

CE SAR EVALUATION REPORT

**In accordance with the requirements of
EN50360, EN50566, EN62209-1/-2, EN62479 and COUNCIL
RECOMMENDATION 1999/519/EC**

Product Name : Mobile Phone

Trademark : ulefone

Model Name : GQ3290

Family Model : Note 19, Note 19 Ultra, Note 19 Pro, Note
19E, Note 19S, Note 19 Lite, Note 19s,
Note 19s Pro

Report No. : S24082606902001

Prepared for

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TEST RESULT CERTIFICATION

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Manufacturer's Name: Shenzhen Gotron Electronic CO.,LTD.
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Product description
Product name: Mobile Phone
Trademark: ulefone
Model and/or type reference ..: GQ3290
Family Model.....: Note 19, Note 19 Ultra, Note 19 Pro, Note 19E, Note 19S, Note
19 Lite, Note 19s, Note 19s Pro
EN 50360:2017;
EN 50566:2017;
Standards: EN 62209-1:2016;
EN 62209-2:2010;
EN 62479:2010;

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in EN62209. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in COUNCIL 1999/519/EC. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Test Sample Number S240826069009

Date of Test

Date (s) of performance of tests Aug. 27, 2024 ~ Sept. 19, 2024

Date of Issue..... Sept. 25, 2024

Test Result..... **Pass**

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※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Sept. 25, 2024	Owen Xiao

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1. General Information

1.1. RF exposure limits

(A).Limits for Occupational/Controlled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	10.0	20.0

(B).Limits for General Population/Uncontrolled Exposure (W/kg)

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	2.0	4.0

NOTE: **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 10 gram of tissue defined as a tissue volume in the shape of a cube.

SAR for hands, wrists, feet and ankles is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

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).

General Population/Uncontrolled Environments:

Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE
HEAD AND TRUNK LIMIT
2.0 W/kg AND MEMBER LIMIT 4.0 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for GQ3290 are as follows.

RF Exposure Conditions	Max SAR Value(W/kg)		
	10-g Head	10-g Body & Hotspot (Separation distance of 5mm)	10-g Member DAS (See note ³) (Separation distance of 0mm)
	0.633	1.482	3.036
Max Simultaneous Tx	0.819	1.714	3.437

NOTE: 1. The Max Simultaneous Tx is calculated based on the same configuration and test position.

2. This device is in compliance with Specific Absorption Rate (SAR) for general population / uncontrolled exposure limits (2.0 W/kg for head and body, 4.0 W/kg for member) specified in COUNCIL RECOMMENDATION 1999/519/EC, and had been tested in accordance with the measurement methods and procedures specified in EN 62209-1:2016 & EN 62209-2:2010.

3. The member DAS, It is only an assessment required by the ANFR (Sell to France).

1.3. EUT Description

Device Information			
Product Name	Mobile Phone		
Trademark	ulefone		
Model Name	GQ3290		
Family Model	Note 19, Note 19 Ultra, Note 19 Pro, Note 19E, Note 19S, Note 19 Lite, Note 19s, Note 19s Pro		
Model Difference	All models are the same circuit and RF module, except for model names.		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	FPC Antenna		
Battery Information	DC 3.85V, 5000mAh		
Hardware version	L617A_V1		
Software version	N/A		
Device Operating Configurations			
Supporting Mode(s)	GSM 900/1800, WCDMA Band 1/8, LTE Band 1/3/7/8/20/28/38/40, WLAN 2.4G, Bluetooth, GPS,FM		
Test Modulation	GSM(GMSK/8PSK), WCDMA(QPSK), LTE(QPSK/16-QAM), WLAN(DSSS/OFDM), Bluetooth(GFSK, $\pi/4$ -DQPSK, 8DPSK) , GPS(BPSK),FM(FM)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)

	GSM 900	880-915	925-960
	GSM 1800	1710-1785	1805-1880
	WCDMA Band 1	1920-1980	2110-2170
	WCDMA Band 8	880-915	925-960
	LTE Band 1	1920-1980	2110-2170
	LTE Band 3	1710-1785	1805-1880
	LTE Band 7	2500-2570	2620-2690
	LTE Band 8	880- 915	925- 960
	LTE Band 20	832-862	791-821
	LTE Band 28	703-748	758-803
	LTE Band 38	2570-2620	
	LTE Band 40	2300-2400	
	WLAN 2.4G	2412-2472	
	Bluetooth	2402-2480	
	FM	N/A	87.5-108
	GPS	N/A	1575.42
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
EGPRS Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
Power Class	4, tested with power level 5(GSM 900)		
	1, tested with power level 0(GSM 1800)		
	3, tested with power control "all 1"(WCDMA Band 1)		
	3, tested with power control "all 1"(WCDMA Band 8)		
	3, tested with power control all Max.(LTE Band 1)		
	3, tested with power control all Max.(LTE Band 3)		
	3, tested with power control all Max.(LTE Band 7)		
	3, tested with power control all Max.(LTE Band 8)		
	3, tested with power control all Max.(LTE Band 20)		
	3, tested with power control all Max.(LTE Band 28)		
	3, tested with power control all Max.(LTE Band 38)		
	3, tested with power control all Max.(LTE Band 40)		

1.4. Test specification(s)

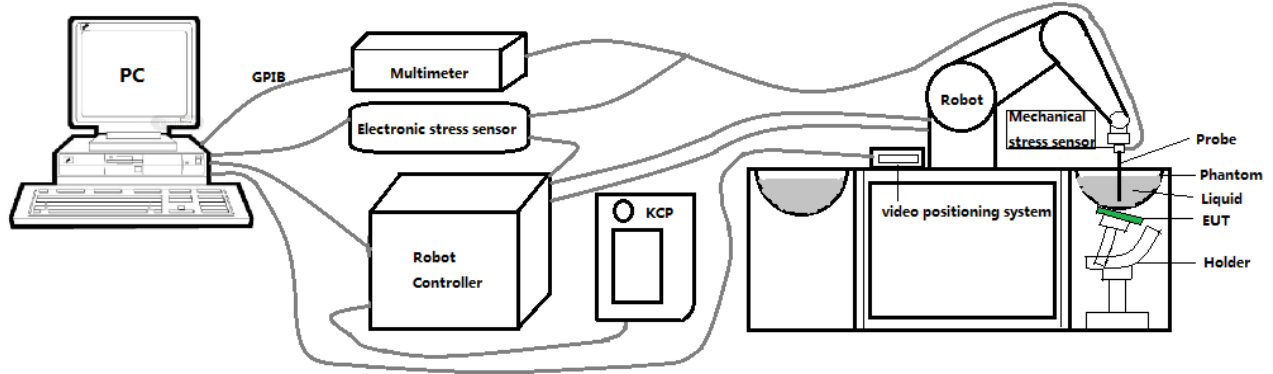
EN 50360:2017	Product standard to demonstrate the compliance of wireless communication devices, with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 300 MHz to 6 GHz: devices used next to the ear
EN 50566:2017	Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body
EN 62209-1:2016	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)
EN 62209-2:2010	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body
EN 62479:2010	Assessment of the compliance of low-power electronic and electrical equipment with the restrictions related to human exposure to electromagnetic fields(10 MHz to 300 GHz)

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
Relative Humidity	30% – 70%

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ± 0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:



- High precision (repeatability ± 0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe 3423-EPGO-426 with following specifications is used



- Dynamic range: 0.01-100 W/kg
 - Tip Diameter : 2.5 mm
 - Distance between probe tip and sensor center: 1 mm
 - Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ± 1 mm).
 - Probe linearity: ± 0.06 dB
 - Axial isotropy: ± 0.01 dB
 - Hemispherical Isotropy: ± 0.01 dB
 - Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
 - Lower detection limit: 8mW/kg
- Angle between probe axis (evaluation axis) and surface normal line: less than 30° .

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than $\pm 10\%$. The spherical isotropy shall be evaluated and within ± 0.25 dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv F) of the probe are tested. The calibration data can be referred to appendix D of this report.

2.4. SAM phantoms

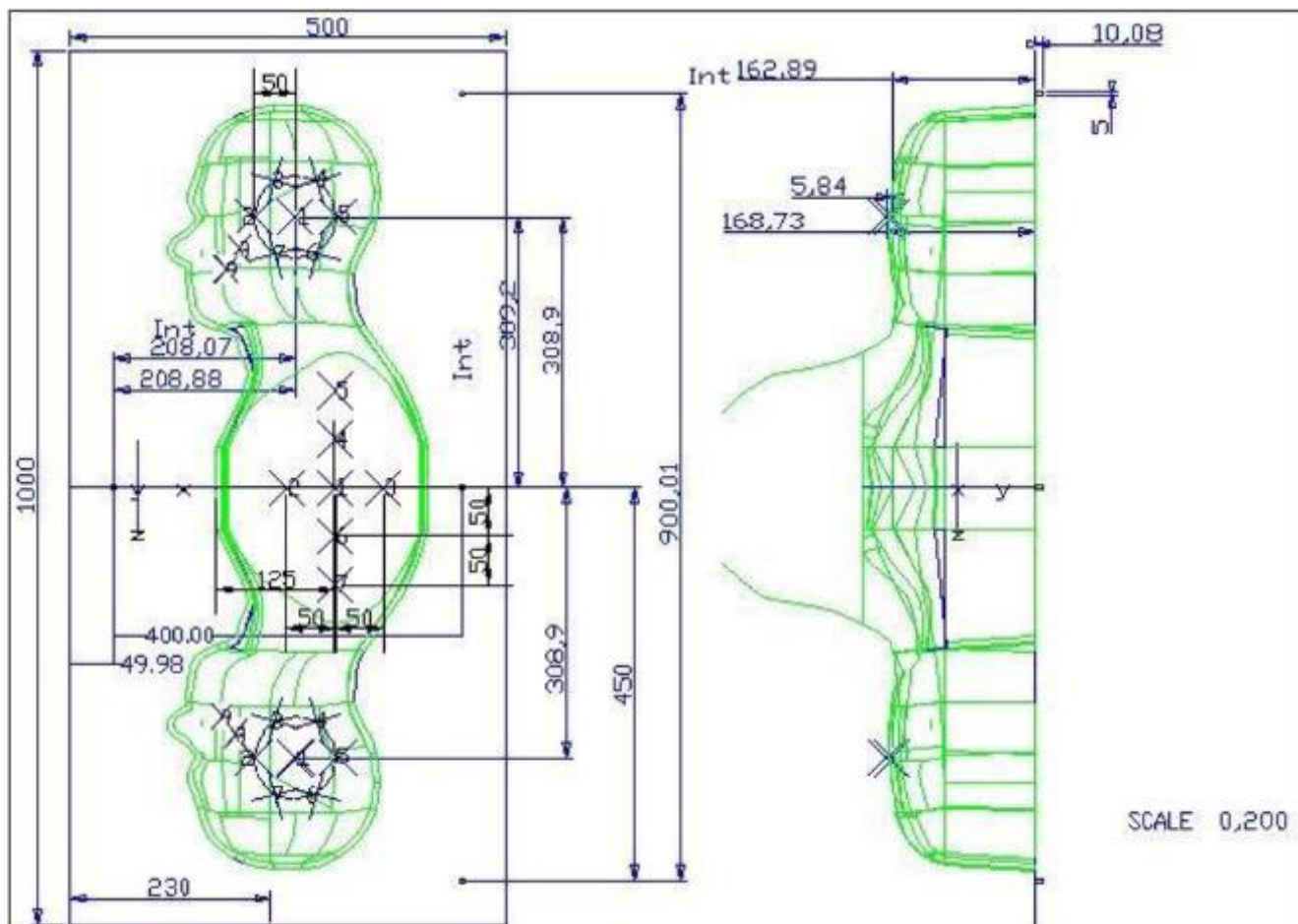
Photo of SAM phantom SN 16/15 SAM119



The SAM phantom is used to measure the SAR relative to people exposed to electro-magnetic field radiated by mobile phones.

2.4.1. Technical Data

Serial Number	Shell thickness	Filling volume	Dimensions	Positionner Material	Permittivity	Loss Tangent
SN 16/15 SAM119	2 mm $\pm$ 0.2 mm	27 liters	Length:1000 mm Width:500 mm Height:200 mm	Gelcoat with fiberglass	3.4	0.02

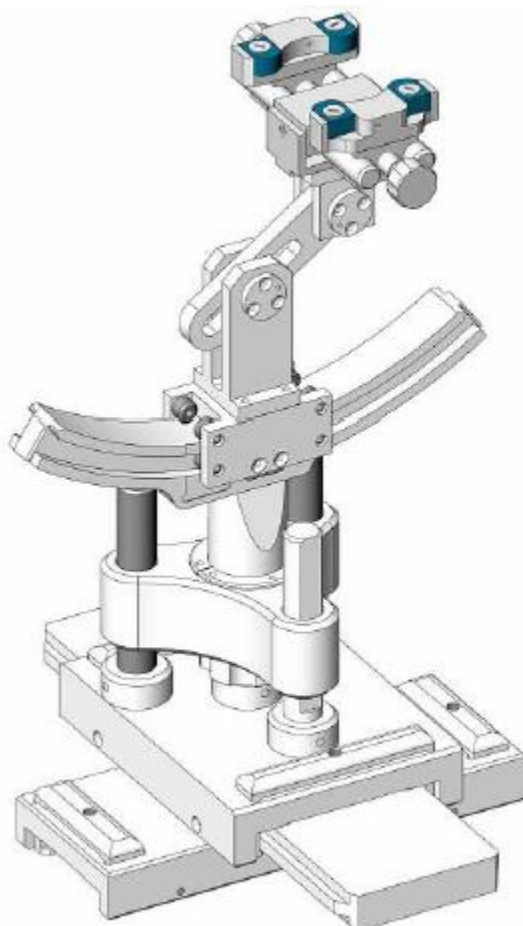


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

The test, based on ultrasonic system, allows measuring the thickness with an accuracy of 10 μ m.

2.5. 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 degree.



Serial Number	Holder Material	Permittivity	Loss Tangent
SN 16/15 MSH100	Delrin	3.7	0.005

2.6. Test Equipment List

This table gives a complete overview of the SAR measurement equipment.

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	3423-EPGO-426	Sep. 18, 2023	Sep. 17, 2024
☒	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 22, 2024	Feb. 21, 2027
☐	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 22, 2024	Feb. 21, 2027
☐	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	2300 MHz Dipole	SID2300	SN 03/16 DIP 2G300-358	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Feb. 22, 2024	Feb. 21, 2027
☐	MVG	3500 MHz Dipole	SID3500	SN 09/12 DIP 3G500-360	Oct. 15, 2022	Oct. 14, 2025
☐	MVG	3700 MHz Dipole	SID3700	SN 09/12 DIP 3G/700-361	Oct. 15 2022	Oct. 14 2025
☐	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Feb. 22, 2024	Feb. 21, 2027
☒	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
☒	R&S	Universal radio communication	CMU200	105747	Apr. 26, 2024	Apr. 25, 2025

		tester				
☒	R&S	Wideband radio communication tester	CMW500	103917	Apr. 26, 2024	Apr. 25, 2025
☒	HP	Network Analyzer	8753D	3410J01136	Apr. 26, 2024	Apr. 25, 2025
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power meter	E4419B	MY45102538	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	MY41495644	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	US39212148	Apr. 25, 2024	Apr. 24, 2025
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
☒	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V4_02_31

3. SAR 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 middle channel.
- (b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as setup photos demonstrates.
- (e) Set scan area, grid size and other setting on the OPENSAR software.
- (f) Measure SAR transmitting at the middle channel for all applicable exposure positions.
- (g) Identify the exposure position and device configuration resulting the highest SAR
- (h) Measure SAR at the lowest and highest channels at the worst exposure position and device configuration.

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

3.1. Power Reference

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 * 30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

3.3. Description of interpolation/extrapolation scheme

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 minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is used to determine 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 1 mm 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 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful for multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is defined in the standard IEEE1528 and IEC62209.

3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR 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 V/m. If the power drifts more than $\pm 5\%$, the SAR will be retested.

4. System Verification Procedure

4.1. Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% of weight)	Head Tissue								
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5000
Water	34.40	34.40	34.40	55.36	55.36	71.88	71.88	71.88	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	17.24
DGBE	0.00	0.00	0.00	13.84	13.84	7.99	7.99	7.99	0.00

For SAR measurement of the field distribution inside the phantom, the phantom must be filled with homogeneous tissue simulating liquid to a depth of at least 15 cm. For head SAR testing, the liquid depth from the ear reference point (ERP) of the phantom to the liquid top surface is larger than 15 cm.

Photo of Liquid depth for Head Position	Photo of Liquid depth for Body Position
	

4.1.1. Tissue Dielectric Parameter Check Results

The simulating liquids should be checked at the beginning of a series of SAR measurements to determine if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

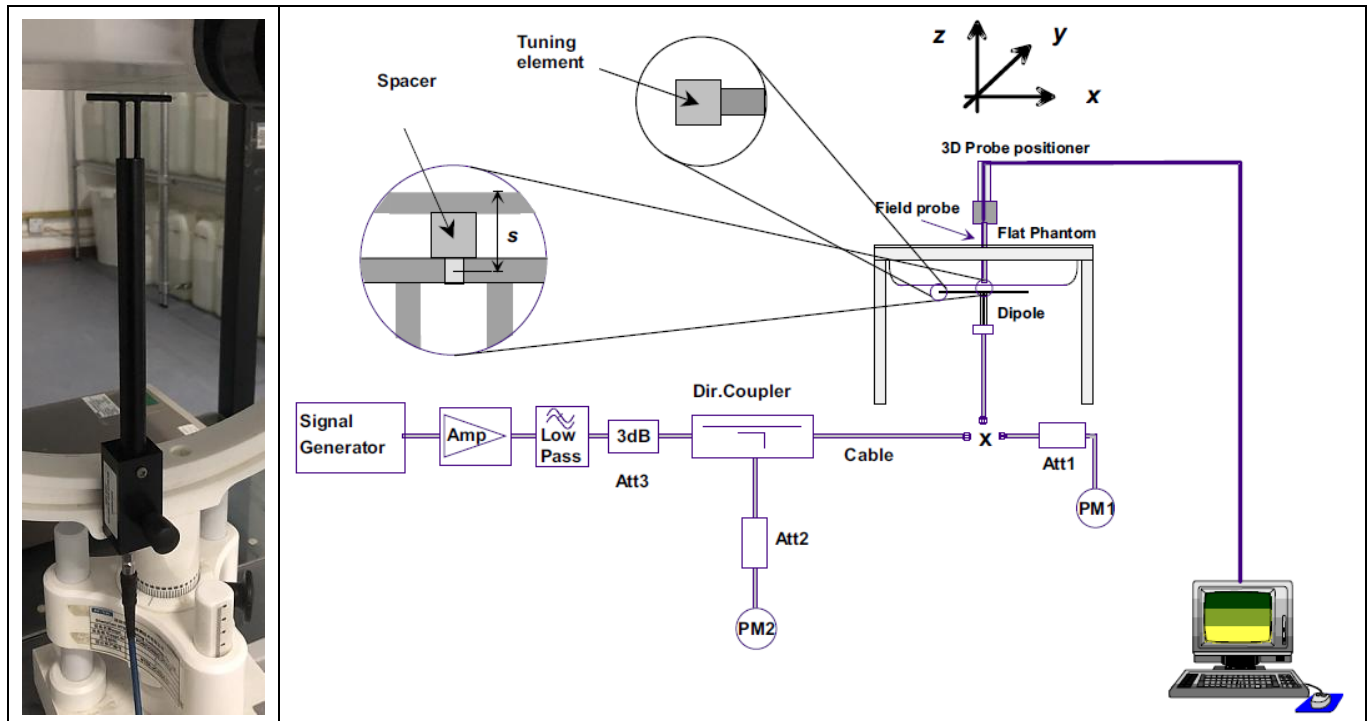
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		$\epsilon_r (\pm 5\%)$	$\sigma \text{ (S/m)} (\pm 5\%)$	ϵ_r	$\sigma \text{ (S/m)}$		
Head 750	750	41.96 (39.86~44.06)	0.89 (0.85~0.93)	40.57	0.90	21.3 °C	Sep. 09, 2024
Head 900	900	41.50 (39.43~43.58)	0.97 (0.92~1.02)	42.21	0.97	21.6 °C	Sep. 15, 2024
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.32	1.37	21.7 °C	Sep. 14, 2024
Head 2000	2000	40.00 (38.00~42.00)	1.40 (1.33~1.47)	40.99	1.39	21.0 °C	Sep. 02, 2024
Head 2300	2300	39.47 (37.50~41.44)	1.66 (1.58~1.74)	39.16	1.61	21.0 °C	Aug. 29, 2024
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.11	1.83	21.8 °C	Sep. 16, 2024
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	39.10	2.01	21.4 °C	Aug. 27, 2024

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

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. It is fed with a power of 100mW (below 5GHz) or 100mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



4.2.1. System Verification Results

Comparing to the original SAR value provided by SATIMO, the verification data should be within its specification of $\pm 10\%$. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance verification can meet the variation criterion and the plots can be referred to Appendix B of this report.

System Verification	Target SAR (1W) ($\pm 10\%$)		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
750MHz	8.60 (7.74~9.46)	5.78 (5.20~6.36)	8.69	5.86	21.3 °C	Sep. 09, 2024
900MHz	10.63 (9.57~11.69)	7.01 (6.31~7.71)	9.79	6.42	21.6 °C	Sep. 15, 2024
1800MHz	37.06 (33.35~40.77)	20.01 (18.01~22.01)	38.53	19.95	21.7 °C	Sep. 14, 2024
2000MHz	38.27 (34.44~42.10)	19.79 (17.81~21.77)	38.26	18.35	21.0 °C	Sep. 02, 2024
2300MHz	50.63 (45.57~55.69)	23.51 (21.16~25.86)	53.03	22.31	21.0 °C	Aug. 29, 2024
2450MHz	50.05 (45.05~55.06)	23.80 (21.42~26.18)	47.60	22.78	21.8 °C	Sep. 16, 2024
2600MHz	54.16 (48.74~59.58)	24.85 (22.37~27.34)	53.49	24.21	21.4 °C	Aug. 27, 2024

5. SAR Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2003. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (±%)	10 g Ui (±%)	Vi
Measurement System								
Probe Calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	√3	0.97	0.97	1.98	1.98	∞
Hemispherical Isotropy	5.9	R	√3	0.28	0.28	0.96	0.96	∞
Boundary Effect	1	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1	R	√3	1	1	0.58	0.58	∞
Modulation response	3	N	1	1	1	3.00	3.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	√3	1	1	0.00	0.00	∞
Integration Time	1.4	R	√3	1	1	0.81	0.81	∞
RF Ambient Conditions - Noise	3	R	√3	1	1	1.73	1.73	∞
RF Ambient Conditions - Reflections	3	R	√3	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe Positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Test sample Related								
Test Sample Positioning	2.6	N	1	1	1	2.60	2.60	11
Device Holder Uncertainty	3	N	1	1	1	3.00	3.00	7
Output Power Variation - SAR drift measurement	5	R	√3	1	1	2.89	2.89	∞
SAR scaling	2	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters								
Phantom Uncertainty (shape and thickness tolerances)	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid Conductivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid conductivity - measurement uncertainty	1.59	N	1	0.23	0.26	0.37	0.41	99

Liquid permittivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid permittivity - measurement uncertainty	1.65	N	1	0.23	0.26	0.38	0.43	99
Combined Standard Uncertainty		RSS				10.19	10.02	
Expanded Uncertainty (95% Confidence interval)		k				20.38	20.04	

6. RF Exposure Positions

6.1. Ear and handset reference point

Figure 6.1.1 shows the front, back, and side views of the SAM phantom. The center-of-mouth reference point is labeled “M”, the left ear reference point (ERP) is marked “LE”, and the right ERP is marked “RE”.



Fig 6.1.1 Front, back, and side views of SAM phantom

6.2. Definition of the cheek position

1. Define two imaginary lines on the handset, the vertical centerline and the horizontal line. The vertical centerline passes through two points on the front side of the handset: the midpoint of the width w_t of the handset at the level of the acoustic output (point A in Figure 6.2.1 and Figure 6.2.2), and the midpoint of the width w_b of the bottom of the handset (point B). The horizontal line is perpendicular to the vertical centerline and passes through the center of the acoustic output (see Figure 6.2.1). The two lines intersect at point A. Note that for many handsets, point A coincides with the center of the acoustic output; however, the acoustic output may be located elsewhere on the horizontal line. Also note that the vertical centerline is not necessarily parallel to the front face of the handset (see Figure 6.2.2), especially for clamshell handsets, handsets with flip covers, and other irregularly-shaped handsets.
2. Position the handset close to the surface of the phantom such that point A is on the (virtual) extension of the line passing through points RE and LE on the phantom (see Figure 6.2.3), such that the plane defined by the vertical centerline and the horizontal line of the handset is approximately parallel to the sagittal plane of the phantom.
3. Translate the handset towards the phantom along the line passing through RE and LE until handset point A touches the pinna at the ERP
4. While maintaining the handset in this plane, rotate it around the LE-RE line until the vertical centerline is in the plane normal to the plane containing B-M and N-F lines, i.e., the Reference Plane.
5. Rotate the handset around the vertical centerline until the handset (horizontal line) is parallel to the

N-F line.

- While maintaining the vertical centerline in the Reference Plane, keeping point A on the line passing through RE and LE, and maintaining the handset contact with the pinna, rotate the handset about the N-F line until any point on the handset is in contact with a phantom point below the pinna on the cheek. See Figure 6.2.3. The actual rotation angles should be documented in the test report.

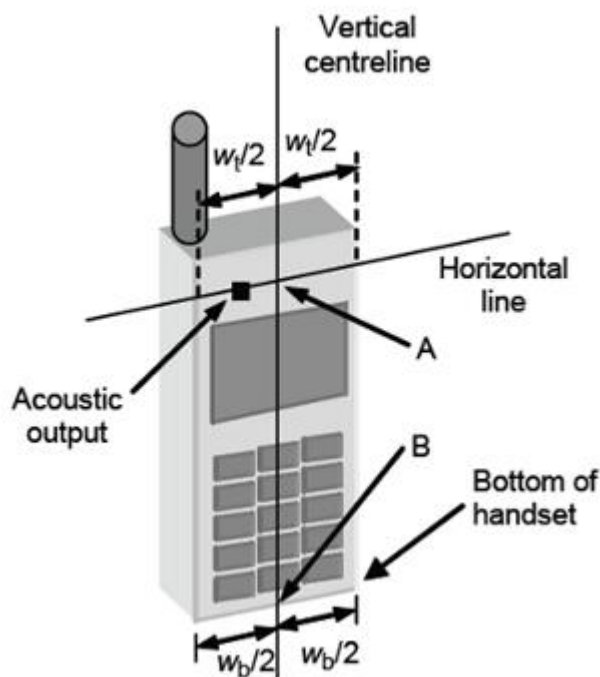


Fig 6.2.1 Handset vertical and horizontal reference lines—"fixed case"

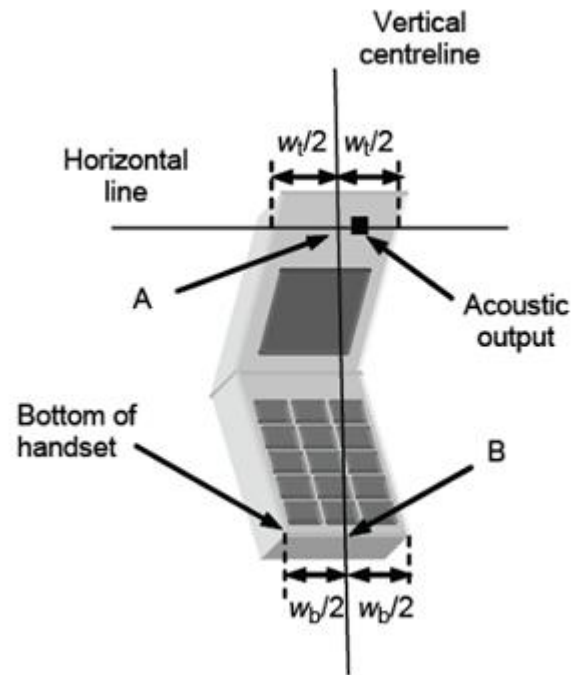


Fig 6.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

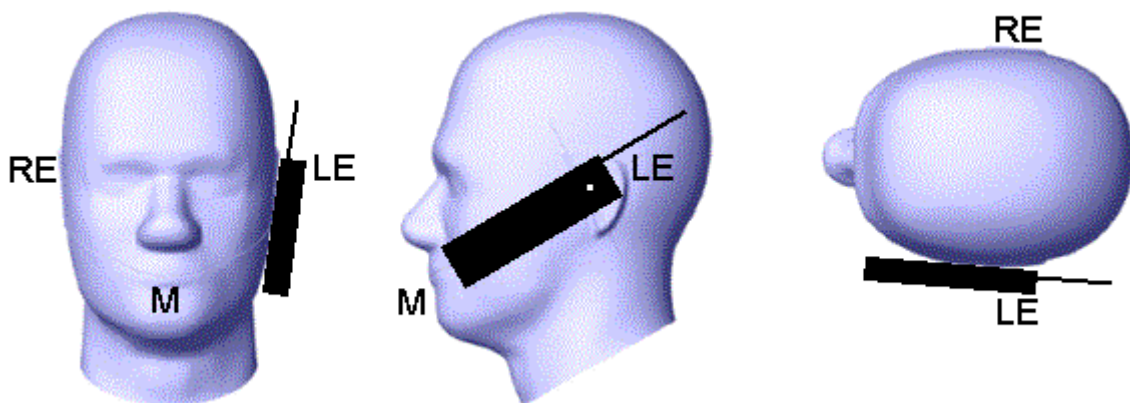


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

- While maintaining the orientation of the handset, retract the handset parallel to the reference plane

far enough away from the phantom to enable a rotation of the device by 15 degree.

2. Rotate the Handset around the horizontal line by 15 degree (see Figure 6.3.1).
3. While maintaining the orientation of the handset, move the handset towards the phantom on a line passing through RE and LE until any part of the handset touches the ear. The tilt position is obtained when the contact is on the pinna. If the contact is at any location other than the pinna, e.g., the antenna with the back of the phantom head, the angle of the handset shall be reduced. In this case, the tilt position is obtained if any part of the handset is in contact with the pinna as well as a second part of the handset is in contact with the phantom, e.g., the antenna with the back of the head.

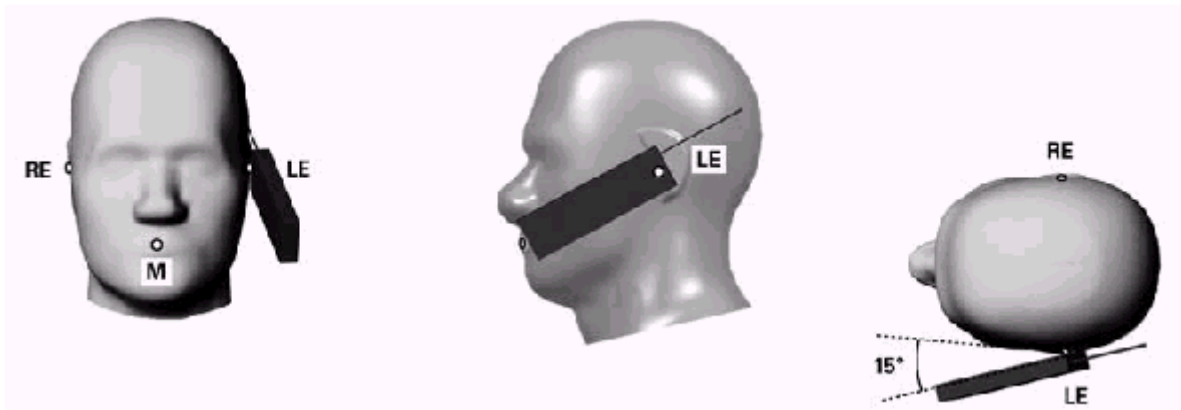


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer. The device shall be positioned as intended at the distance to the outer surface of the phantom that corresponds to the specified distance (See figure 6.1). Adjust the distance between the device surface and the flat phantom to 5mm.

