subtest-4	21.84	21.30	21.09		21.21	21.79	21.43	
HSUPA Subtest-1	22.79	21.97	21.88	23.0	22.07	22.18	22.09	22.5
HSUPA Subtest-2	22.66	21.87	21.83		22.18	22.28	22.08	
HSUPA Subtest-3	21.76	21.73	21.78		21.51	22.22	22.12	
HSUPA Subtest-4	22.59	21.85	21.77		22.05	22.26	22.12	
HSUPA Subtest-5	22.12	21.96	21.82		21.98	22.29	22.00	

See Appendix 1 for RF conduction data for LTE.

14.2 Transmit Antennas and SAR Measurement Position

EUT Antenna Location:



Antennas	Support Band
WWAN	GSM 850/1900 + WCDMA Band 2/5 + LTE Band 2/4/5/7
BT/WIFI	Bluetooth + WIFI

14.3 Measured and Reported (Scaled) SAR Results

The calculated SAR is obtained by the following formula:

1. Reported SAR for WWAN=Measured SAR * Tune-up Scaling factor
2. Reported SAR for WLAN and Bluetooth=Measured SAR * Tune-up Scaling factor * Duty Cycle Scaling factor
3. Duty Cycle Scaling factor=1/ Duty Cycle (%)

GSM 850								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	GSM	Front Face	824.2	33.22	33.5	0.180	0.192	1
	EGPRS	Front Face	824.2	31.42	31.5	0.149	0.152	

GSM 850								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	GSM	Back Face	824.2	33.22	33.5	0.449	0.479	2
	EGPRS	Back Face	824.2	31.42	31.5	0.402	0.409	

GSM 1900								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	GSM	Front Face	1850.2	29.79	30.0	0.318	0.334	
	GPRS	Front Face	1850.2	26.01	26.5	0.332	0.372	3

GSM 1900								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	GSM	Back Face	1850.2	29.79	30.0	0.879	0.923	
	GSM	Back Face	1880	29.29	30.0	0.950	1.119	
	GSM	Back Face	1909.8	28.50	30.0	0.889	1.256	4
	GPRS	Back Face	1850.2	26.01	26.5	0.866	0.969	
	GPRS	Back Face	1880	25.42	26.5	0.758	0.972	
	GPRS	Back Face	1909.8	25.02	26.5	0.769	1.081	

WCDMA Band 2								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	RMC	Front Face	1852.4	22.88	23.0	0.468	0.481	5

WCDMA Band 2								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	RMC	Back Face	1852.4	22.88	23.0	1.046	1.075	
		Back Face	1880	22.46	23.0	1.009	1.143	
		Back Face	1907.6	22.18	23.0	1.034	1.249	6

WCDMA Band 5								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	RMC	Front Face	846.6	22.97	23.0	0.146	0.147	7

WCDMA Band 5								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	RMC	Back Face	846.6	22.97	23.0	0.478	0.481	
		Back Face	826.4	22.49	23.0	0.459	0.516	8
		Back Face	836.4	22.80	23.0	0.458	0.480	

LTE Band 2 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	QPSK, 1RB	Front Face	1880	23.69	24.0	0.525	0.564	9
	QPSK, 50%RB	Front Face	1860	22.65	23.0	0.209	0.227	

LTE Band 2 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	QPSK, 1RB	Back Face	1880	23.69	24.0	1.261	1.354	
		Back Face	1860	23.55	24.0	1.249	1.385	
		Back Face	1900	23.62	24.0	1.130	1.233	
	QPSK, 50%RB	Back Face	1860	22.65	23.0	1.320	1.431	
		Back Face	1880	22.59	23.0	1.206	1.325	
		Back Face	1900	22.24	23.0	1.198	1.427	10
	QPSK, 100%RB	Back Face	1860	22.57	23.0	0.956	1.055	

LTE Band 4 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	QPSK, 1RB	Front Face	1732.5	23.68	24.0	0.232	0.250	11
	QPSK, 50%RB	Front Face	1732.5	22.52	23.0	0.187	0.209	

LTE Band 4 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	QPSK, 1RB	Back Face	1732.5	23.68	24.0	0.868	0.934	12
		Back Face	1720	23.54	24.0	0.803	0.893	
		Back Face	1745	23.67	24.0	0.831	0.897	
	QPSK, 50%RB	Back Face	1732.5	22.52	23.0	0.577	0.644	
		Back Face	1720	22.40	23.0	0.602	0.691	
		Back Face	1745	22.38	23.0	0.628	0.724	
	QPSK, 100%RB	Back Face	1732.5	22.48	22.5	0.606	0.609	

LTE Band 5 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	QPSK, 1RB	Front Face	844	23.54	24.0	0.149	0.166	13
	QPSK, 50%RB	Front Face	844	22.49	23.0	0.064	0.072	

LTE Band 5 (10MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	QPSK, 1RB	Back Face	829	23.03	24.0	0.659	0.824	14
		Back Face	836.5	23.49	24.0	0.609	0.685	
		Back Face	844	23.54	24.0	0.624	0.694	
	QPSK, 50%RB	Back Face	844	22.49	23.0	0.545	0.613	

LTE Band 7 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{1g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Front-of-face (10mm)	QPSK, 1RB	Front Face	2560	23.48	23.5	0.759	0.763	15
	QPSK, 50%RB	Front Face	2510	22.24	22.5	0.620	0.658	

LTE Band 7 (20MHz Bandwidth)								
RF Exposure Conditions	Mode	Test Position	Freq. (MHz)	Output Power (dBm)		SAR _{10g} (W/kg)		Plot No.
				Meas.	Turn-up	Meas.	Scaled	
Limb-worn (0mm)	QPSK, 1RB	Back Face	2510	23.26	23.5	1.646	1.740	16
		Back Face	2560	23.48	23.5	1.704	1.712	
		Back Face	2535	23.25	23.5	1.496	1.585	
	QPSK, 50%RB	Back Face	2510	22.24	22.5	1.502	1.595	
		Back Face	2535	22.20	22.5	1.305	1.398	
		Back Face	2560	22.22	22.5	1.405	1.499	
	QPSK, 100%RB	Back Face	2560	22.13	22.5	1.461	1.591	

14.4 SAR Measurement Variability

According to KDB865664, Repeated measurements are required only when the measured SAR is ≥ 0.80 W/kg. If the measured SAR value of the initial repeated measurement is < 1.45 W/kg with $\leq 20\%$ variation, only one repeated measurement is required to reaffirm that the results are not expected to have substantial variations, which may introduce significant compliance concerns. A second repeated measurement is required only if the measured result for the initial repeated measurement is within 10% of the SAR limit and vary by more than 20%, which are often related to device and measurement setup difficulties. The following procedures are applied to determine if repeated measurements are required. The same procedures should be adapted for measurements according to extremity and occupational exposure limits by applying a factor of 2.5 for extremity exposure and a factor of 5 for occupational exposure to the corresponding SAR thresholds.¹⁹ The repeated measurement results must be clearly identified in the SAR report. All measured SAR, including the repeated results, must be considered to determine compliance and for reporting according to KDB 690783. Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.

- 1) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 2) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 3) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

Test Mode	Frequency (MHz)	RF Exposure Configuration	Test Position	Repeated SAR (yes/no)	Highest Measured SAR1-g (W/Kg)	First Repeated	
						Measured SAR1-g (W/Kg)	Largest to Smallest SAR Ratio
GSM 1900	1850.2	Limb-worn	Back Face	yes	0.879	0.821	1.071
GSM 1900	1880	Limb-worn	Back Face	yes	0.950	0.907	1.047
GSM 1900	1909.8	Limb-worn	Back Face	yes	0.889	0.831	1.070
GPRS 1900	1850.2	Limb-worn	Back Face	yes	0.866	0.829	1.045
WCDMA 2	1852.4	Limb-worn	Back Face	yes	1.046	0.958	1.092
WCDMA 2	1880	Limb-worn	Back Face	yes	1.009	0.913	1.105
WCDMA 2	1907.6	Limb-worn	Back Face	yes	1.034	0.945	1.094
LTE Band 2 1RB	1880	Limb-worn	Back Face	yes	1.261	1.165	1.082
LTE Band 2 1RB	1860	Limb-worn	Back Face	yes	1.249	1.209	1.033
LTE Band 2 1RB	1900	Limb-worn	Back Face	yes	1.130	1.096	1.031
LTE Band 2 50%RB	1860	Limb-worn	Back Face	yes	1.320	1.265	1.043
LTE Band 2 50%RB	1880	Limb-worn	Back Face	yes	1.206	1.139	1.059
LTE Band 2 50%RB	1900	Limb-worn	Back Face	yes	1.198	1.133	1.057
LTE Band 2 100%RB	1860	Limb-worn	Back Face	yes	0.956	0.917	1.043
LTE Band 4 1RB	1732.5	Limb-worn	Back Face	yes	0.868	0.829	1.047
LTE Band 4 1RB	1720	Limb-worn	Back Face	yes	0.803	0.733	1.095
LTE Band 4 1RB	1745	Limb-worn	Back Face	yes	0.831	0.806	1.031
LTE Band 7 1RB	2510	Limb-worn	Back Face	yes	1.646	1.588	1.037
LTE Band 7 1RB	2560	Limb-worn	Back Face	yes	1.704	1.630	1.045
LTE Band 7 1RB	2535	Limb-worn	Back Face	yes	1.496	1.431	1.045
LTE Band 7 50%RB	2510	Limb-worn	Back Face	yes	1.502	1.468	1.023
LTE Band 7 50%RB	2535	Limb-worn	Back Face	yes	1.305	1.248	1.046
LTE Band 7 50%RB	2560	Limb-worn	Back Face	yes	1.405	1.356	1.036
LTE Band 7 100%RB	2560	Limb-worn	Back Face	yes	1.461	1.418	1.030

14.5 Simultaneous Transmission Evaluation

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.

Application Simultaneous Transmission information:

No.	Configurations	Body SAR
1	WWAN + WIFI	Yes
2	WWAN + Bluetooth	Yes
3	WIFI + Bluetooth	No

Remark:

- WIFI and Bluetooth are the same antenna and cannot be sent at the same time.
- According to the KDB 447498 D01 v06, when standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following 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.

Estimated stand alone SAR					
Mode	Maximum Power (dBm)	Maximum Power (mW)	Separation Distance (mm)	x	Estimated SAR1-g (W/kg)
Bluetooth	5.0	3.16	5	7.5	0.133
WIFI 2.4G	6.5	4.47	5	7.5	0.188

Estimated stand alone SAR					
Mode	Maximum Power (dBm)	Maximum Power (mW)	Separation Distance (mm)	x	Estimated SAR10-g (W/kg)
Bluetooth	5.0	3.16	5	18.75	0.053
WIFI 2.4G	6.5	4.47	5	18.75	0.075

Note:

- Maximum average power including tune-up tolerance;
- When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion
- Per FCC KD B447498 D01, simultaneous transmission SAR test exclusion may be applied when the sum of the 1-g SAR for all the transmitting antenna in a specific a physical test configuration is ≤ 1.6 W/Kg. When the sum is greater than the SAR limit, SAR test exclusion is determined by the SAR to peak location separation ratio.

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

4. Simultaneous transmission of maximum SAR sum calculation.

RF Exposure Conditions	Test Position	Standalone SAR _{1g} (W/kg)		Summed SAR _{1g} (W/kg)	Limit SAR _{1g} (W/kg)
		WWAN	BT/WIFI		
Front-of-face (10mm)	Front Face	0.763	0.188	0.951	1.6

RF Exposure Conditions	Test Position	Standalone SAR _{10g} (W/kg)		Summed SAR _{10g} (W/kg)	Limit SAR _{10g} (W/kg)
		WWAN	BT/WIFI		
Limb-worn (0mm)	Back Face	1.740	0.075	1.815	4.0

15. Test Plots

15.1 System Performance Check

System check at 835 MHz

Date of measurement: 26/5/2025

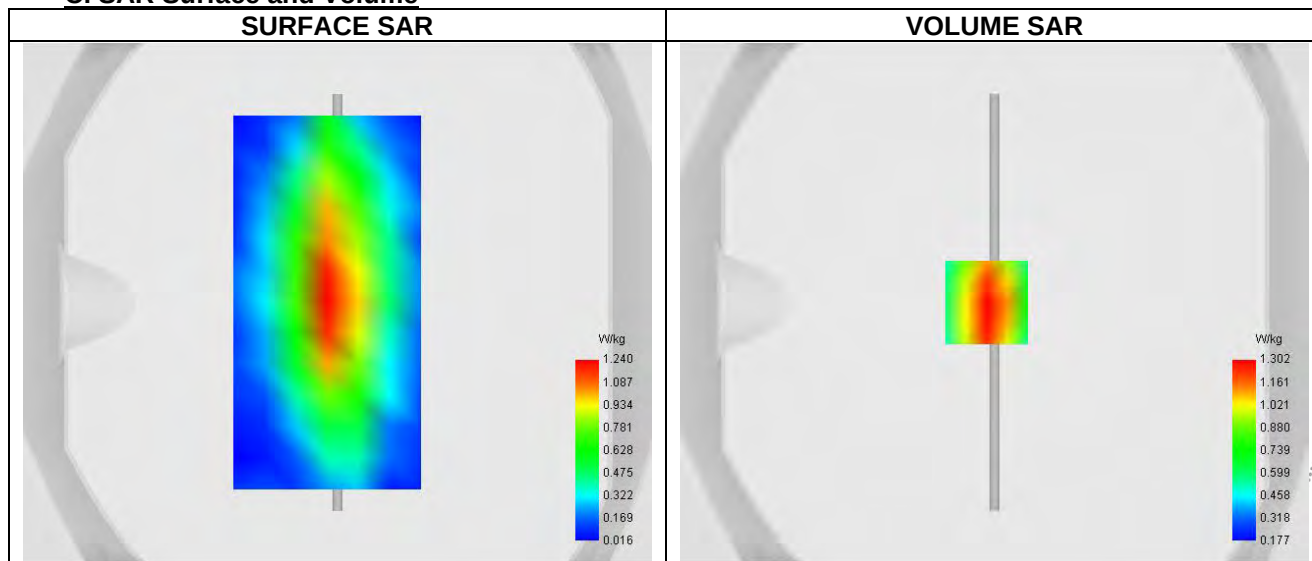
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.80
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Signal	CW

B. Permittivity

Frequency (MHz)	835.000
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	20.910
Conductivity (S/m)	0.927

C. SAR Surface and Volume



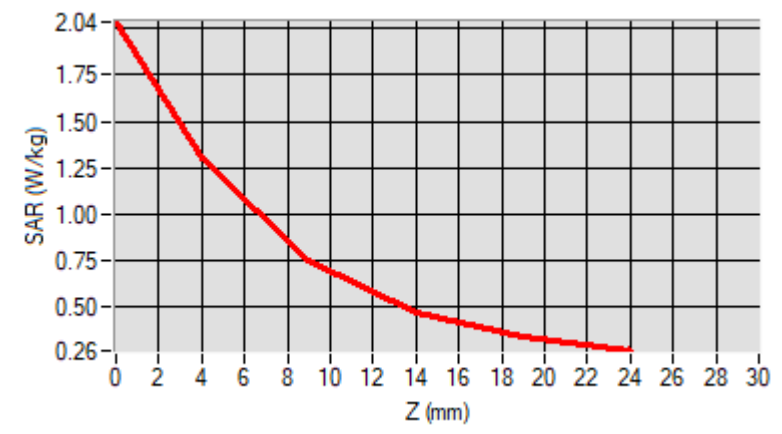
Maximum location: X=-3.00, Y=0.00 ; SAR Peak: 2.06 W/kg

D. SAR 1g & 10g

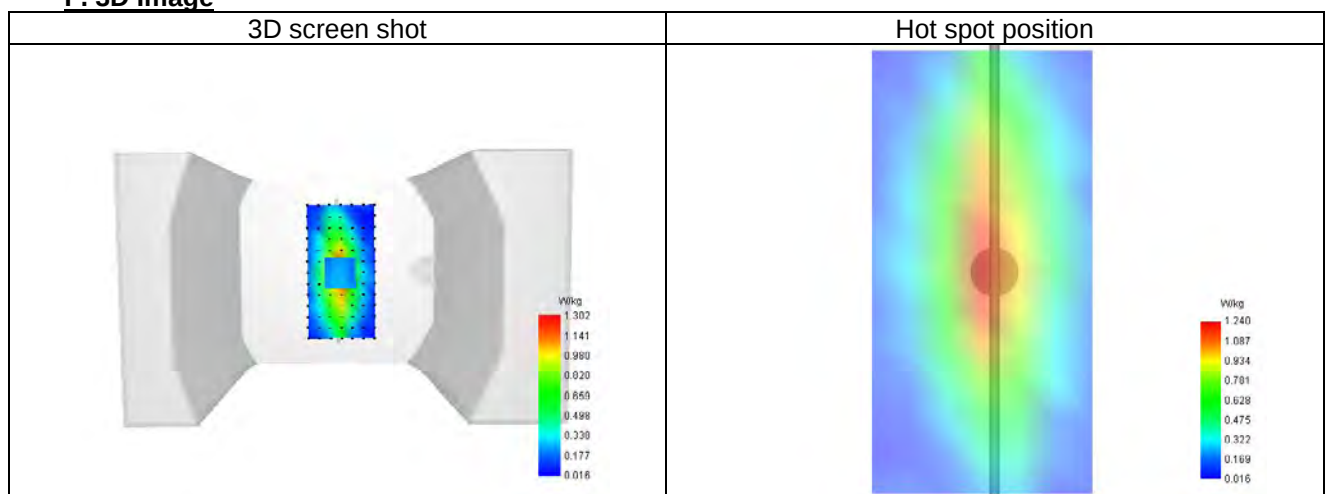
SAR 10g (W/Kg)	1.553
SAR 1g (W/Kg)	2.472
Variation (%)	3.702

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.036	1.302	0.747	0.462	0.331



F. 3D Image



System check at 1800 MHz

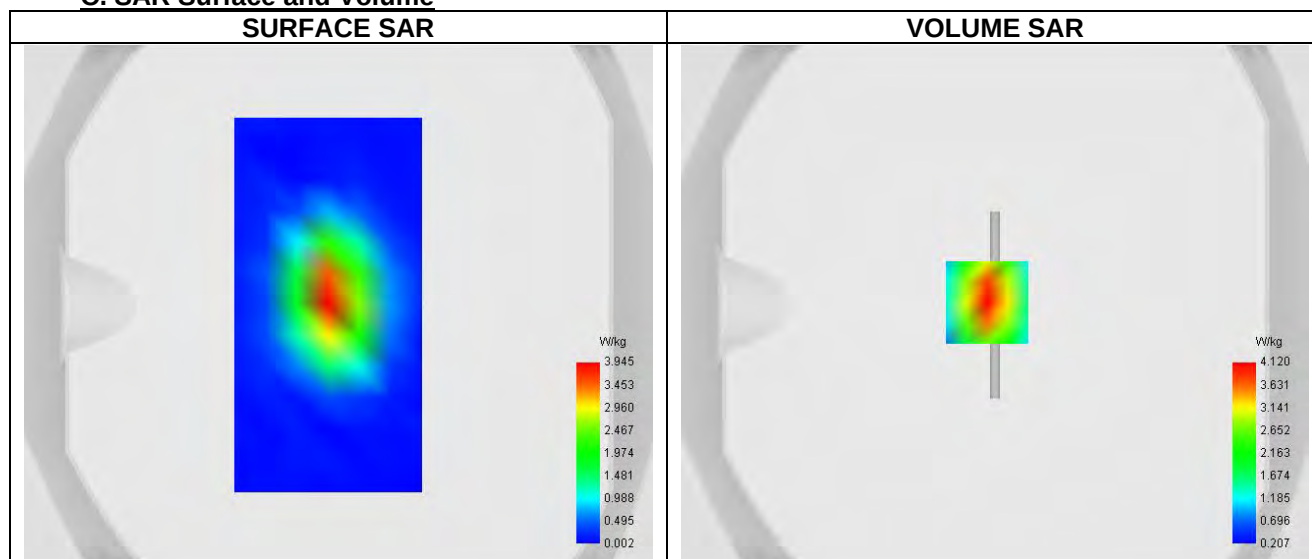
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.01
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW

B. Permittivity

Frequency (MHz)	1800.000
Relative permittivity (real part)	41.696
Relative permittivity (imaginary part)	15.200
Conductivity (S/m)	1.349

C. SAR Surface and Volume


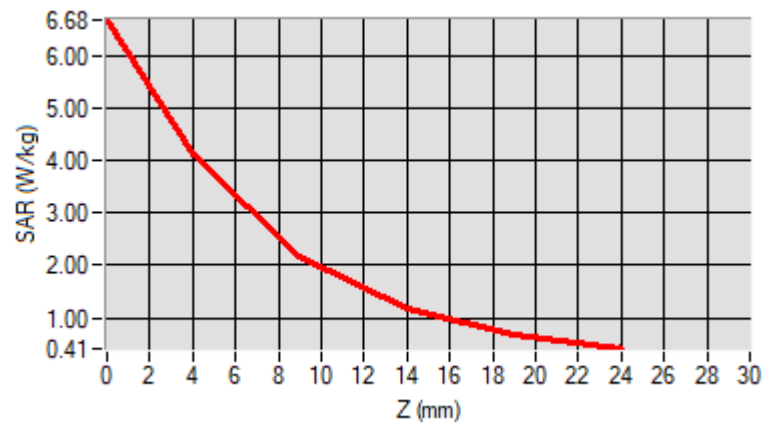
Maximum location: X=-3.00, Y=1.00 ; SAR Peak: 6.69 W/kg

D. SAR 1g & 10g

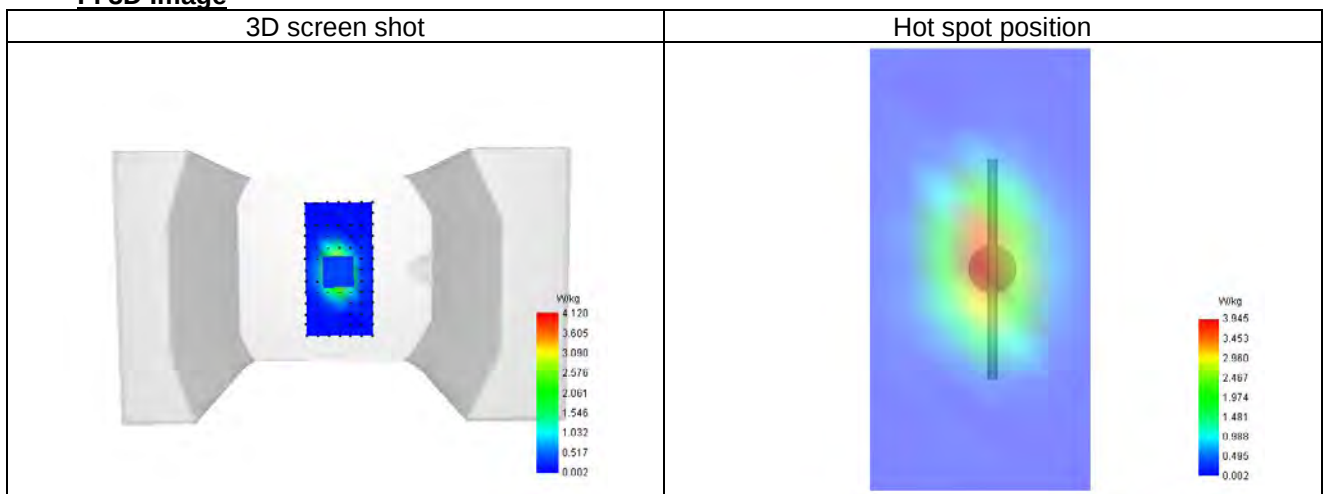
SAR 10g (W/Kg)	5.291
SAR 1g (W/Kg)	10.262
Variation (%)	-3.445

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.684	4.120	2.184	1.177	0.685



F. 3D Image



System check at 1900 MHz

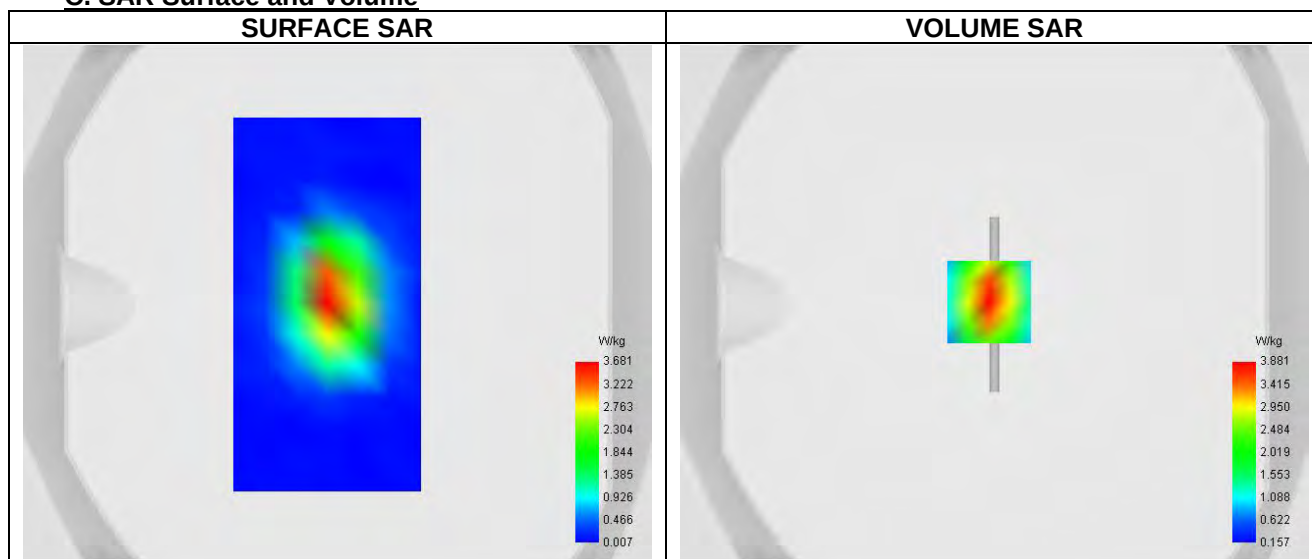
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	1.11
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Signal	CW

B. Permittivity

Frequency (MHz)	1900.000
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	14.400
Conductivity (S/m)	1.412

C. SAR Surface and Volume


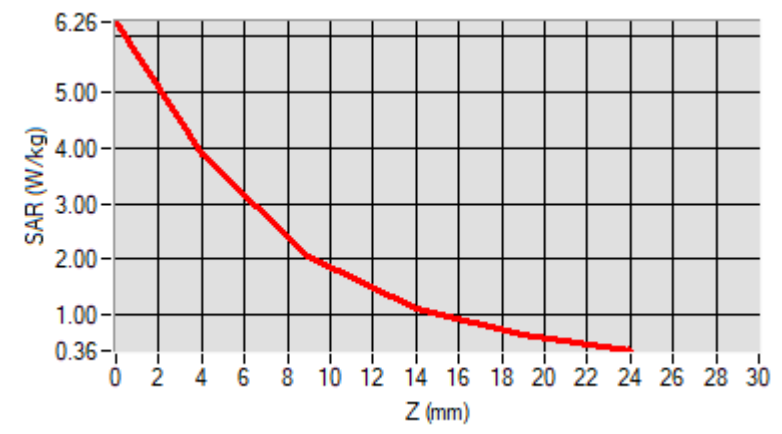
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 6.27 W/kg

D. SAR 1g & 10g

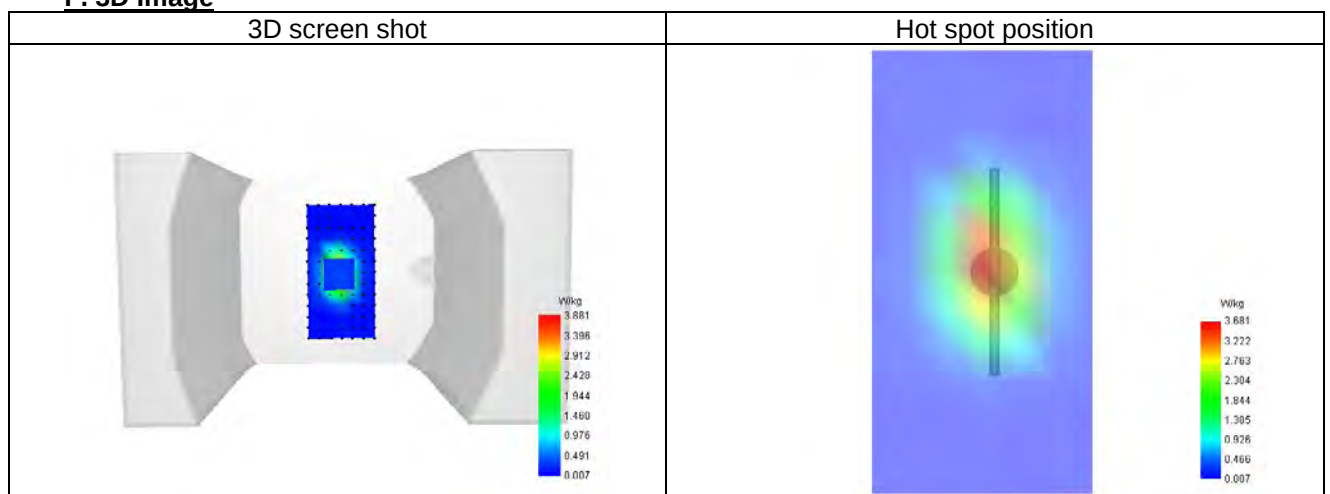
SAR 10g (W/Kg)	5.405
SAR 1g (W/Kg)	10.522
Variation (%)	1.744

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	6.259	3.881	2.069	1.111	0.634



F. 3D Image



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System check at 2600MHz

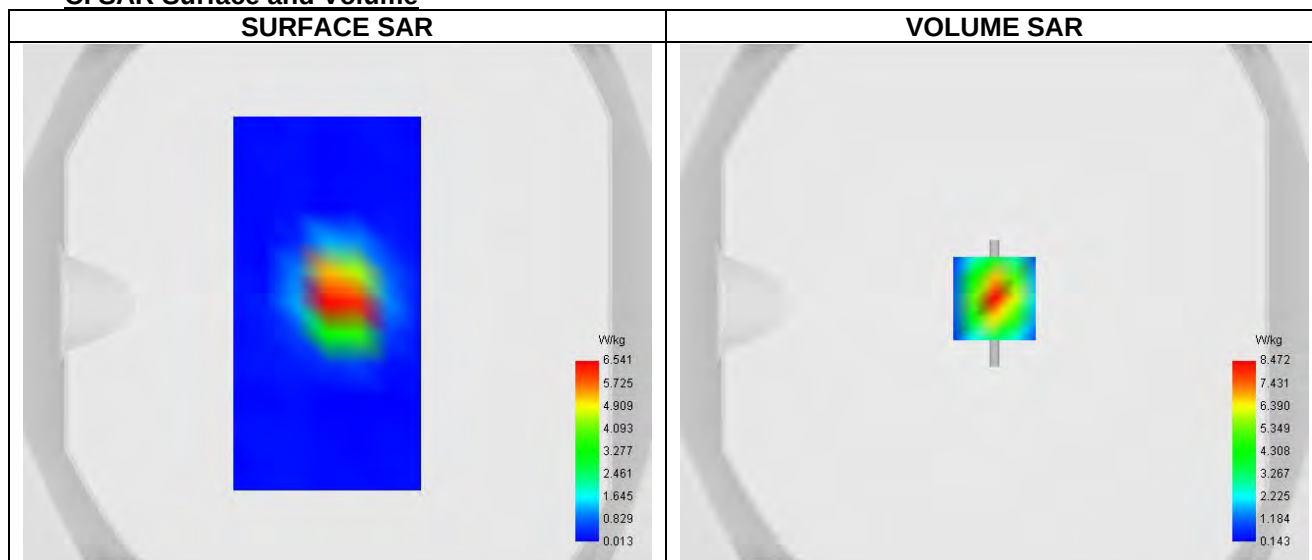
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.19
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Signal	CW

B. Permittivity

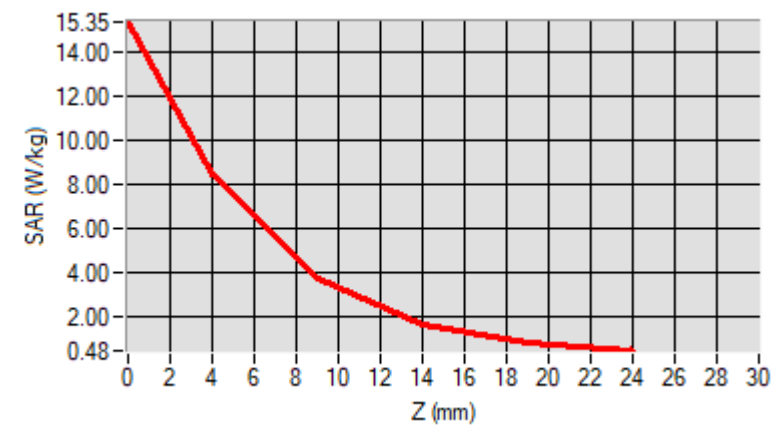
Frequency (MHz)	2600.000
Relative permittivity (real part)	38.261
Relative permittivity (imaginary part)	14.889
Conductivity (S/m)	1.886

C. SAR Surface and Volume

D. SAR 1g & 10g

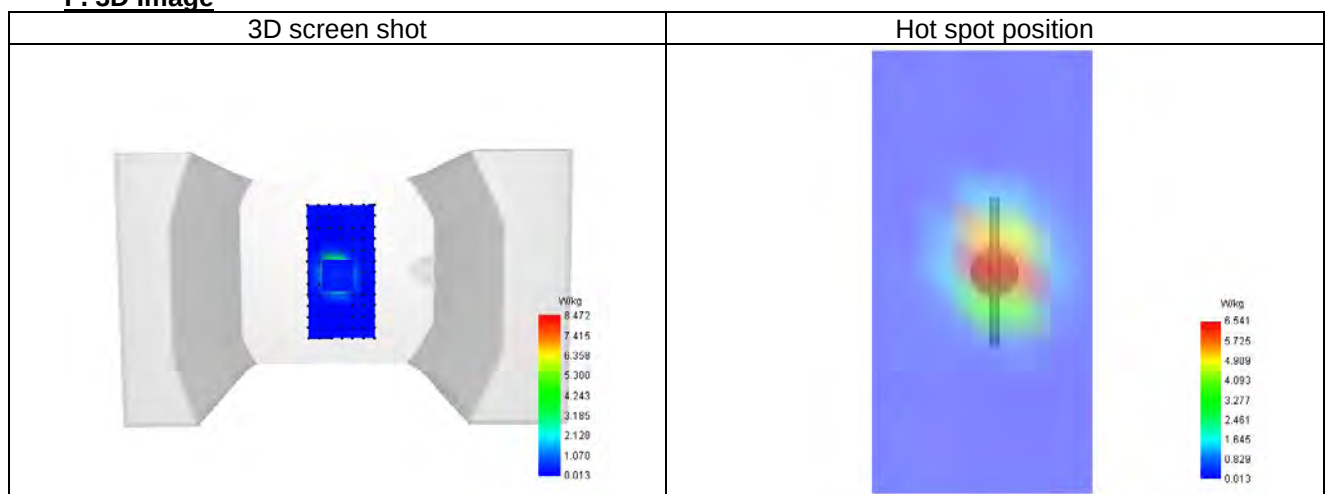
SAR 10g (W/Kg)	6.038
SAR 1g (W/Kg)	13.921
Variation (%)	-3.056

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	15.347	8.472	3.768	1.677	0.856