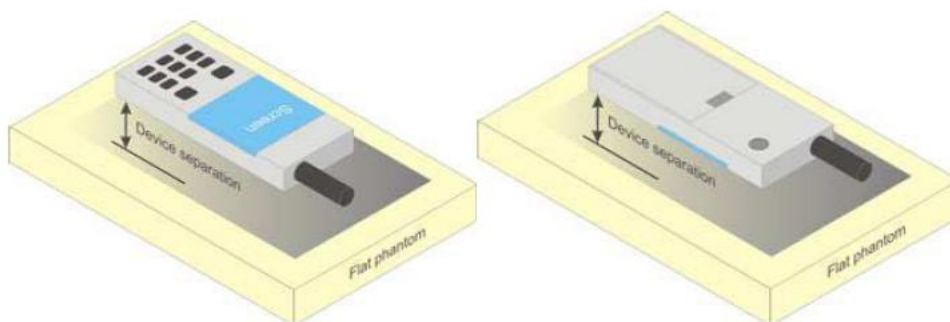


Figure 6.1 – Test positions for Body-worn device

7. RF Output Power

7.1. GSM Conducted Power

Band GSM900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	975	38	124	Tune-up	975	38	124
Frequency (MHz)		880.2	897.6	914.8		880.2	897.6	914.8
GSM (GMSK)	32.00	31.69	31.67	31.64	22.97	22.66	22.64	22.61
GPRS(GMSK,1 Tx slot)	32.00	31.76	31.68	31.67	22.97	22.73	22.65	22.64
GPRS(GMSK,2 Tx slot)	31.50	31.13	31.13	31.05	25.48	25.11	25.11	25.03
GPRS(GMSK,3 Tx slot)	30.00	29.67	29.64	29.52	25.74	25.41	25.38	25.26
GPRS(GMSK,4 Tx slot)	28.50	28.48	28.46	28.35	25.49	25.47	25.45	25.34
EGPRS(8PSK,1 Tx slot)	27.00	26.42	26.60	26.58	17.97	17.39	17.57	17.55
EGPRS(8PSK,2 Tx slot)	26.50	25.9	26.1	26.09	20.48	19.88	20.08	20.07
EGPRS(8PSK,3 Tx slot)	24.00	23.4	23.5	23.55	19.74	19.14	19.24	19.29
EGPRS(8PSK,4 Tx slot)	22.50	22.1	22.19	22.26	19.49	19.09	19.18	19.25
Band GSM1800	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	512	698	885	Tune-up	512	698	885
Frequency (MHz)		1710.2	1747.4	1784.8		1710.2	1747.4	1784.8
GSM (GMSK)	30.00	29.55	29.48	29.15	20.97	20.52	20.45	20.12
GPRS(GMSK,1 Tx slot)	30.00	29.70	29.57	29.23	20.97	20.67	20.54	20.20
GPRS(GMSK,2 Tx slot)	29.50	29.18	29.01	28.7	23.48	23.16	22.99	22.68
GPRS(GMSK,3 Tx slot)	27.50	27.38	27.26	27.03	23.24	23.12	23.00	22.77
GPRS(GMSK,4 Tx slot)	26.50	26.4	26.26	26.04	23.49	23.39	23.25	23.03
EGPRS(8PSK,1 Tx slot)	26.00	25.59	25.35	24.66	16.97	16.56	16.32	15.63
EGPRS(8PSK,2 Tx slot)	25.50	25.12	24.86	24.22	19.48	19.10	18.84	18.20
EGPRS(8PSK,3 Tx slot)	24.50	24.28	24.02	23.41	20.24	20.02	19.76	19.15
EGPRS(8PSK,4 Tx slot)	24.00	23.69	23.47	22.94	20.99	20.68	20.46	19.93

Note: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3.01 dB

7.2. WCDMA Conducted Power

WCDMA Band1	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	9612	9750	9888
Frequency (MHz)		1922.4	1950	1977.6
RMC12.2K	23.50	22.95	23.04	22.92
HSDPA Sub 1	22.50	22.49	22.29	22.35
HSDPA Sub 2	22.50	21.95	21.95	22.08
HSDPA Sub 3	22.00	21.60	21.59	21.74
HSDPA Sub 4	22.00	21.38	21.83	21.67
HSUPA Sub 1	22.50	22.40	22.10	22.15
HSUPA Sub 2	22.50	22.18	22.20	22.31
HSUPA Sub 3	22.00	21.86	21.81	21.90
HSUPA Sub 4	22.50	22.05	22.13	22.16
HSUPA Sub 5	22.50	21.80	21.93	22.04
WCDMA Band 8	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	2712	2788	2863
Frequency (MHz)		882.4	897.6	912.6
RMC12.2K	23.50	23.03	23.07	23.09
HSDPA Sub 1	23.50	23.01	22.73	22.32
HSDPA Sub 2	22.50	22.45	22.39	22.03
HSDPA Sub 3	22.50	22.09	22.22	21.83
HSDPA Sub 4	22.00	21.85	21.98	21.35
HSUPA Sub 1	23.00	22.71	22.67	22.06
HSUPA Sub 2	23.00	22.73	22.70	22.17
HSUPA Sub 3	22.50	22.31	22.36	21.85
HSUPA Sub 4	23.00	22.55	22.59	22.18
HSUPA Sub 5	23.00	22.22	22.51	21.76

7.3. LTE Conducted Power

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Tune-up	Power (dBm)
Band1	5	18025	1	#0	QPSK	23.50	23.35
Band1	5	18025	8	#0	QPSK	23.50	23.44
Band1	5	18025	25	#0	QPSK	23.50	22.30
Band1	5	18300	1	#0	QPSK	23.50	23.15
Band1	5	18300	8	#0	QPSK	23.50	23.41
Band1	5	18300	25	#0	QPSK	23.50	22.34
Band1	5	18575	1	#0	QPSK	23.50	23.22
Band1	5	18575	8	#0	QPSK	23.50	23.24
Band1	5	18575	25	#0	QPSK	23.50	22.35
Band1	20	18100	1	#0	QPSK	23.50	23.32
Band1	20	18100	18	#0	QPSK	23.50	23.33
Band1	20	18100	100	#0	QPSK	23.50	22.34
Band1	20	18300	1	#0	QPSK	23.50	23.31
Band1	20	18300	18	#0	QPSK	23.50	23.37
Band1	20	18300	100	#0	QPSK	23.50	22.34
Band1	20	18500	1	#0	QPSK	23.50	23.09
Band1	20	18500	18	#0	QPSK	23.50	23.14
Band1	20	18500	100	#0	QPSK	23.50	22.27
Band20	5	24175	1	#0	QPSK	24.00	23.39
Band20	5	24175	8	#0	QPSK	24.00	23.54
Band20	5	24175	25	#0	QPSK	24.00	22.52
Band20	5	24300	1	#0	QPSK	24.00	23.43
Band20	5	24300	8	#0	QPSK	24.00	23.52
Band20	5	24300	25	#0	QPSK	24.00	22.53
Band20	5	24425	1	#0	QPSK	24.00	23.19
Band20	5	24425	8	#0	QPSK	24.00	23.32
Band20	5	24425	25	#0	QPSK	24.00	22.25
Band20	20	24250	1	#0	QPSK	24.00	23.26
Band20	20	24250	18	#0	QPSK	24.00	23.60
Band20	20	24250	100	#0	QPSK	24.00	22.43
Band20	20	24300	1	#0	QPSK	24.00	23.54
Band20	20	24300	18	#0	QPSK	24.00	23.45
Band20	20	24300	100	#0	QPSK	24.00	22.56
Band20	20	24350	1	#0	QPSK	24.00	23.52

Band20	20	24350	18	#0	QPSK	24.00	23.63
Band20	20	24350	100	#0	QPSK	24.00	22.47
Band28	3	27225	1	#0	QPSK	23.50	23.19
Band28	3	27225	1	#Max	QPSK	23.50	23.21
Band28	3	27225	4	#0	QPSK	23.50	23.36
Band28	3	27225	4	#Max	QPSK	23.50	23.24
Band28	3	27360	1	#0	QPSK	23.50	23.26
Band28	3	27360	1	#Max	QPSK	23.50	23.24
Band28	3	27360	4	#0	QPSK	23.50	23.32
Band28	3	27360	4	#Max	QPSK	23.50	23.32
Band28	3	27495	1	#0	QPSK	23.50	23.17
Band28	3	27495	1	#Max	QPSK	23.50	23.21
Band28	3	27495	4	#0	QPSK	23.50	23.18
Band28	3	27495	4	#Max	QPSK	23.50	23.16
Band28	5	27235	1	#0	QPSK	23.50	23.16
Band28	5	27235	1	#Max	QPSK	23.50	23.12
Band28	5	27235	8	#0	QPSK	23.50	23.17
Band28	5	27235	8	#Max	QPSK	23.50	23.13
Band28	5	27385	1	#0	QPSK	23.50	23.20
Band28	5	27385	1	#Max	QPSK	23.50	23.18
Band28	5	27385	8	#0	QPSK	23.50	23.42
Band28	5	27385	8	#Max	QPSK	23.50	23.15
Band28	5	27635	1	#0	QPSK	23.50	23.11
Band28	5	27635	1	#Max	QPSK	23.50	23.16
Band28	5	27635	8	#0	QPSK	23.50	23.20
Band28	5	27635	8	#Max	QPSK	23.50	23.35
Band28	20	27310	1	#0	QPSK	23.50	23.21
Band28	20	27310	1	#Max	QPSK	23.50	23.16
Band28	20	27310	18	#0	QPSK	23.50	23.28
Band28	20	27310	18	#Max	QPSK	23.50	23.27
Band28	20	27460	1	#0	QPSK	23.50	23.29
Band28	20	27460	1	#Max	QPSK	23.50	23.10
Band28	20	27460	18	#0	QPSK	23.50	23.46
Band28	20	27460	18	#Max	QPSK	23.50	23.30
Band28	20	27560	1	#0	QPSK	23.50	23.27
Band28	20	27560	1	#Max	QPSK	23.50	23.19
Band28	20	27560	18	#0	QPSK	23.50	23.37
Band28	20	27560	18	#Max	QPSK	23.50	23.19
Band3	1.4	19207	1	#0	QPSK	24.00	23.37

Band3	1.4	19207	5	#0	QPSK	24.00	23.52
Band3	1.4	19207	6	#0	QPSK	24.00	22.46
Band3	1.4	19575	1	#0	QPSK	24.00	23.43
Band3	1.4	19575	5	#0	QPSK	24.00	23.50
Band3	1.4	19575	6	#0	QPSK	24.00	22.59
Band3	1.4	19943	1	#0	QPSK	24.00	23.21
Band3	1.4	19943	5	#0	QPSK	24.00	23.48
Band3	1.4	19943	6	#0	QPSK	24.00	22.35
Band3	5	19225	1	#0	QPSK	24.00	23.33
Band3	5	19225	8	#0	QPSK	24.00	23.54
Band3	5	19225	25	#0	QPSK	24.00	22.41
Band3	5	19575	1	#0	QPSK	24.00	23.38
Band3	5	19575	8	#0	QPSK	24.00	23.50
Band3	5	19575	25	#0	QPSK	24.00	22.47
Band3	5	19925	1	#0	QPSK	24.00	23.27
Band3	5	19925	8	#0	QPSK	24.00	23.46
Band3	5	19925	25	#0	QPSK	24.00	22.31
Band3	20	19300	1	#0	QPSK	24.00	23.37
Band3	20	19300	18	#0	QPSK	24.00	23.55
Band3	20	19300	100	#0	QPSK	24.00	22.62
Band3	20	19575	1	#0	QPSK	24.00	23.38
Band3	20	19575	18	#0	QPSK	24.00	23.61
Band3	20	19575	100	#0	QPSK	24.00	22.46
Band3	20	19850	1	#0	QPSK	24.00	23.33
Band3	20	19850	18	#0	QPSK	24.00	23.41
Band3	20	19850	100	#0	QPSK	24.00	22.44
Band38	5	37775	1	#0	QPSK	24.00	23.42
Band38	5	37775	8	#0	QPSK	24.00	23.52
Band38	5	37775	25	#0	QPSK	24.00	22.38
Band38	5	38000	1	#0	QPSK	24.00	23.33
Band38	5	38000	8	#0	QPSK	24.00	23.36
Band38	5	38000	25	#0	QPSK	24.00	22.42
Band38	5	38225	1	#0	QPSK	24.00	23.29
Band38	5	38225	8	#0	QPSK	24.00	23.40
Band38	5	38225	25	#0	QPSK	24.00	22.33
Band38	20	37850	1	#0	QPSK	24.00	23.62
Band38	20	37850	18	#0	QPSK	24.00	23.46
Band38	20	37850	100	#0	QPSK	24.00	22.47
Band38	20	38000	1	#0	QPSK	24.00	23.43

Band38	20	38000	18	#0	QPSK	24.00	23.42
Band38	20	38000	100	#0	QPSK	24.00	22.31
Band38	20	38150	1	#0	QPSK	24.00	23.28
Band38	20	38150	18	#0	QPSK	24.00	23.29
Band38	20	38150	100	#0	QPSK	24.00	22.23
Band40	5	38675	1	#0	QPSK	23.50	23.24
Band40	5	38675	8	#0	QPSK	23.50	23.26
Band40	5	38675	25	#0	QPSK	23.50	22.19
Band40	5	39150	1	#0	QPSK	23.50	23.24
Band40	5	39150	8	#0	QPSK	23.50	23.27
Band40	5	39150	25	#0	QPSK	23.50	22.19
Band40	5	39625	1	#0	QPSK	23.50	23.25
Band40	5	39625	8	#0	QPSK	23.50	23.31
Band40	5	39625	25	#0	QPSK	23.50	22.24
Band40	20	38750	1	#0	QPSK	23.50	23.31
Band40	20	38750	18	#0	QPSK	23.50	23.24
Band40	20	38750	100	#0	QPSK	23.50	22.25
Band40	20	39150	1	#0	QPSK	23.50	23.39
Band40	20	39150	18	#0	QPSK	23.50	23.35
Band40	20	39150	100	#0	QPSK	23.50	22.35
Band40	20	39550	1	#0	QPSK	23.50	23.35
Band40	20	39550	18	#0	QPSK	23.50	23.16
Band40	20	39550	100	#0	QPSK	23.50	22.16
Band7	5	20775	1	#0	QPSK	23.50	22.81
Band7	5	20775	8	#0	QPSK	23.50	22.97
Band7	5	20775	25	#0	QPSK	23.50	21.81
Band7	5	21100	1	#0	QPSK	23.50	22.70
Band7	5	21100	8	#0	QPSK	23.50	22.81
Band7	5	21100	25	#0	QPSK	23.50	21.79
Band7	5	21425	1	#0	QPSK	23.50	23.01
Band7	5	21425	8	#0	QPSK	23.50	23.10
Band7	5	21425	25	#0	QPSK	23.50	22.12
Band7	20	20850	1	#0	QPSK	23.50	22.76
Band7	20	20850	18	#0	QPSK	23.50	22.93
Band7	20	20850	100	#0	QPSK	23.50	21.85
Band7	20	21100	1	#0	QPSK	23.50	22.78
Band7	20	21100	18	#0	QPSK	23.50	22.83
Band7	20	21100	100	#0	QPSK	23.50	21.88
Band7	20	21350	1	#0	QPSK	23.50	22.89

Band7	20	21350	18	#0	QPSK	23.50	23.05
Band7	20	21350	100	#0	QPSK	23.50	22.12
Band8	1.4	21457	1	#0	QPSK	23.00	22.89
Band8	1.4	21457	5	#0	QPSK	23.00	22.83
Band8	1.4	21457	6	#0	QPSK	23.00	21.83
Band8	1.4	21625	1	#0	QPSK	23.00	22.72
Band8	1.4	21625	5	#0	QPSK	23.00	22.79
Band8	1.4	21625	6	#0	QPSK	23.00	21.94
Band8	1.4	21793	1	#0	QPSK	23.00	22.74
Band8	1.4	21793	5	#0	QPSK	23.00	22.74
Band8	1.4	21793	6	#0	QPSK	23.00	21.82
Band8	5	21475	1	#0	QPSK	23.00	22.77
Band8	5	21475	8	#0	QPSK	23.00	22.94
Band8	5	21475	25	#0	QPSK	23.00	21.77
Band8	5	21625	1	#0	QPSK	23.00	22.65
Band8	5	21625	8	#0	QPSK	23.00	22.95
Band8	5	21625	25	#0	QPSK	23.00	21.75
Band8	5	21775	1	#0	QPSK	23.00	22.64
Band8	5	21775	8	#0	QPSK	23.00	22.84
Band8	5	21775	25	#0	QPSK	23.00	21.83
Band8	10	21500	1	#0	QPSK	23.00	22.93
Band8	10	21500	12	#0	QPSK	23.00	22.83
Band8	10	21500	50	#0	QPSK	23.00	21.79
Band8	10	21625	1	#0	QPSK	23.00	22.77
Band8	10	21625	12	#0	QPSK	23.00	22.89
Band8	10	21625	50	#0	QPSK	23.00	21.82
Band8	10	21750	1	#0	QPSK	23.00	22.87
Band8	10	21750	12	#0	QPSK	23.00	22.90
Band8	10	21750	50	#0	QPSK	23.00	21.80

7.4. WLAN & Bluetooth Output Power

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	15.00	13.98
	7	2442	15.00	14.62
	13	2472	15.00	13.95
802.11g	1	2412	14.00	12.08
	7	2442	14.00	13.76
	13	2472	14.00	12.28

802.11n (HT20)	1	2412	12.00	10.97
	7	2442	12.00	11.67
	13	2472	12.00	11.70

NOTE: Power measurement results of WLAN 2.4G.

BR+EDR	Data Rates	Tune - up(dBm)	Output Power (dBm)
	GFSK DH5	3.50	3.26
	Pi/4 DQPSK DH5	3.00	2.61
	8DPSK DH5	3.00	2.62

BLE	Channel	Tune - up	Output Power (dBm)
	0CH	-0.50	-0.55
	19CH	-1.00	-1.06
	39CH	0.00	-0.34

NOTE: Power measurement results of Bluetooth. Refer to EN 62479, the available power of this EUT is 3.50dBm (2.24mW), the power is less than the low-power exclusion level defined in 4.2 (P max: 20mW), So Bluetooth stand-alone SAR is not required

8. Assessment of the compliance of low power equipment

According to EN 62479 Clause 4.1& 4.2, these require does not apply to the receivers that has no transmit. So, GPS and FM is compliance.

9. SAR Results

9.1. SAR measurement results

9.1.1. SAR measurement Result of GSM900

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	38/897.6	GPRS(GMSK 3TS)	0	0.164	0.125	0.34	29.64	30.00	0.136	2024/9/15
Left Tilt 15 Degree	38/897.6	GPRS(GMSK 3TS)	0	0.089	0.068	-2.79	29.64	30.00	0.074	2024/9/15
Right Cheek	38/897.6	GPRS(GMSK 3TS)	0	0.147	0.106	0.24	29.64	30.00	0.115	2024/9/15

		3TS)								
Right Tilt 15 Degree	38/897.6	GPRS(GMSK 3TS)	0	0.069	0.050	4.38	29.64	30.00	0.054	2024/9/15
Left Cheek	975/880.2	GPRS(GMSK 3TS)	0	0.144	0.108	0.87	29.67	30.00	0.117	2024/9/15
Left Cheek	124/914.8	GPRS(GMSK 3TS)	0	0.153	0.111	-0.21	29.52	30.00	0.124	2024/9/15
Extremity										
Front Side	38/897.6	GPRS(GMSK 3TS)	0	0.472	0.302	-1.99	29.64	30.00	0.328	2024/9/15
Back Side	38/897.6	GPRS(GMSK 3TS)	0	0.597	0.386	-1.99	29.64	30.00	0.419	2024/9/15
Left Side	38/897.6	GPRS(GMSK 3TS)	0	0.579	0.363	-0.56	29.64	30.00	0.394	2024/9/15
Right Side	38/897.6	GPRS(GMSK 3TS)	0	0.030	0.019	0.96	29.64	30.00	0.021	2024/9/15
Top Side	38/897.6	GPRS(GMSK 3TS)	0	0.400	0.259	-0.64	29.64	30.00	0.281	2024/9/15
Bottom Side	38/897.6	GPRS(GMSK 3TS)	0	0.012	0.010	-3.37	29.64	30.00	0.011	2024/9/15
Back Side	975/880.2	GPRS(GMSK 3TS)	0	0.567	0.352	0.67	29.67	30.00	0.380	2024/9/15
Back Side	124/914.8	GPRS(GMSK 3TS)	0	0.555	0.348	3.22	29.52	30.00	0.389	2024/9/15
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	38/897.6	GPRS(GMSK 3TS)	5	0.299	0.184	-1.68	29.64	30.00	0.200	2024/9/15

9.1.2. SAR measurement Result of GSM1800

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	698/1747.4	GPRS(GMSK 4TS)	0	0.361	0.227	0.36	26.26	26.50	0.240	2024/9/14
Left Tilt 15 Degree	698/1747.4	GPRS(GMSK 4TS)	0	0.206	0.126	-1.84	26.26	26.50	0.133	2024/9/14
Right Cheek	698/1747.4	GPRS(GMSK	0	0.318	0.192	-1.38	26.26	26.50	0.203	2024/9/14

		4TS)								
Right Tilt 15 Degree	698/1747.4	GPRS(GMSK 4TS)	0	0.149	0.089	-0.86	26.26	26.50	0.094	2024/9/14
Left Cheek	512/1710.2	GPRS(GMSK 4TS)	0	0.338	0.208	-4.37	26.40	26.50	0.213	2024/9/16
Left Cheek	885/1784.8	GPRS(GMSK 4TS)	0	0.340	0.205	0.81	26.04	26.50	0.228	2024/8/27
Extremity										
Front Side	698/1747.4	GPRS(GMSK 4TS)	0	1.339	0.620	0.54	26.26	26.50	0.655	2024/9/14
Back Side	698/1747.4	GPRS(GMSK 4TS)	0	1.762	0.850	-1.12	26.26	26.50	0.898	2024/9/14
Left Side	698/1747.4	GPRS(GMSK 4TS)	0	1.744	0.833	-3.07	26.26	26.50	0.880	2024/9/14
Right Side	698/1747.4	GPRS(GMSK 4TS)	0	0.141	0.067	-2.86	26.26	26.50	0.071	2024/9/14
Top Side	698/1747.4	GPRS(GMSK 4TS)	0	1.163	0.544	1.76	26.26	26.50	0.575	2024/9/14
Bottom Side	698/1747.4	GPRS(GMSK 4TS)	0	0.070	0.033	1.62	26.26	26.50	0.035	2024/9/14
Back Side	512/1710.2	GPRS(GMSK 4TS)	0	1.639	0.775	-3.55	26.40	26.50	0.793	2024/9/14
Back Side	885/1784.8	GPRS(GMSK 4TS)	0	1.744	0.803	2.60	26.04	26.50	0.893	2024/9/14
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	698/1747.4	GPRS(GMSK 4TS)	5	1.145	0.552	-1.83	26.26	26.50	0.583	2024/9/14

9.1.3. SAR measurement Result of WCDMA Band 1

Test Position	Test channel /Freq	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
				Head						
Left Cheek	9750/1950	RMC12.2K	0	0.659	0.386	-1.05	23.04	23.50	0.429	2024/9/02
Left Tilt 15 Degree	9750/1950	RMC12.2K	0	0.344	0.199	0.35	23.04	23.50	0.221	2024/9/02
Right Cheek	9750/1950	RMC12.2K	0	0.561	0.329	-1.59	23.04	23.50	0.366	2024/9/02
Right Tilt 15 Degree	9750/1950	RMC12.2K	0	0.272	0.156	2.45	23.04	23.50	0.173	2024/9/02

Left Cheek	9612/1922.4	RMC12.2K	0	0.605	0.340	-1.37	22.95	23.50	0.386	2024/9/02
Left Cheek	9888/1977.6	RMC12.2K	0	0.564	0.317	-2.38	22.92	23.50	0.362	2024/9/02
Extremity										
Front Side	9750/1950	RMC12.2K	0	2.560	1.151	3.01	23.04	23.50	1.280	2024/9/02
Back Side	9750/1950	RMC12.2K	0	3.413	1.566	-0.97	23.04	23.50	1.741	2024/9/02
Left Side	9750/1950	RMC12.2K	0	3.379	1.535	1.05	23.04	23.50	1.707	2024/9/02
Right Side	9750/1950	RMC12.2K	0	0.239	0.109	-1.42	23.04	23.50	0.121	2024/9/02
Top Side	9750/1950	RMC12.2K	0	2.389	1.041	-1.94	23.04	23.50	1.157	2024/9/02
Bottom Side	9750/1950	RMC12.2K	0	0.068	0.031	3.64	23.04	23.50	0.034	2024/9/02
Back Side	9612/1922.4	RMC12.2K	0	3.208	1.413	0.10	22.95	23.50	1.604	2024/9/02
Back Side	9888/1977.6	RMC12.2K	0	3.379	1.500	0.74	22.92	23.50	1.714	2024/9/02
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	9750/1950	RMC12.2K	5	1.707	0.768	-1.88	23.04	23.50	0.854	2024/9/02

9.1.4. SAR measurement Result of WCDMA Band 8

Test Position	Test channel /Freq	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	2788/897.6	RMC12.2K	0	0.308	0.232	0.89	23.07	23.50	0.256	2024/9/15
Left Tilt 15 Degree	2788/897.6	RMC12.2K	0	0.165	0.121	4.81	23.07	23.50	0.134	2024/9/15
Right Cheek	2788/897.6	RMC12.2K	0	0.291	0.210	1.06	23.07	23.50	0.232	2024/9/15
Right Tilt 15 Degree	2788/897.6	RMC12.2K	0	0.142	0.107	-3.80	23.07	23.50	0.118	2024/9/15
Left Cheek	2712/882.4	RMC12.2K	0	0.265	0.196	-2.86	23.03	23.50	0.218	2024/8/29
Left Cheek	2863/912.6	RMC12.2K	0	0.286	0.215	2.27	23.09	23.50	0.236	2024/9/16
Extremity										
Front Side	2788/897.6	RMC12.2K	0	0.891	0.555	-1.17	23.07	23.50	0.613	2024/9/15
Back Side	2788/897.6	RMC12.2K	0	1.157	0.721	-0.37	23.07	23.50	0.796	2024/9/15
Left Side	2788/897.6	RMC12.2K	0	1.145	0.714	-2.59	23.07	23.50	0.788	2024/9/15
Right Side	2788/897.6	RMC12.2K	0	0.081	0.049	2.50	23.07	23.50	0.054	2024/9/15
Top Side	2788/897.6	RMC12.2K	0	0.775	0.459	-1.25	23.07	23.50	0.507	2024/9/15
Bottom Side	2788/897.6	RMC12.2K	0	0.046	0.028	3.57	23.07	23.50	0.031	2024/9/15
Back Side	2712/882.4	RMC12.2K	0	1.064	0.630	0.69	23.03	23.50	0.702	2024/9/15
Back Side	2863/912.6	RMC12.2K	0	1.134	0.707	-0.19	23.09	23.50	0.777	2024/9/15
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	2788/897.6	RMC12.2K	5	0.752	0.464	1.34	23.07	23.50	0.512	2024/9/15

9.1.5. SAR measurement Result of LTE Band 1

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				(W/kg)						
				1-g	10-g					
Head										
Left Cheek	18300/1950	20M QPSK(1,0)	0	0.670	0.405	-0.05	23.31	23.50	0.423	2024/9/02
Left Tilt 15 Degree	18300/1950	20M QPSK(1,0)	0	0.395	0.236	-3.51	23.31	23.50	0.247	2024/9/02
Right Cheek	18300/1950	20M QPSK(1,0)	0	0.597	0.343	0.45	23.31	23.50	0.358	2024/9/02
Right Tilt 15 Degree	18300/1950	20M QPSK(1,0)	0	0.305	0.183	0.55	23.31	23.50	0.191	2024/9/02
Left Cheek	18100/1930	20M QPSK(1,0)	0	0.601	0.345	-0.22	23.32	23.50	0.360	2024/9/02
Left Cheek	18500/1970	20M QPSK(1,0)	0	0.575	0.344	-4.35	23.09	23.50	0.378	2024/9/02
Extremity										
Front Side	18300/1950	20M QPSK(1,0)	0	2.978	1.360	-1.65	23.31	23.50	1.421	2024/9/02
Back Side	18300/1950	20M QPSK(1,0)	0	3.770	1.794	-0.69	23.31	23.50	1.874	2024/9/02
Left Side	18300/1950	20M QPSK(1,0)	0	3.582	1.619	1.03	23.31	23.50	1.691	2024/9/02
Right Side	18300/1950	20M QPSK(1,0)	0	0.302	0.141	1.54	23.31	23.50	0.147	2024/9/02
Top Side	18300/1950	20M QPSK(1,0)	0	2.639	1.231	2.29	23.31	23.50	1.286	2024/9/02
Bottom Side	18300/1950	20M QPSK(1,0)	0	0.151	0.072	-2.62	23.31	23.50	0.075	2024/9/02
Back Side	18100/1930	20M QPSK(1,0)	0	3.468	1.584	3.99	23.32	23.50	1.651	2024/9/02
Back Side	18500/1970	20M QPSK(1,0)	0	3.506	1.668	2.18	23.09	23.50	1.833	2024/9/02
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	18300/1950	20M QPSK(1,0)	5	1.923	0.897	-0.03	23.31	23.50	0.937	2024/9/02

9.1.6. SAR measurement Result of LTE Band 3

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	19575/1747.5	20M QPSK(1,0)	0	0.821	0.549	-0.26	23.38	24.00	0.633	2024/9/14
Left Tilt 15 Degree	19575/1747.5	20M QPSK(1,0)	0	0.465	0.302	2.08	23.38	24.00	0.348	2024/9/14
Right Cheek	19575/1747.5	20M QPSK(1,0)	0	0.734	0.471	-1.91	23.38	24.00	0.543	2024/9/14
Right Tilt 15 Degree	19575/1747.5	20M QPSK(1,0)	0	0.347	0.220	-2.34	23.38	24.00	0.254	2024/9/14
Left Cheek	19300/1720	20M QPSK(1,0)	0	0.709	0.469	-0.67	23.37	24.00	0.542	2024/9/14
Left Cheek	19850/1775	20M QPSK(1,0)	0	0.719	0.471	-3.98	23.33	24.00	0.550	2024/9/14
Extremity										
Front Side	19575/1747.5	20M QPSK(1,0)	0	3.012	1.461	3.02	23.38	24.00	1.685	2024/9/14
Back Side	19575/1747.5	20M QPSK(1,0)	0	4.016	2.051	1.50	23.38	24.00	2.366	2024/9/14
Left Side	19575/1747.5	20M QPSK(1,0)	0	3.855	1.910	-3.59	23.38	24.00	2.203	2024/9/14
Right Side	19575/1747.5	20M QPSK(1,0)	0	0.120	0.059	2.35	23.38	24.00	0.068	2024/9/14
Top Side	19575/1747.5	20M QPSK(1,0)	0	2.811	1.393	2.01	23.38	24.00	1.607	2024/9/14
Bottom Side	19575/1747.5	20M QPSK(1,0)	0	0.120	0.061	2.44	23.38	24.00	0.070	2024/9/14
Back Side	19300/1720	20M QPSK(1,0)	0	3.655	1.867	-2.26	23.37	24.00	2.158	2024/9/14
Back Side	19850/1775	20M QPSK(1,0)	0	3.896	1.930	-3.24	23.33	24.00	2.252	2024/9/14
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	19575/1747.5	20M QPSK(1,0)	5	2.008	1.005	3.34	23.38	24.00	1.159	2024/9/14

9.1.7. SAR measurement Result of LTE Band 7

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	21100/2535	20M QPSK(1,0)	0	0.786	0.385	1.56	22.78	23.50	0.454	2024/8/27
Left Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0	0.417	0.194	-2.70	22.78	23.50	0.229	2024/8/27
Right Cheek	21100/2535	20M QPSK(1,0)	0	0.742	0.363	-3.70	22.78	23.50	0.428	2024/8/27
Right Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0	0.406	0.199	1.90	22.78	23.50	0.235	2024/8/27
Left Cheek	20850/2510	20M QPSK(1,0)	0	0.725	0.337	-1.52	22.76	23.50	0.400	2024/8/27
Left Cheek	21350/2560	20M QPSK(1,0)	0	0.729	0.354	-1.52	22.89	23.50	0.407	2024/8/27
Extremity										
Front Side	21100/2535	20M QPSK(1,0)	0	4.653	1.858	-3.53	22.78	23.50	2.193	2024/8/27
Back Side	21100/2535	20M QPSK(1,0)	0	5.816	2.394	-0.85	22.78	23.50	2.826	2024/8/27
Left Side	21100/2535	20M QPSK(1,0)	0	5.525	2.206	-3.37	22.78	23.50	2.604	2024/8/27
Right Side	21100/2535	20M QPSK(1,0)	0	0.291	0.115	1.14	22.78	23.50	0.136	2024/8/27
Top Side	21100/2535	20M QPSK(1,0)	0	3.780	1.525	-3.73	22.78	23.50	1.800	2024/8/27
Bottom Side	21100/2535	20M QPSK(1,0)	0	0.291	0.116	-1.84	22.78	23.50	0.137	2024/8/27
Back Side	20850/2510	20M QPSK(1,0)	0	6.233	2.560	0.30	22.76	23.50	3.036	2024/8/27
Back Side	21350/2560	20M QPSK(1,0)	0	5.894	2.353	2.20	22.89	23.50	2.708	2024/8/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	20850/2510	20M QPSK(1,0)	5	3.082	1.256	-1.39	22.78	23.50	1.482	2024/8/27

9.1.8. SAR measurement Result of LTE Band 8

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	21625/897.5	10M QPSK(1,0)	0	0.193	0.149	-0.15	22.77	23.00	0.157	2024/9/15
Left Tilt 15 Degree	21625/897.5	10M QPSK(1,0)	0	0.104	0.078	2.34	22.77	23.00	0.082	2024/9/15
Right Cheek	21625/897.5	10M QPSK(1,0)	0	0.167	0.129	-1.07	22.77	23.00	0.136	2024/9/15
Right Tilt 15 Degree	21625/897.5	10M QPSK(1,0)	0	0.080	0.060	4.18	22.77	23.00	0.063	2024/9/15
Left Cheek	21500/885	10M QPSK(1,0)	0	0.165	0.124	-1.16	22.93	23.00	0.126	2024/9/15
Left Cheek	21750/910	10M QPSK(1,0)	0	0.169	0.130	-4.18	22.87	23.00	0.134	2024/9/15
Extremity										
Front Side	21625/897.5	10M QPSK(1,0)	0	0.786	0.505	2.17	22.77	23.00	0.532	2024/9/15
Back Side	21625/897.5	10M QPSK(1,0)	0	0.995	0.639	0.47	22.77	23.00	0.674	2024/9/15
Left Side	21625/897.5	10M QPSK(1,0)	0	0.955	0.607	-2.41	22.77	23.00	0.640	2024/9/15
Right Side	21625/897.5	10M QPSK(1,0)	0	0.070	0.045	-0.97	22.77	23.00	0.047	2024/9/15
Top Side	21625/897.5	10M QPSK(1,0)	0	0.687	0.424	-3.58	22.77	23.00	0.447	2024/9/15
Bottom Side	21625/897.5	10M QPSK(1,0)	0	0.040	0.025	-1.00	22.77	23.00	0.026	2024/9/15
Back Side	21500/885	10M QPSK(1,0)	0	0.945	0.601	0.42	22.93	23.00	0.611	2024/9/15
Back Side	21750/910	10M QPSK(1,0)	0	0.985	0.614	-3.05	22.87	23.00	0.633	2024/9/15
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	21625/897.5	10M QPSK(1,0)	5	0.597	0.383	-1.07	22.77	23.00	0.404	2024/9/15

9.1.9. SAR measurement Result of LTE Band 20

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	24300/847	20M QPSK(1,0)	0	0.180	0.142	4.03	23.54	24.00	0.158	2024/9/15
Left Tilt 15 Degree	24300/847	20M QPSK(1,0)	0	0.108	0.081	5.71	23.54	24.00	0.090	2024/9/15
Right Cheek	24300/847	20M QPSK(1,0)	0	0.159	0.122	-2.83	23.54	24.00	0.136	2024/9/15
Right Tilt 15 Degree	24300/847	20M QPSK(1,0)	0	0.076	0.058	3.72	23.54	24.00	0.064	2024/9/15
Left Cheek	24250/842	20M QPSK(1,0)	0	0.169	0.132	2.22	23.26	24.00	0.157	2024/9/15
Left Cheek	24350/852	20M QPSK(1,0)	0	0.160	0.121	-4.09	23.52	24.00	0.135	2024/9/15
Extremity										
Front Side	24300/847	20M QPSK(1,0)	0	0.887	0.553	2.25	23.54	24.00	0.615	2024/9/15
Back Side	24300/847	20M QPSK(1,0)	0	1.152	0.740	0.43	23.54	24.00	0.823	2024/9/15
Left Side	24300/847	20M QPSK(1,0)	0	1.140	0.710	1.35	23.54	24.00	0.789	2024/9/15
Right Side	24300/847	20M QPSK(1,0)	0	0.046	0.029	-1.87	23.54	24.00	0.032	2024/9/15
Top Side	24300/847	20M QPSK(1,0)	0	0.795	0.490	1.41	23.54	24.00	0.545	2024/9/15
Bottom Side	24300/847	20M QPSK(1,0)	0	0.023	0.014	-0.45	23.54	24.00	0.016	2024/9/15
Back Side	24250/842	20M QPSK(1,0)	0	1.060	0.654	2.63	23.26	24.00	0.775	2024/9/15
Back Side	24350/852	20M QPSK(1,0)	0	1.152	0.703	-2.89	23.52	24.00	0.785	2024/9/15
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	24300/847	20M QPSK(1,0)	5	0.703	0.434	3.59	23.54	24.00	0.482	2024/9/15

9.1.10. SAR measurement Result of LTE Band 28

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	27460/728	20M QPSK(1,0)	0	0.228	0.185	0.85	23.29	23.50	0.194	2024/9/09
Left Tilt 15 Degree	27460/728	20M QPSK(1,0)	0	0.131	0.102	-0.42	23.29	23.50	0.107	2024/9/09
Right Cheek	27460/728	20M QPSK(1,0)	0	0.206	0.160	-4.52	23.29	23.50	0.168	2024/9/09
Right Tilt 15 Degree	27460/728	20M QPSK(1,0)	0	0.111	0.087	1.61	23.29	23.50	0.091	2024/9/09
Left Cheek	27310/713	20M QPSK(1,0)	0	0.210	0.164	-4.91	23.21	23.50	0.175	2024/9/02
Left Cheek	27560/738	20M QPSK(1,0)	0	0.199	0.158	-4.10	23.27	23.50	0.167	2024/8/29
Extremity										
Front Side	27460/728	20M QPSK(1,0)	0	0.977	0.526	3.45	23.29	23.50	0.552	2024/9/09
Back Side	27460/728	20M QPSK(1,0)	0	1.221	0.685	1.81	23.29	23.50	0.719	2024/9/09
Left Side	27460/728	20M QPSK(1,0)	0	1.221	0.651	2.53	23.29	23.50	0.683	2024/9/09
Right Side	27460/728	20M QPSK(1,0)	0	0.037	0.020	0.40	23.29	23.50	0.021	2024/9/09
Top Side	27460/728	20M QPSK(1,0)	0	0.818	0.454	-2.03	23.29	23.50	0.476	2024/9/09
Bottom Side	27460/728	20M QPSK(1,0)	0	0.012	0.010	3.49	23.29	23.50	0.010	2024/9/09
Back Side	27310/713	20M QPSK(1,0)	0	1.136	0.637	0.63	23.21	23.50	0.681	2024/9/09
Back Side	27560/738	20M QPSK(1,0)	0	1.160	0.631	2.46	23.27	23.50	0.665	2024/9/09
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	27460/728	20M QPSK(1,0)	5	0.733	0.411	2.18	23.29	23.50	0.431	2024/9/09