F. 3D Image



15.2 SAR Test Graph Results

Plot 1

Date of measurement: 26/5/2025

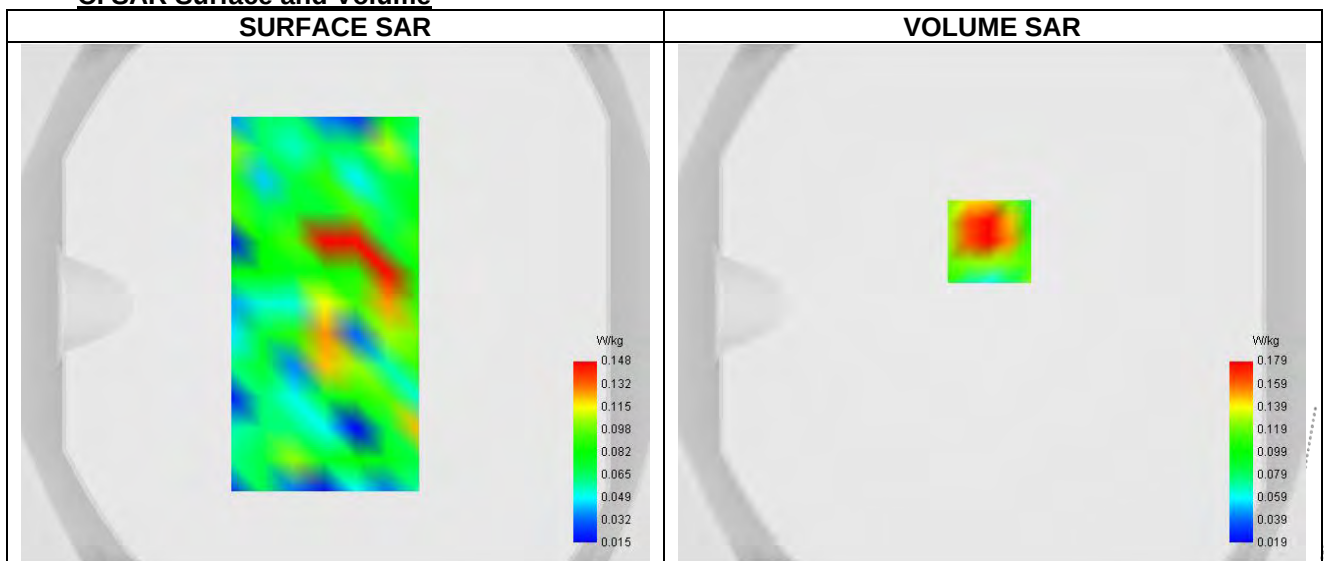
A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GSM850
Signal	TDMA (GSM)
Modulation	GMSK

B. Permittivity

Frequency (MHz)	824.200
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.400
Conductivity (S/m)	0.927

C. SAR Surface and Volume



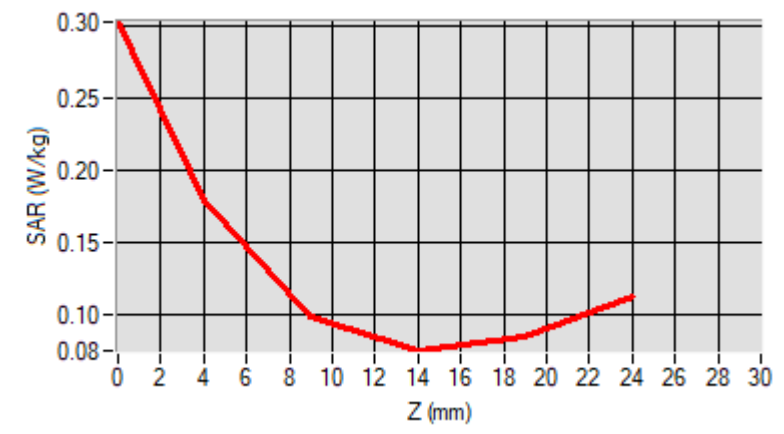
Maximum location: X=-1.00, Y=24.00 ; SAR Peak: 0.34 W/kg

D. SAR 1g & 10g

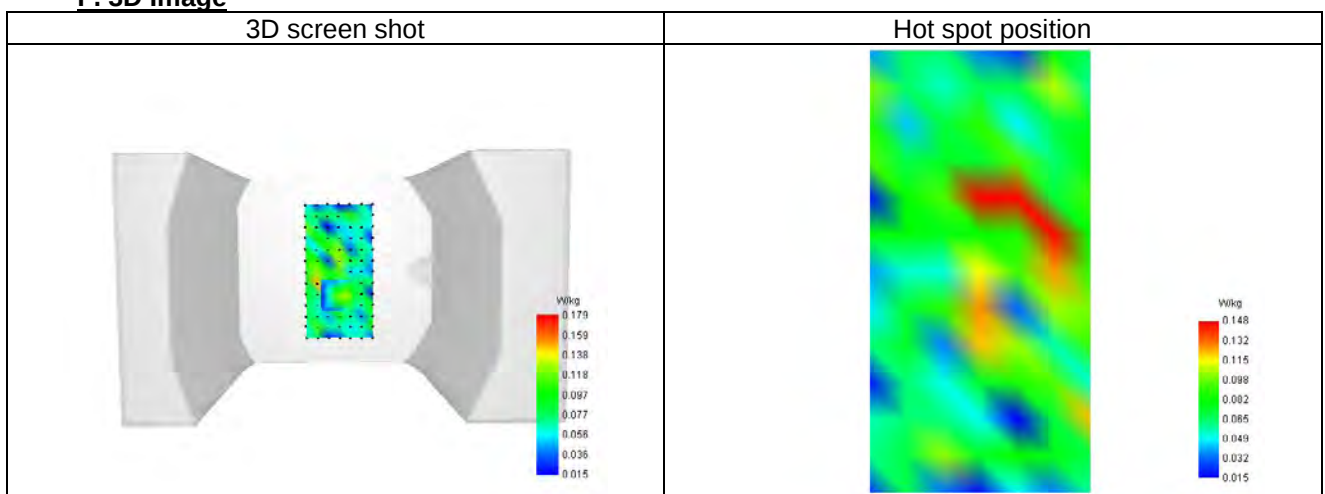
SAR 10g (W/Kg)	0.104
SAR 1g (W/Kg)	0.180
Variation (%)	-2.530

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.302	0.179	0.099	0.075	0.084



F. 3D Image



Plot 2

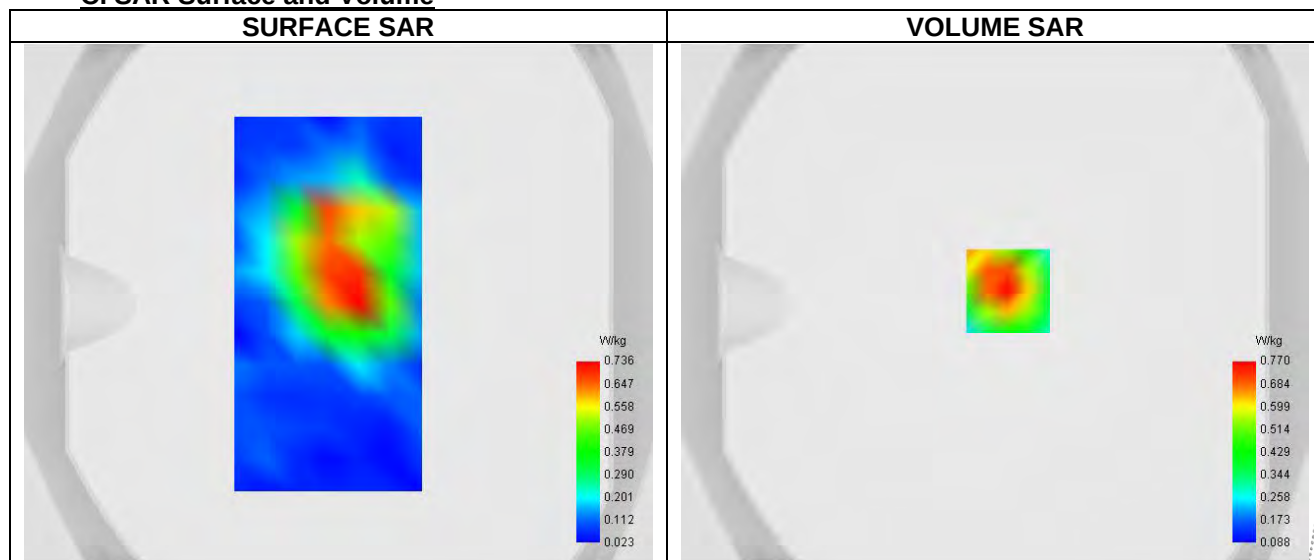
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GSM850
Signal	TDMA (GSM)
Modulation	GMSK

B. Permittivity

Frequency (MHz)	824.200
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.400
Conductivity (S/m)	0.927

C. SAR Surface and Volume


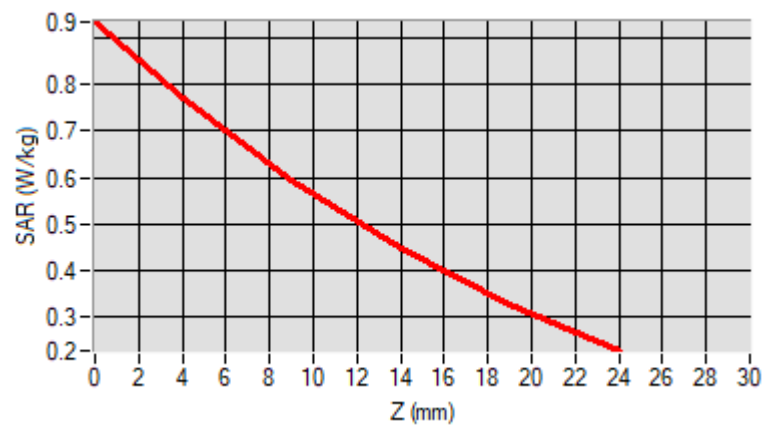
Maximum location: X=5.00, Y=5.00 ; SAR Peak: 1.17 W/kg

D. SAR 1g & 10g

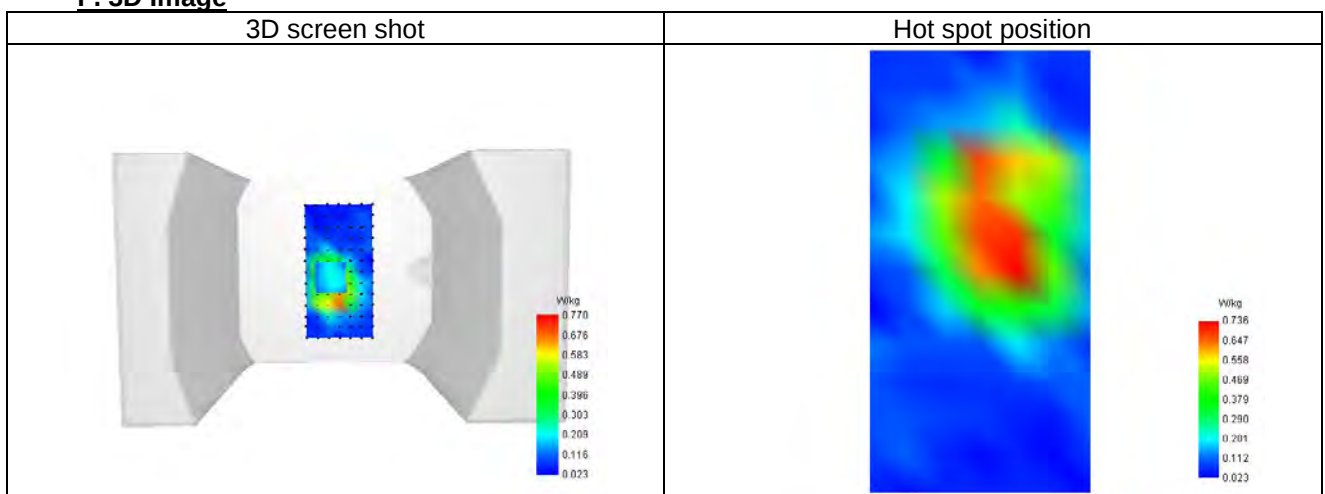
SAR 10g (W/Kg)	0.449
SAR 1g (W/Kg)	0.731
Variation (%)	-1.550

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.935	0.770	0.593	0.447	0.326



F. 3D Image



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Plot 3

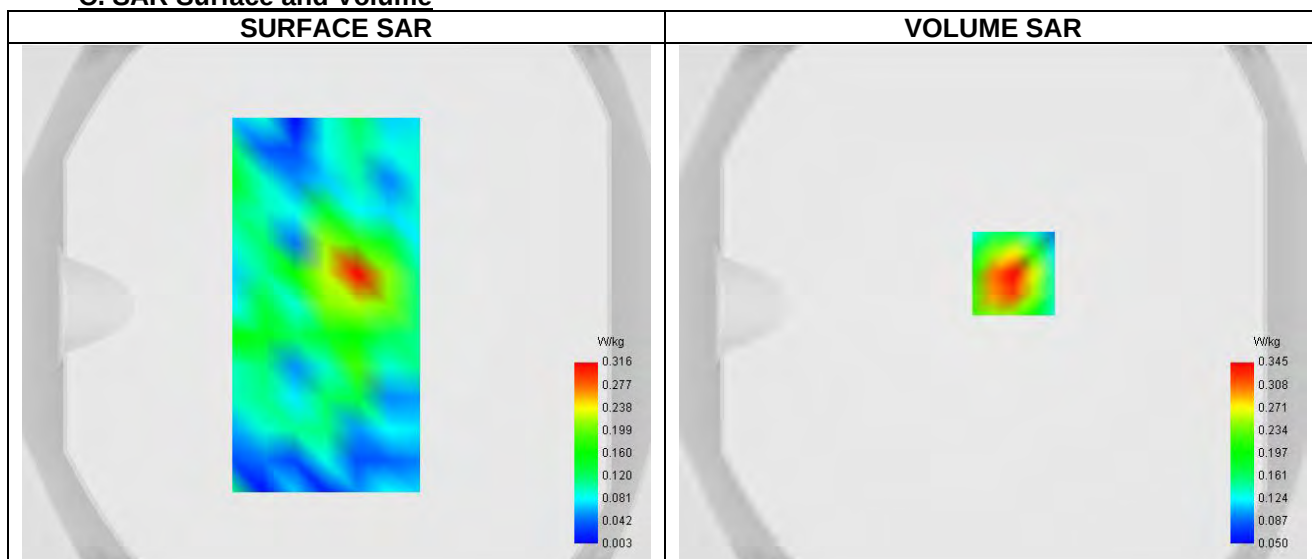
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GPRS1900
Signal	TDMA (GPRS)

B. Permittivity

Frequency (MHz)	1850.200
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.408
Conductivity (S/m)	1.412

C. SAR Surface and Volume


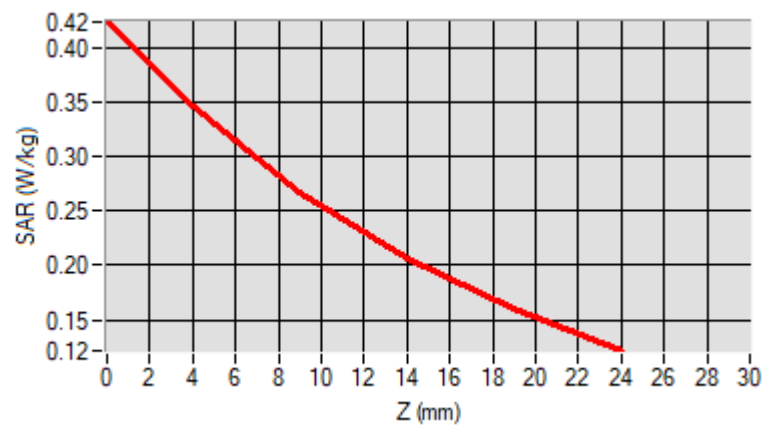
Maximum location: X=8.00, Y=12.00 ; SAR Peak: 0.46 W/kg

D. SAR 1g & 10g

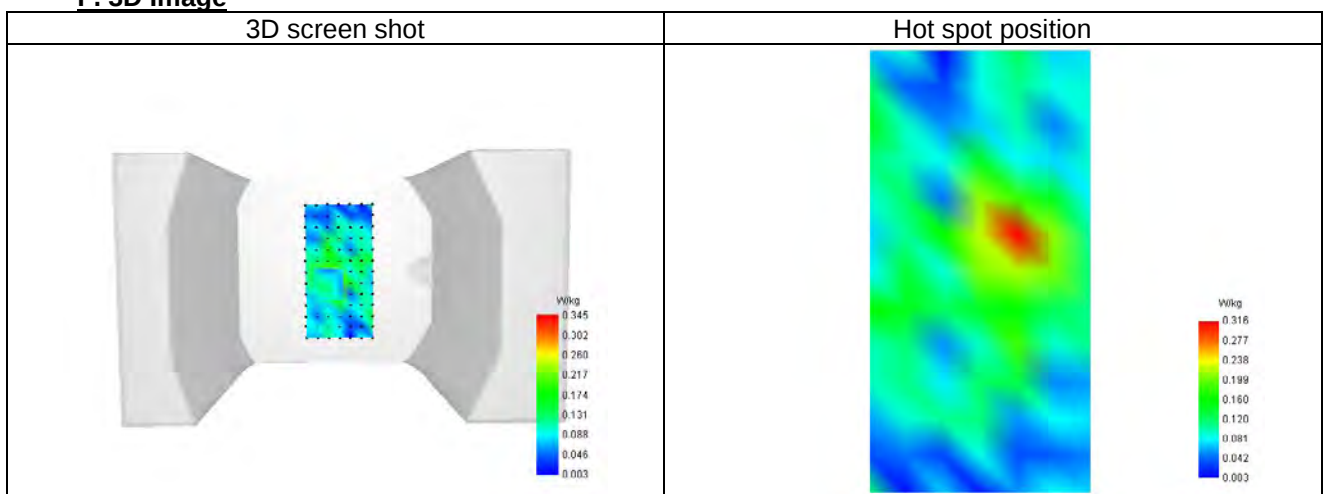
SAR 10g (W/Kg)	0.224
SAR 1g (W/Kg)	0.332
Variation (%)	-2.890

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.423	0.345	0.267	0.206	0.160



F. 3D Image



Plot 4

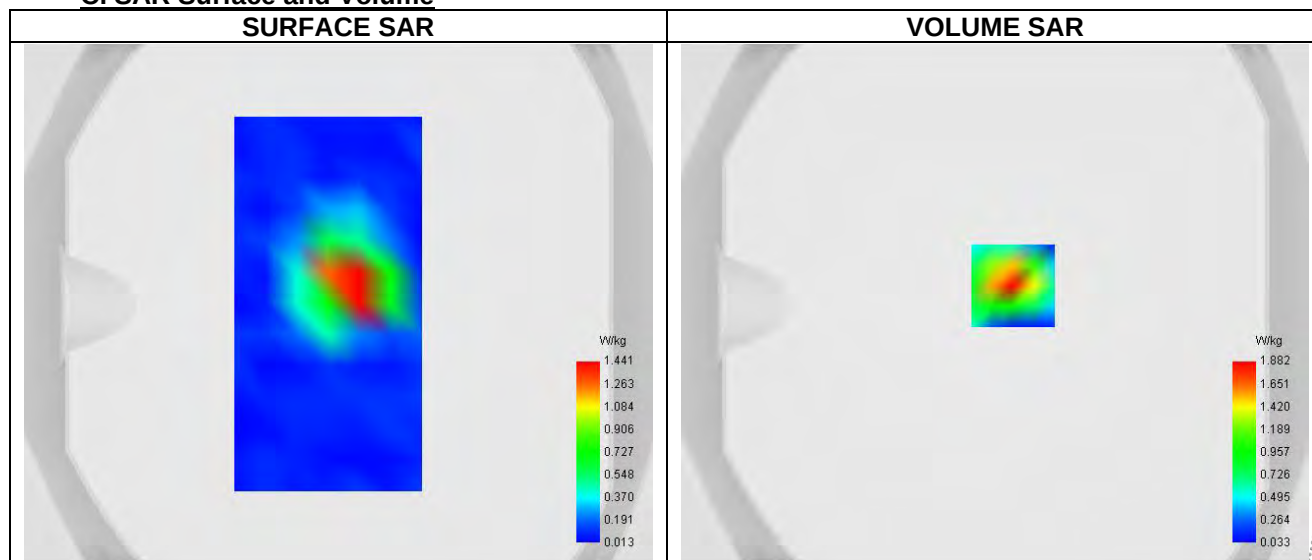
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	GSM1900
Signal	TDMA (GSM)
Modulation	GMSK