9.1.11. SAR measurement Result of LTE Band 38

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	38000/2595	20M QPSK(1,0)	0	0.471	0.248	-1.44	23.43	24.00	0.283	2024/8/27
Left Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0	0.274	0.141	0.29	23.43	24.00	0.161	2024/8/27
Right Cheek	38000/2595	20M QPSK(1,0)	0	0.416	0.208	0.92	23.43	24.00	0.237	2024/8/27
Right Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0	0.208	0.108	-1.17	23.43	24.00	0.123	2024/8/27
Left Cheek	37850/2580	20M QPSK(1,0)	0	0.422	0.211	-0.62	23.62	24.00	0.230	2024/8/27
Left Cheek	38150/2610	20M QPSK(1,0)	0	0.410	0.216	-3.14	23.28	24.00	0.255	2024/8/27
Extremity										
Front Side	38000/2595	20M QPSK(1,0)	0	2.474	1.226	0.68	23.43	24.00	1.398	2024/8/27
Back Side	38000/2595	20M QPSK(1,0)	0	3.839	1.571	-0.34	23.43	24.00	1.791	2024/8/27
Left Side	38000/2595	20M QPSK(1,0)	0	3.334	1.529	-0.95	23.43	24.00	1.743	2024/8/27
Right Side	38000/2595	20M QPSK(1,0)	0	0.155	0.082	-1.42	23.43	24.00	0.094	2024/8/27
Top Side	38000/2595	20M QPSK(1,0)	0	2.697	1.264	-0.05	23.43	24.00	1.441	2024/8/27
Bottom Side	38000/2595	20M QPSK(1,0)	0	0.077	0.031	0.10	23.43	24.00	0.035	2024/8/27
Back Side	37850/2580	20M QPSK(1,0)	0	3.570	1.388	-0.74	23.62	24.00	1.515	2024/8/27
Back Side	38150/2610	20M QPSK(1,0)	0	3.801	1.504	-1.23	23.28	24.00	1.775	2024/8/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	38000/2595	20M QPSK(1,0)	5	1.996	0.792	-0.87	23.43	24.00	0.903	2024/8/27

9.1.12. SAR measurement Result of LTE Band 40

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	39150/2350	20M QPSK(1,0)	0	0.348	0.200	0.11	23.39	23.50	0.205	2024/8/29
Left Tilt 15 Degree	39150/2350	20M QPSK(1,0)	0	0.184	0.102	-1.24	23.39	23.50	0.105	2024/8/29
Right Cheek	39150/2350	20M QPSK(1,0)	0	0.301	0.171	-1.73	23.39	23.50	0.175	2024/8/29
Right Tilt 15 Degree	39150/2350	20M QPSK(1,0)	0	0.157	0.088	1.24	23.39	23.50	0.090	2024/8/29
Left Cheek	38750/2310	20M QPSK(1,0)	0	0.300	0.171	4.27	23.31	23.50	0.179	2024/8/29
Left Cheek	39550/2390	20M QPSK(1,0)	0	0.307	0.169	0.15	23.35	23.50	0.175	2024/8/29
Extremity										
Front Side	39150/2350	20M QPSK(1,0)	0	2.806	1.185	-2.05	23.39	23.50	1.215	2024/8/29
Back Side	39150/2350	20M QPSK(1,0)	0	3.508	1.512	-0.69	23.39	23.50	1.551	2024/8/29
Left Side	39150/2350	20M QPSK(1,0)	0	3.508	1.467	-1.03	23.39	23.50	1.505	2024/8/29
Right Side	39150/2350	20M QPSK(1,0)	0	0.140	0.059	-0.29	23.39	23.50	0.061	2024/8/29
Top Side	39150/2350	20M QPSK(1,0)	0	2.421	1.002	0.79	23.39	23.50	1.028	2024/8/29
Bottom Side	39150/2350	20M QPSK(1,0)	0	0.070	0.029	3.53	23.39	23.50	0.030	2024/8/29
Back Side	38750/2310	20M QPSK(1,0)	0	3.157	1.320	2.60	23.31	23.50	1.379	2024/8/29
Back Side	39550/2390	20M QPSK(1,0)	0	3.438	1.408	2.06	23.35	23.50	1.457	2024/8/29
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	39150/2350	20M QPSK(1,0)	5	1.824	0.786	-3.71	23.39	23.50	0.806	2024/8/29

9.1.13. SAR measurement Result of WLAN 2.4G

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Head										
Left Cheek	7/2442	802.11 b	0	0.329	0.159	1.06	14.62	15.00	0.174	2024/9/16
Left Tilt 15 Degree	7/2442	802.11 b	0	0.172	0.081	-2.41	14.62	15.00	0.088	2024/9/16
Right Cheek	7/2442	802.11 b	0	0.288	0.138	0.37	14.62	15.00	0.151	2024/9/16
Right Tilt 15 Degree	7/2442	802.11 b	0	0.130	0.062	-0.56	14.62	15.00	0.068	2024/9/16
Left Cheek	1/2412	802.11 b	0	0.321	0.137	-0.74	13.98	15.00	0.173	2024/9/16
Left Cheek	13/2472	802.11 b	0	0.308	0.131	-3.61	13.95	15.00	0.167	2024/9/16
Extremity										
Front Side	7/2442	802.11 b	0	0.700	0.311	3.41	14.62	15.00	0.339	2024/9/16
Back Side	7/2442	802.11 b	0	0.779	0.367	-0.27	14.62	15.00	0.401	2024/9/16
Left Side	7/2442	802.11 b	0	0.078	0.036	2.64	14.62	15.00	0.039	2024/9/16
Right Side	7/2442	802.11 b	0	0.397	0.185	-2.53	14.62	15.00	0.202	2024/9/16
Top Side	7/2442	802.11 b	0	0.483	0.225	-3.33	14.62	15.00	0.246	2024/9/16
Bottom Side	7/2442	802.11 b	0	0.039	0.018	-1.70	14.62	15.00	0.020	2024/9/16
Back Side	1/2412	802.11 b	0	0.717	0.314	-3.56	13.98	15.00	0.397	2024/9/16
Back Side	13/2472	802.11 b	0	0.740	0.314	-3.51	13.95	15.00	0.400	2024/9/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	7/2442	802.11 b	5	0.467	0.213	3.87	14.62	15.00	0.232	2024/9/16

9.2. Simultaneous Transmission Analysis

Refer to EN 62209-2:2010 Annex K, the secondary transmitter SAR test exclusion thresholds are determined by:

$$P_{\text{available}} = P_{\text{th,m}} \left(\frac{\text{SAR}_{\text{lim}} - \text{SAR}_1}{\text{SAR}_{\text{lim}}} \right)$$

$P_{\text{th,m}}$ is the threshold exclusion power level taken from Annex B of EN 62479.

Mode	P_{max} (dBm)	P_{max} (mW)	$P_{\text{th,m}}$ (mW)	SAR_{lim} (W/Kg)	SAR_1 (W/Kg)	Calculation Result (mW)	Simultaneous Transmission Exclusion
Bluetooth	3.50	2.24	20	2	1.482	5.18	YES
Bluetooth	3.50	2.24	40	4	3.036	9.64	YES

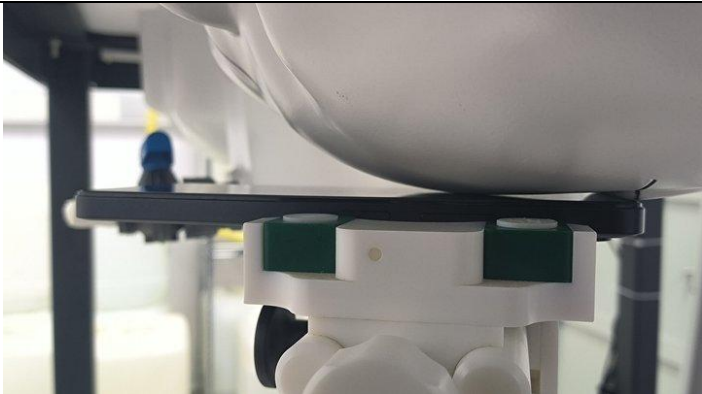
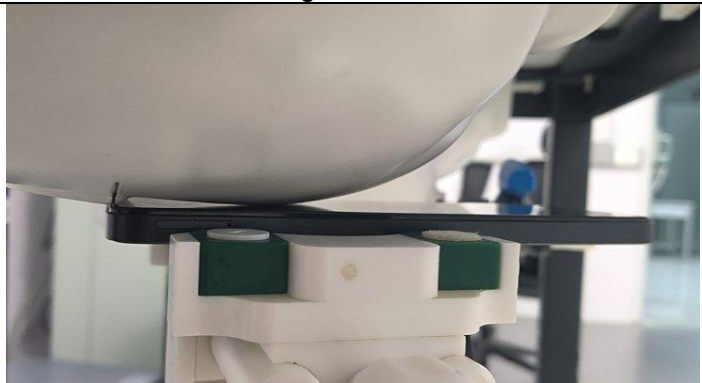
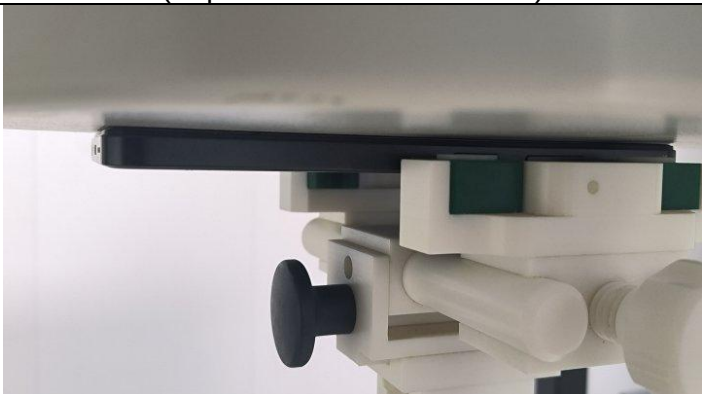
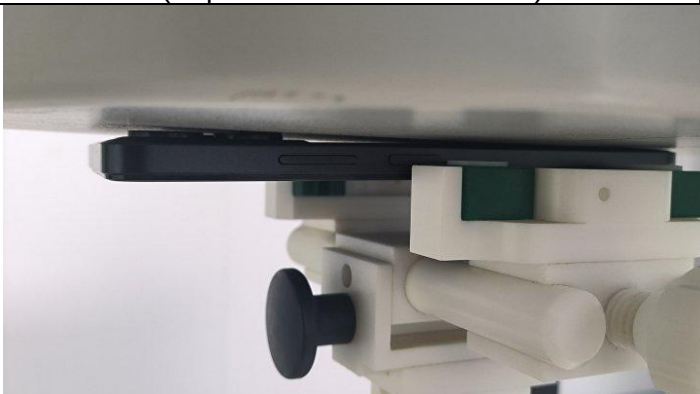
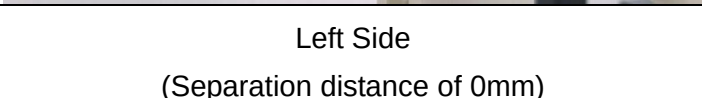
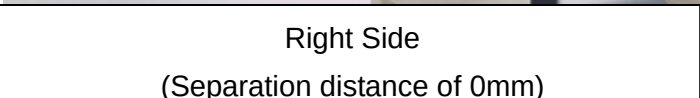
9.3. Exposure Conditions

Exposure Position		WWAN Band	WLAN Band	Simultaneous Tx SAR(W/Kg)
		SAR(W/Kg)	SAR(W/Kg)	
Head	Left Cheek	0.633	0.186	0.819
	Left Tilt 15 Degree	0.348	0.088	0.436
	Right Cheek	0.543	0.151	0.694
	Right Tilt 15 Degree	0.254	0.068	0.322
Member	Front Side	2.193	0.339	2.532
	Back Side	3.036	0.401	3.437
	Left Side	2.604	0.039	2.643
	Right Side	0.147	0.202	0.349
	Top Side	1.800	0.246	2.046
	Bottom Side	0.137	0.020	0.157
Body&Hotspot	Front Side	1.482	0.232	1.714
	Back Side	0.633	0.186	0.819

NOTE: The Simultaneous Tx is calculated based on the same configuration and test position.

10. Appendix A. Photo documentation

Test Positions

Left Cheek	Left Tilt 15 Degree
	
Right Cheek	Right Tilt 15 Degree
	
Front Side (Separation distance of 0mm)	Back Side (Separation distance of 0mm)
	
Left Side (Separation distance of 0mm)	Right Side (Separation distance of 0mm)
	



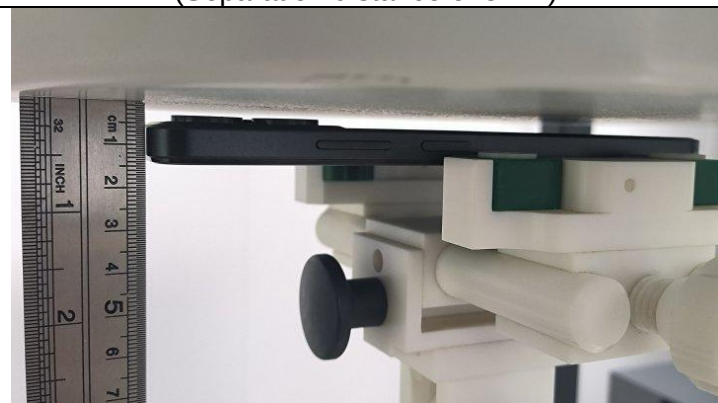
Top Side
(Separation distance of 0mm)



Bottom Side
(Separation distance of 0mm)



Back Side
(Separation distance of 5mm)



11. Appendix B. System Check Plots

Table of contents
MEASUREMENT 1 System Performance Check - 750MHz
MEASUREMENT 2 System Performance Check - 900MHz
MEASUREMENT 3 System Performance Check - 1800MHz
MEASUREMENT 4 System Performance Check - 2000MHz
MEASUREMENT 5 System Performance Check - 2300MHz
MEASUREMENT 6 System Performance Check - 2450MHz
MEASUREMENT 7 System Performance Check - 2600MHz

MEASUREMENT 1

Date of measurement: 9/9/2024

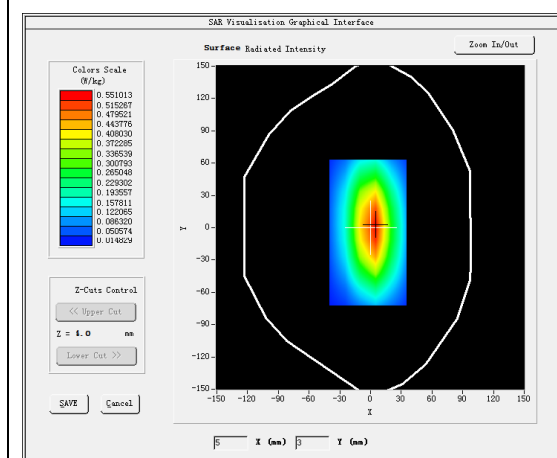
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW750</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

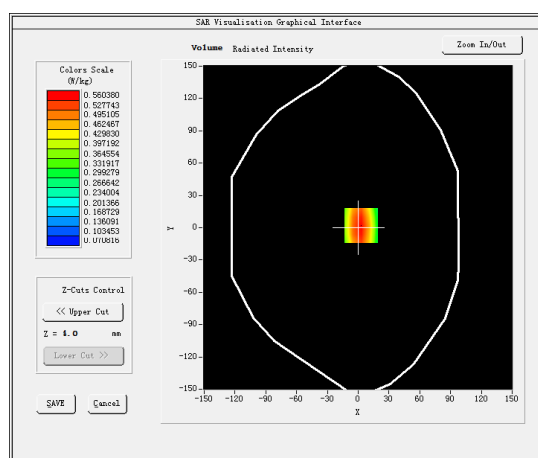
B. SAR Measurement Results

Frequency (MHz)	750.000000
Relative permittivity (real part)	40.571880
Relative permittivity (imaginary part)	21.550346
Conductivity (S/m)	0.897931
Variation (%)	-0.110000

SURFACE SAR



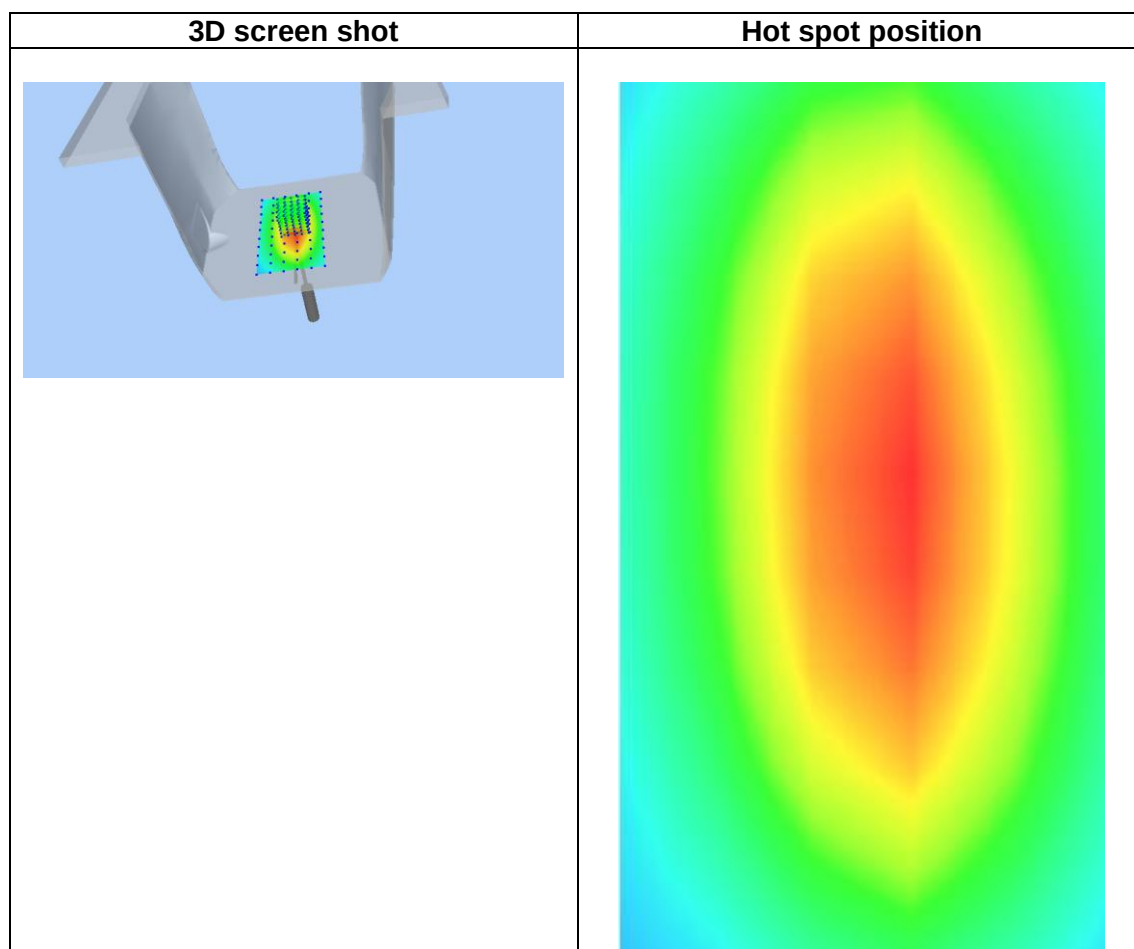
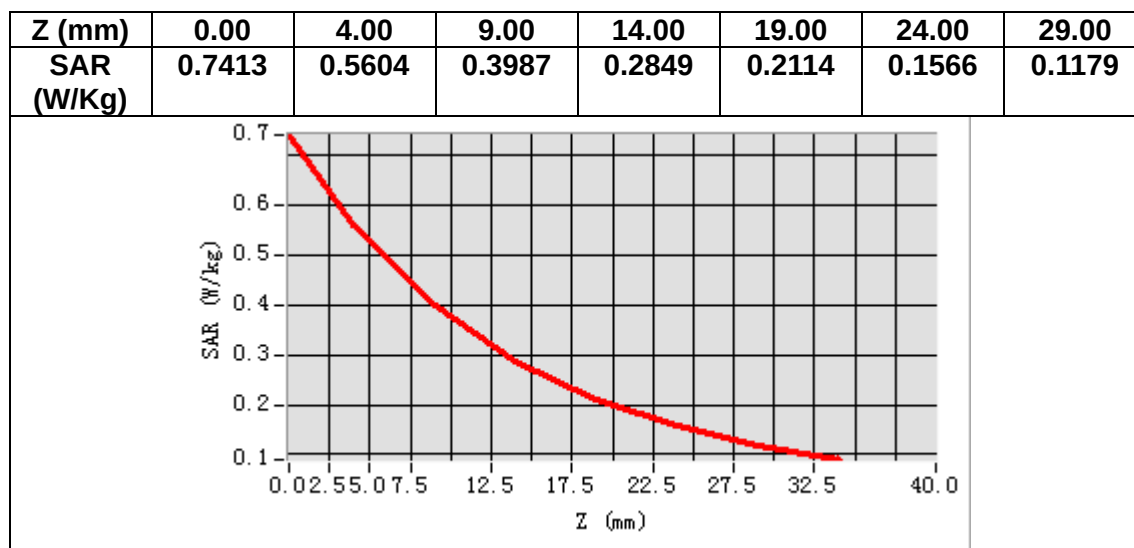
VOLUME SAR



Maximum location: X=3.00, Y=2.00

SAR Peak: 0.74 W/kg

SAR 10g (W/Kg)	0.366403
SAR 1g (W/Kg)	0.543299



MEASUREMENT 2

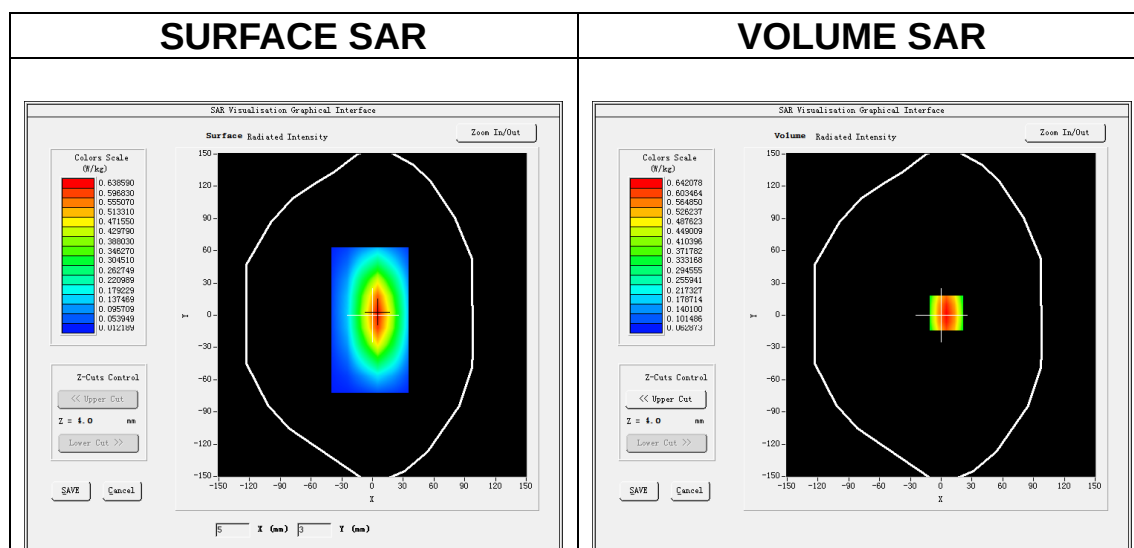
Date of measurement: 15/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

B. SAR Measurement Results

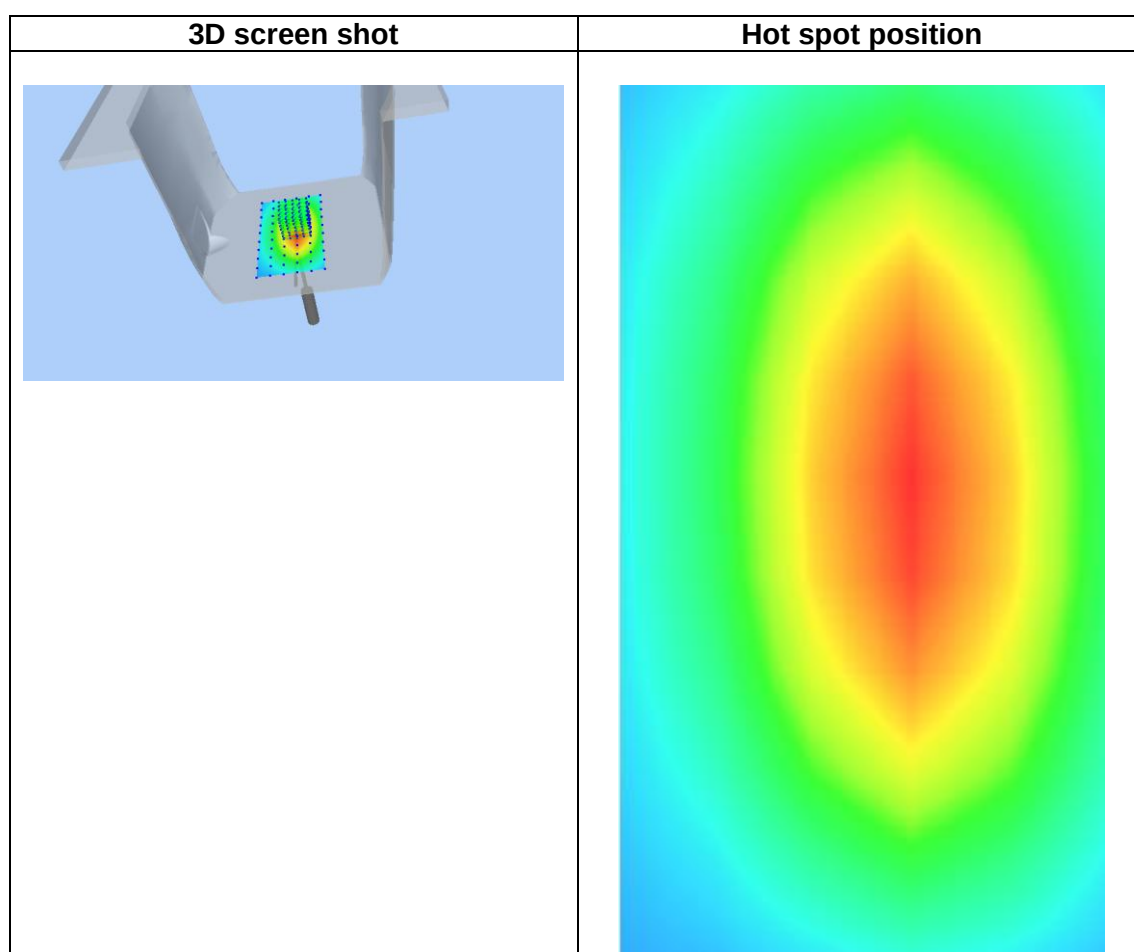
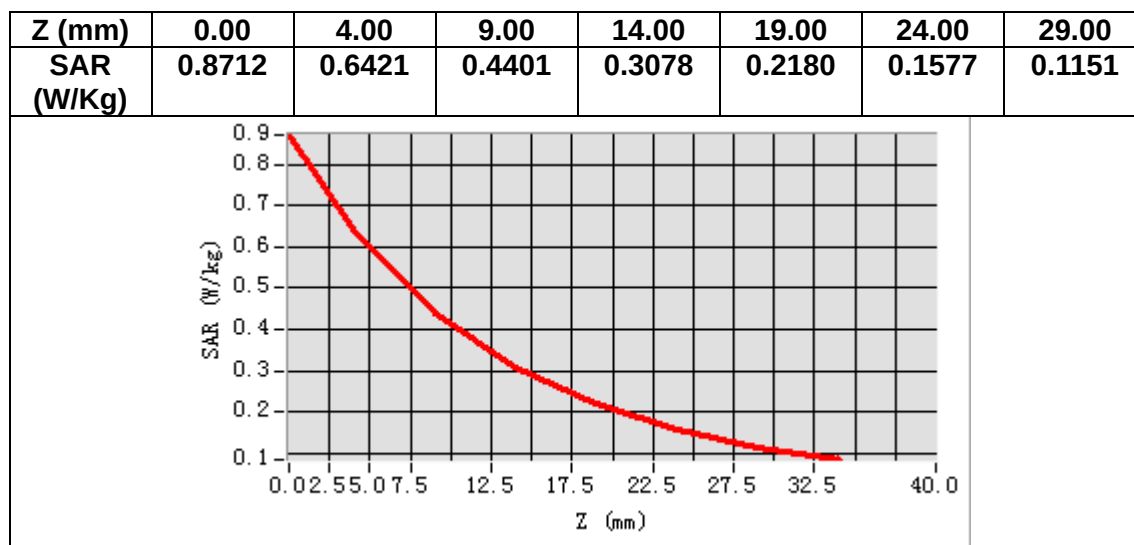
Frequency (MHz)	900.000000
Relative permittivity (real part)	42.205341
Relative permittivity (imaginary part)	19.400059
Conductivity (S/m)	0.970003
Variation (%)	-0.300000



Maximum location: X=5.00, Y=2.00

SAR Peak: 0.87 W/kg

SAR 10g (W/Kg)	0.400767
SAR 1g (W/Kg)	0.611630



MEASUREMENT 3

Date of measurement: 13/9/2024

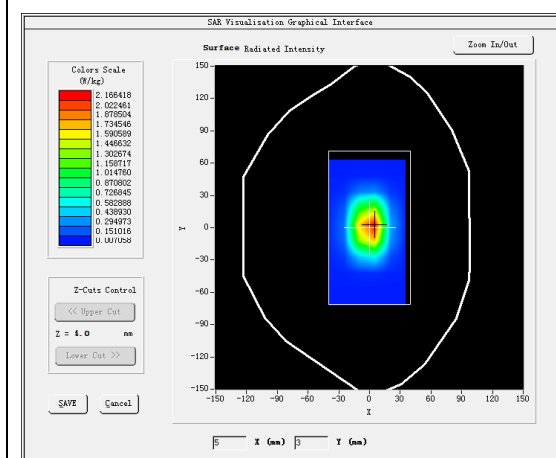
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

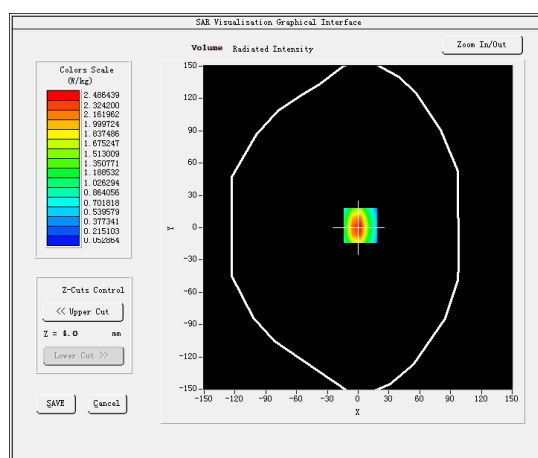
B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative permittivity (real part)	39.320408
Relative permittivity (imaginary part)	13.742189
Conductivity (S/m)	1.374219
Variation (%)	-0.430000

SURFACE SAR



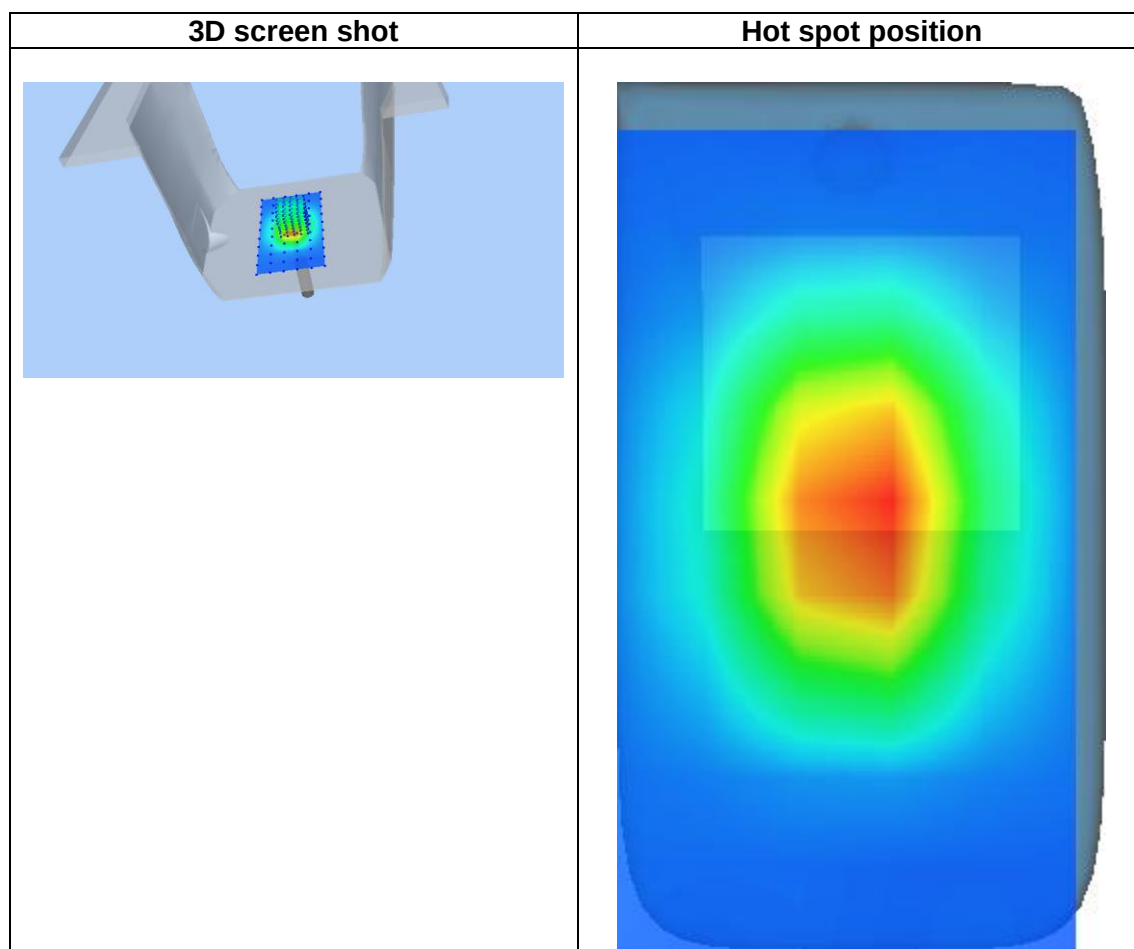
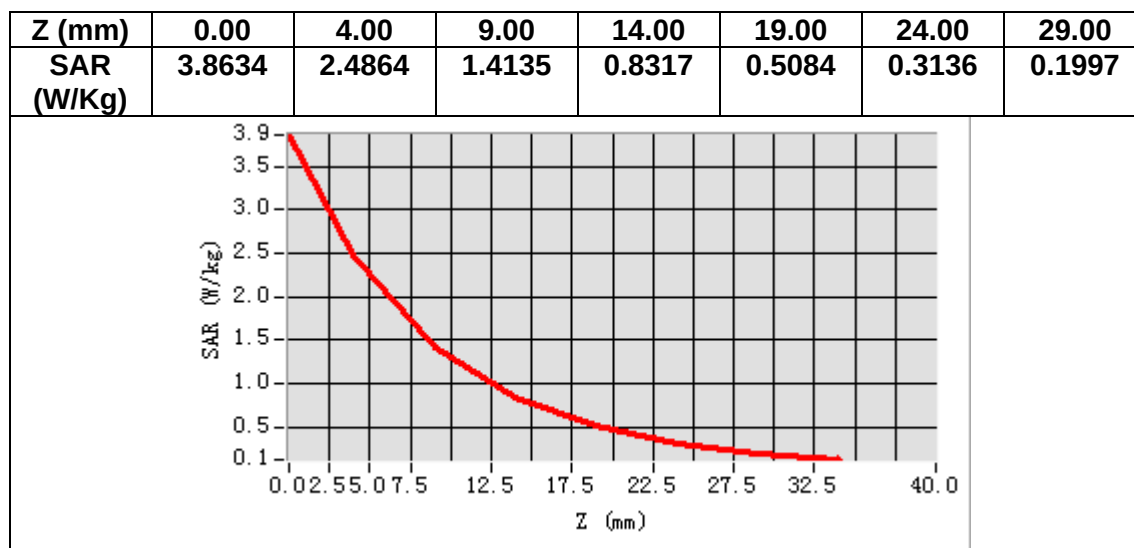
VOLUME SAR



Maximum location: X=2.00, Y=2.00

SAR Peak: 4.00 W/kg

SAR 10g (W/Kg)	1.246602
SAR 1g (W/Kg)	2.407766



MEASUREMENT 4

Date of measurement: 2/9/2024

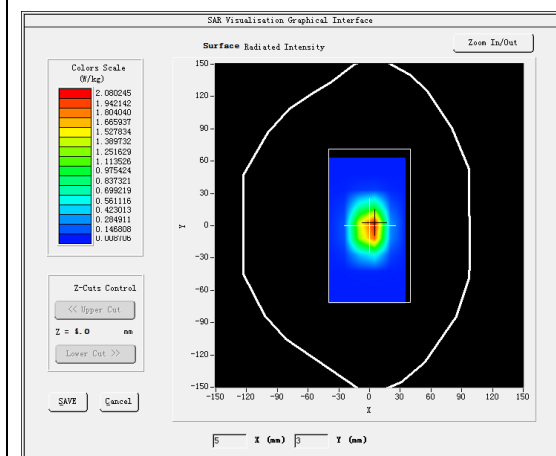
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2000</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

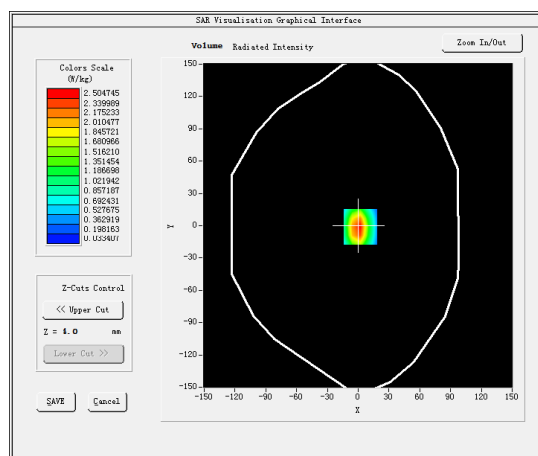
B. SAR Measurement Results

Frequency (MHz)	2000.000000
Relative permittivity (real part)	40.985710
Relative permittivity (imaginary part)	12.549280
Conductivity (S/m)	1.394364
Variation (%)	-0.080000

SURFACE SAR



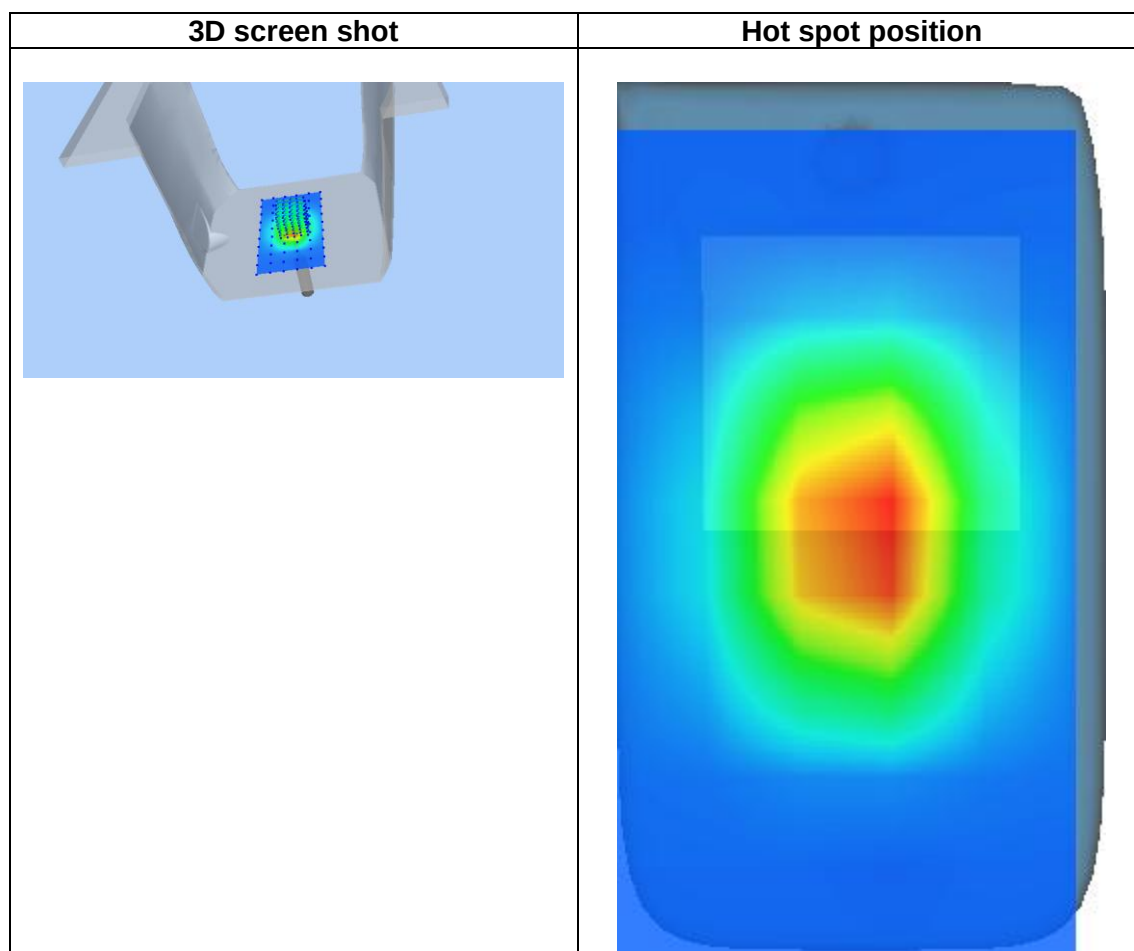
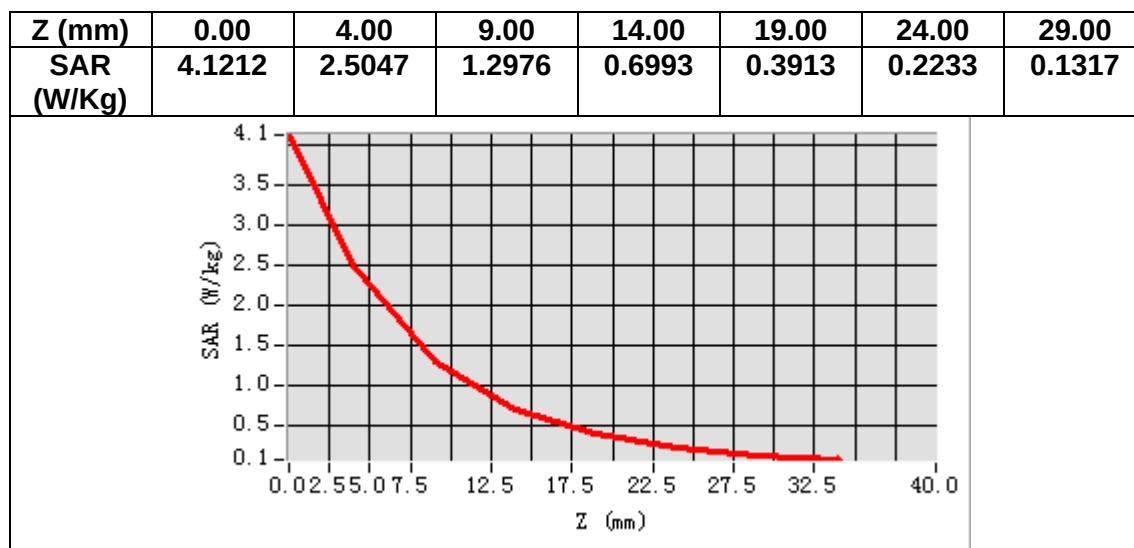
VOLUME SAR



Maximum location: X=2.00, Y=-1.00

SAR Peak: 4.21 W/kg

SAR 10g (W/Kg)	1.146637
SAR 1g (W/Kg)	2.390679



MEASUREMENT 5

Date of measurement: 29/8/2024

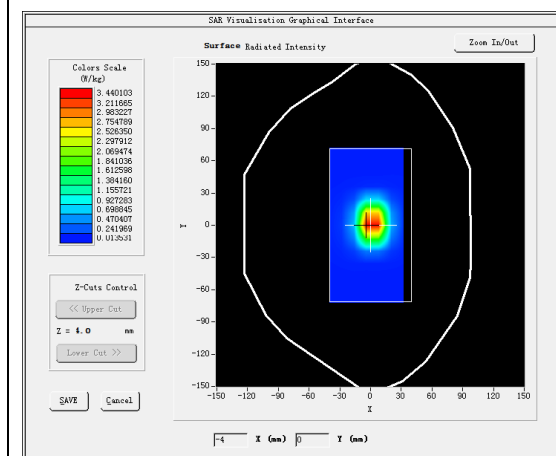
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2300</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.81</u>

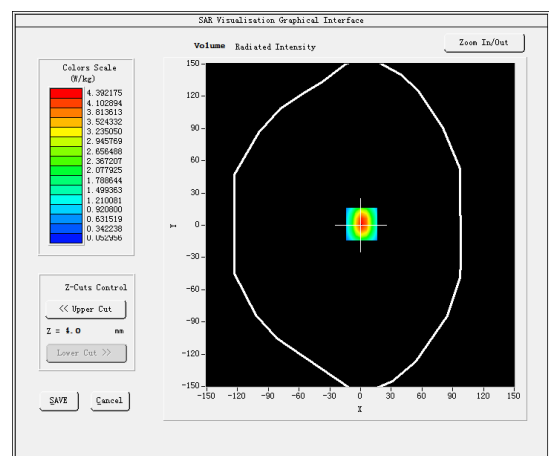
B. SAR Measurement Results

Frequency (MHz)	2300.000000
Relative permittivity (real part)	39.161189
Relative permittivity (imaginary part)	12.587256
Conductivity (S/m)	1.608372
Variation (%)	-3.580000

SURFACE SAR



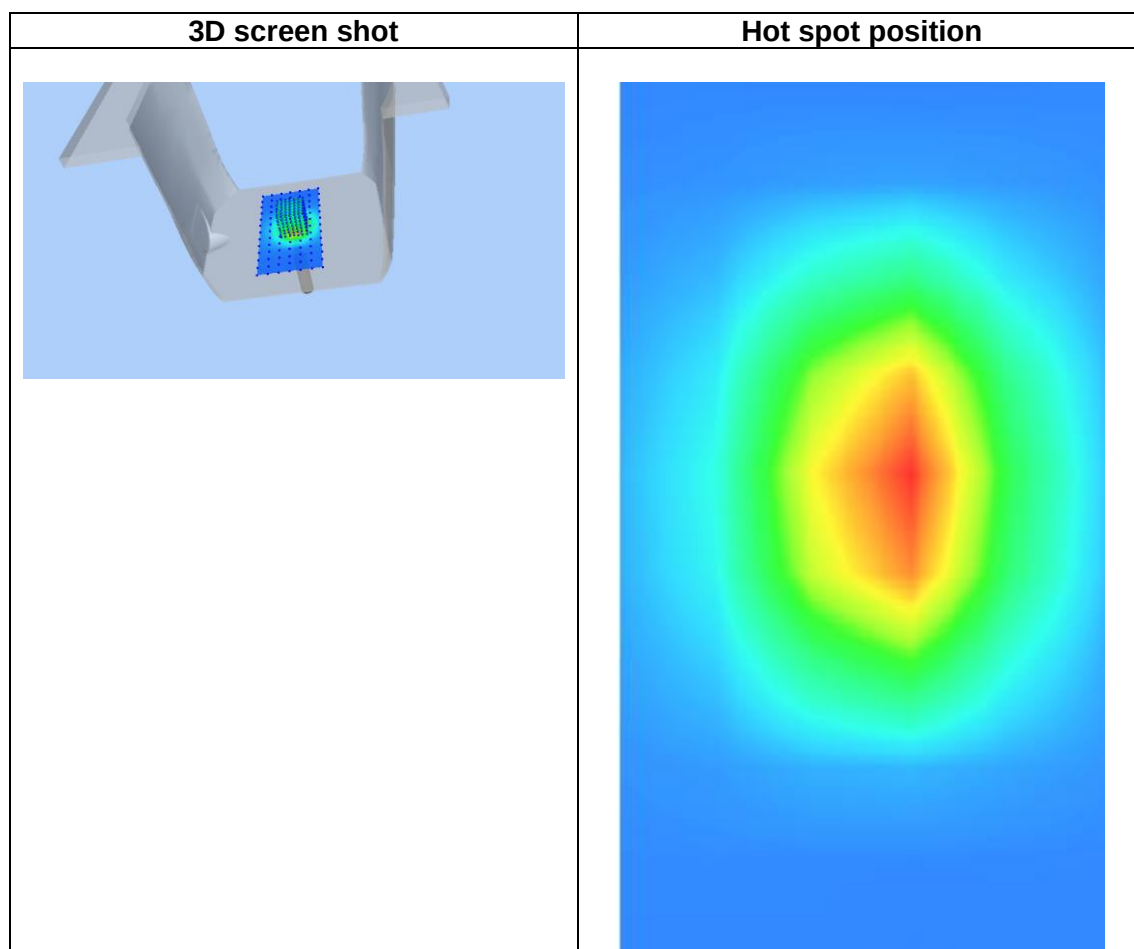
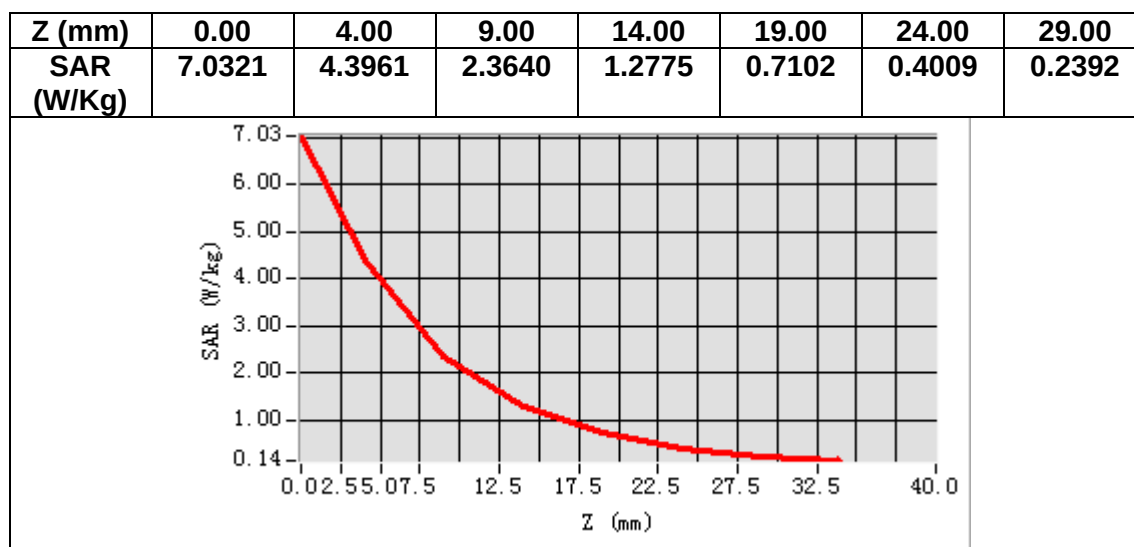
VOLUME SAR



Maximum location: X=1.00, Y=1.00

SAR Peak: 7.04 W/kg

SAR 10g (W/Kg)	2.231050
SAR 1g (W/Kg)	5.303251



MEASUREMENT 6

Date of measurement: 16/9/2024

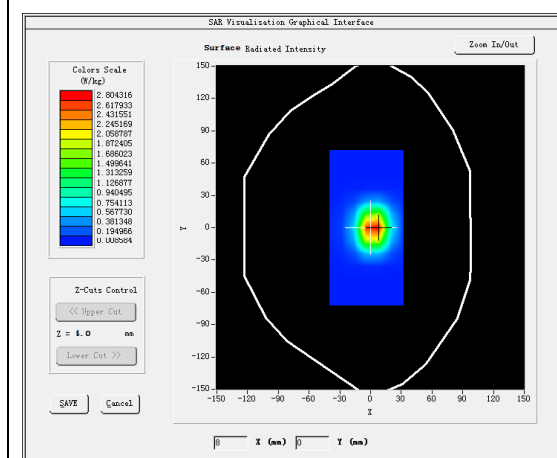
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2450</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

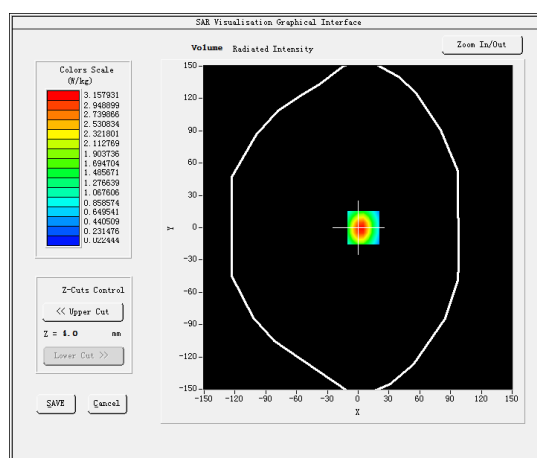
B. SAR Measurement Results

Frequency (MHz)	2450.000000
Relative permittivity (real part)	40.110912
Relative permittivity (imaginary part)	13.431449
Conductivity (S/m)	1.828169
Variation (%)	-3.670000

SURFACE SAR



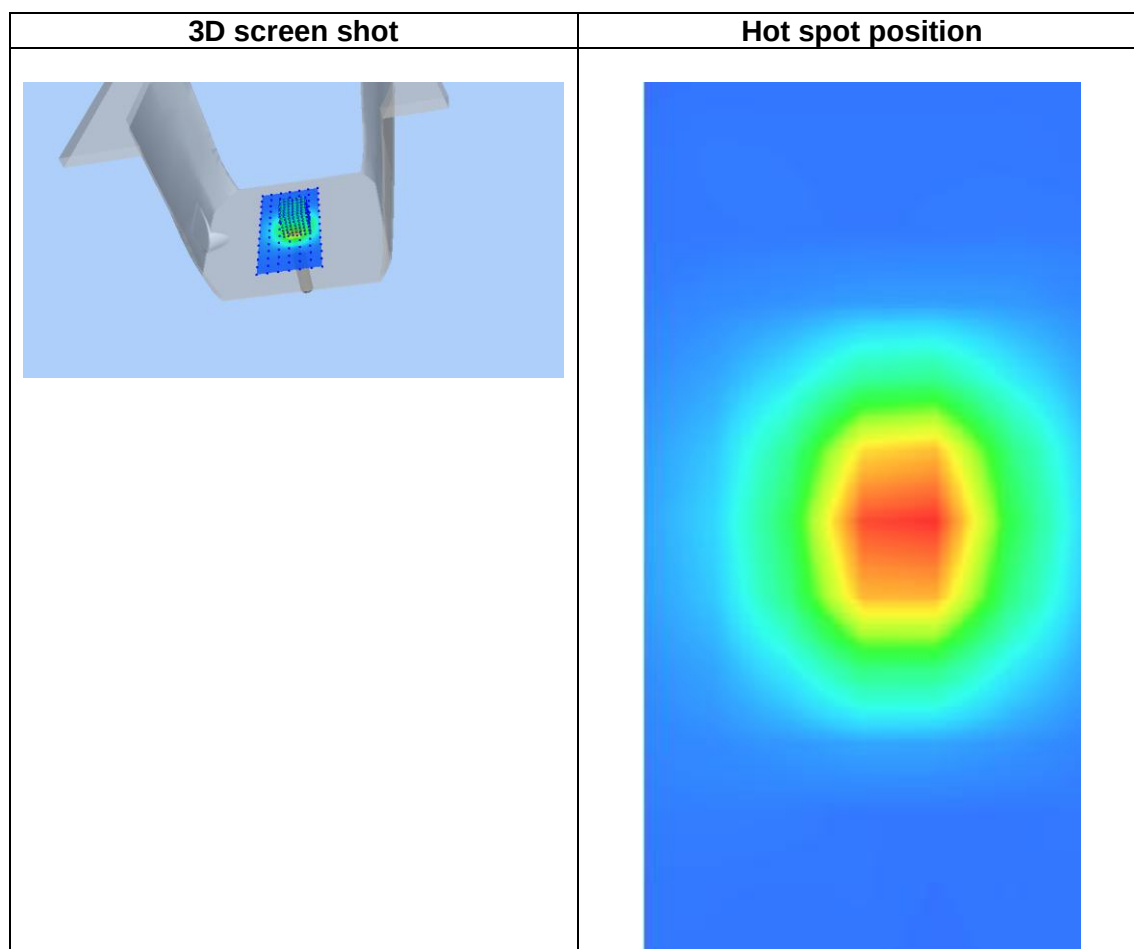
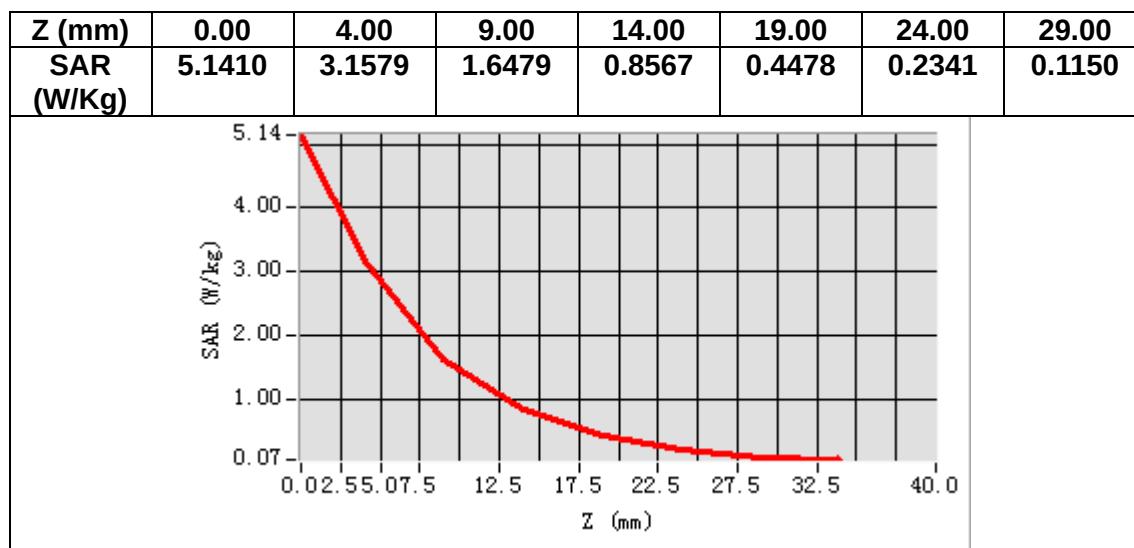
VOLUME SAR



Maximum location: X=5.00, Y=0.00

SAR Peak: 5.23 W/kg

SAR 10g (W/Kg)	1.423636
SAR 1g (W/Kg)	2.975236



MEASUREMENT 7

Date of measurement: 27/8/2024

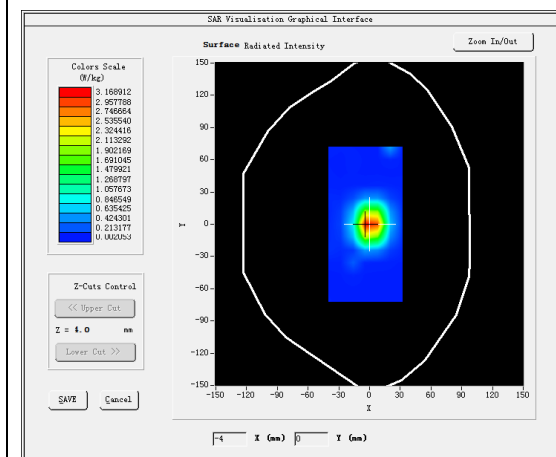
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2600</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

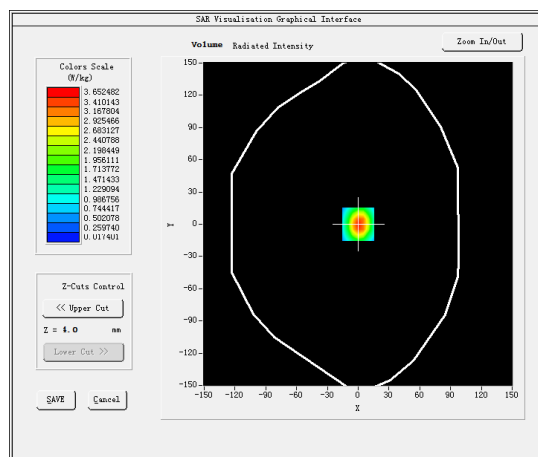
B. SAR Measurement Results

Frequency (MHz)	2600.000000
Relative permittivity (real part)	39.097961
Relative permittivity (imaginary part)	13.921630
Conductivity (S/m)	2.010902
Variation (%)	0.550000

SURFACE SAR



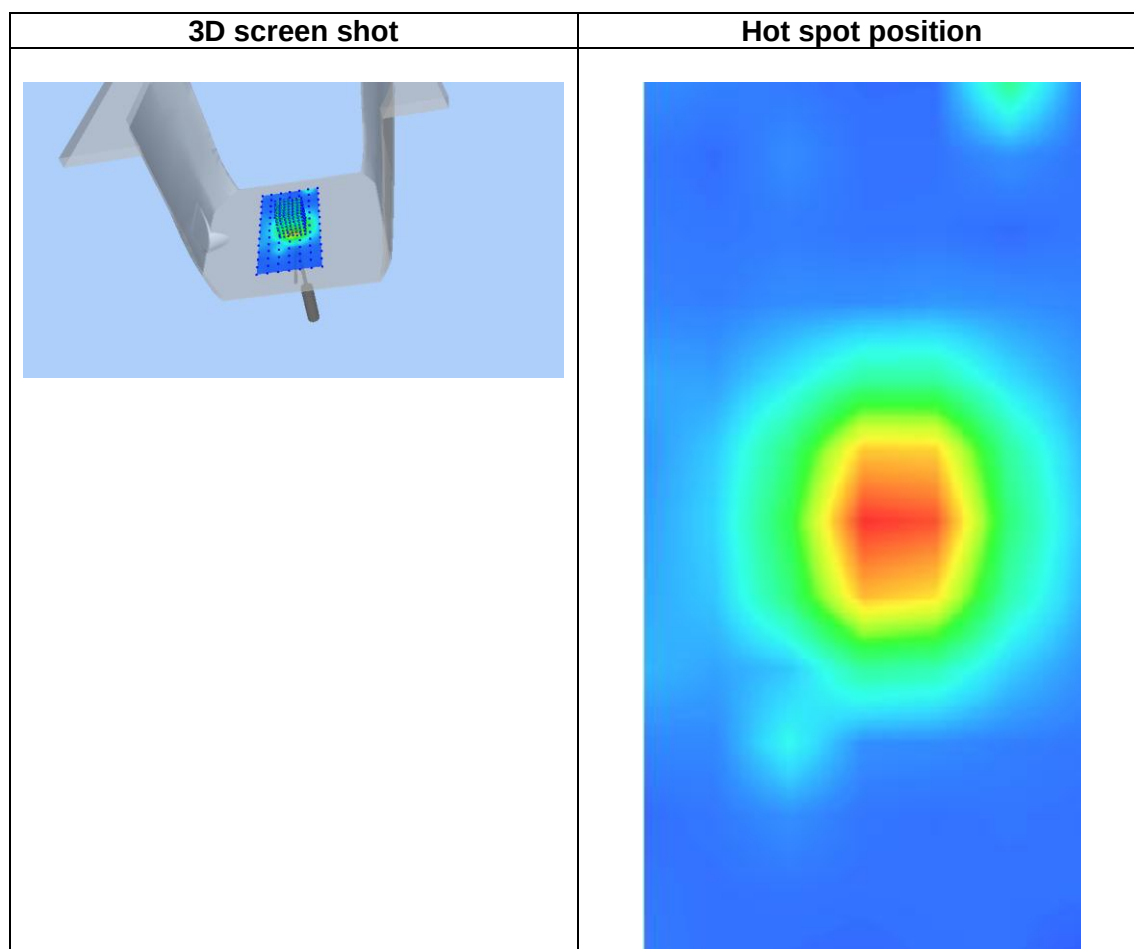
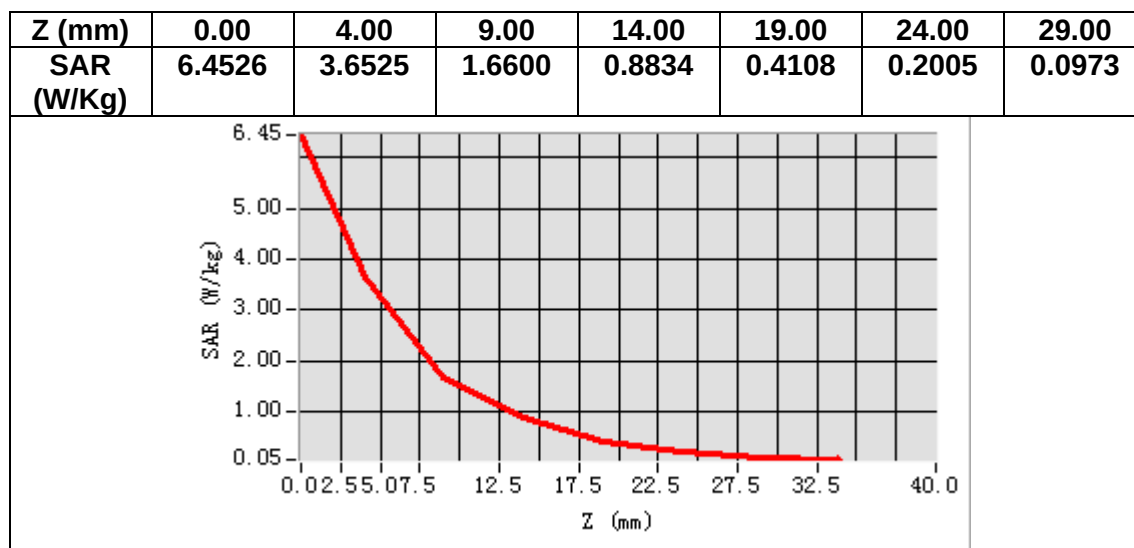
VOLUME SAR



Maximum location: X=0.00, Y=0.00

SAR Peak: 6.35 W/kg

SAR 10g (W/Kg)	1.513066
SAR 1g (W/Kg)	3.343411



12. Appendix C. Plots of High SAR Measurement

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MEASUREMENT 24 LTE Band 40 Extremity
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MEASUREMENT 1

Date of measurement: 15/9/2024

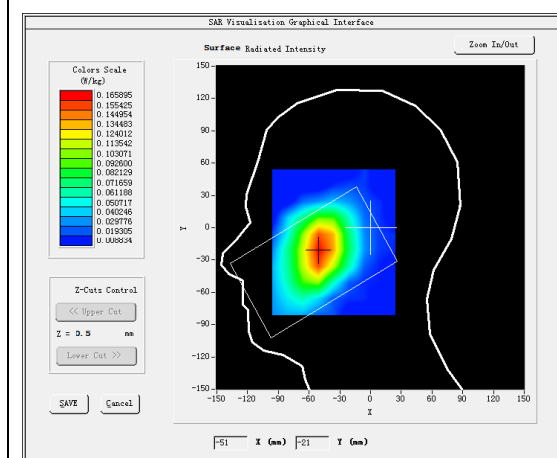
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>GSM900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.7)</u>
<u>ConvF</u>	<u>2.23</u>

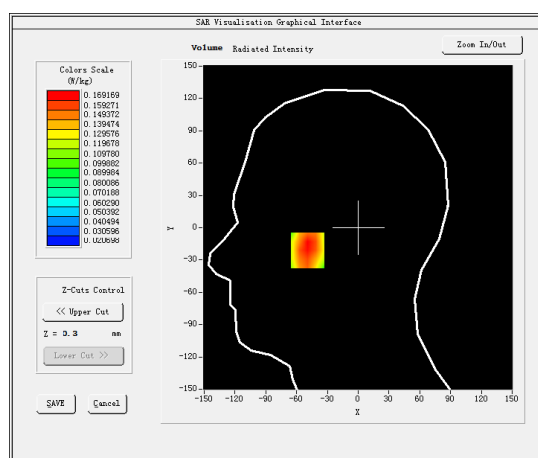
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.285702
Relative permittivity (imaginary part)	19.453878
Conductivity (S/m)	0.970100
Variation (%)	0.340000

SURFACE SAR



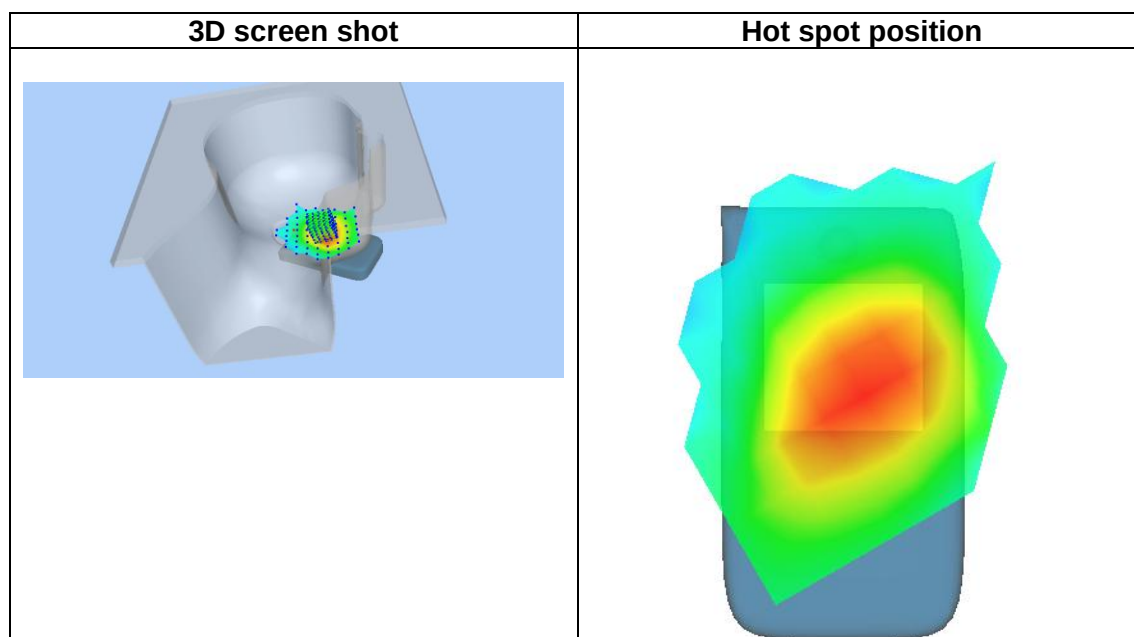
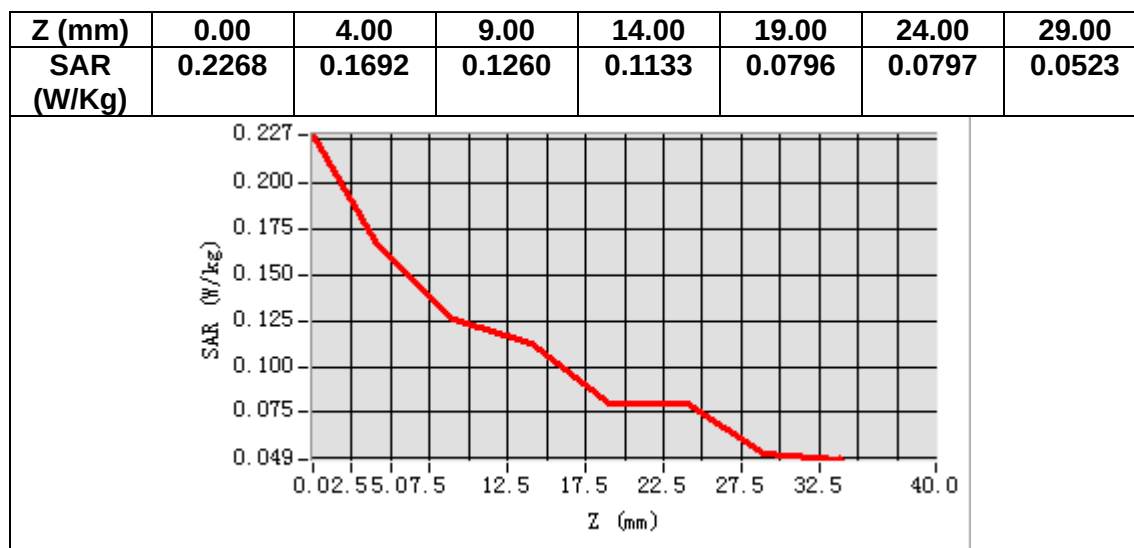
VOLUME SAR