B. Permittivity

Frequency (MHz)	1909.800
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.195
Conductivity (S/m)	1.412

C. SAR Surface and Volume


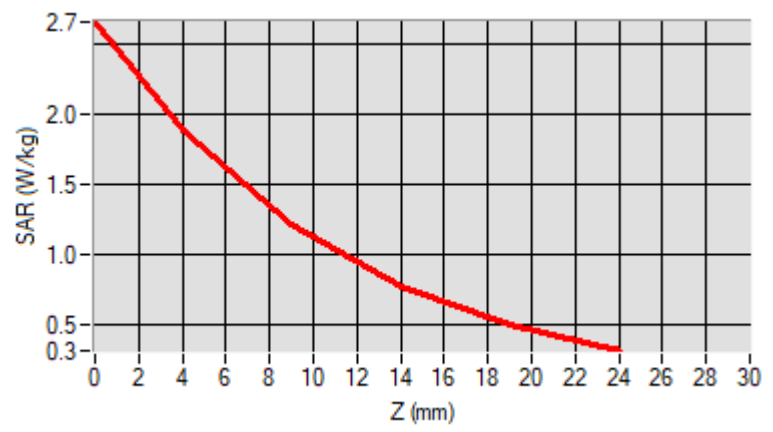
Maximum location: X=7.00, Y=7.00 ; SAR Peak: 2.76 W/kg

D. SAR 1g & 10g

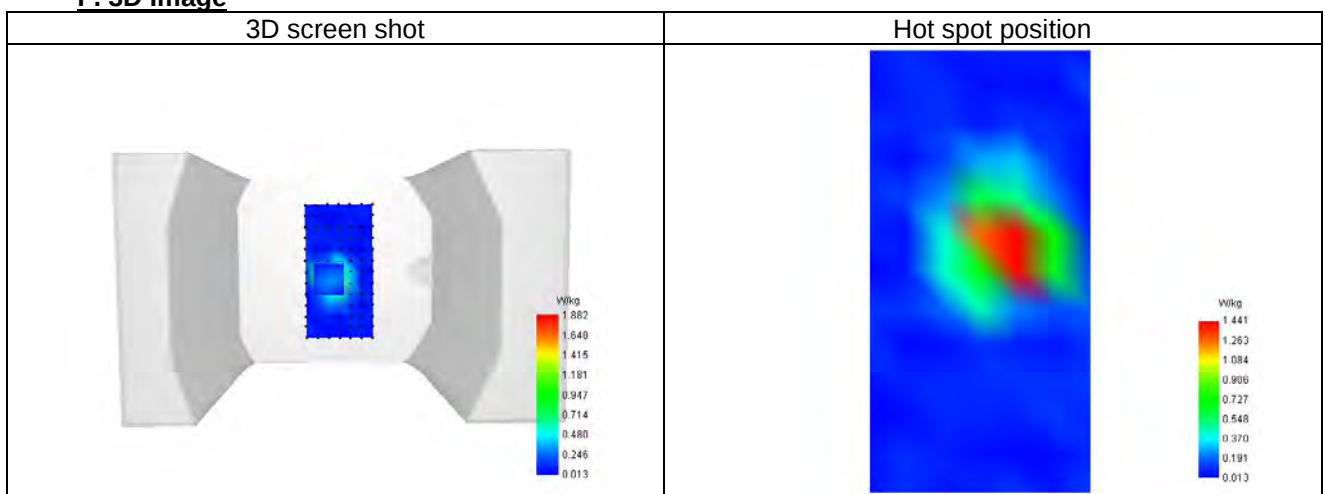
SAR 10g (W/Kg)	0.889
SAR 1g (W/Kg)	1.718
Variation (%)	-1.060

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	2.658	1.882	1.206	0.773	0.499



F. 3D Image



Plot 5

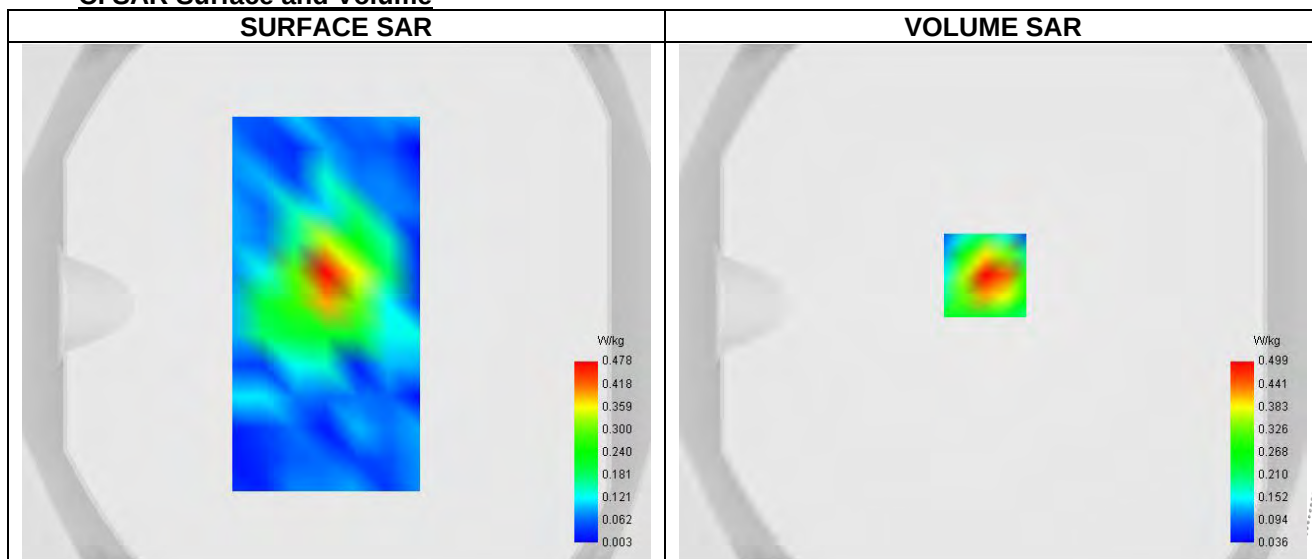
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 2 (1900)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Frequency (MHz)	1852.400
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.408
Conductivity (S/m)	1.412

C. SAR Surface and Volume


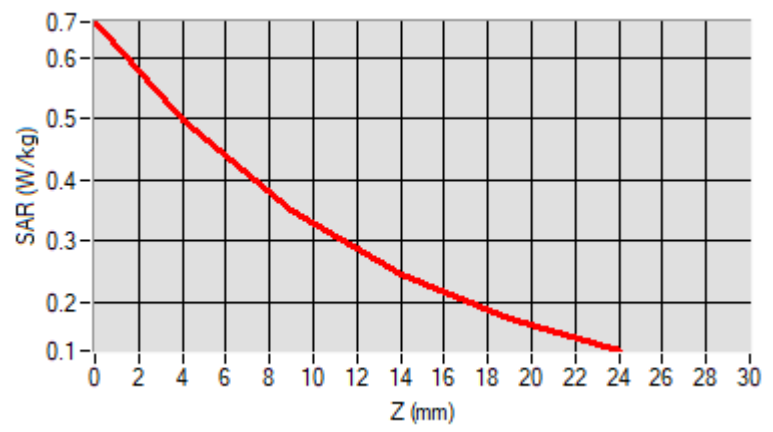
Maximum location: X=-3.00, Y=11.00 ; SAR Peak: 0.69 W/kg

D. SAR 1g & 10g

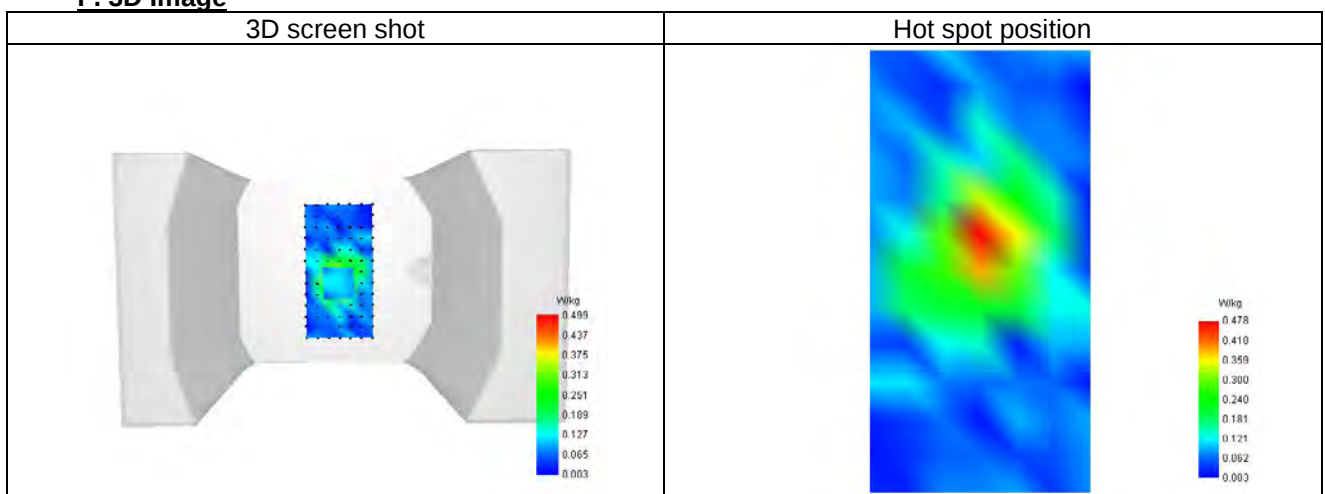
SAR 10g (W/Kg)	0.288
SAR 1g (W/Kg)	0.468
Variation (%)	-2.760

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.659	0.499	0.351	0.247	0.175



F. 3D Image



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Plot 6

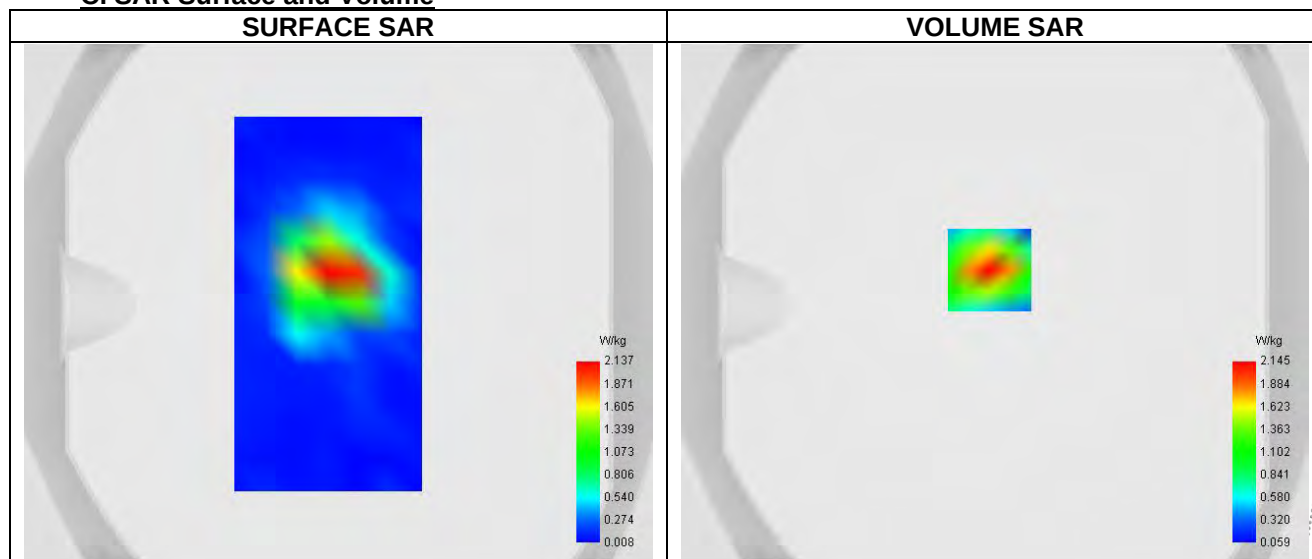
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 2 (1900)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

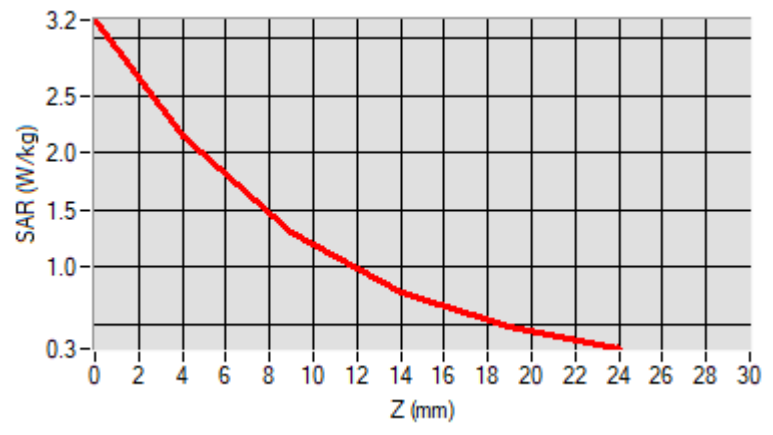
Frequency (MHz)	1907.600
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.210
Conductivity (S/m)	1.412

C. SAR Surface and Volume

D. SAR 1g & 10g

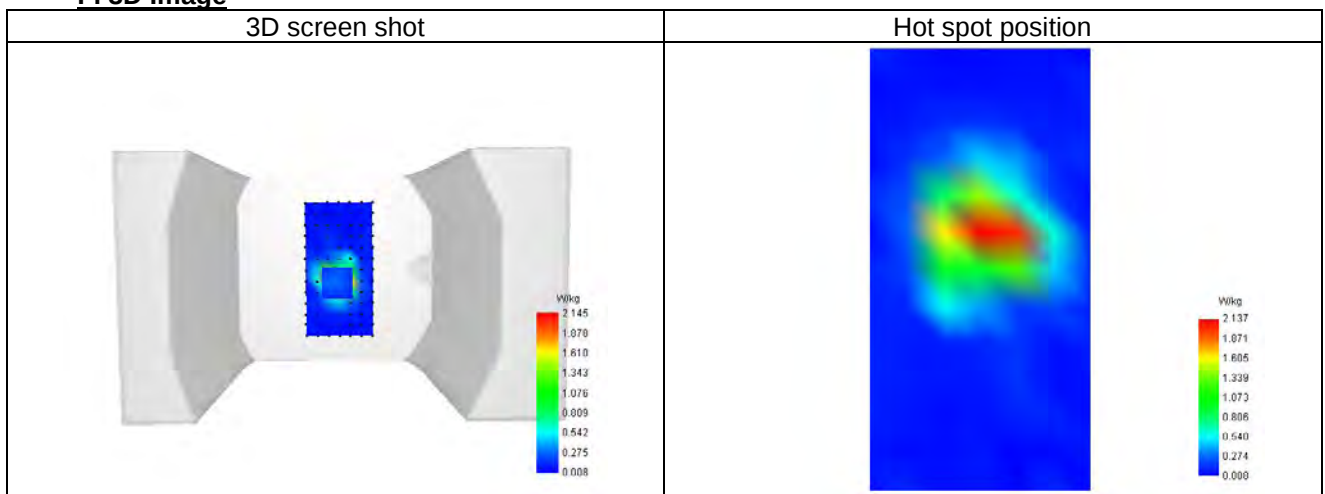
SAR 10g (W/Kg)	1.034
SAR 1g (W/Kg)	1.958
Variation (%)	-2.580

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	3.165	2.145	1.295	0.782	0.481



F. 3D Image



Plot 7

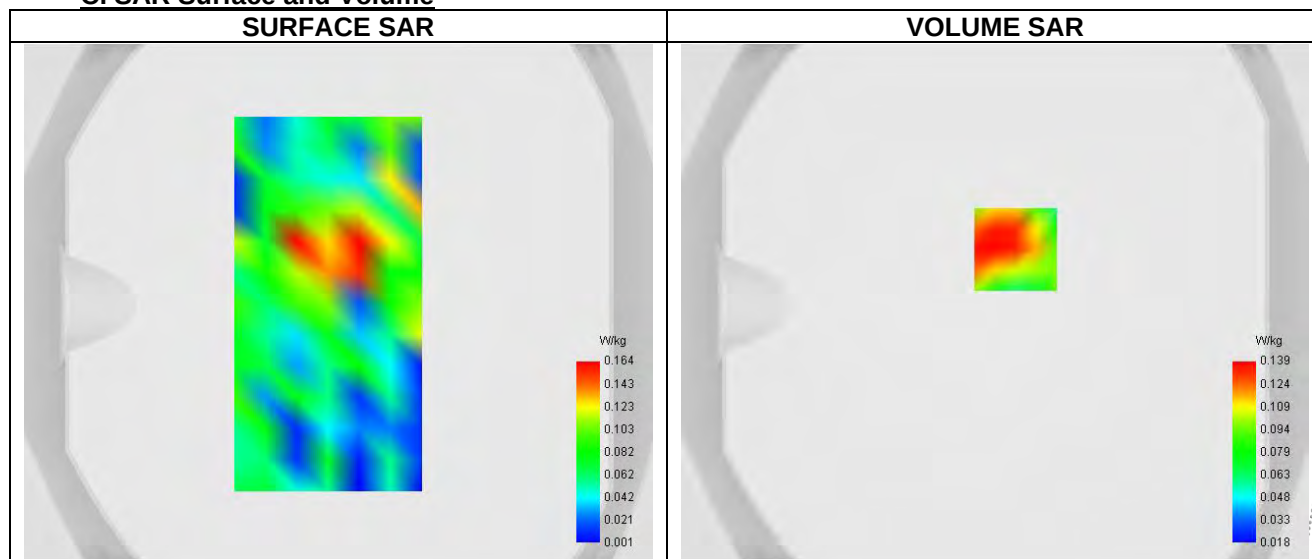
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 5 (850)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