Maximum location: X=-49.00, Y=-21.00

SAR Peak: 0.20 W/kg

SAR 10g (W/Kg)	0.124966
SAR 1g (W/Kg)	0.163839



MEASUREMENT 2

Date of measurement: 15/9/2024

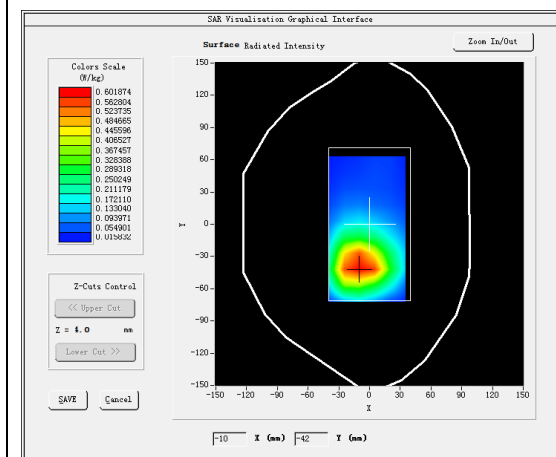
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>GSM900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.7)</u>
<u>ConvF</u>	<u>2.23</u>

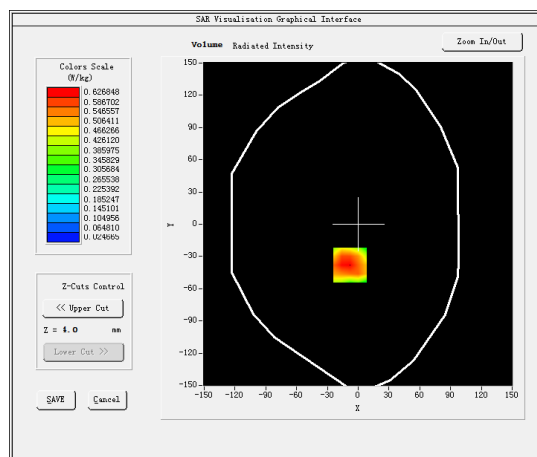
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.285702
Relative permittivity (imaginary part)	19.453878
Conductivity (S/m)	0.970100
Variation (%)	-1.990000

SURFACE SAR



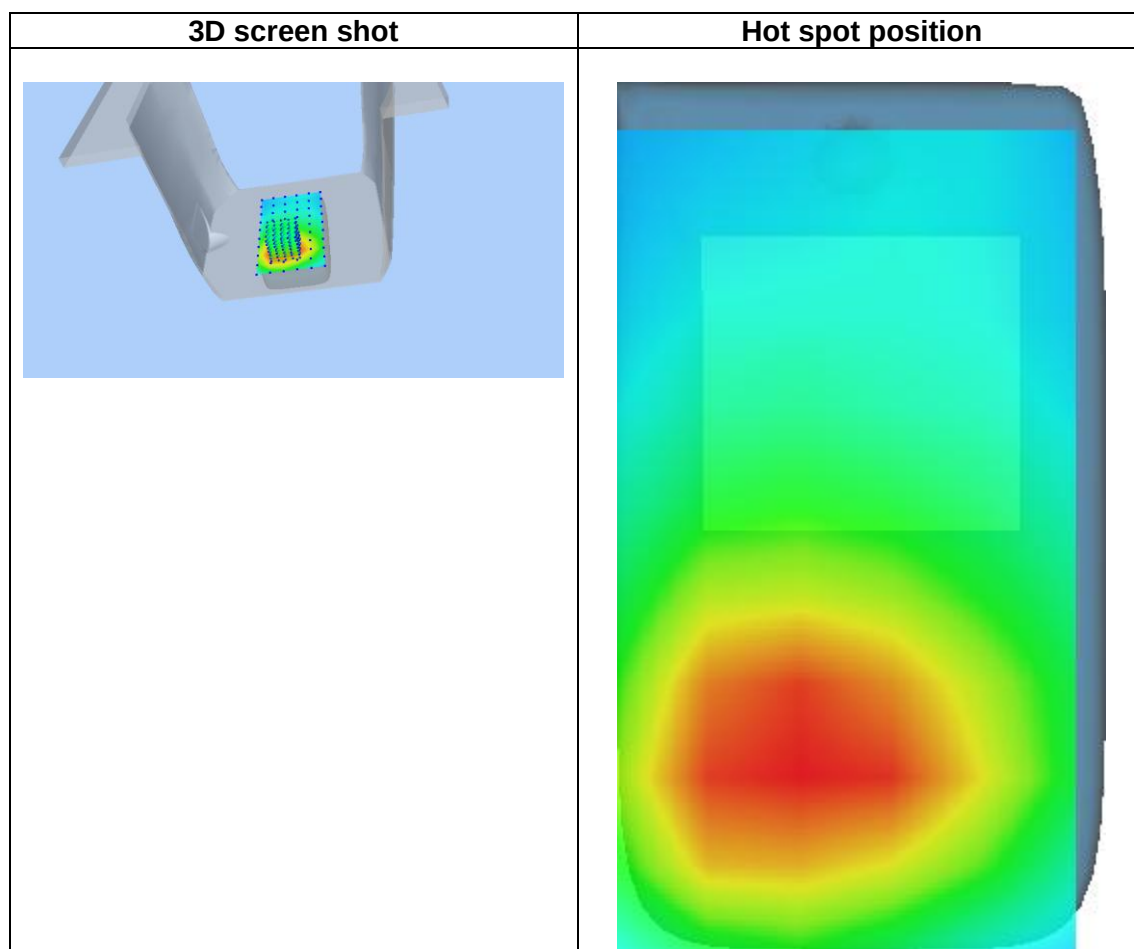
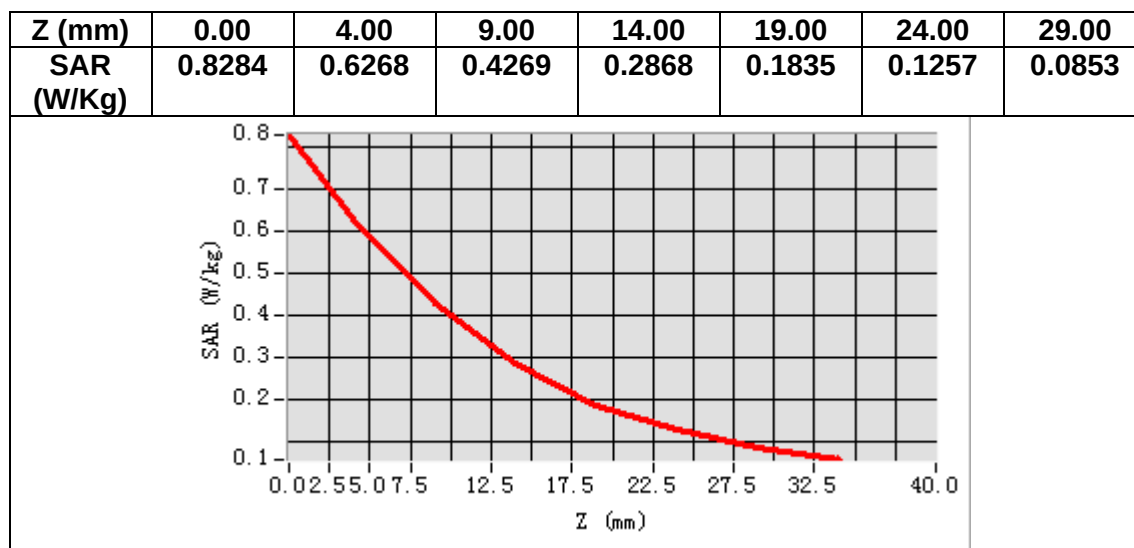
VOLUME SAR



Maximum location: X=-8.00, Y=-38.00

SAR Peak: 0.88 W/kg

SAR 10g (W/Kg)	0.385691
SAR 1g (W/Kg)	0.596930



MEASUREMENT 3

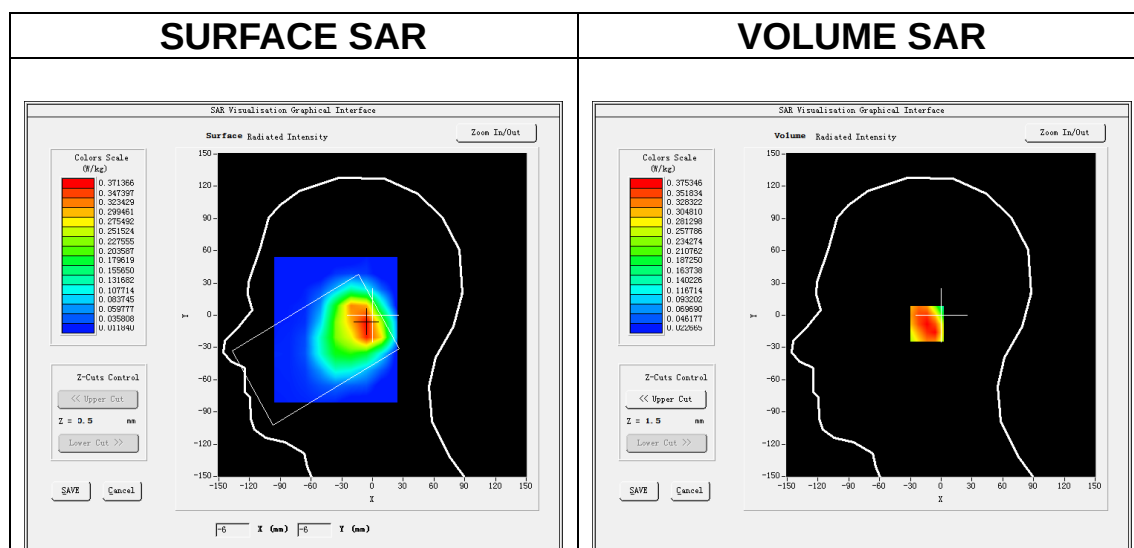
Date of measurement: 14/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>GSM1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.45</u>

B. SAR Measurement Results

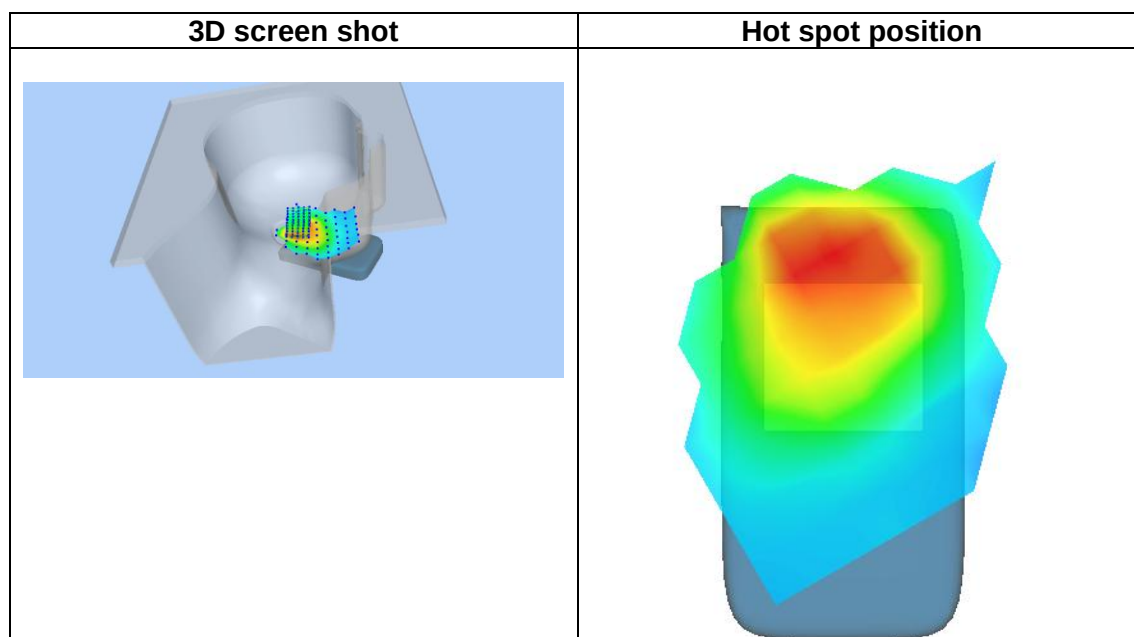
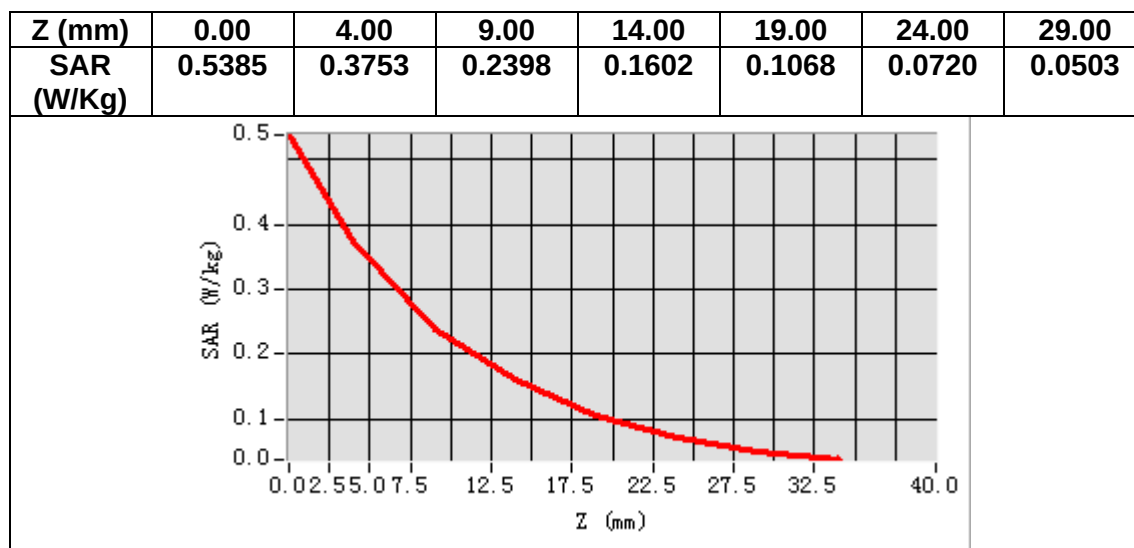
Frequency (MHz)	1747.400000
Relative permittivity (real part)	39.674866
Relative permittivity (imaginary part)	13.710069
Conductivity (S/m)	1.330943
Variation (%)	0.360000



Maximum location: X=-7.00, Y=-8.00

SAR Peak: 0.56 W/kg

SAR 10g (W/Kg)	0.226940
SAR 1g (W/Kg)	0.360864



MEASUREMENT 4

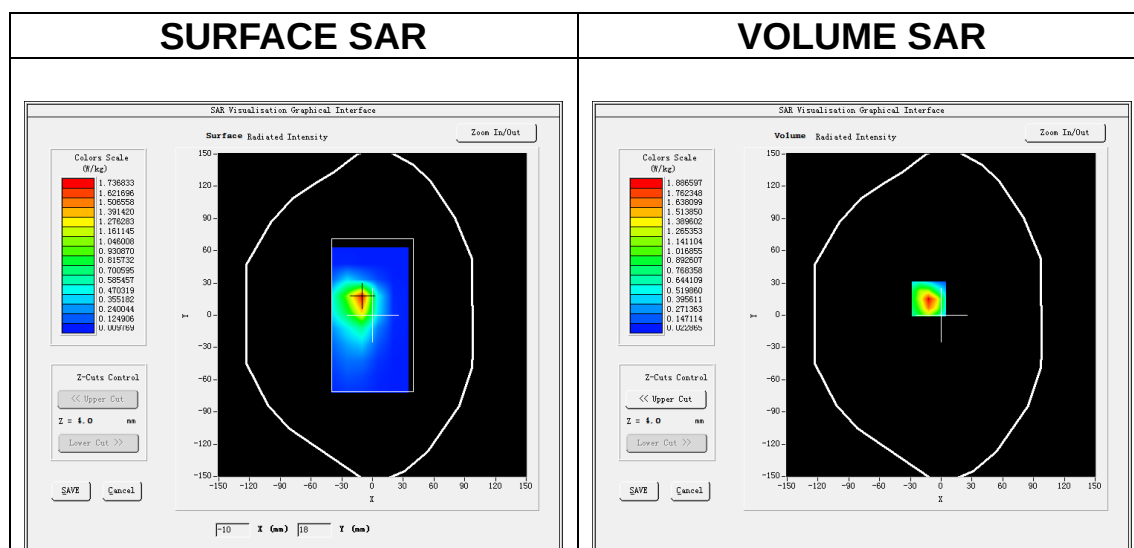
Date of measurement: 14/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>GSM1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.45</u>

B. SAR Measurement Results

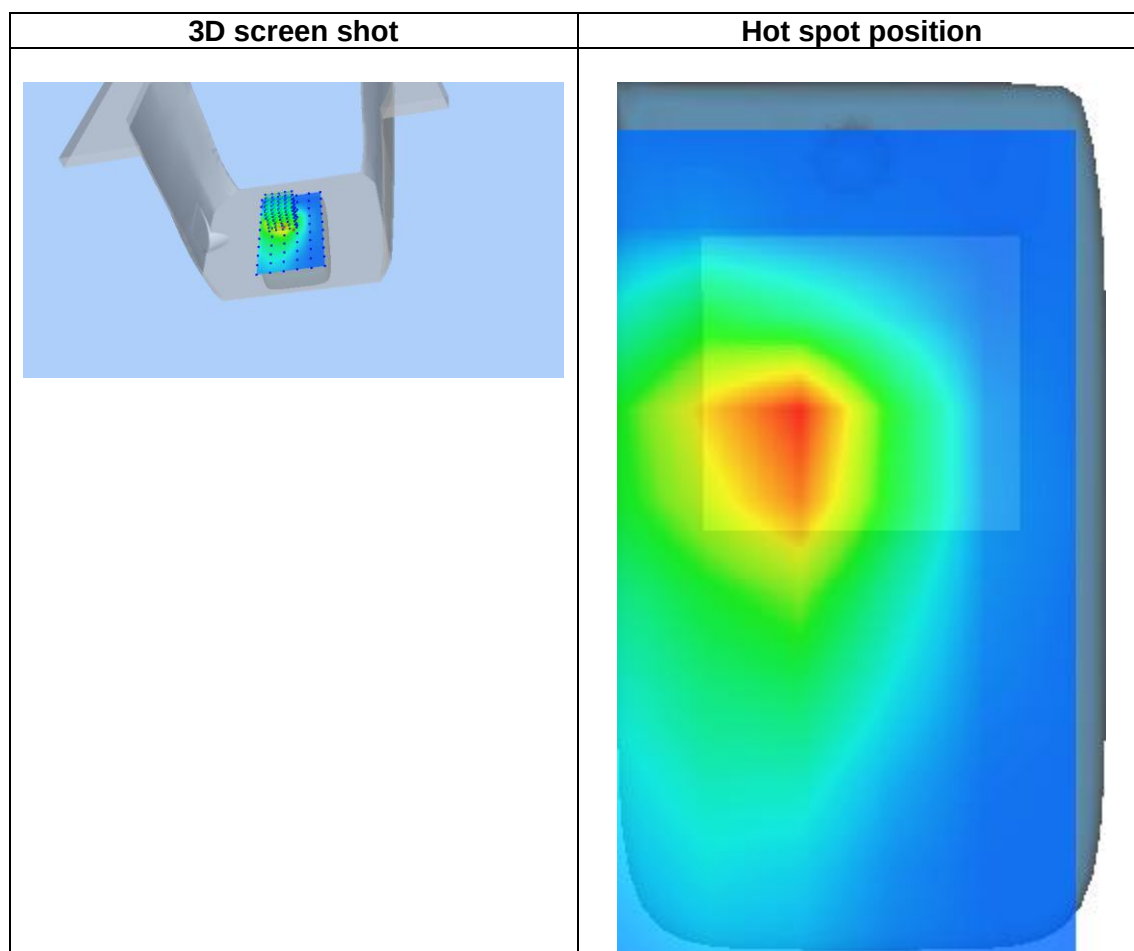
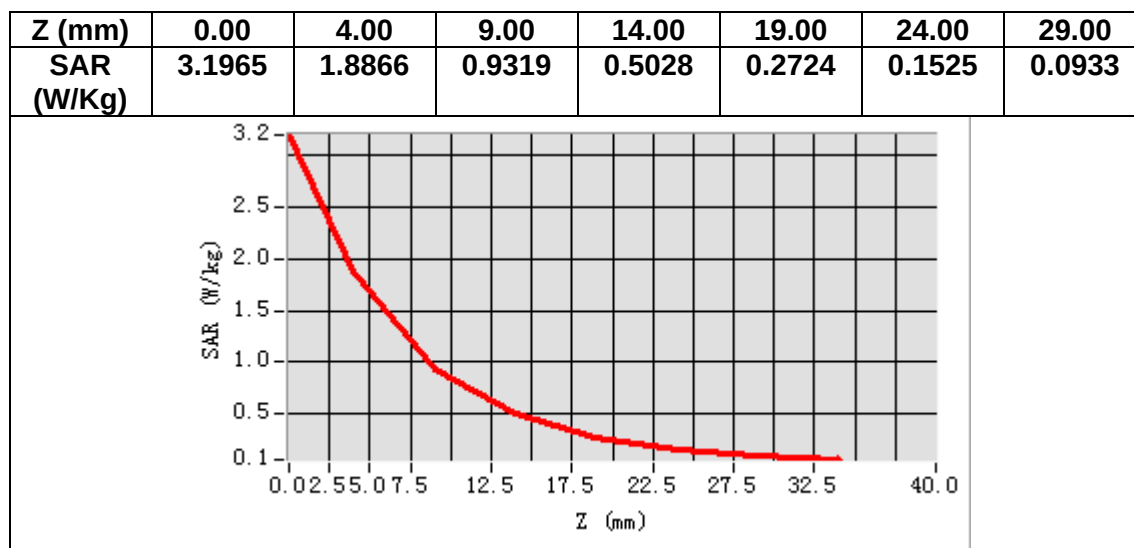
Frequency (MHz)	1747.400000
Relative permittivity (real part)	39.674866
Relative permittivity (imaginary part)	13.710069
Conductivity (S/m)	1.330943
Variation (%)	-1.120000



Maximum location: X=-12.00, Y=15.00

SAR Peak: 3.21 W/kg

SAR 10g (W/Kg)	0.850255
SAR 1g (W/Kg)	1.761599



MEASUREMENT 5

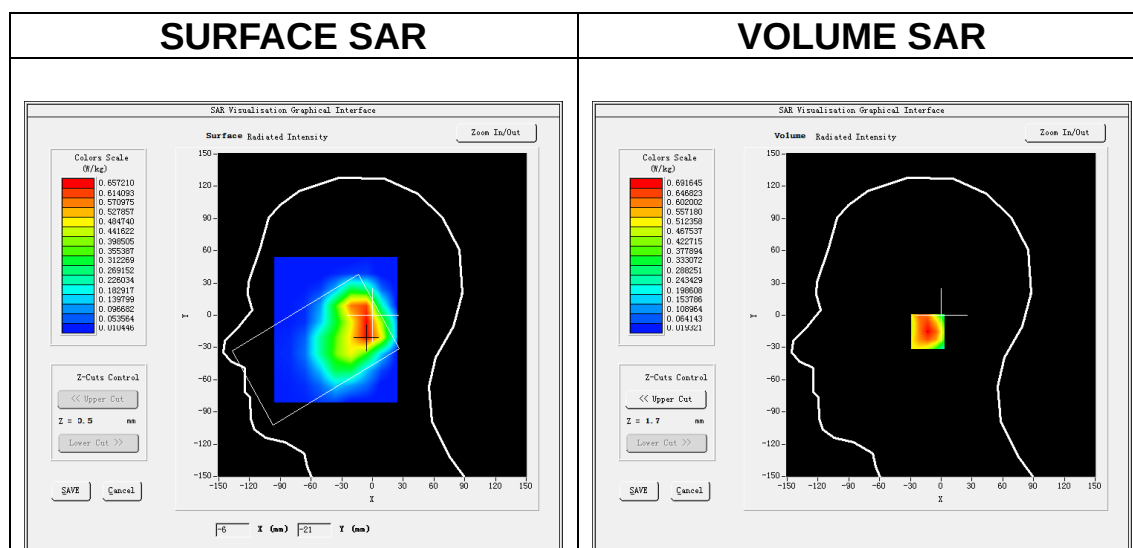
Date of measurement: 2/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>Band1 UMTS</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

B. SAR Measurement Results

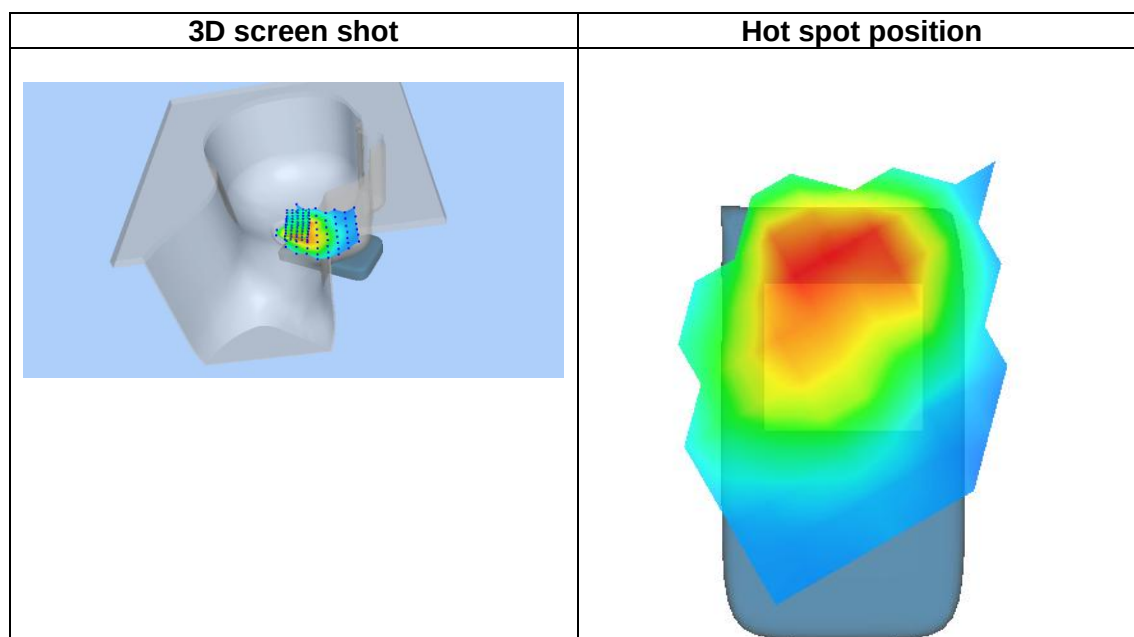
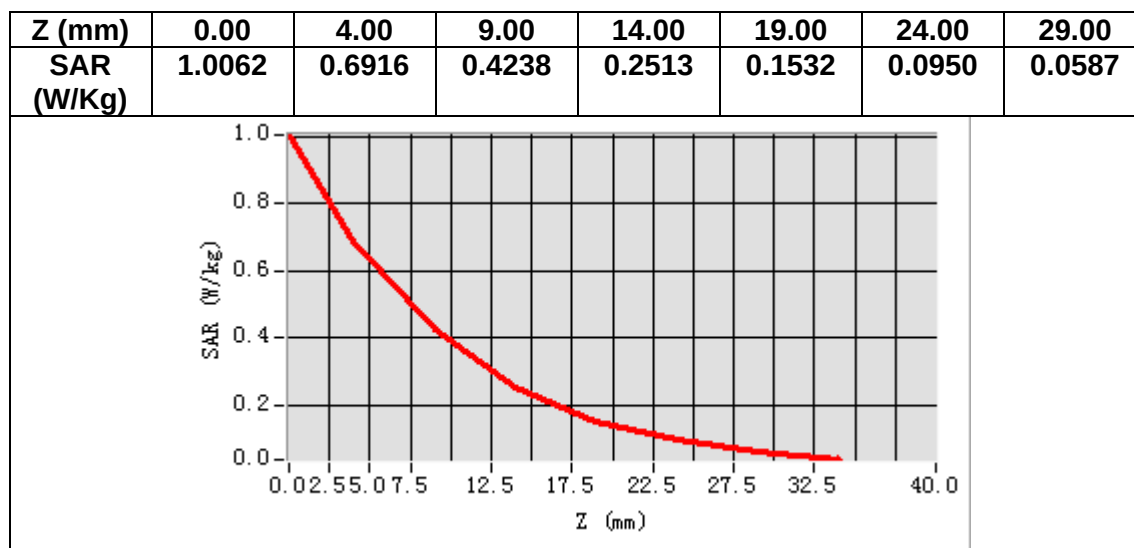
Frequency (MHz)	1950.000000
Relative permittivity (real part)	40.885212
Relative permittivity (imaginary part)	12.629380
Conductivity (S/m)	1.368183
Variation (%)	-1.050000



Maximum location: X=-5.00, Y=-15.00

SAR Peak: 1.02 W/kg

SAR 10g (W/Kg)	0.386073
SAR 1g (W/Kg)	0.658570



MEASUREMENT 6

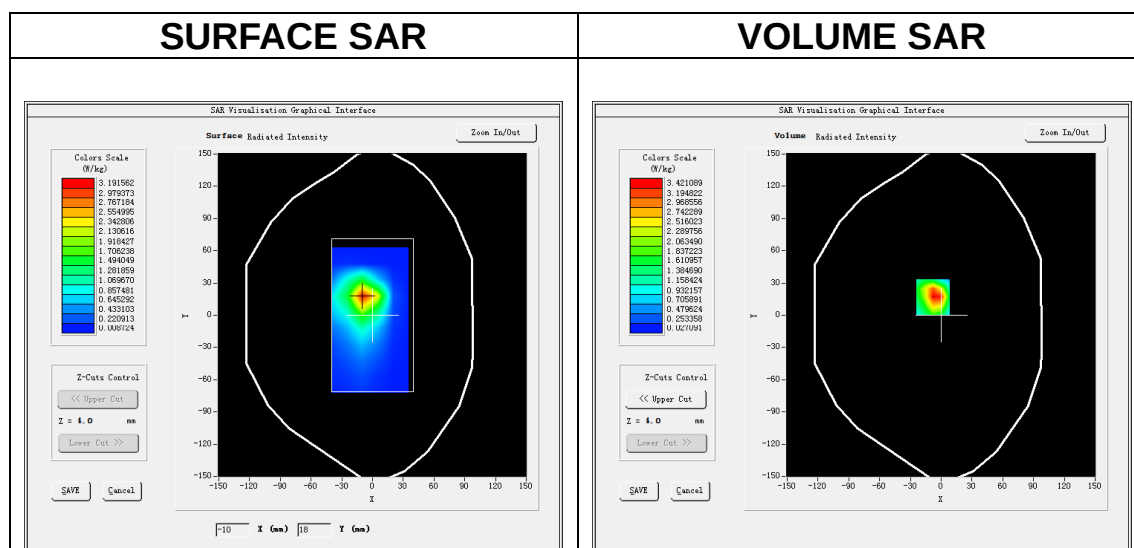
Date of measurement: 2/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>Band1 UMTS</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

B. SAR Measurement Results

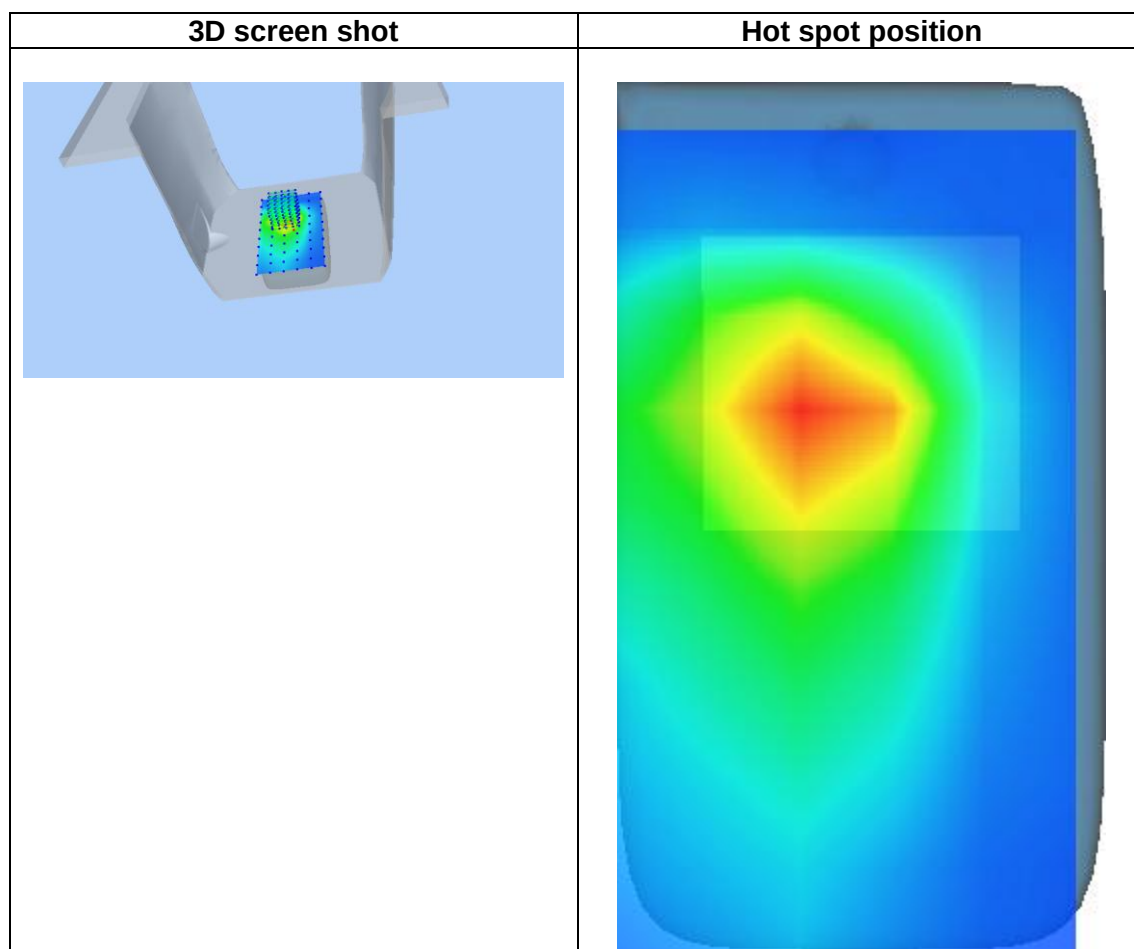
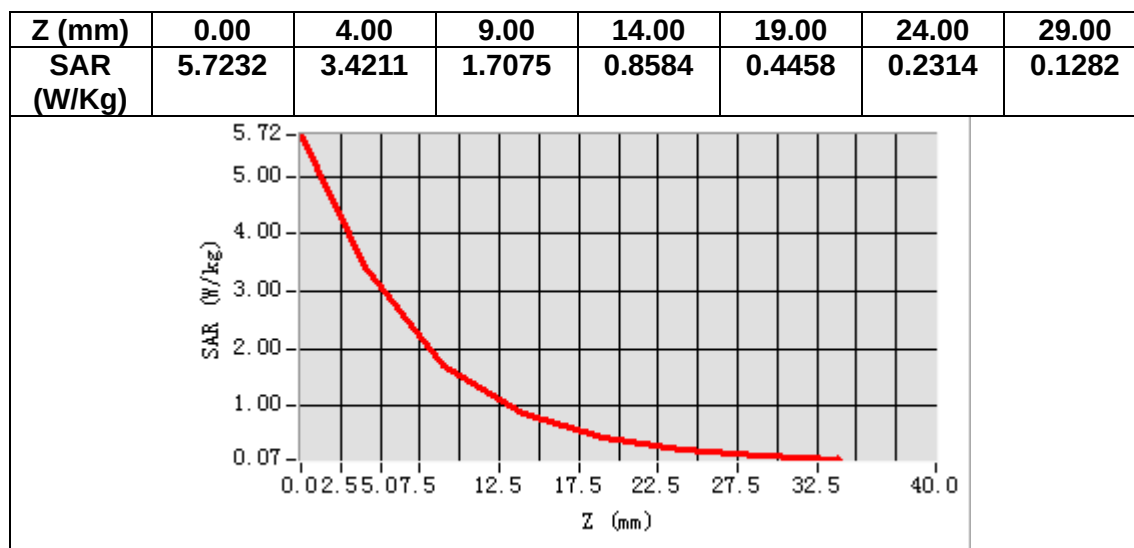
Frequency (MHz)	1950.000000
Relative permittivity (real part)	40.885212
Relative permittivity (imaginary part)	12.629380
Conductivity (S/m)	1.368183
Variation (%)	-0.970000



Maximum location: X=-8.00, Y=17.00

SAR Peak: 6.46 W/kg

SAR 10g (W/Kg)	1.565669
SAR 1g (W/Kg)	3.413124



MEASUREMENT 7

Date of measurement: 15/9/2024

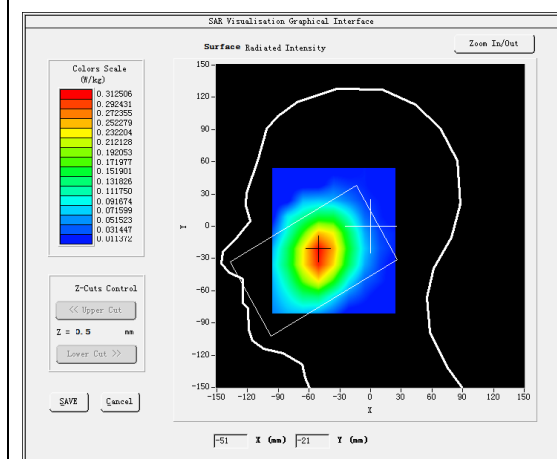
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>Band8 WCDMA900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

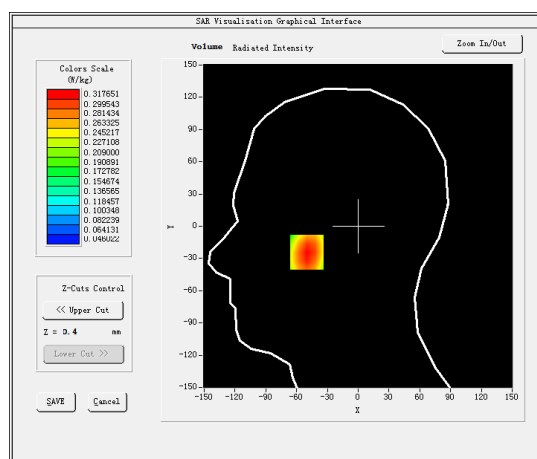
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.285702
Relative permittivity (imaginary part)	19.453878
Conductivity (S/m)	0.970100
Variation (%)	0.890000

SURFACE SAR



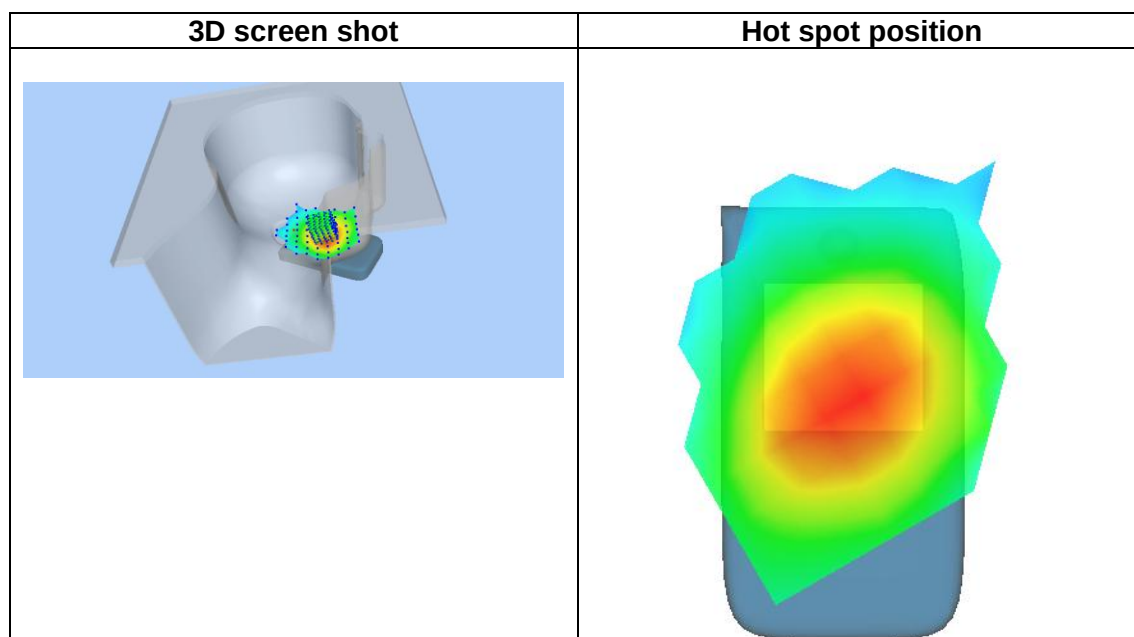
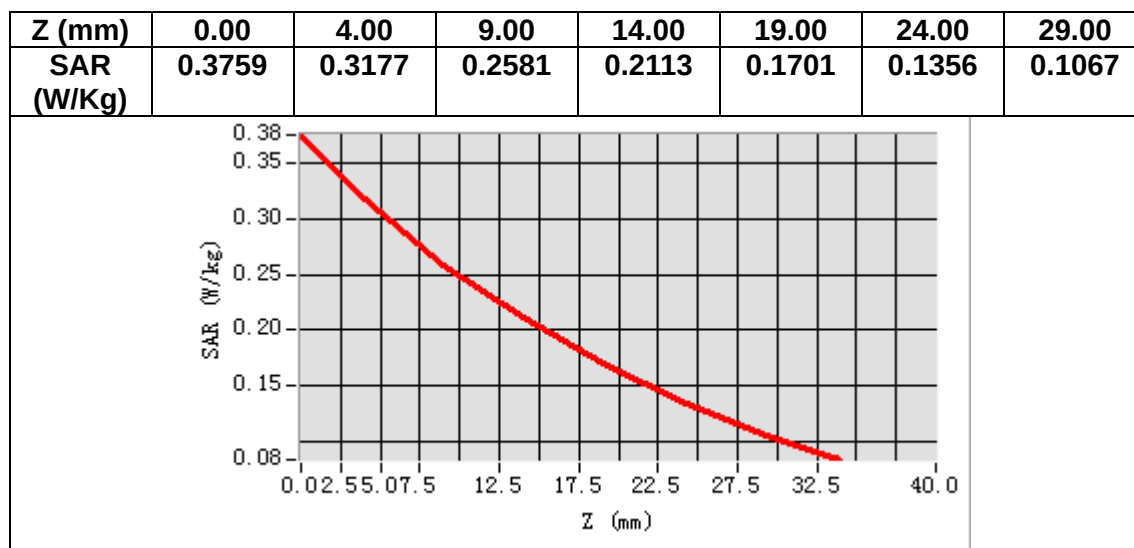
VOLUME SAR



Maximum location: X=-50.00, Y=-24.00

SAR Peak: 0.38 W/kg

SAR 10g (W/Kg)	0.232335
SAR 1g (W/Kg)	0.308166



MEASUREMENT 8

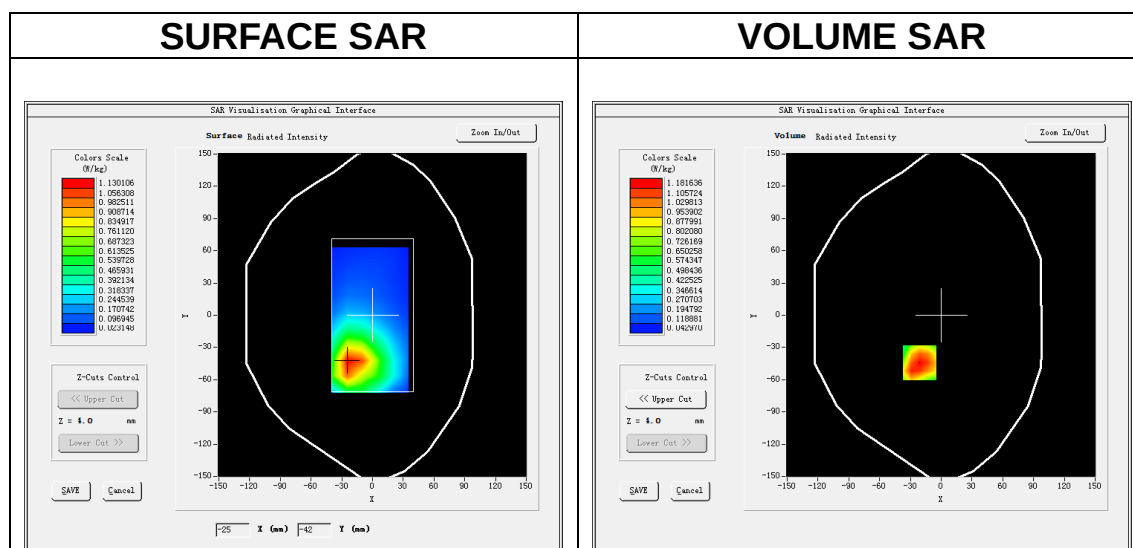
Date of measurement: 15/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>Band8 WCDMA900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

B. SAR Measurement Results

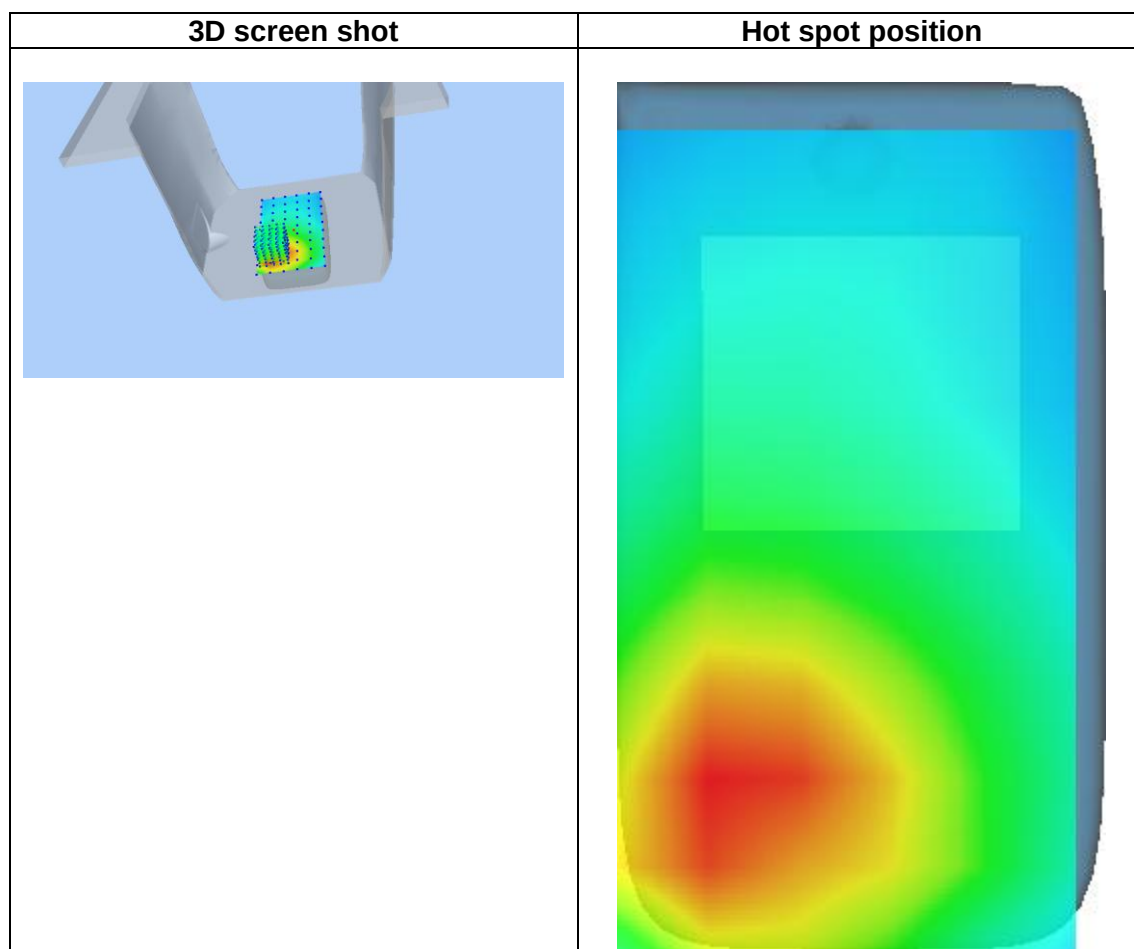
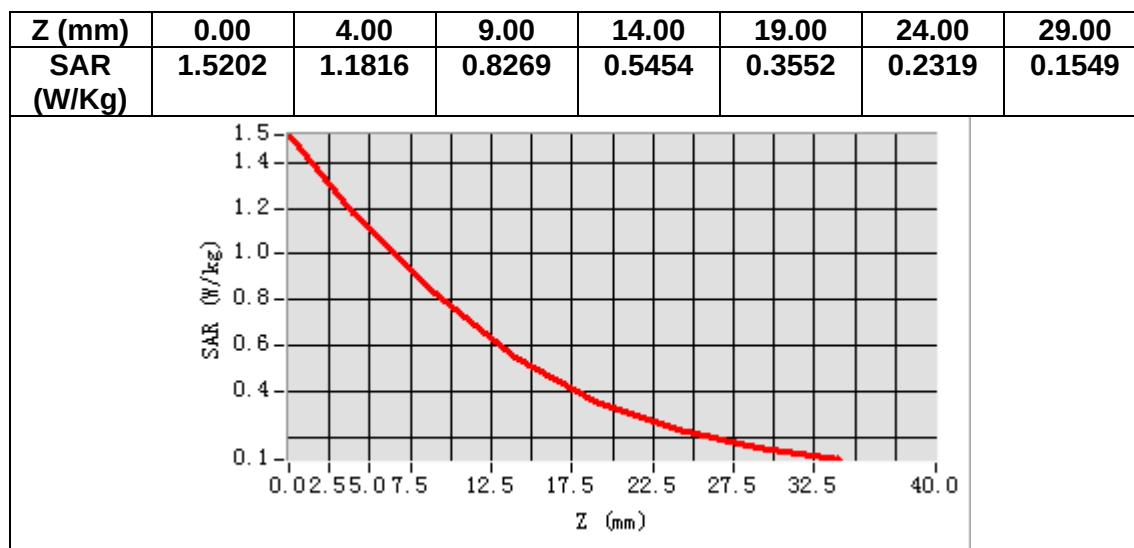
Frequency (MHz)	897.600000
Relative permittivity (real part)	42.285702
Relative permittivity (imaginary part)	19.453878
Conductivity (S/m)	0.970100
Variation (%)	-0.370000



Maximum location: X=-21.00, Y=-44.00

SAR Peak: 1.80 W/kg

SAR 10g (W/Kg)	0.720518
SAR 1g (W/Kg)	1.157027



MEASUREMENT 9

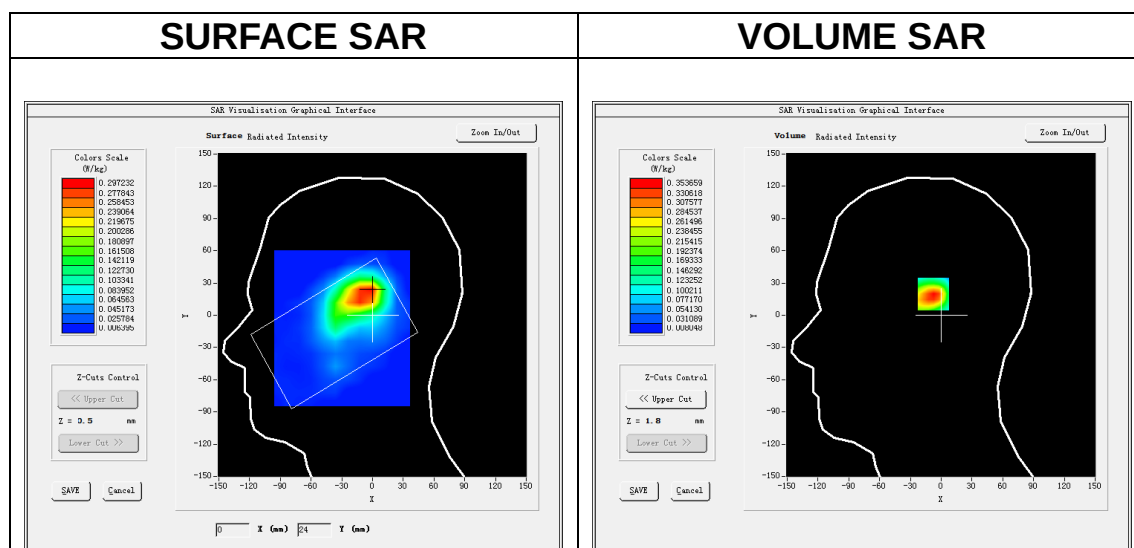
Date of measurement: 16/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

B. SAR Measurement Results

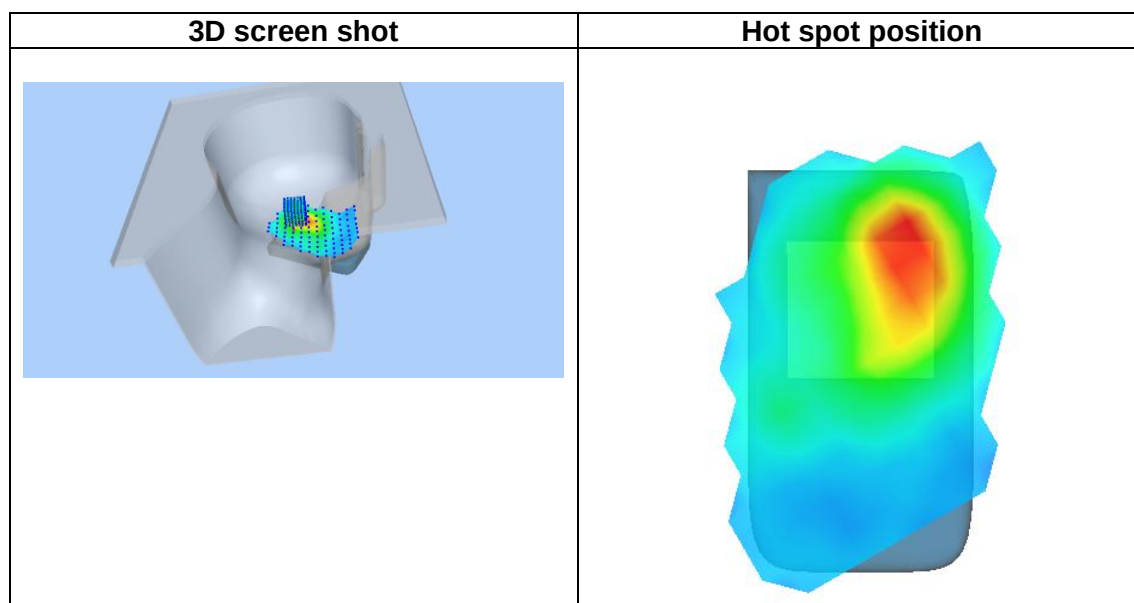
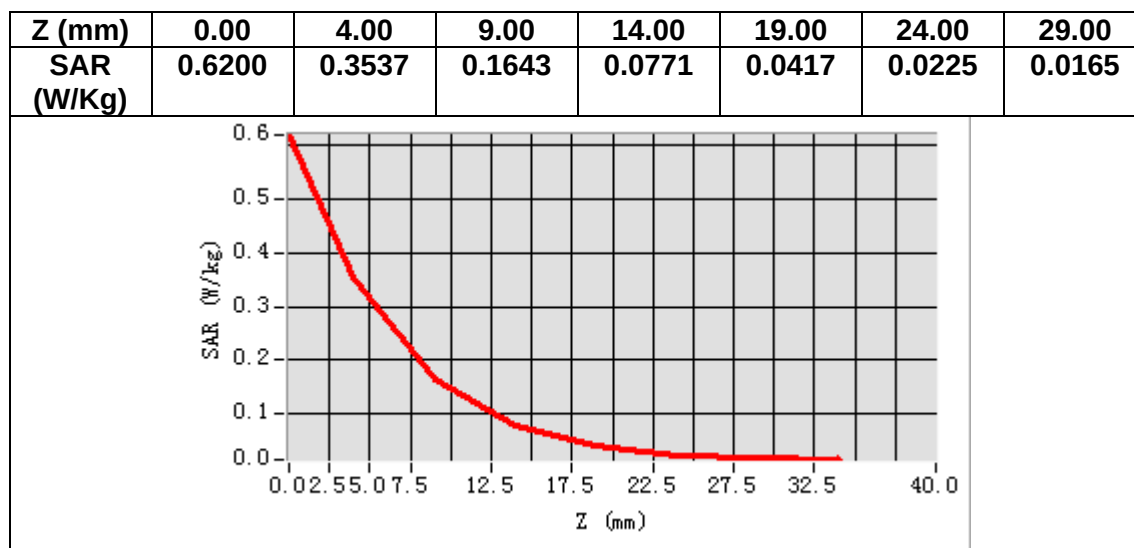
Frequency (MHz)	2442.000000
Relative permittivity (real part)	40.186211
Relative permittivity (imaginary part)	13.424949
Conductivity (S/m)	1.821318
Variation (%)	1.060000



Maximum location: X=-5.00, Y=21.00

SAR Peak: 0.62 W/kg

SAR 10g (W/Kg)	0.159382
SAR 1g (W/Kg)	0.328940



MEASUREMENT 10

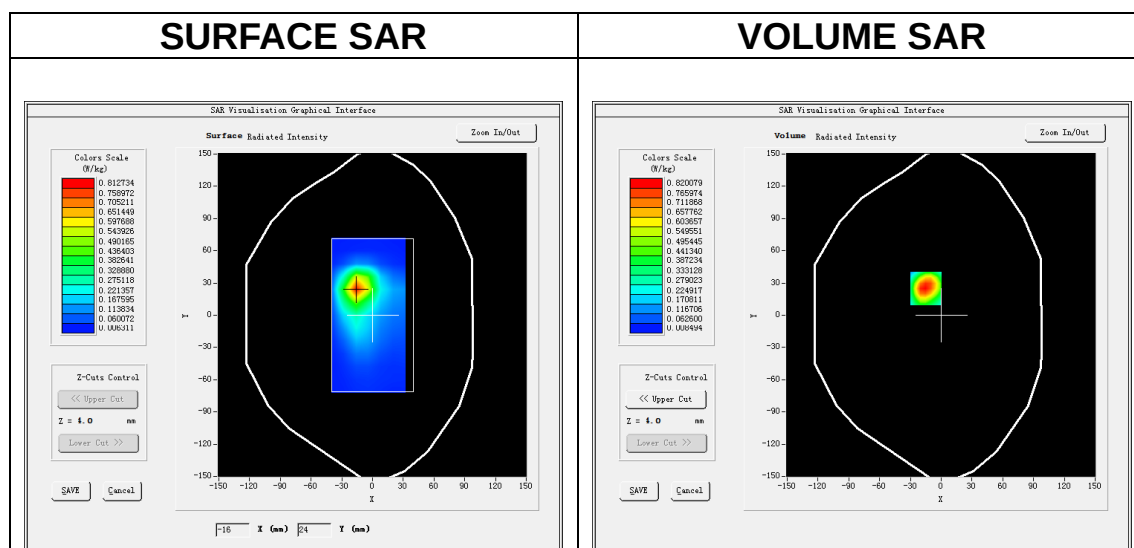
Date of measurement: 16/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

B. SAR Measurement Results

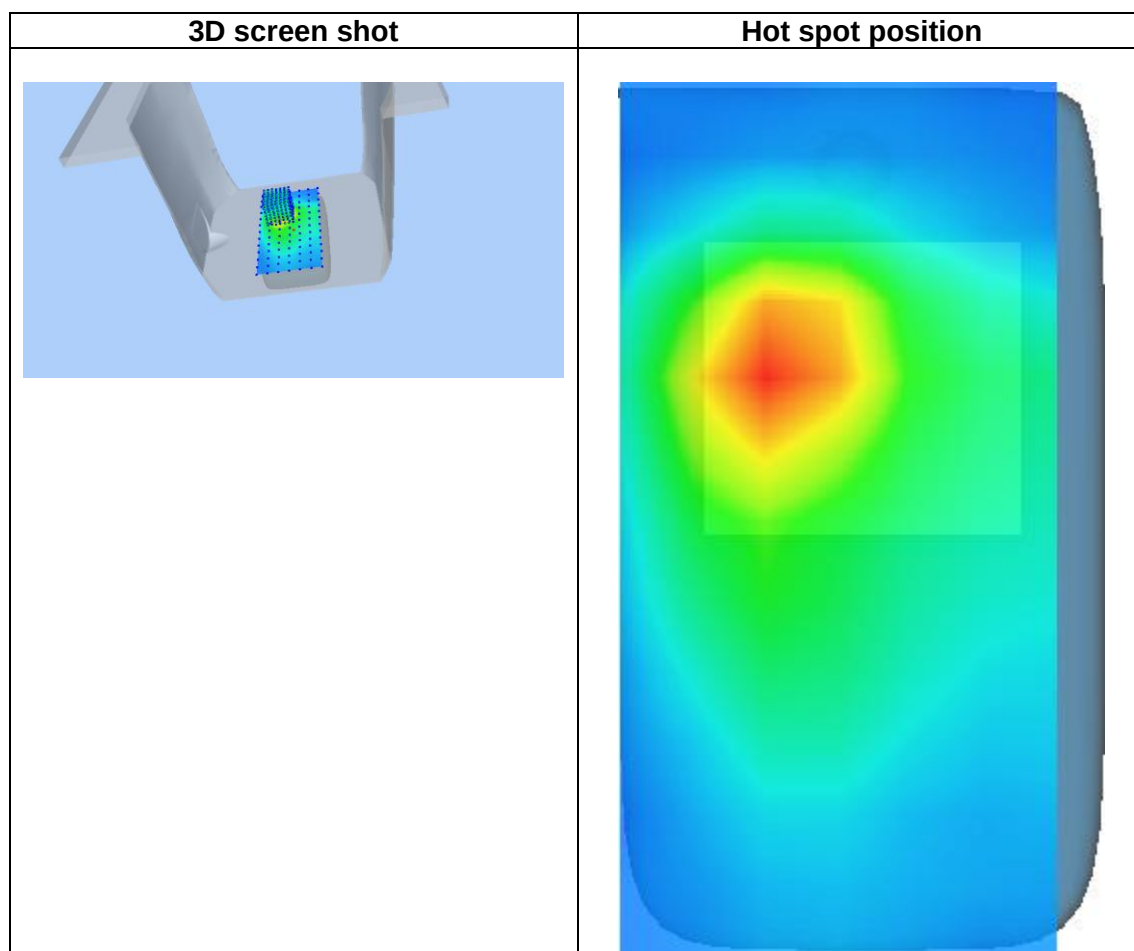
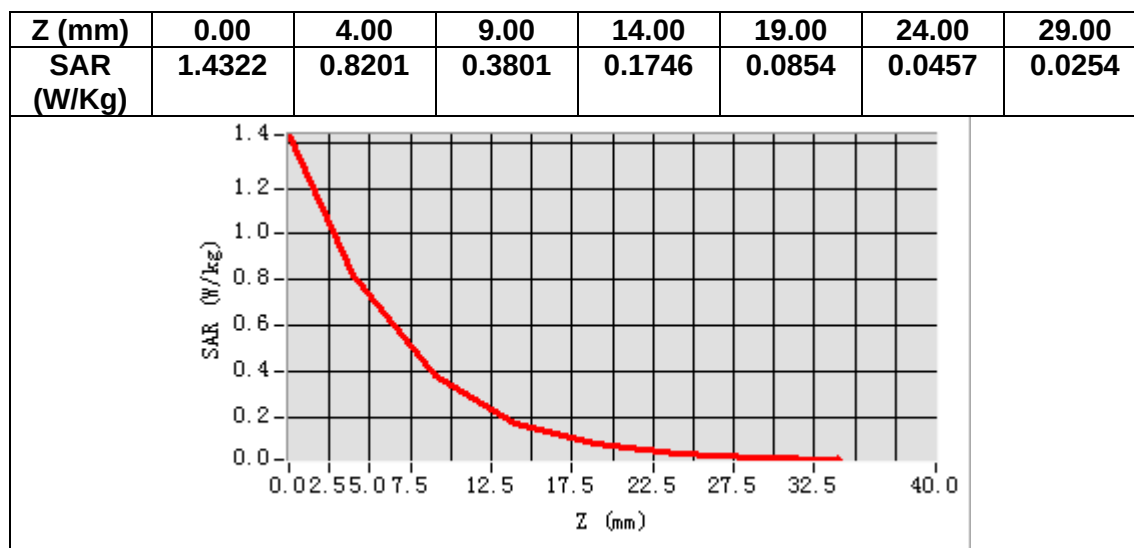
Frequency (MHz)	2442.000000
Relative permittivity (real part)	40.186211
Relative permittivity (imaginary part)	13.424949
Conductivity (S/m)	1.821318
Variation (%)	-0.270000



Maximum location: X=-15.00, Y=25.00

SAR Peak: 1.45 W/kg

SAR 10g (W/Kg)	0.366870
SAR 1g (W/Kg)	0.779240



MEASUREMENT 11

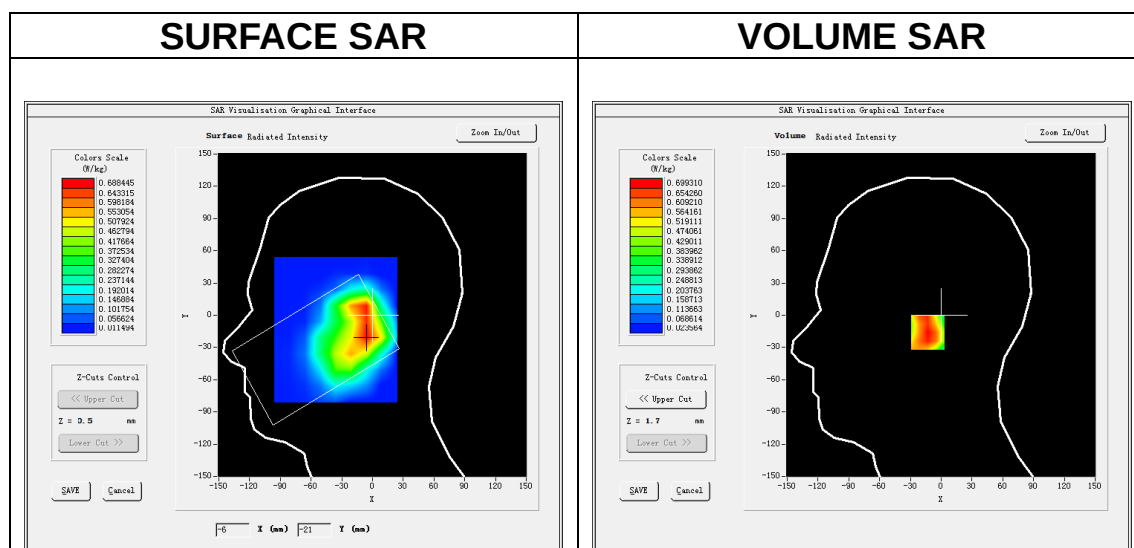
Date of measurement: 2/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

B. SAR Measurement Results

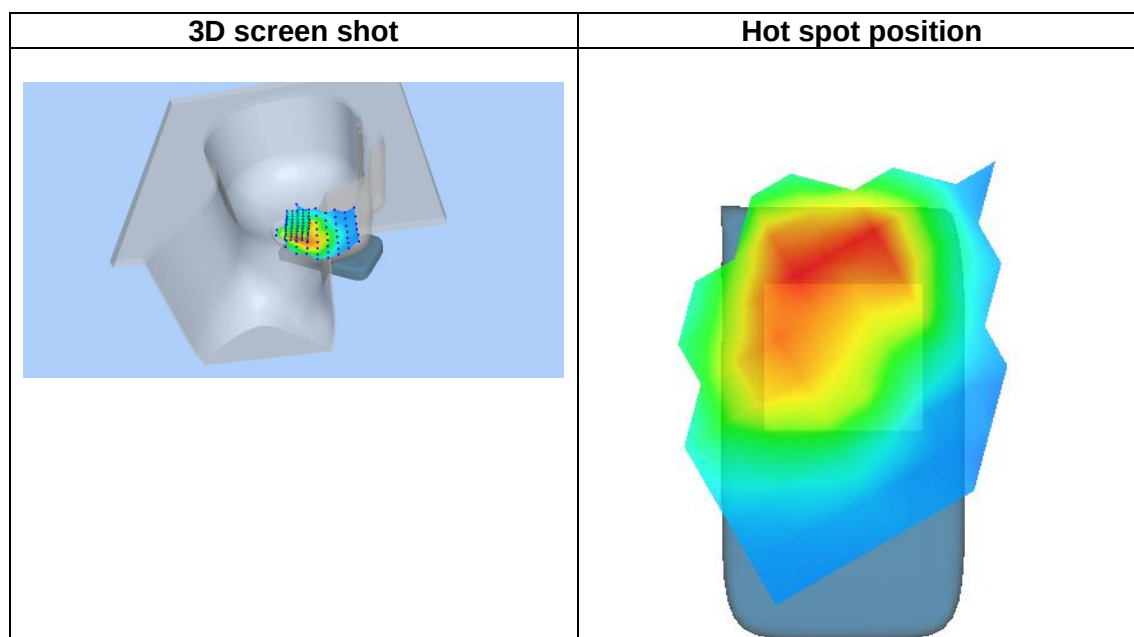
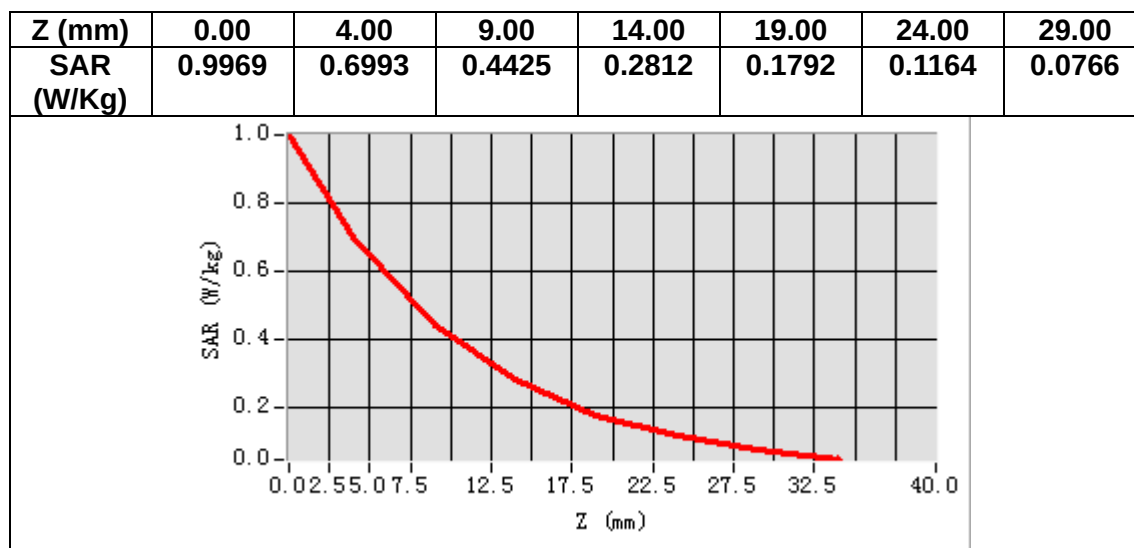
Frequency (MHz)	1950.000000
Relative permittivity (real part)	40.885212
Relative permittivity (imaginary part)	12.629380
Conductivity (S/m)	1.368183
Variation (%)	-0.050000