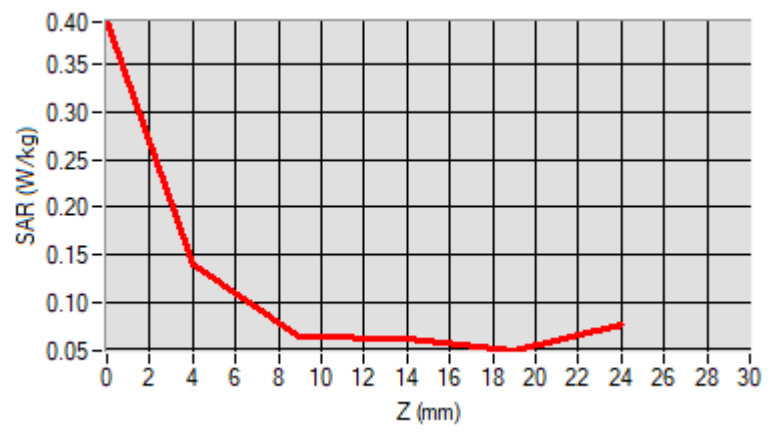
Frequency (MHz)	836.600
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.400
Conductivity (S/m)	0.927

C. SAR Surface and Volume

D. SAR 1g & 10g

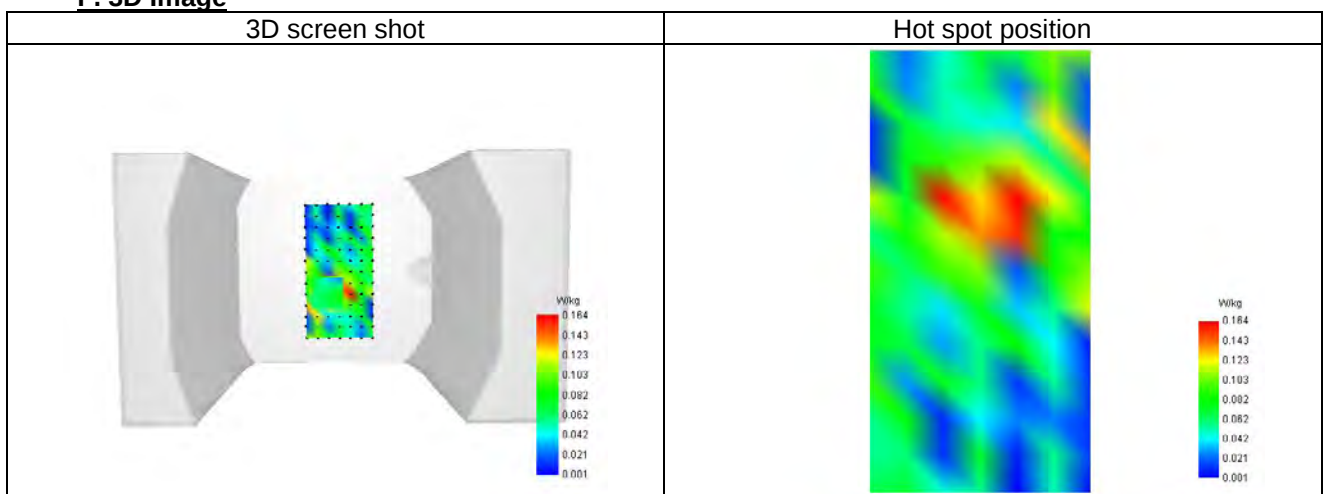
SAR 10g (W/Kg)	0.087
SAR 1g (W/Kg)	0.146
Variation (%)	3.430

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.395	0.139	0.063	0.061	0.049



F. 3D Image



Plot 8

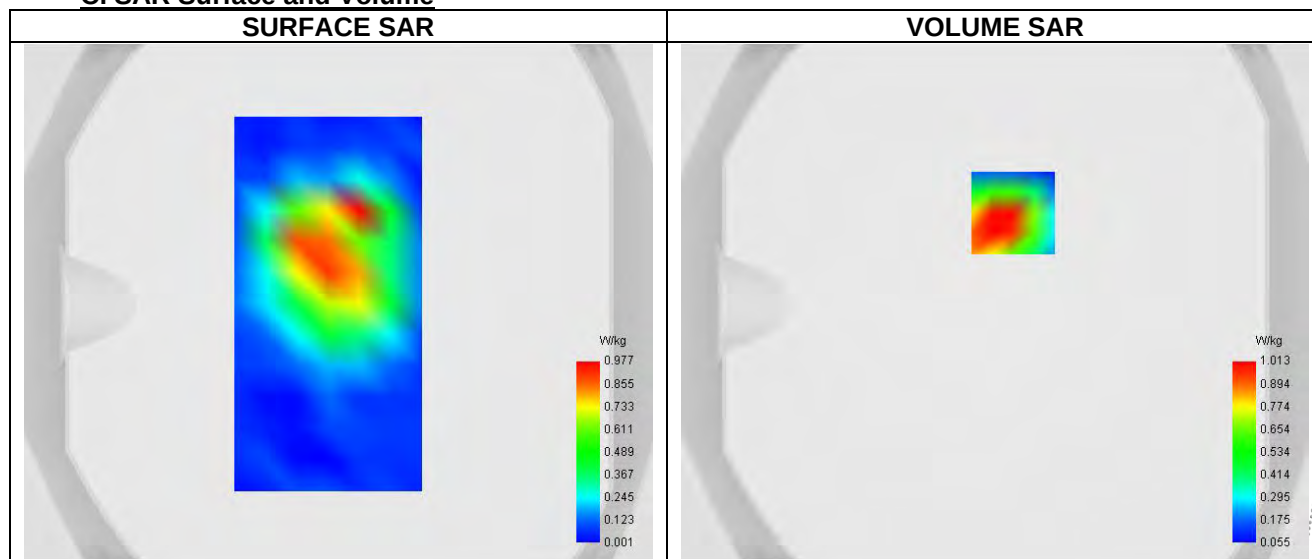
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	Band 5 (850)
Signal	WCDMA
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Frequency (MHz)	826.400
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.400
Conductivity (S/m)	0.927

C. SAR Surface and Volume


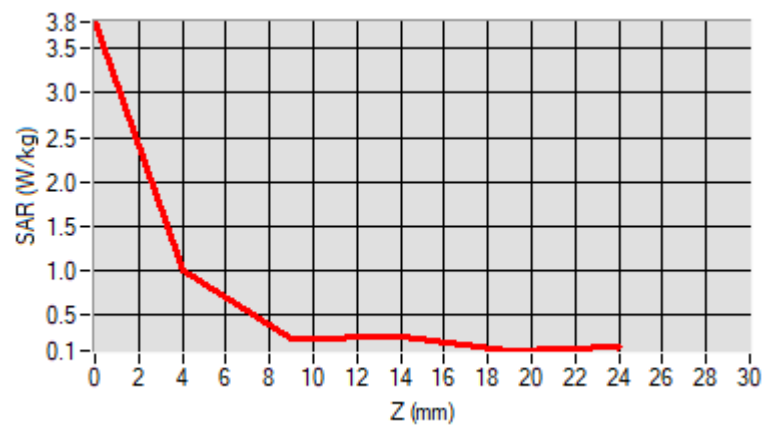
Maximum location: X=7.00, Y=35.00 ; SAR Peak: 2.07 W/kg

D. SAR 1g & 10g

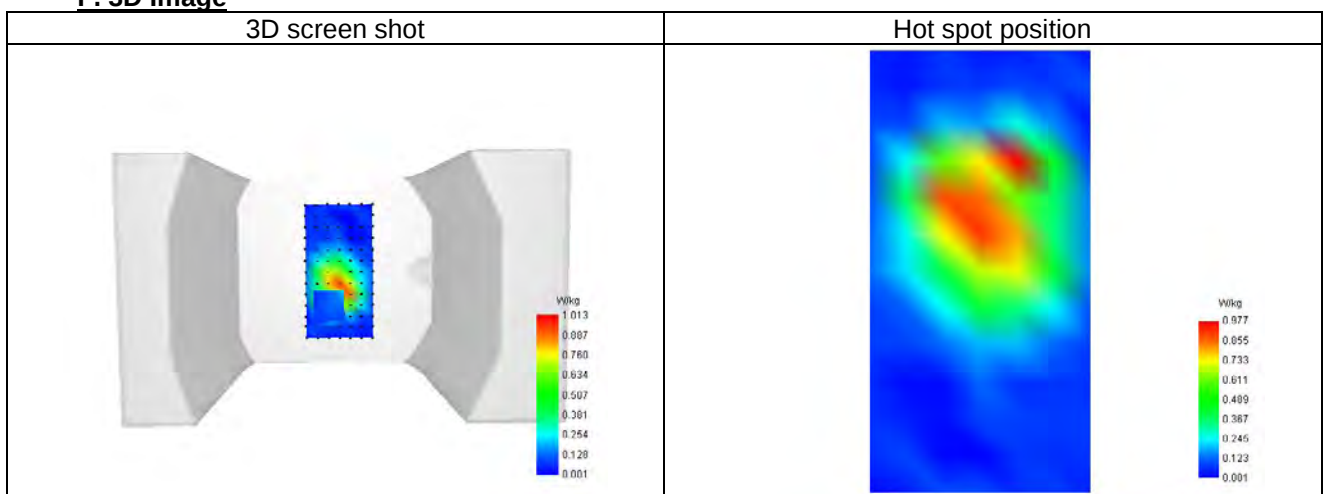
SAR 10g (W/Kg)	0.459
SAR 1g (W/Kg)	1.033
Variation (%)	-1.110

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	3.796	1.013	0.231	0.264	0.105



F. 3D Image



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Plot 9

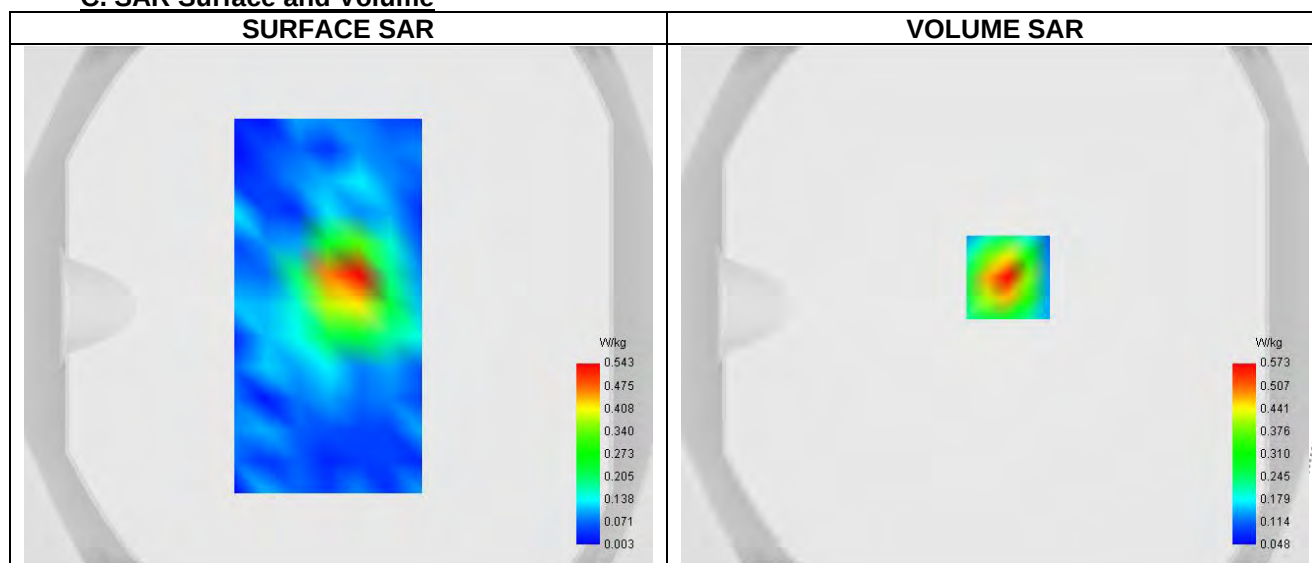
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

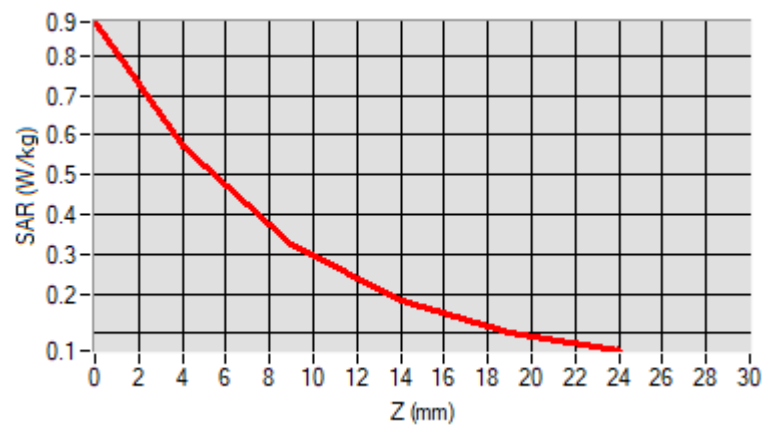
Frequency (MHz)	1880.000
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.455
Conductivity (S/m)	1.412

C. SAR Surface and Volume

D. SAR 1g & 10g

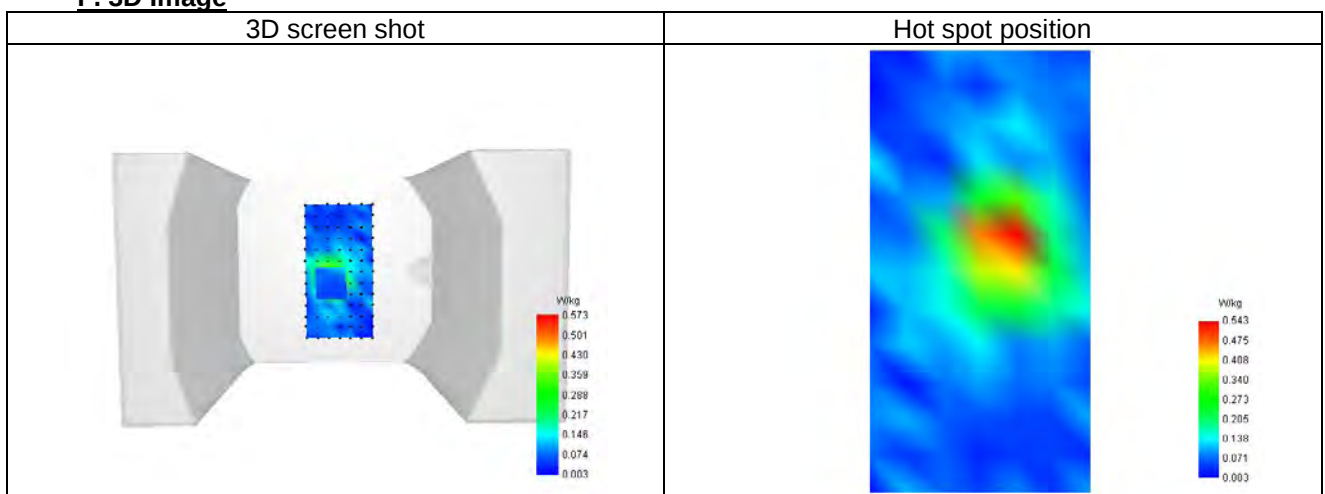
SAR 10g (W/Kg)	0.270
SAR 1g (W/Kg)	0.525
Variation (%)	-2.320

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.885	0.573	0.323	0.181	0.103



F. 3D Image



Plot 10

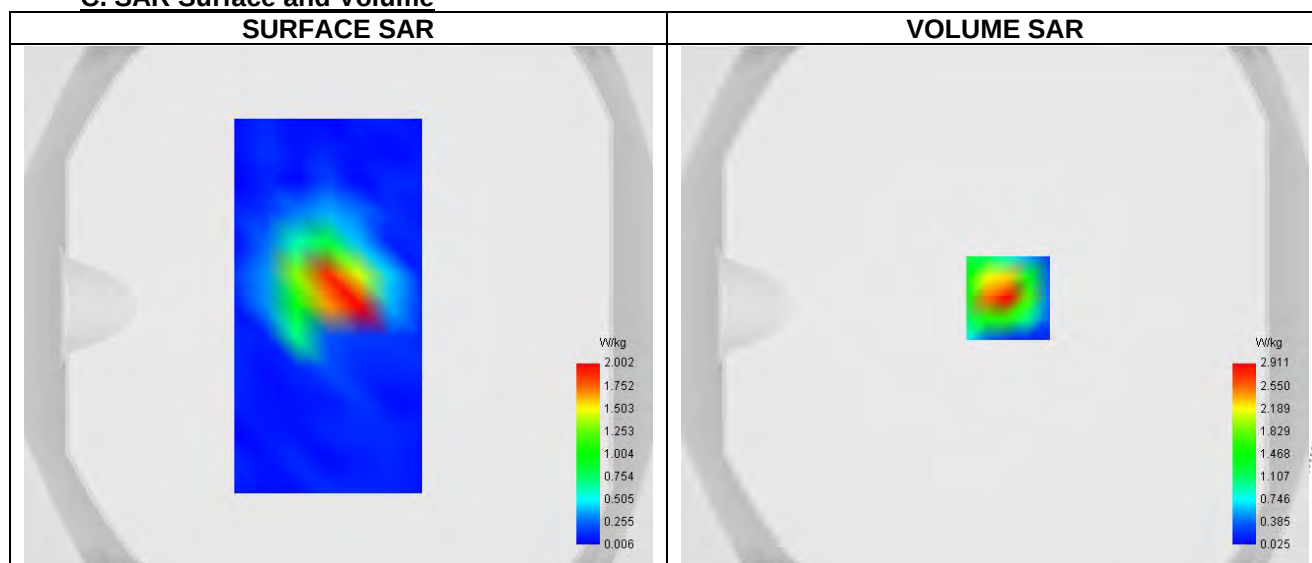
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	1.04
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

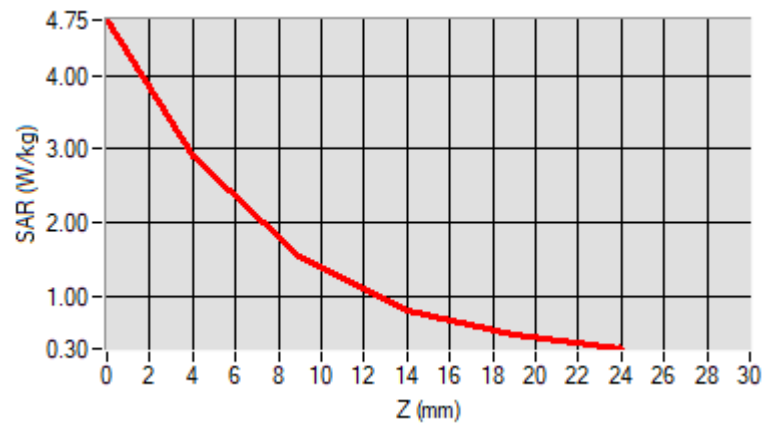
Frequency (MHz)	1900.000
Relative permittivity (real part)	38.557
Relative permittivity (imaginary part)	13.455
Conductivity (S/m)	1.412

C. SAR Surface and Volume

D. SAR 1g & 10g

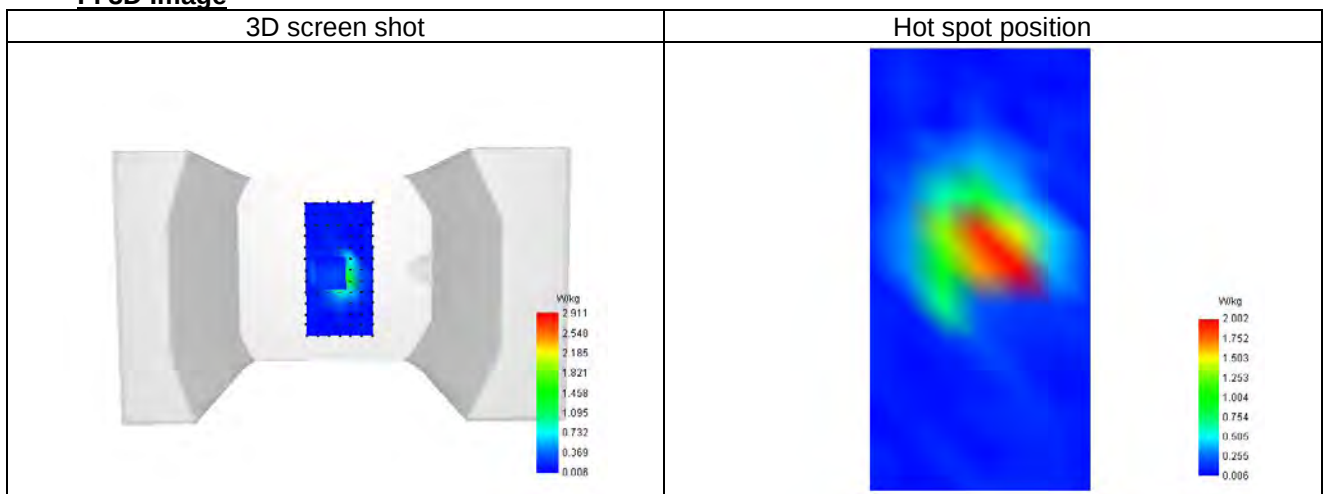
SAR 10g (W/Kg)	1.198
SAR 1g (W/Kg)	2.685
Variation (%)	-3.760

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	4.749	2.911	1.534	0.827	0.488



F. 3D Image



Plot 11

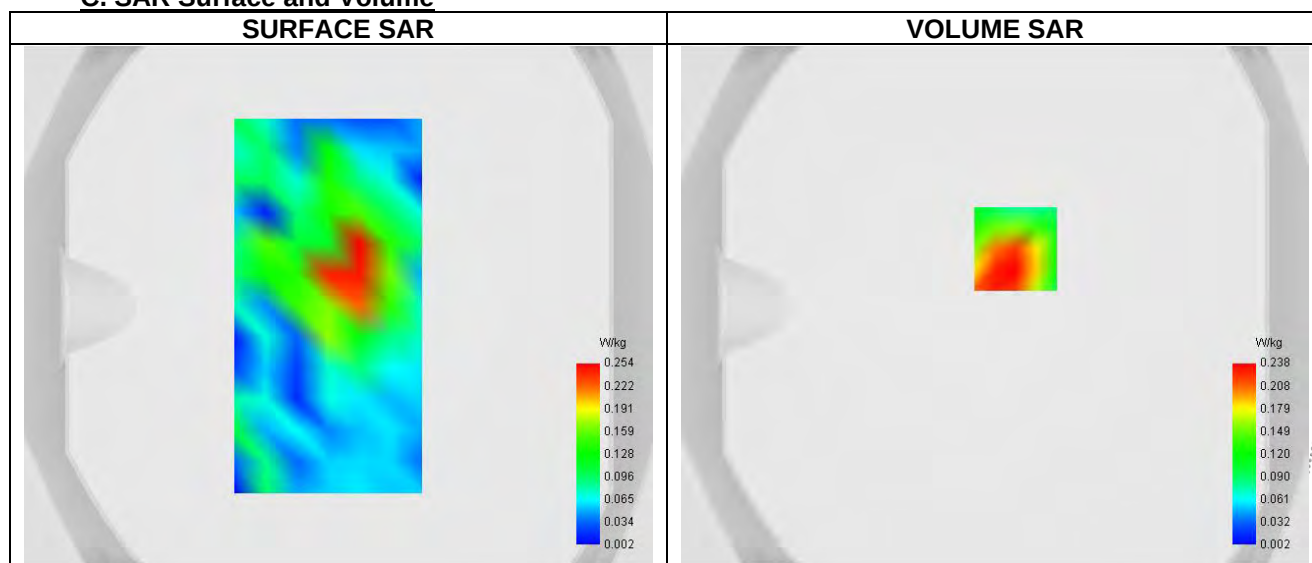
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

Frequency (MHz)	1732.500
Relative permittivity (real part)	41.696
Relative permittivity (imaginary part)	14.153
Conductivity (S/m)	1.349

C. SAR Surface and Volume


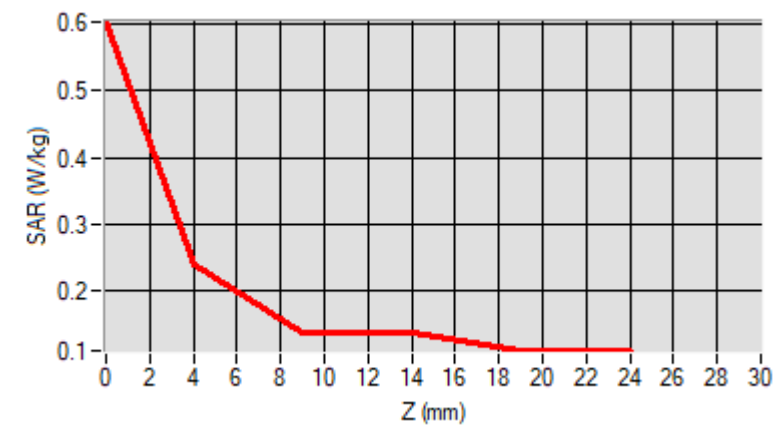
Maximum location: X=8.00, Y=22.00 ; SAR Peak: 0.36 W/kg

D. SAR 1g & 10g

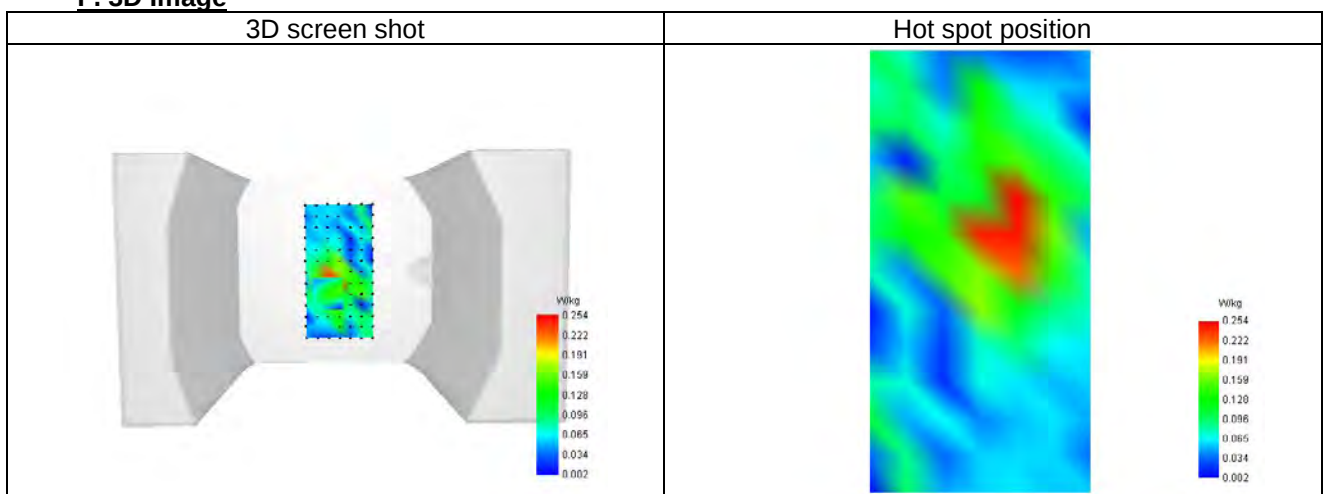
SAR 10g (W/Kg)	0.152
SAR 1g (W/Kg)	0.232
Variation (%)	-3.390

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.604	0.238	0.135	0.136	0.109



F. 3D Image



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Plot 12

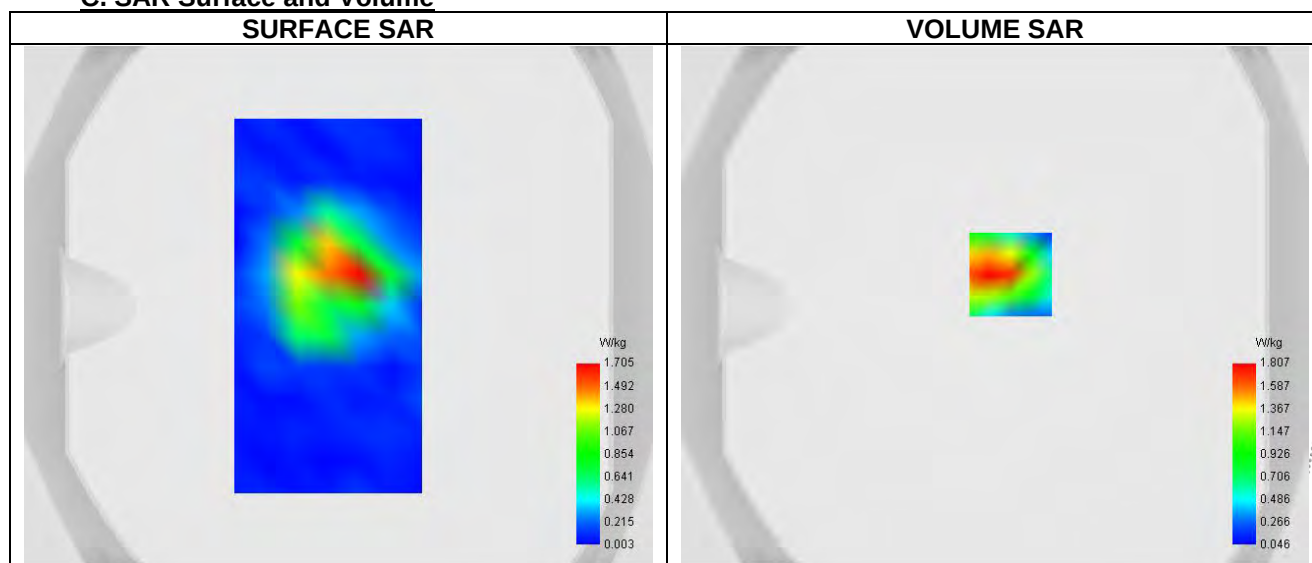
Date of measurement: 27/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	0.96
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 4
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

Frequency (MHz)	1732.500
Relative permittivity (real part)	41.696
Relative permittivity (imaginary part)	14.153
Conductivity (S/m)	1.349

C. SAR Surface and Volume


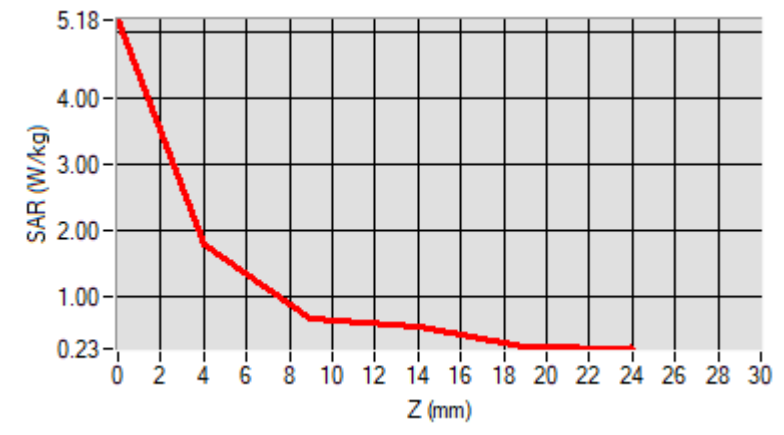
Maximum location: X=6.00, Y=12.00 ; SAR Peak: 2.95 W/kg

D. SAR 1g & 10g

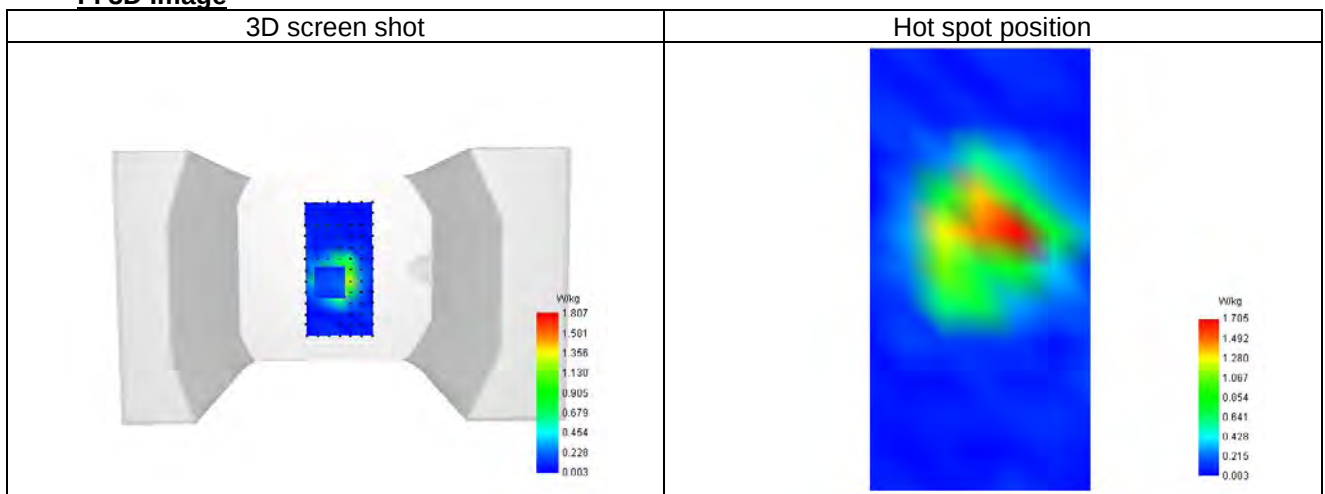
SAR 10g (W/Kg)	0.868
SAR 1g (W/Kg)	1.690
Variation (%)	-0.670

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	5.177	1.807	0.685	0.551	0.261



F. 3D Image



Plot 13

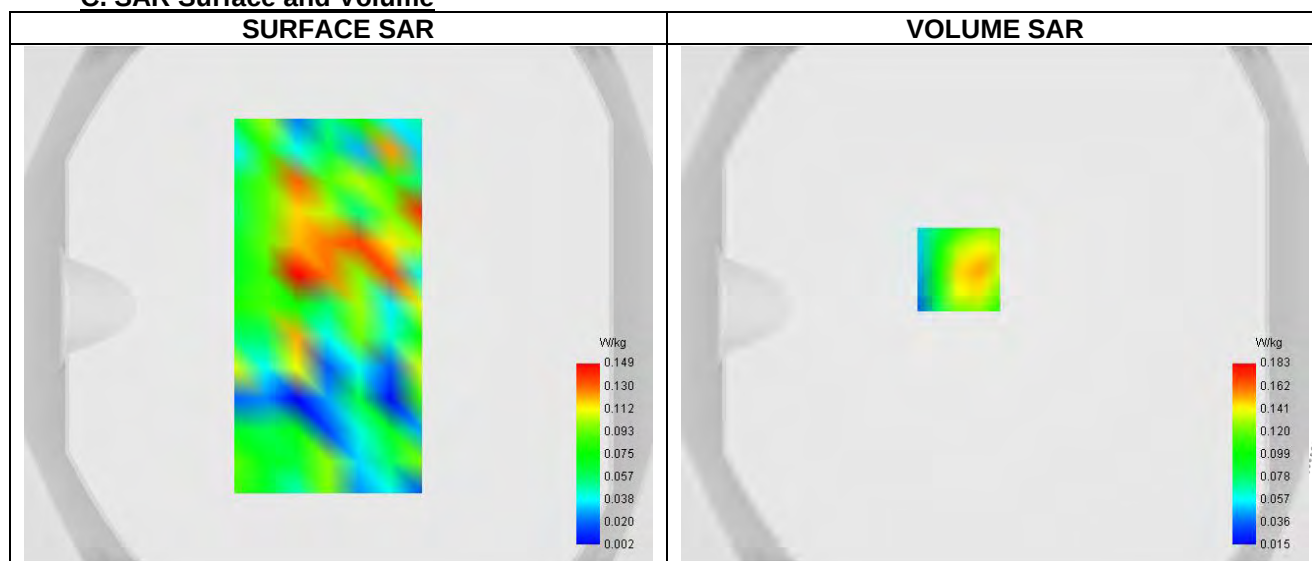
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

Frequency (MHz)	844.000
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.407
Conductivity (S/m)	0.927

C. SAR Surface and Volume


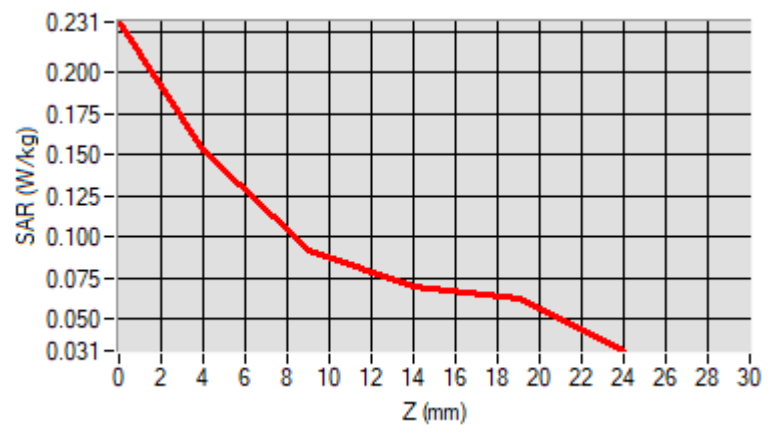
Maximum location: X=-14.00, Y=14.00 ; SAR Peak: 0.24 W/kg