Maximum location: X=-5.00, Y=-16.00

SAR Peak: 1.01 W/kg

SAR 10g (W/Kg)	0.404500
SAR 1g (W/Kg)	0.670206



MEASUREMENT 12

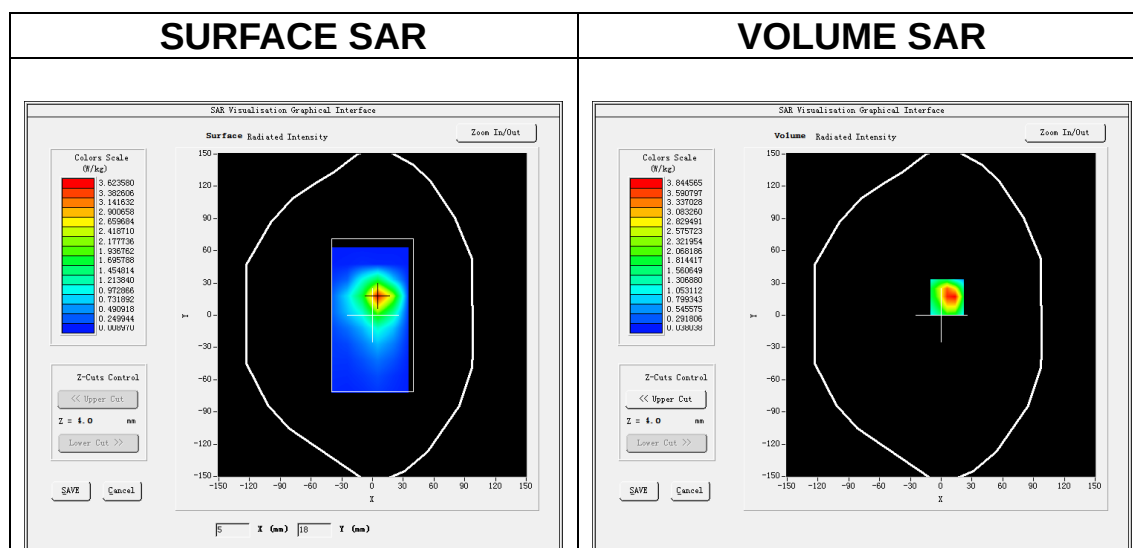
Date of measurement: 2/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

B. SAR Measurement Results

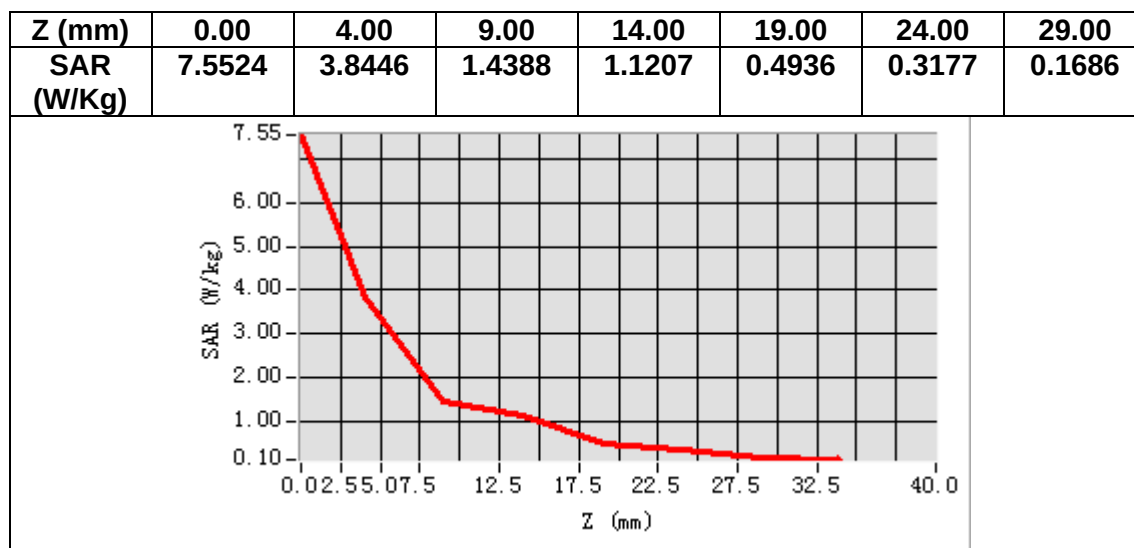
Frequency (MHz)	1950.000000
Relative permittivity (real part)	40.885212
Relative permittivity (imaginary part)	12.629380
Conductivity (S/m)	1.368183
Variation (%)	-0.690000



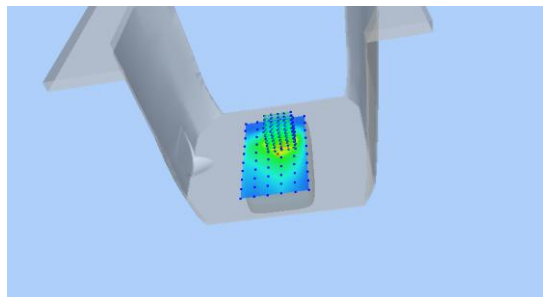
Maximum location: X=6.00, Y=17.00

SAR Peak: 6.94 W/kg

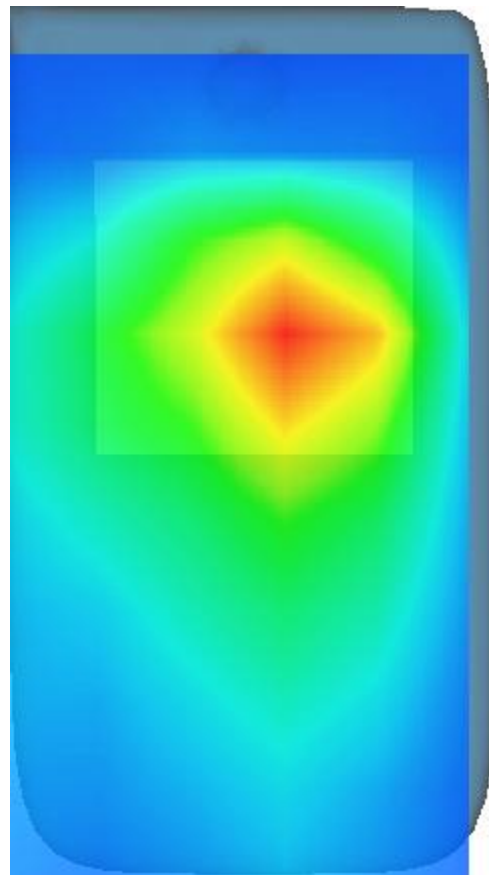
SAR 10g (W/Kg)	1.793661
SAR 1g (W/Kg)	3.769546



3D screen shot



Hot spot position



MEASUREMENT 13

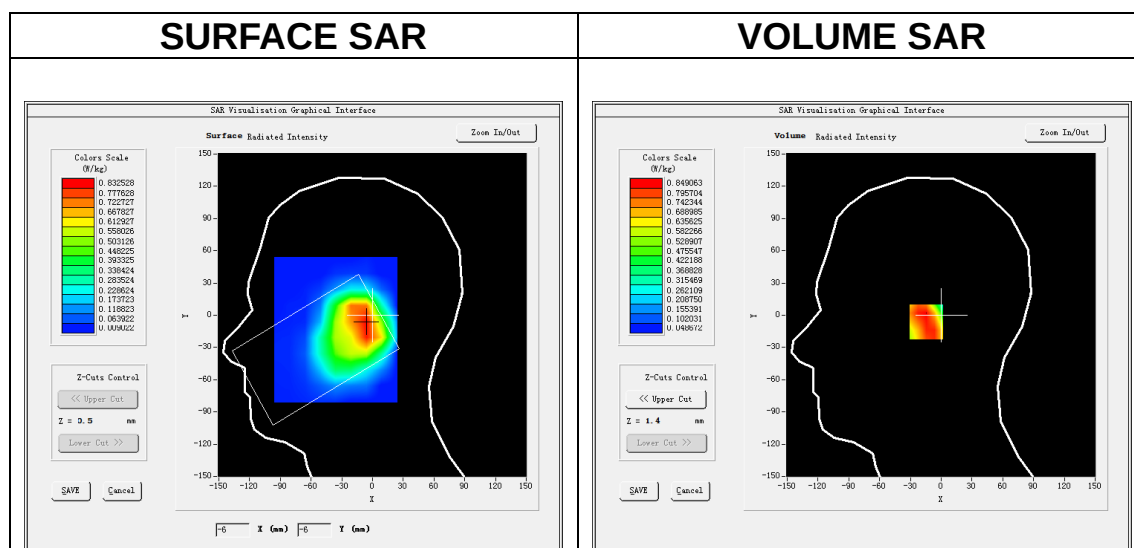
Date of measurement: 14/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

B. SAR Measurement Results

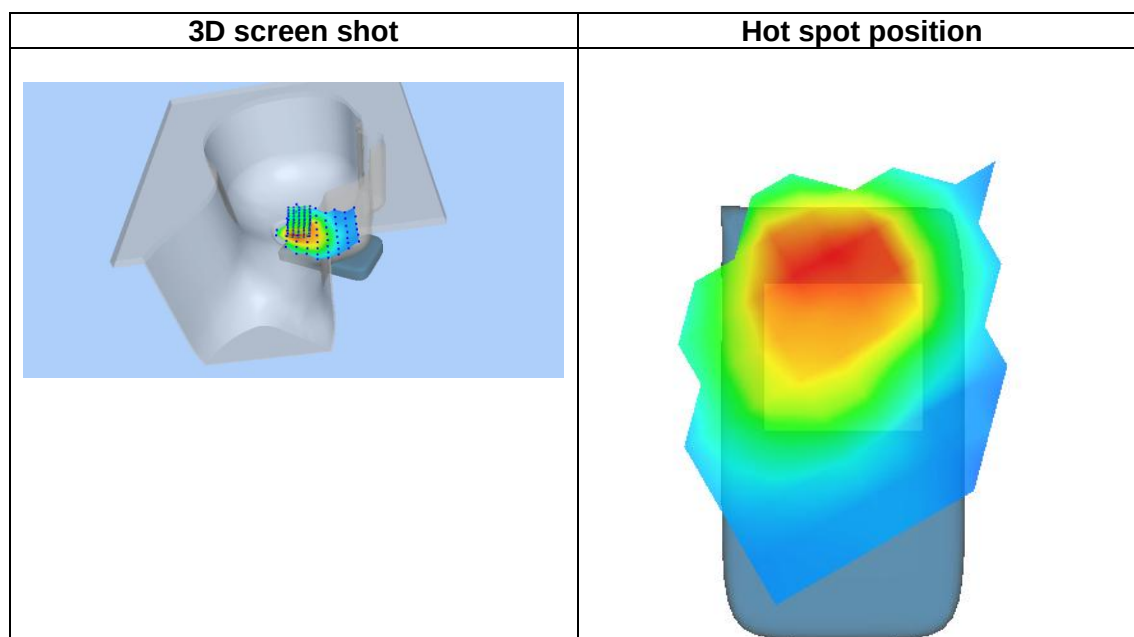
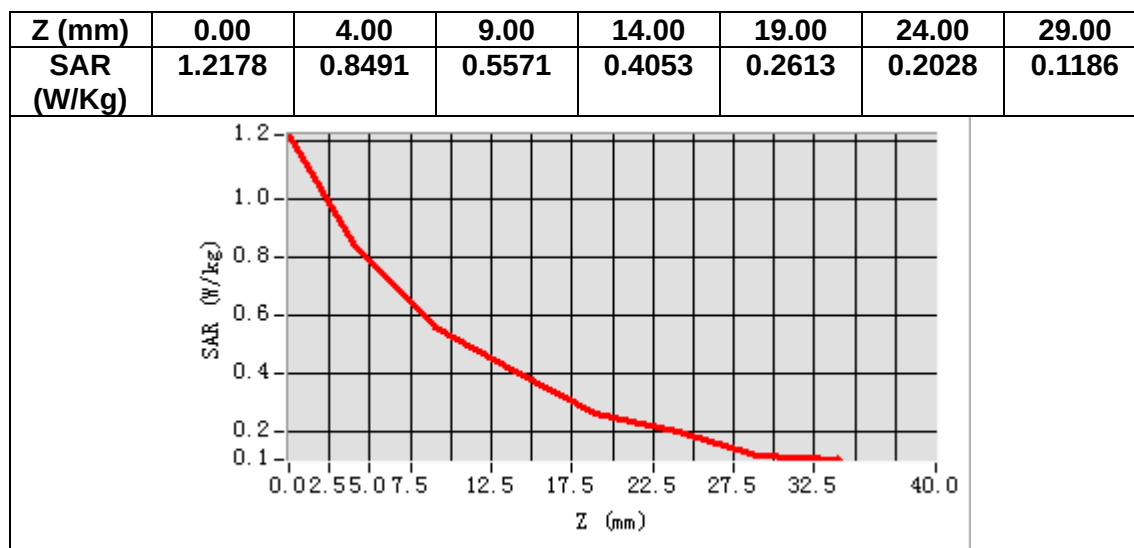
Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.674309
Relative permittivity (imaginary part)	13.708589
Conductivity (S/m)	1.330495
Variation (%)	-0.260000



Maximum location: X=-8.00, Y=-6.00

SAR Peak: 1.18 W/kg

SAR 10g (W/Kg)	0.548889
SAR 1g (W/Kg)	0.821465



MEASUREMENT 14

Date of measurement: 14/9/2024

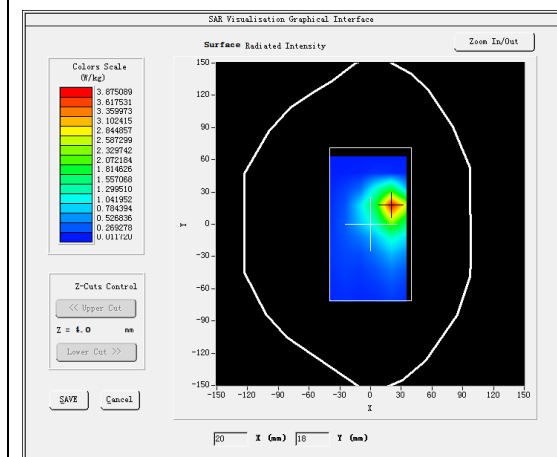
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

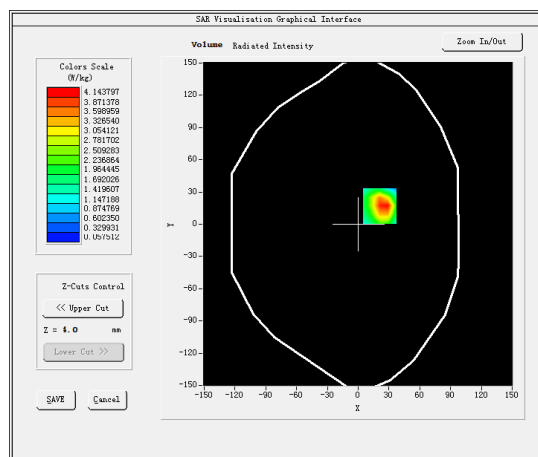
B. SAR Measurement Results

Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.674309
Relative permittivity (imaginary part)	13.708589
Conductivity (S/m)	1.330495
Variation (%)	1.500000

SURFACE SAR



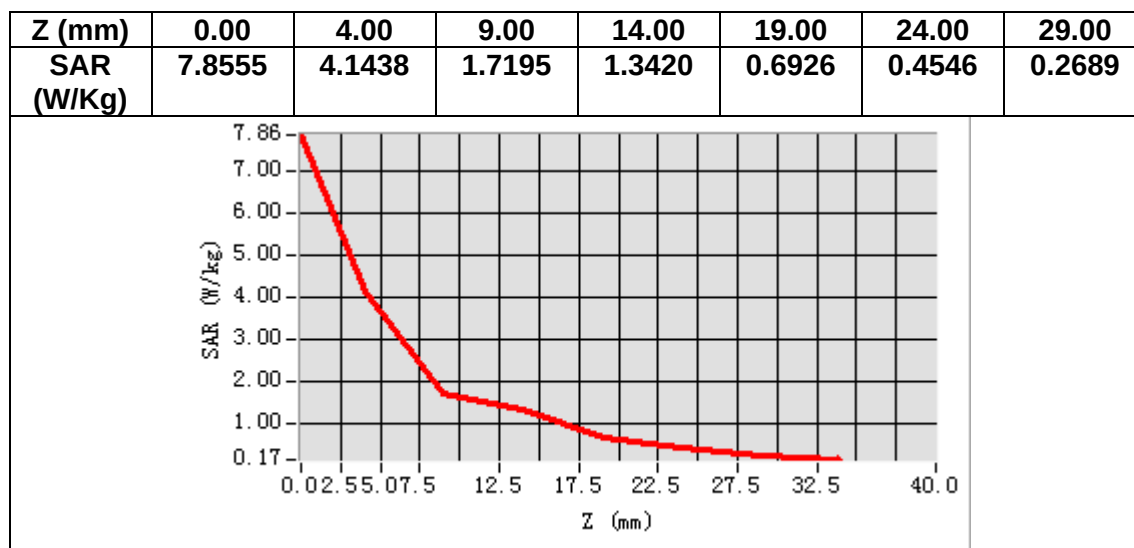
VOLUME SAR



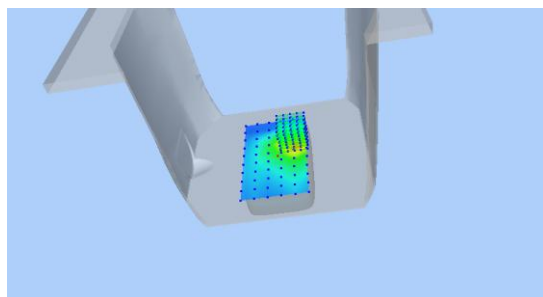
Maximum location: X=21.00, Y=17.00

SAR Peak: 6.99 W/kg

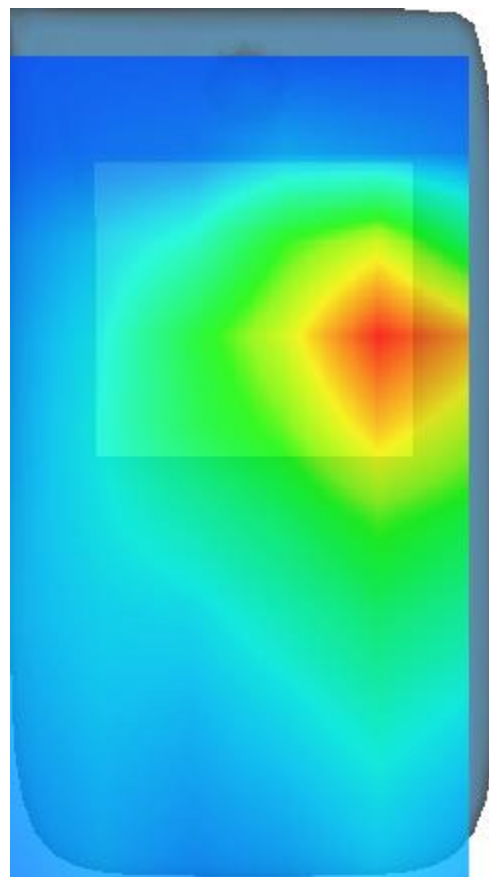
SAR 10g (W/Kg)	2.051092
SAR 1g (W/Kg)	4.016089



3D screen shot



Hot spot position



MEASUREMENT 15

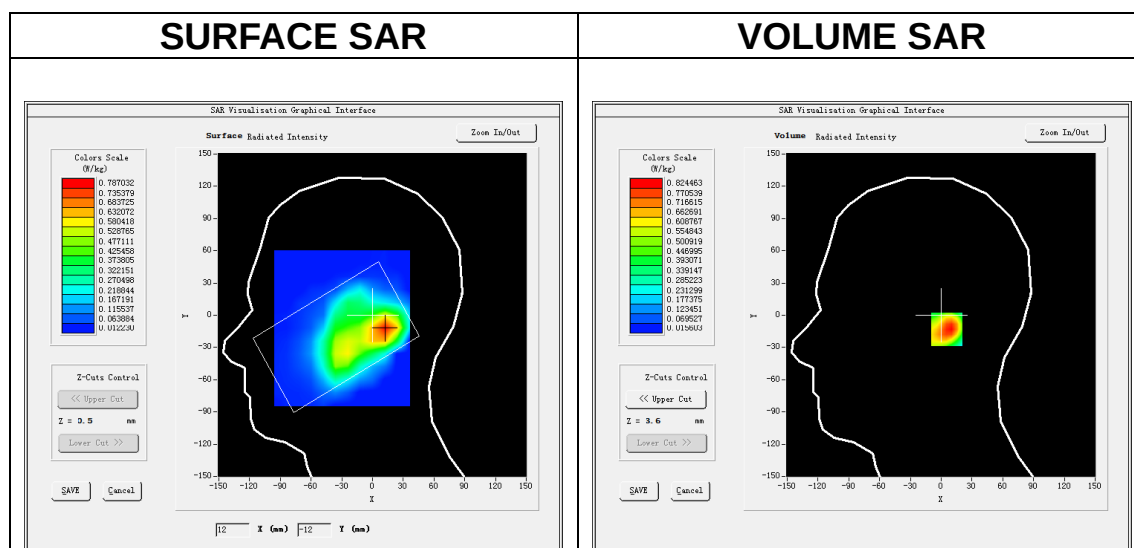
Date of measurement: 27/8/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 7</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

B. SAR Measurement Results

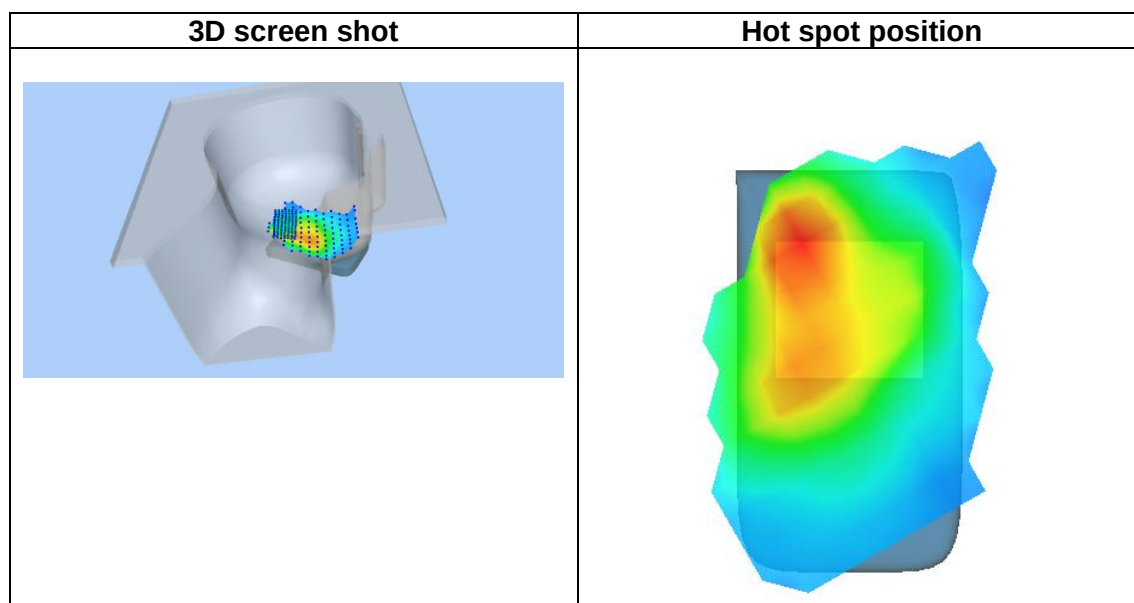
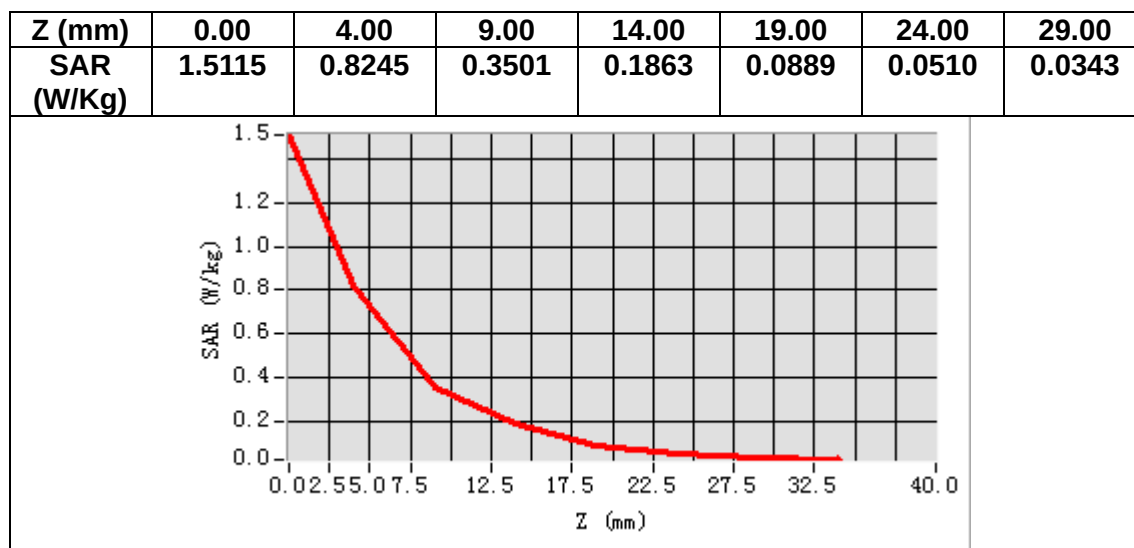
Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.433262
Relative permittivity (imaginary part)	13.789530
Conductivity (S/m)	1.942025
Variation (%)	1.560000



Maximum location: X=12.00, Y=-13.00

SAR Peak: 1.43 W/kg

SAR 10g (W/Kg)	0.384772
SAR 1g (W/Kg)	0.786213



MEASUREMENT 16

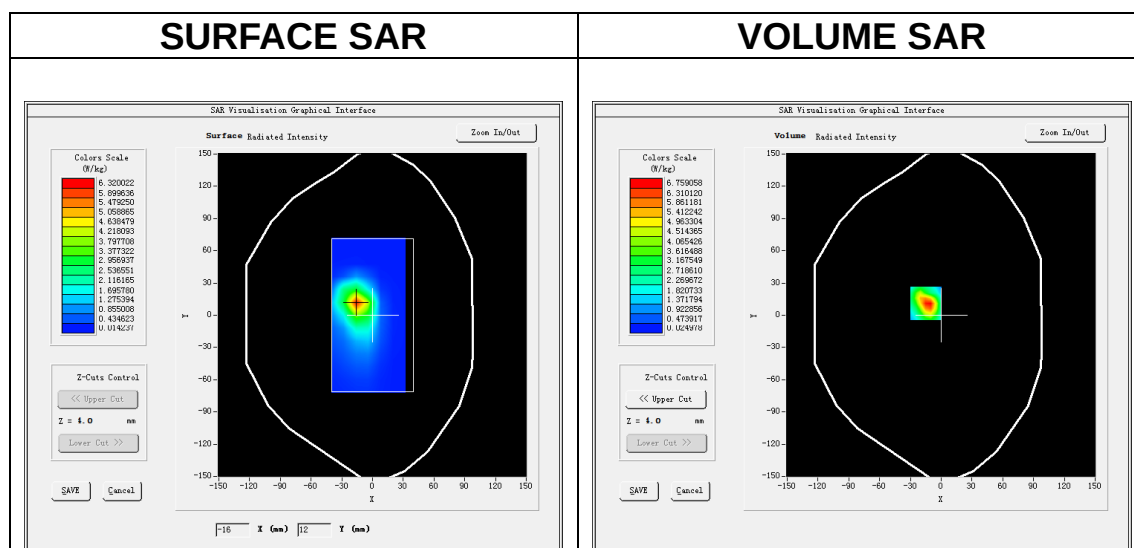
Date of measurement: 27/8/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 7</u>
<u>Channels</u>	<u>Low</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

B. SAR Measurement Results

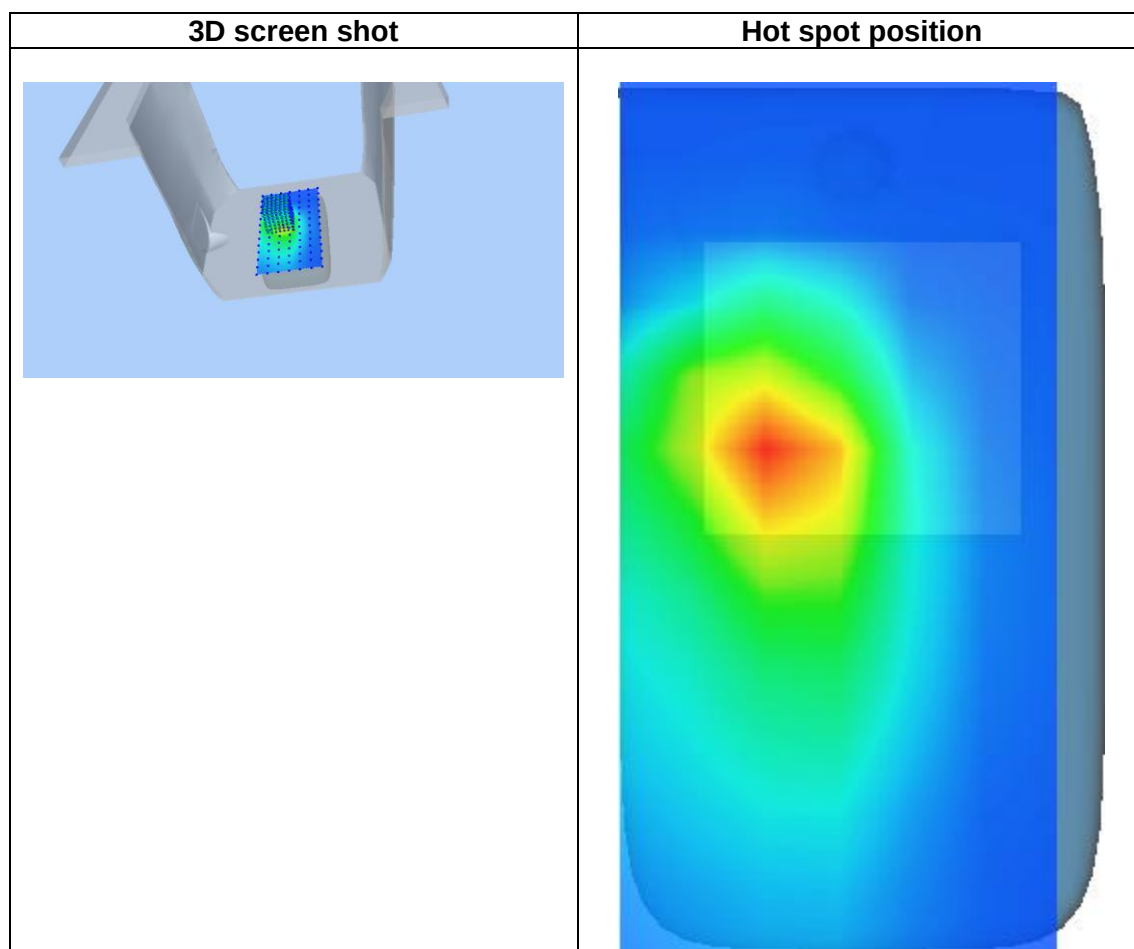
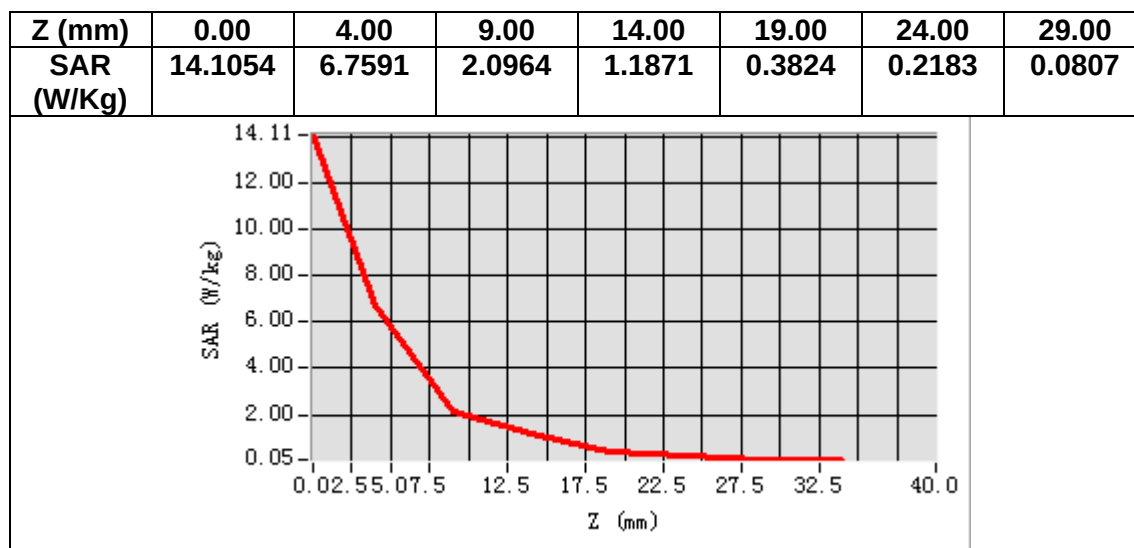
Frequency (MHz)	2510.000000
Relative permittivity (real part)	39.548363
Relative permittivity (imaginary part)	13.732230
Conductivity (S/m)	1.914883
Variation (%)	0.300000



Maximum location: X=-15.00, Y=11.00

SAR Peak: 12.60 W/kg

SAR 10g (W/Kg)	2.559946
SAR 1g (W/Kg)	6.233155



MEASUREMENT 17

Date of measurement: 15/9/2024

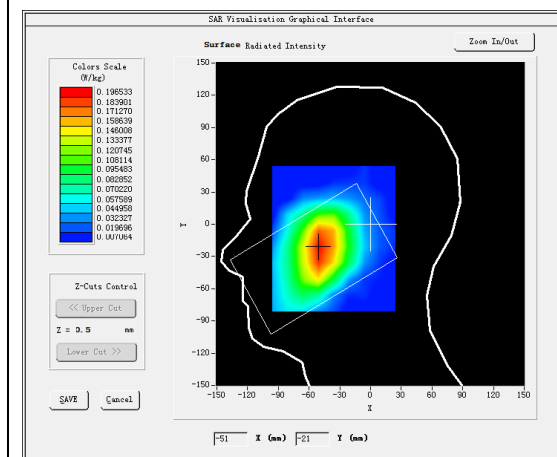
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