D. SAR 1g & 10g

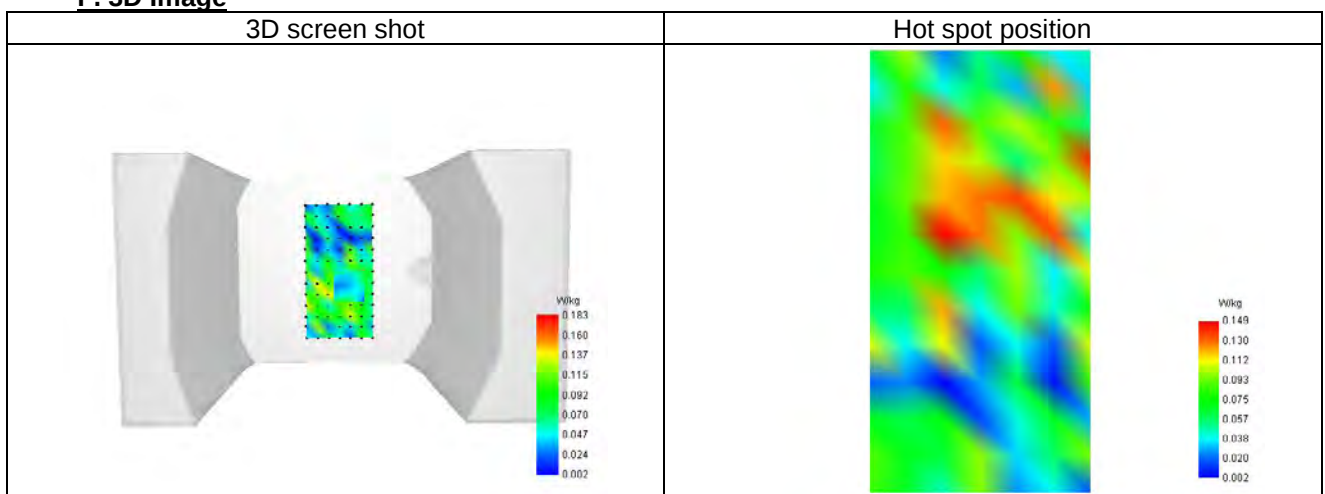
SAR 10g (W/Kg)	0.083
SAR 1g (W/Kg)	0.149
Variation (%)	-1.420

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	0.231	0.152	0.092	0.069	0.062



F. 3D Image



Plot 14

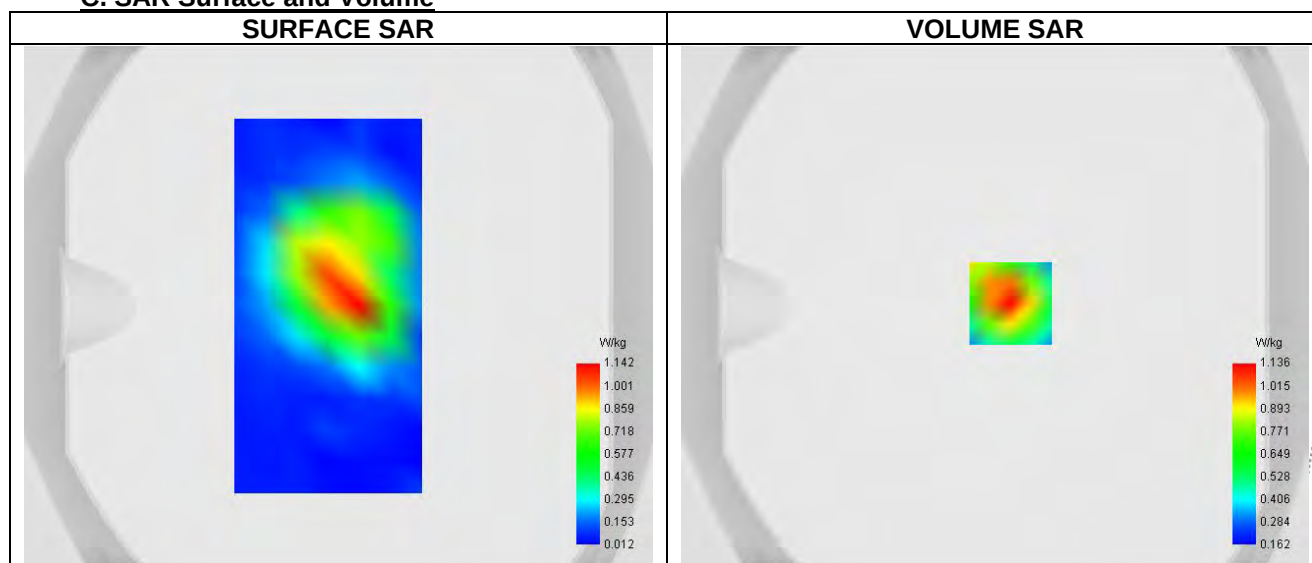
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	0.81
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Signal	LTE FDD
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

Frequency (MHz)	829.000
Relative permittivity (real part)	42.435
Relative permittivity (imaginary part)	19.580
Conductivity (S/m)	0.927

C. SAR Surface and Volume


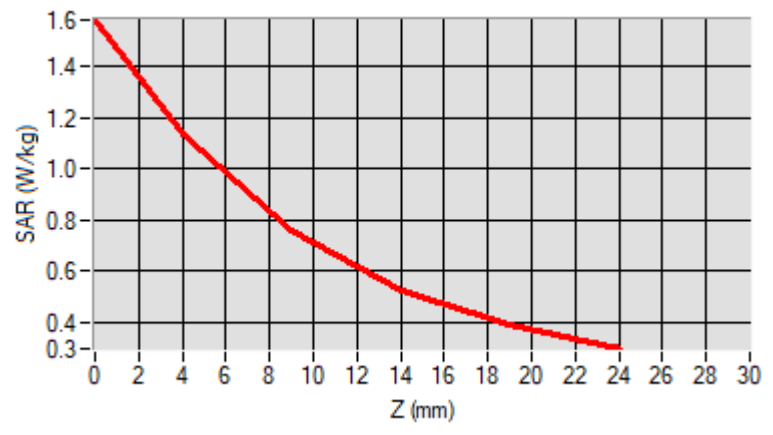
Maximum location: X=6.00, Y=1.00 ; SAR Peak: 1.59 W/kg

D. SAR 1g & 10g

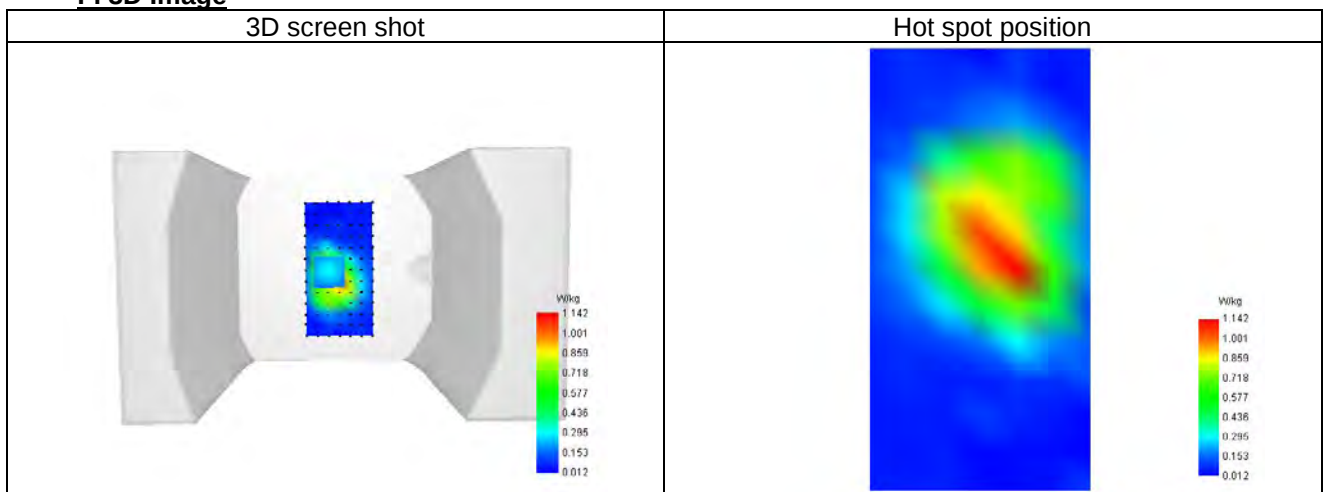
SAR 10g (W/Kg)	0.659
SAR 1g (W/Kg)	1.066
Variation (%)	-1.660

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.581	1.136	0.759	0.529	0.392



F. 3D Image



C.O.LTD

Plot 15

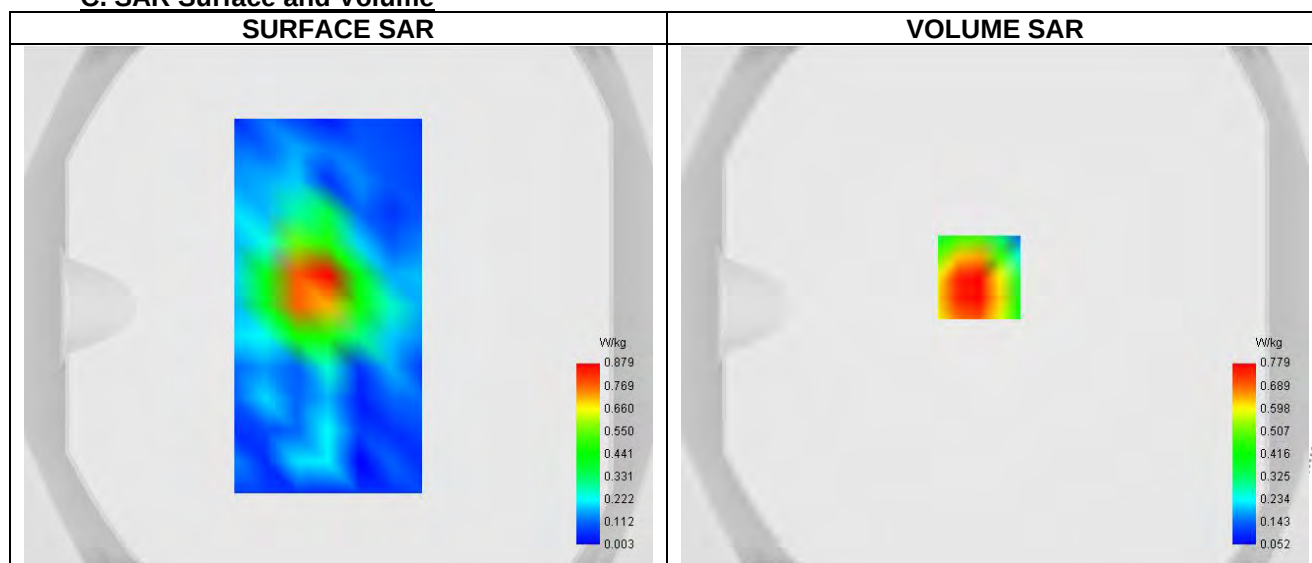
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPGO420
ConvF	1.03
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

Frequency (MHz)	2560.000
Relative permittivity (real part)	38.261
Relative permittivity (imaginary part)	13.404
Conductivity (S/m)	1.886

C. SAR Surface and Volume


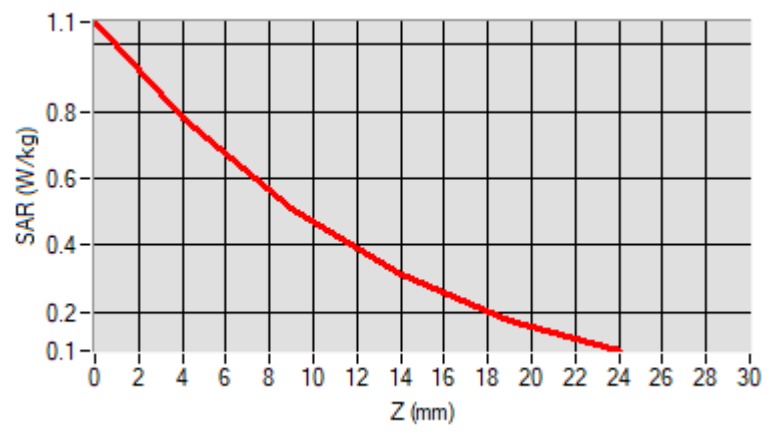
Maximum location: X=-6.00, Y=11.00 ; SAR Peak: 1.12 W/kg

D. SAR 1g & 10g

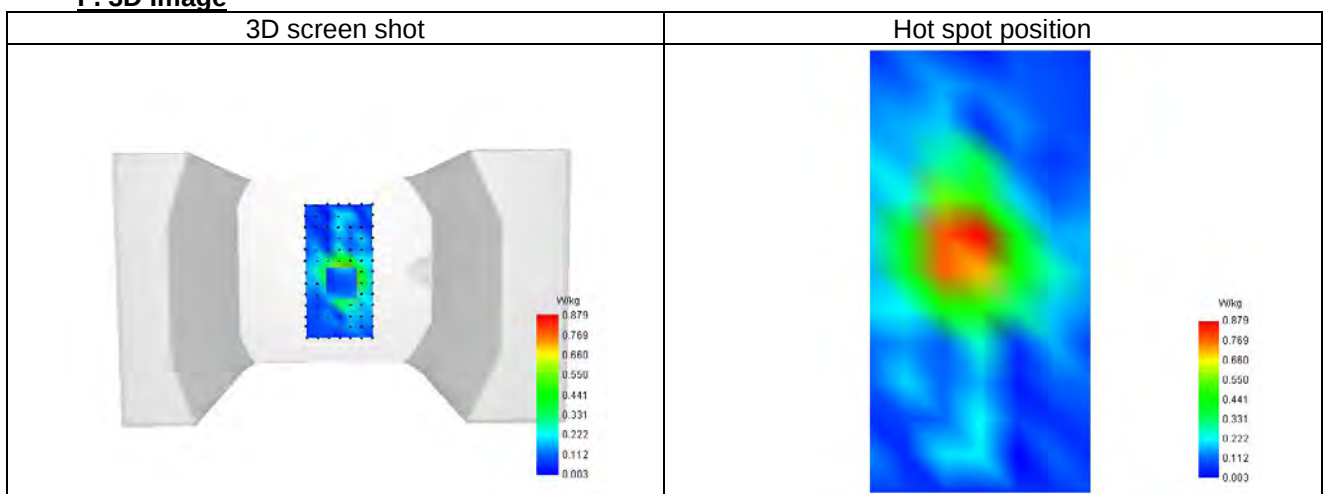
SAR 10g (W/Kg)	0.438
SAR 1g (W/Kg)	0.759
Variation (%)	2.380

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	1.067	0.779	0.507	0.312	0.177



F. 3D Image



Plot 16

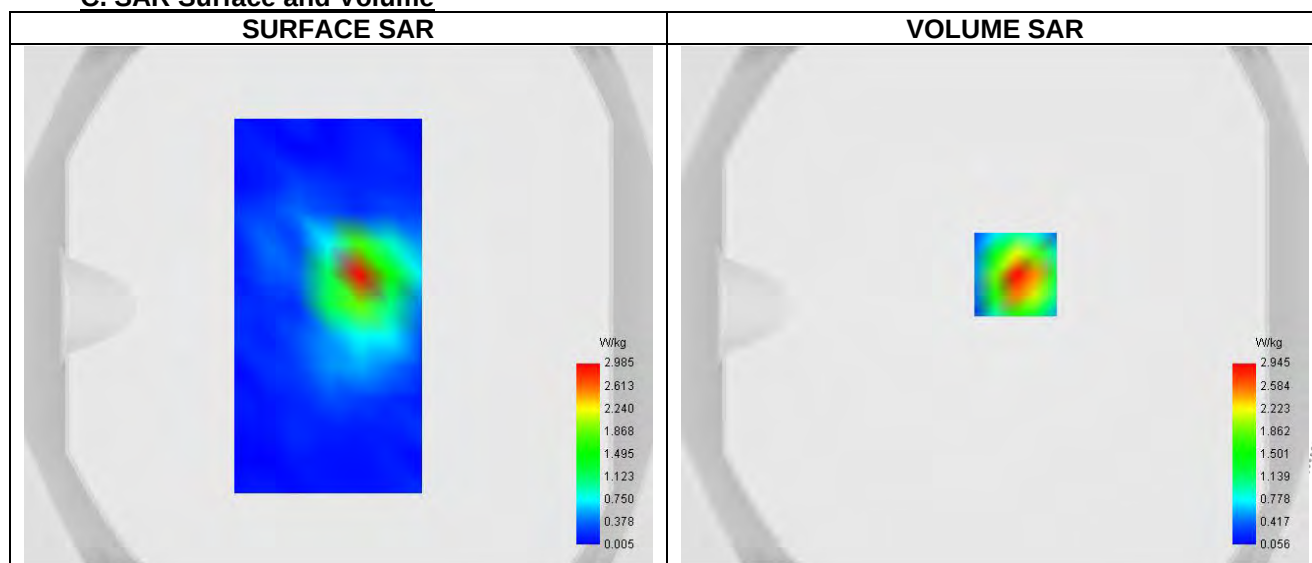
Date of measurement: 26/5/2025

A. Experimental conditions.

Probe	SN 26/23 EPG0420
ConvF	1.03
Area Scan	surf_sam_plan.txt
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
RB offset	5
RB size	20

B. Permittivity

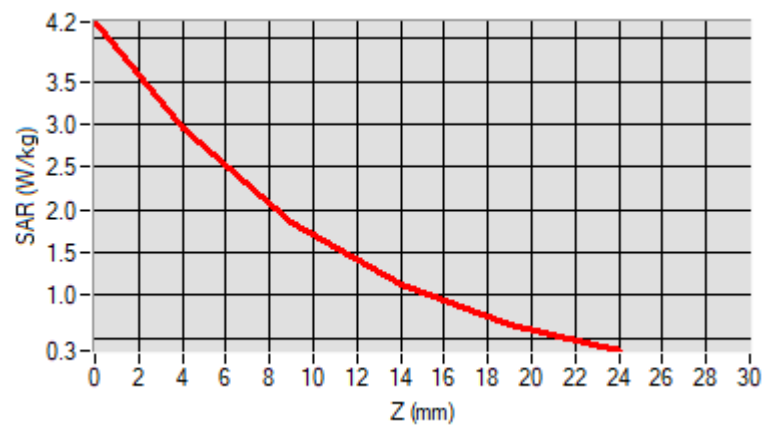
Frequency (MHz)	2510.000
Relative permittivity (real part)	38.261
Relative permittivity (imaginary part)	13.404
Conductivity (S/m)	1.886

C. SAR Surface and Volume

D. SAR 1g & 10g

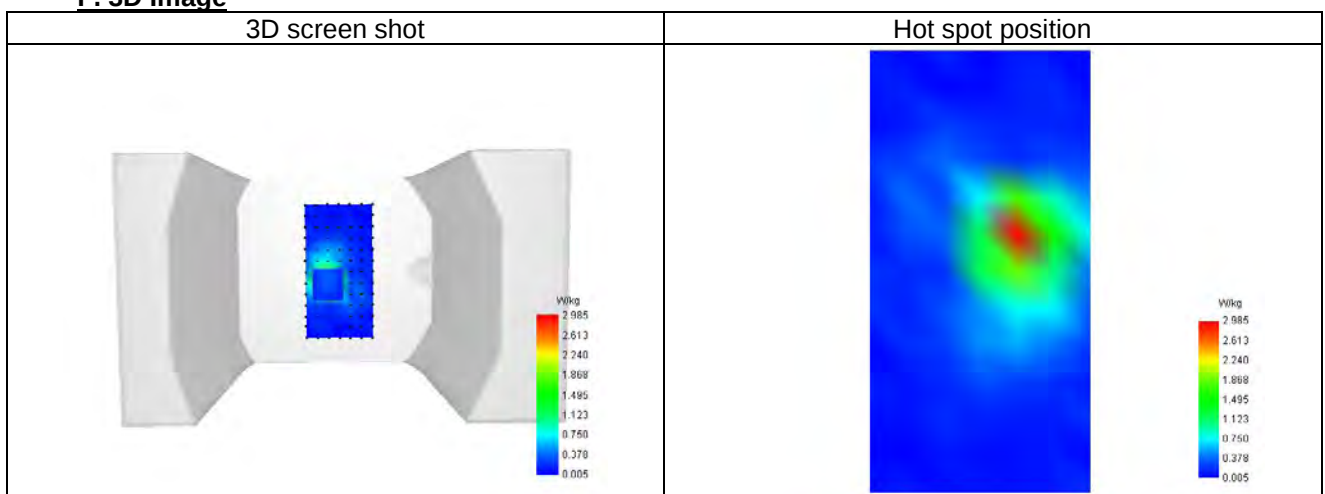
SAR 10g (W/Kg)	1.646
SAR 1g (W/Kg)	3.188
Variation (%)	3.390

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00
SAR (W/Kg)	4.191	2.945	1.843	1.122	0.660

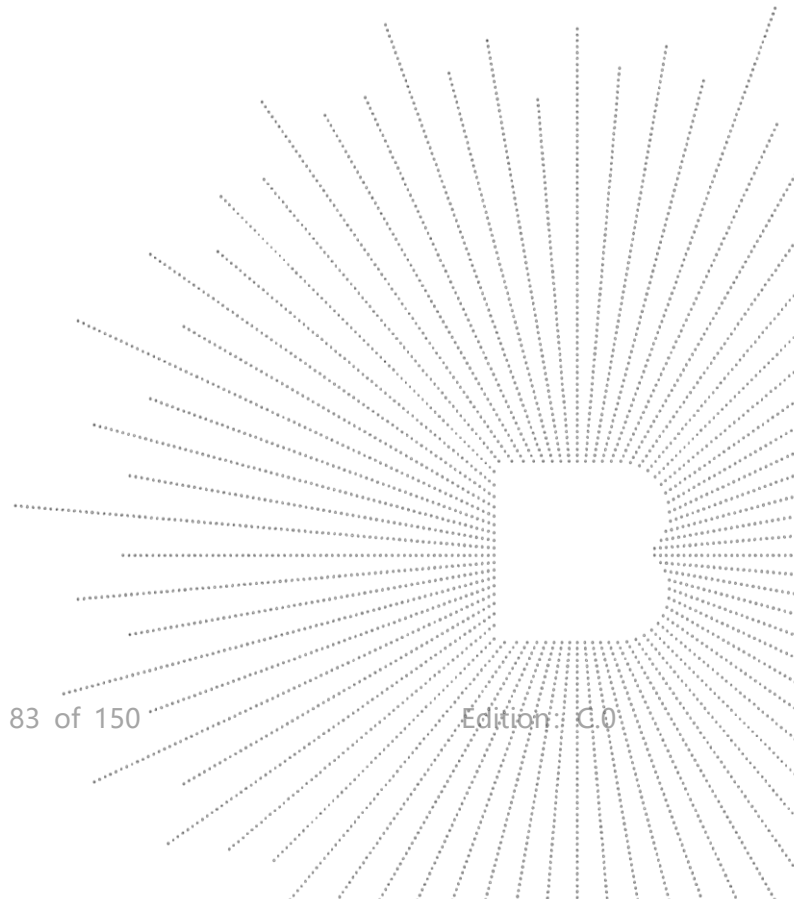


F. 3D Image



16 CALIBRATION CERTIFICATES

Probe-EPGO420 Calibration Certificate
SID835Dipole Calibration Ceriticate
SID1800Dipole Calibration Ceriticate
SID1900Dipole Calibration Ceriticate
SID2600Dipole Calibration Ceriticate





COMOSAR E-Field Probe Calibration Report

Ref : ACR.199.1.24.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.
1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU
INDUSTRIAL PARK, FUYUAN 1ST ROAD,
TANGWEI COMMUNITY, FUHAI STREET, BAO'AN
DISTRICT, SHENZHEN, GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: 2623-EPGO-420

Calibrated at MVG
Z.I. de la pointe du diable
Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 7/18/2024



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Scope available on www.cofrac.fr

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Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.199.1.24.BES.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Cyrille ONNEE	Measurement Responsible	7/18/2024	
<i>Checked & approved by:</i>	Jérôme Luc	Technical Manager	7/18/2024	
<i>Authorized by:</i>	Yann Toutain	Laboratory Director	7/18/2024	

Yann
Toutain ID

Signature numérique
de Yann Toutain ID
Date : 2024.07.18
10:38:49 +02'00'

	<i>Customer Name</i>
<i>Distribution :</i>	Shenzhen BCTC Technology Co., Ltd.

<i>Issue</i>	<i>Name</i>	<i>Date</i>	<i>Modifications</i>
A	Cyrille ONNEE	7/18/2024	Initial release

Page: 2/11

Template: ACR.DDD.N.YE.MVG.B.ISSUE: COMOSAR Probe v1.

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	2623-EPGO-420
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.228 MΩ Dipole 2: R2=0.238 MΩ Dipole 3: R3=0.230 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

MVG's COMOSAR E field Probes are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards.



Figure 1 – MVG COMOSAR Dosimetric E field Probe

Probe Length	330 mm
Length of Individual Dipoles	24.5 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.55 mm
Distance between dipoles / probe extremity	12.7 mm

3 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide recommended practices for the probe calibrations, including the performance characteristics of interest and methods by which to assess their effect. All calibrations / measurements performed meet the fore-mentioned standards.

3.1 SENSITIVITY

The sensitivity factors of the three dipoles were determined using a two step calibration method (air and tissue simulating liquid) using waveguides as outlined in the standards for frequency range 600-7500MHz and using the calorimeter cell method (transfer method) as outlined in the standards for frequency 150-450 MHz.



3.2 LINEARITY

The evaluation of the linearity was done in free space using the waveguide, performing a power sweep to cover the SAR range 0.01 W/kg to 100 W/kg.

3.3 ISOTROPY

The axial isotropy was evaluated by exposing the probe to a reference wave from a standard dipole with the dipole mounted under the flat phantom in the test configuration suggested for system validations and checks. The probe was rotated along its main axis from 0 to 360 degrees in 15-degree steps. The hemispherical isotropy is determined by inserting the probe in a thin plastic box filled with tissue-equivalent liquid, with the plastic box illuminated with the fields from a half wave dipole. The dipole is rotated about its axis (0°–180°) in 15° increments. At each step the probe is rotated about its axis (0°–360°).

3.4 BOUNDARY EFFECT

The boundary effect is defined as the deviation between the SAR measured data and the expected exponential decay in the liquid when the probe is oriented normal to the interface. To evaluate this effect, the liquid filled flat phantom is exposed to fields from either a reference dipole or waveguide. With the probe normal to the phantom surface, the peak spatial average SAR is measured and compared to the analytical value at the surface.

The boundary effect uncertainty can be estimated according to the following uncertainty approximation formula based on linear and exponential extrapolations between the surface and $d_{be} + d_{step}$ along lines that are approximately normal to the surface:

$$SAR_{uncertainty} [\%] = \delta SAR_{be} \frac{(d_{be} + d_{step})^2}{2d_{step}} \frac{(e^{-\alpha_e(d_{be})})}{\delta/2} \quad \text{for } (d_{be} + d_{step}) < 10 \text{ mm}$$

where

$SAR_{uncertainty}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest <i>zoom-scan</i> measurement point, in millimetre
Δ_{step}	is the separation distance between the first and second measurement points that are closest to the phantom surface, in millimetre, assuming the boundary effect at the second location is negligible
δ	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\delta \approx 14 \text{ mm}$ at 3 GHz;
ΔSAR_{be}	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect $SAR_{uncertainty}[\%]$ for scanning distances larger than 4mm is 1.0% Limit 2%).



4 MEASUREMENT UNCERTAINTY

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty associated with a SAR probe calibration using the waveguide or calorimetric cell technique depending on the frequency.

The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.

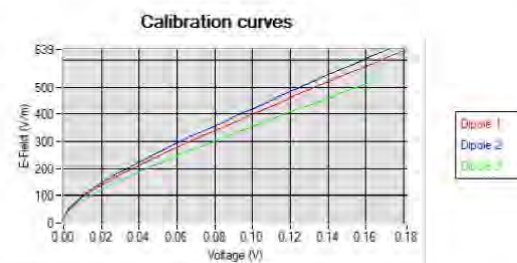
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

Ambient condition	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

5.1 CALIBRATION IN AIR

The following curve represents the measurement in waveguide of the voltage picked up by the probe toward the E-field generated inside the waveguide.



From this curve, the sensitivity in air is calculated using the below formula.

$$E^2 = \sum_{i=1}^3 \frac{V_i (1 + V_i / DCP_i)}{Norm_i}$$

where

V_i =voltage readings on the 3 channels of the probe

DCP_i =diode compression point given below for the 3 channels of the probe

$Norm_i$ =dipole sensitivity given below for the 3 channels of the probe


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref. ACR.199.1.24.BES.A

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
1.21	1.09	1.56

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
106	109	103

5.2 CALIBRATION IN LIQUID

The calorimeter cell or the waveguide is used to determine the calibration in liquid using the formula below.

$$ConvF = \frac{E_{liquid}^2}{E_{air}^2}$$

The E-field in the liquid is determined from the SAR measurement according to the below formula.

$$E_{liquid}^2 = \frac{\rho SAR}{\sigma}$$

where

σ =the conductivity of the liquid

ρ =the volumetric density of the liquid

SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

For the calorimeter cell (150-450 MHz), the formula is:

$$SAR = c \frac{dT}{dt}$$

where

c =the specific heat for the liquid

dT/dt =the temperature rises over the time

For the waveguide setup (600-75000 MHz), the formula is:

$$SAR = \frac{4P_W}{ab\delta} e^{-\frac{2z}{\delta}}$$

where

a =the larger cross-sectional of the waveguide

b =the smaller cross-sectional of the waveguide

δ =the skin depth for the liquid in the waveguide

P_W =the power delivered to the liquid

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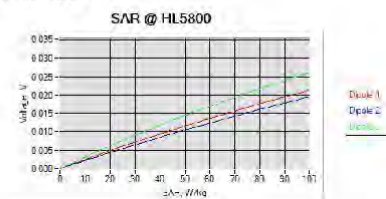

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.199.1.24.BES.A

The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

Liquid	Frequenc y (MHz*)	ConvF
HL450	450	0.86
BL450	450	0.78
HL750	750	0.80
BL750	750	0.87
HL850	835	0.81
BL850	835	0.80
HL900	900	0.76
BL900	900	0.87
HL1800	1800	0.96
BL1800	1800	1.01
HL1900	1900	1.04
BL1900	1900	1.11
HL2100	2100	1.00
BL2100	2100	1.16
HL2300	2300	1.11
BL2300	2300	1.23
HL2450	2450	1.11
BL2450	2450	1.32
HL2600	2600	1.03
BL2600	2600	1.19
HL5200	5200	1.18
BL5200	5200	0.97
HL5400	5400	1.17
BL5400	5400	1.00
HL5600	5600	1.20
BL5600	5600	0.95
HL5800	5800	1.15
BL5800	5800	1.05

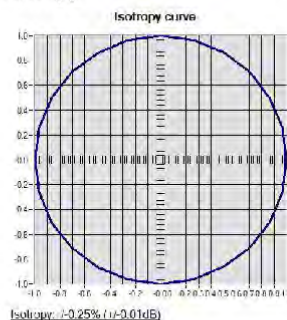
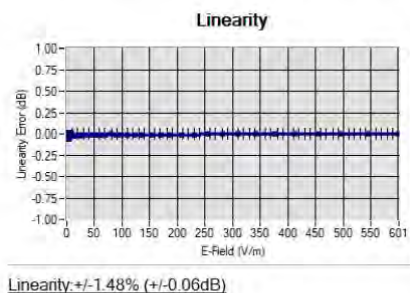
(*) Frequency validity is +/-50MHz below 600MHz, +/-100MHz from 600MHz to 6GHz and +/-700MHz above 6GHz





6 VERIFICATION RESULTS

The figures below represent the measured linearity and axial isotropy for this probe. The probe specification is ± 0.2 dB for linearity and ± 0.15 dB for axial isotropy.





7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Descriptio	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2024	08/2027
Network Analyzer	Agilent 8753ES	MY40003210	10/2023	10/2027
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2024	06/2027
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2022	09/2025
Coaxial cell	MVG	SN 32/16 COAXCELL_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.

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Ref: ACR.199.1.24.BES.A

Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2024	06/2027

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SAR Reference Dipole Calibration Report

Ref : ACR.329.9.24.BES.A

SHENZHEN BCTC TECHNOLOGY CO., LTD.

**1 ~2/ F, NO. B FACTORY BUILDING, PENGZHOU
INDUSTRIAL PARK, FUYUAN 1ST ROAD,
TANGWEI COMMUNITY, FUHAI STREET, BAO'AN
DISTRICT, SHENZHEN, GUANGDONG, CHINA**

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 835 MHZ

SERIAL NO.: SN 47/21 DIP 0G835-621

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 11/25/2024



Accreditations #2-6789 and #2-6814
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Summary:

This document presents the method and results from an accredited SAR reference dipole calibration performed in MVG using the COMOSAR test bench. All calibration results are traceable to national metrology institutions.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR-329.9.24.BES.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Jérôme Luc	Technical Manager	11/25/2024	<i>JS</i>
<i>Checked by :</i>	Jérôme Luc	Technical Manager	11/25/2024	<i>JS</i>
<i>Approved by :</i>	Yann Toutain	Laboratory Director	11/25/2024	<i>Yann TOUTAIN</i>

2024.11.25

11:52:29 +01'00'

	<i>Customer Name</i>
<i>Distribution :</i>	Shenzhen BCTC Technology Co., Ltd.

<i>Issue</i>	<i>Name</i>	<i>Date</i>	<i>Modifications</i>
A	Jérôme Luc	11/25/2024	Initial release

Page: 2/13

Template: ACR.DDD.N.YE.MVGB.ISSUE_SAR Référence Dipôle vJ

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference dipoles used for SAR measurement system validations and the measurements that were performed to verify that the product complies with the fore mentioned standards.

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 835 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID835
Serial Number	SN 47/21 DIP 0G835-621
Product Condition (new / used)	New

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Dipoles are built in accordance to the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards. The product is designed for use with the COMOSAR test bench only.



Figure 1 – MVG COMOSAR Validation Dipole



4 MEASUREMENT METHOD

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards provide requirements for reference dipoles used for system validation measurements. The following measurements were performed to verify that the product complies with the fore mentioned standards.

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

All uncertainties listed below represent an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$, traceable to the Internationally Accepted Guides to Measurement Uncertainty.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards were followed to generate the measurement uncertainty for validation measurements.

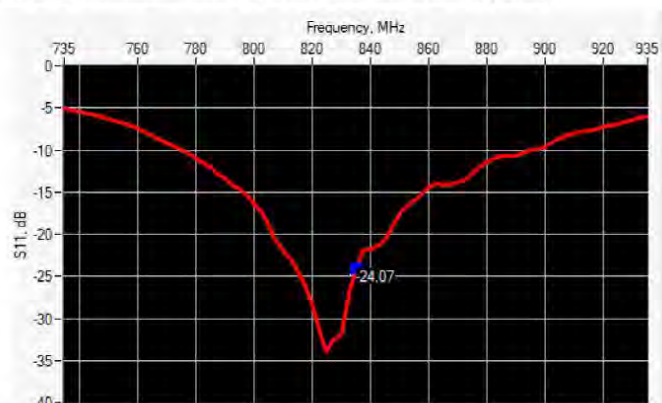

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.329.9.24.BES.A

Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

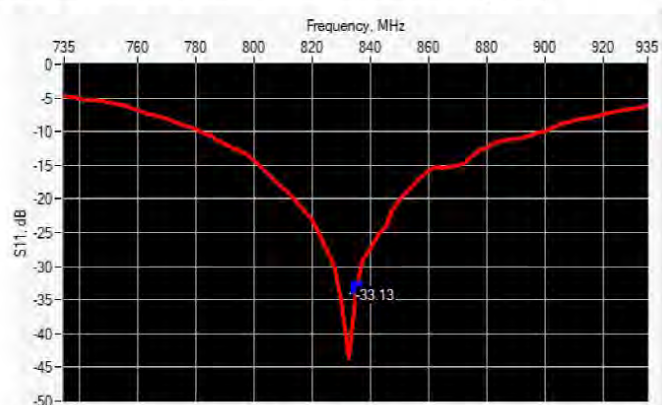
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-24.07	-20	55.3 Ω - 3.3 j Ω

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
835	-33.13	-20	52.2 Ω - 0.4 j Ω