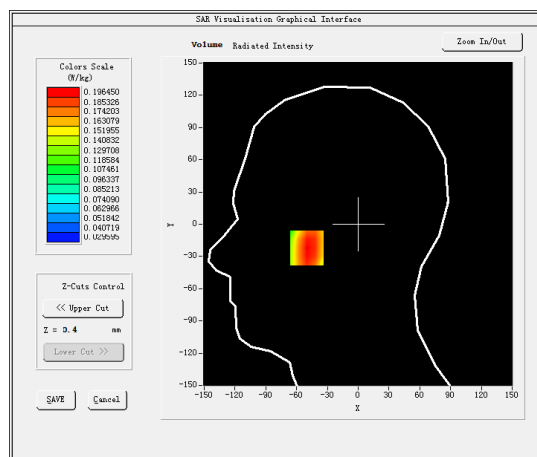
B. SAR Measurement Results

Frequency (MHz)	897.500000
Relative permittivity (real part)	42.300343
Relative permittivity (imaginary part)	19.414459
Conductivity (S/m)	0.967487
Variation (%)	-0.150000

SURFACE SAR



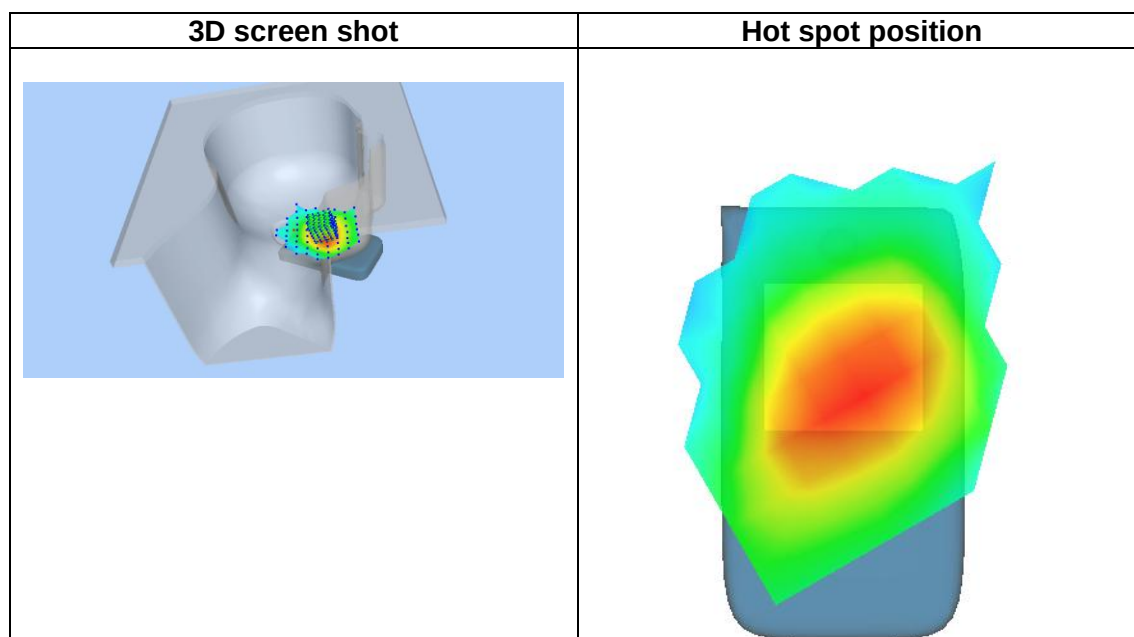
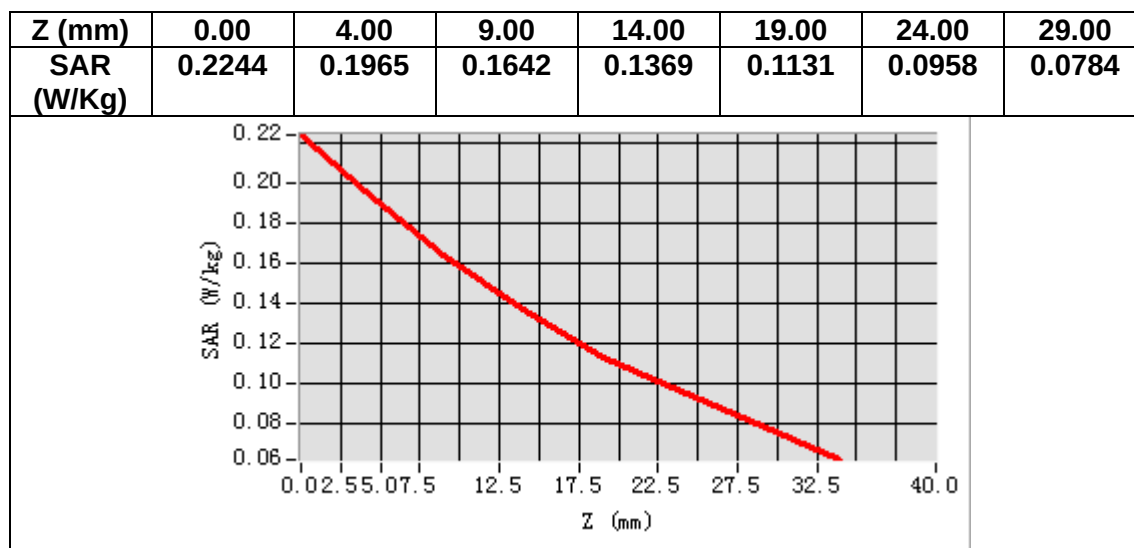
VOLUME SAR



Maximum location: X=-50.00, Y=-22.00

SAR Peak: 0.24 W/kg

SAR 10g (W/Kg)	0.149335
SAR 1g (W/Kg)	0.193424



MEASUREMENT 18

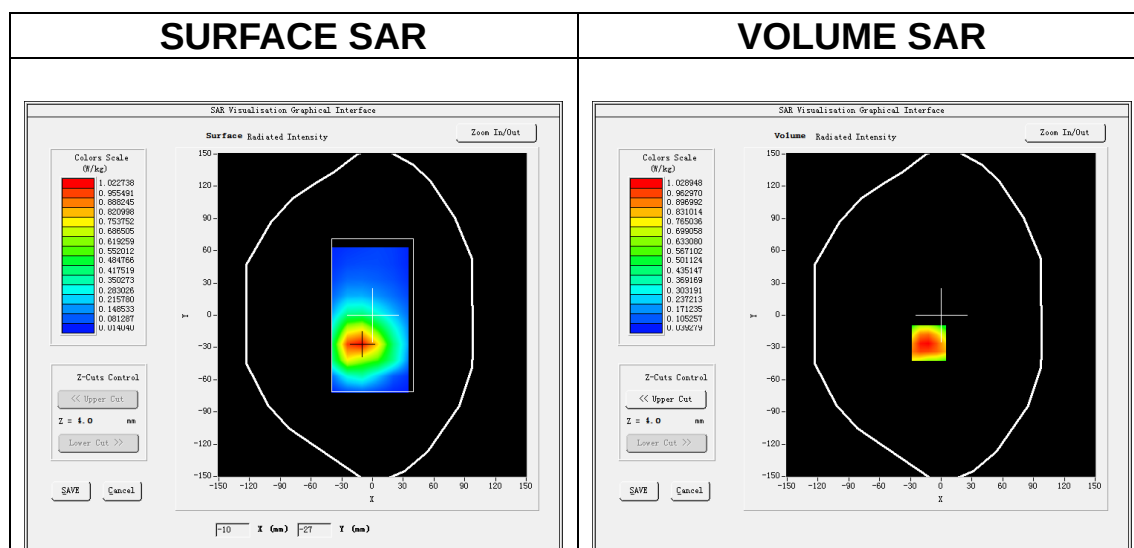
Date of measurement: 15/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

B. SAR Measurement Results

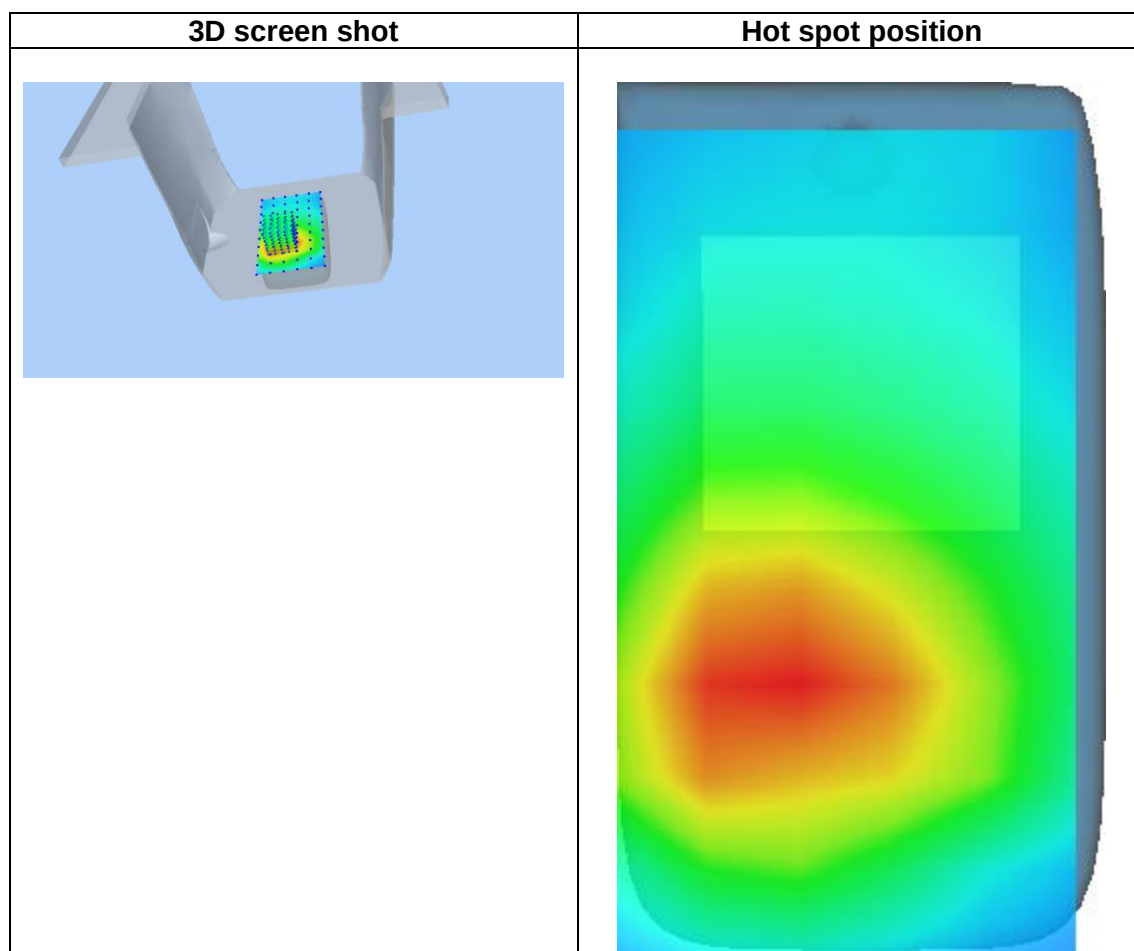
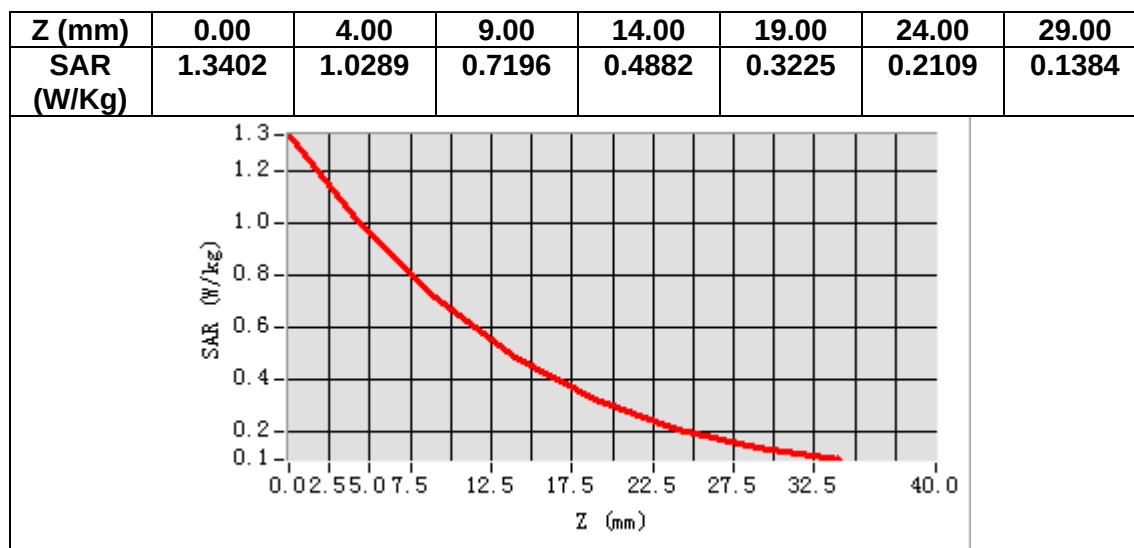
Frequency (MHz)	897.500000
Relative permittivity (real part)	42.300343
Relative permittivity (imaginary part)	19.414459
Conductivity (S/m)	0.967487
Variation (%)	0.470000



Maximum location: X=-12.00, Y=-26.00

SAR Peak: 1.41 W/kg

SAR 10g (W/Kg)	0.639406
SAR 1g (W/Kg)	0.995380



MEASUREMENT 19

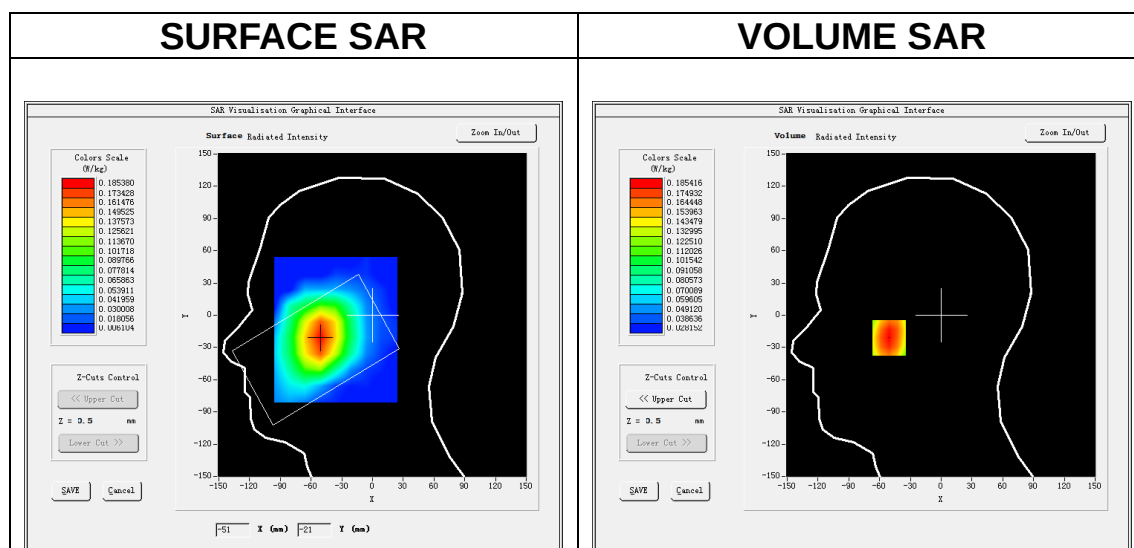
Date of measurement: 15/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

B. SAR Measurement Results

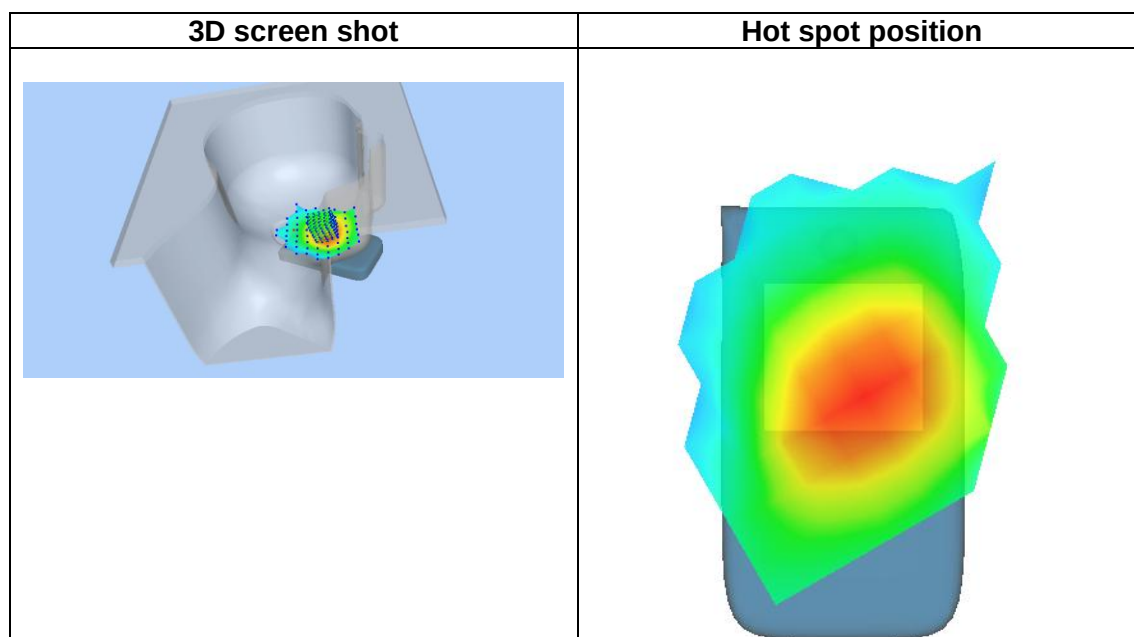
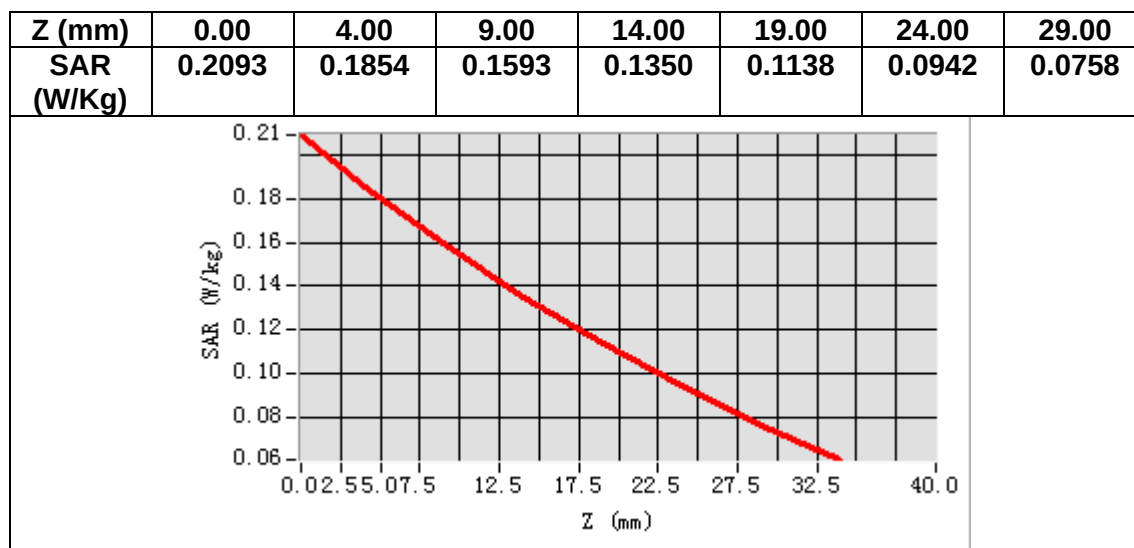
Frequency (MHz)	847.000000
Relative permittivity (real part)	42.962841
Relative permittivity (imaginary part)	19.396191
Conductivity (S/m)	0.912699
Variation (%)	4.030000



Maximum location: X=-51.00, Y=-21.00

SAR Peak: 0.21 W/kg

SAR 10g (W/Kg)	0.142181
SAR 1g (W/Kg)	0.180292



MEASUREMENT 20

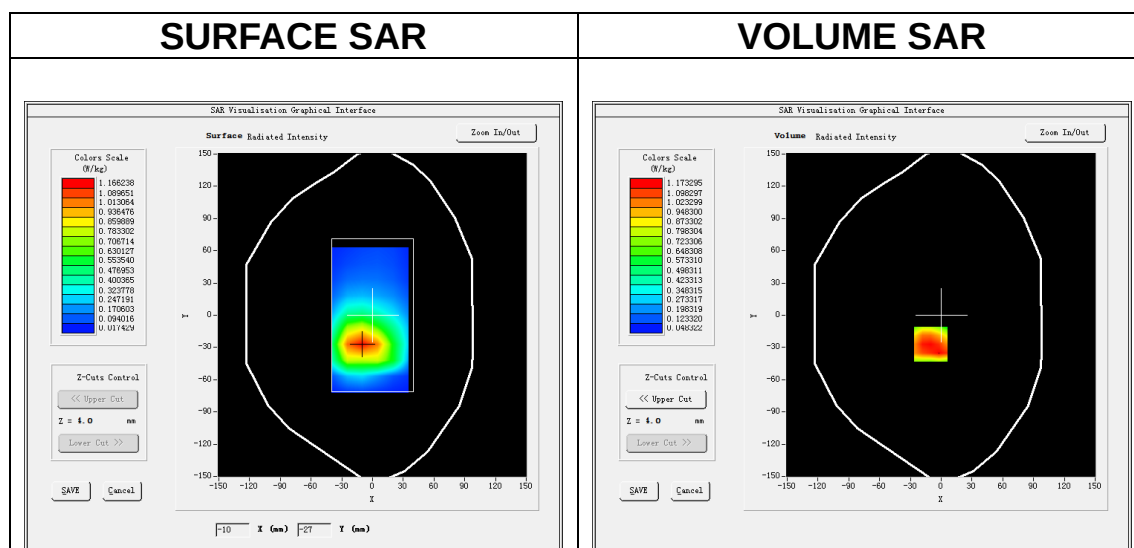
Date of measurement: 15/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

B. SAR Measurement Results

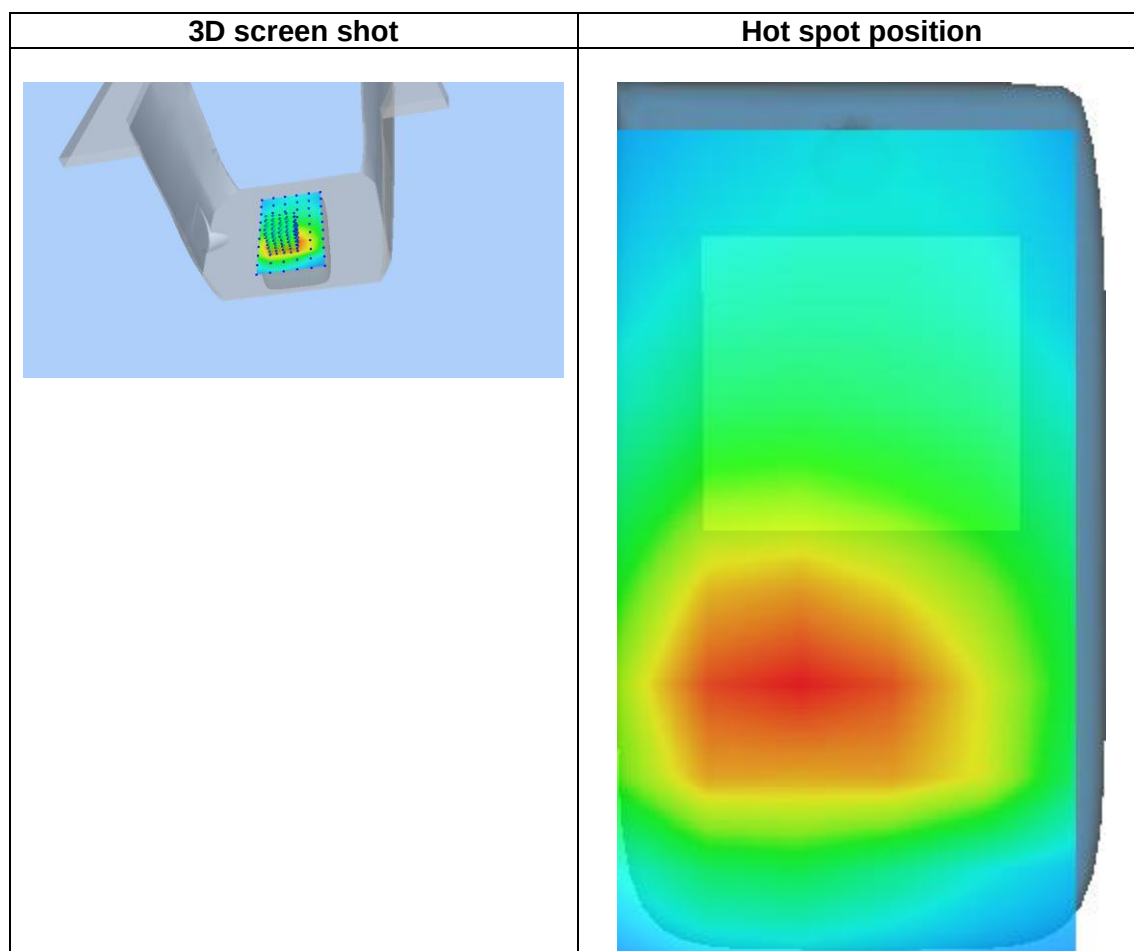
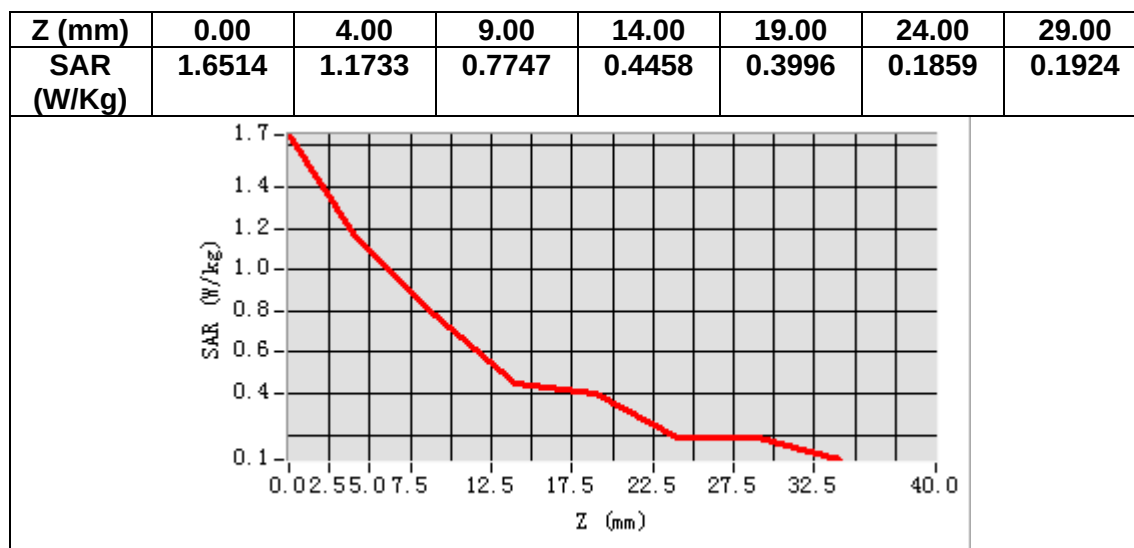
Frequency (MHz)	847.000000
Relative permittivity (real part)	42.962841
Relative permittivity (imaginary part)	19.396191
Conductivity (S/m)	0.912699
Variation (%)	0.430000



Maximum location: X=-10.00, Y=-27.00

SAR Peak: 1.75 W/kg

SAR 10g (W/Kg)	0.740089
SAR 1g (W/Kg)	1.152039



MEASUREMENT 21

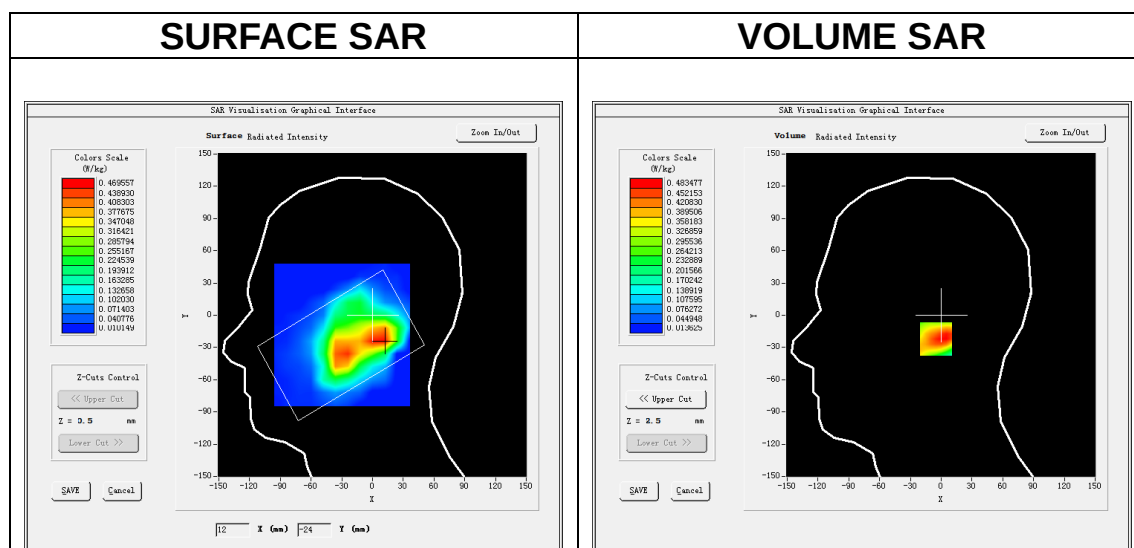
Date of measurement: 27/8/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

B. SAR Measurement Results

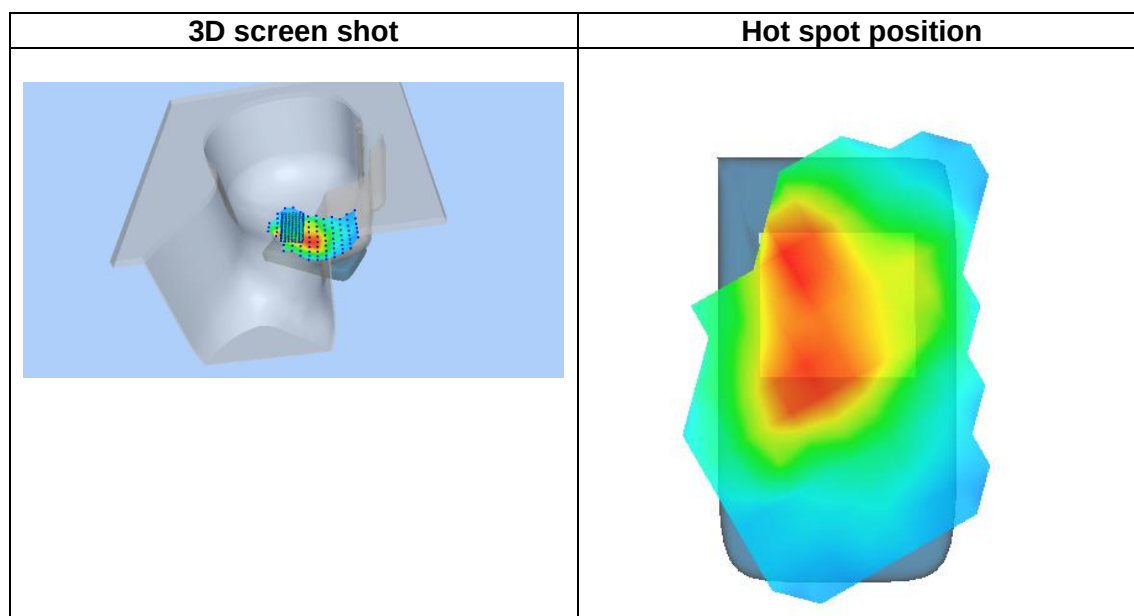
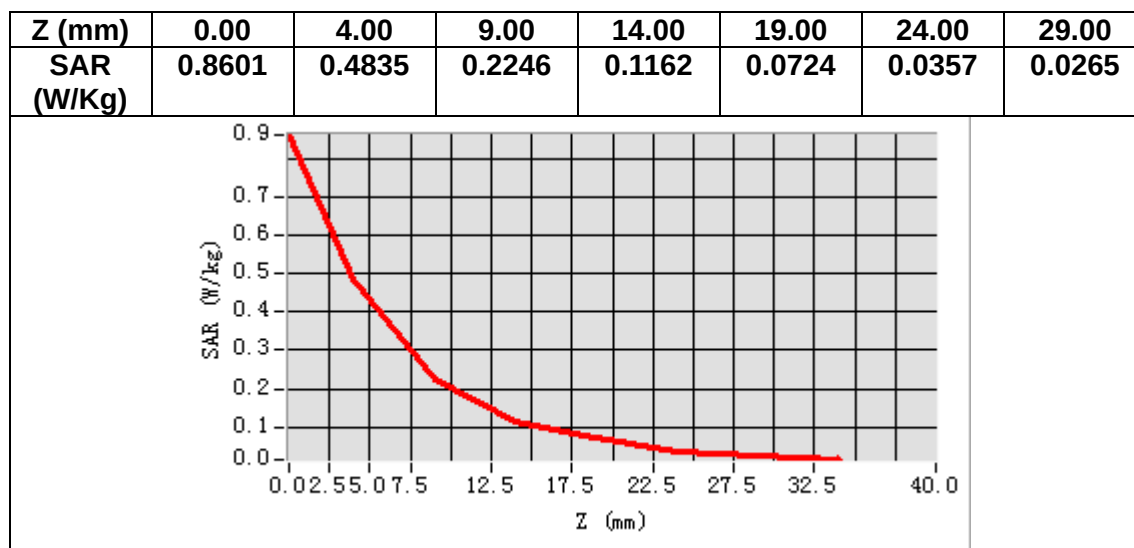
Frequency (MHz)	2595.000000
Relative permittivity (real part)	39.065365
Relative permittivity (imaginary part)	14.003330
Conductivity (S/m)	2.018813
Variation (%)	-1.440000



Maximum location: X=1.00, Y=-22.00

SAR Peak: 0.84 W/kg

SAR 10g (W/Kg)	0.247757
SAR 1g (W/Kg)	0.471365



MEASUREMENT 22

Date of measurement: 27/8/2024

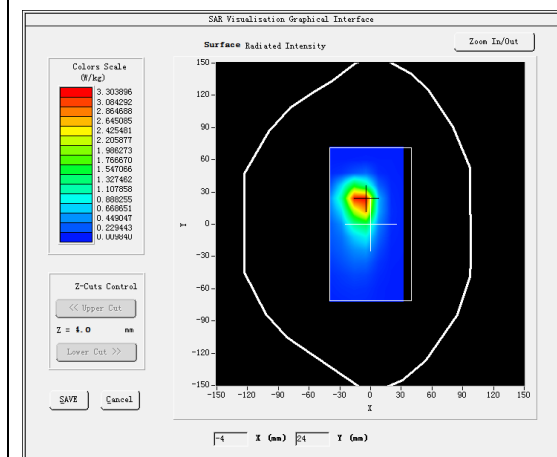
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

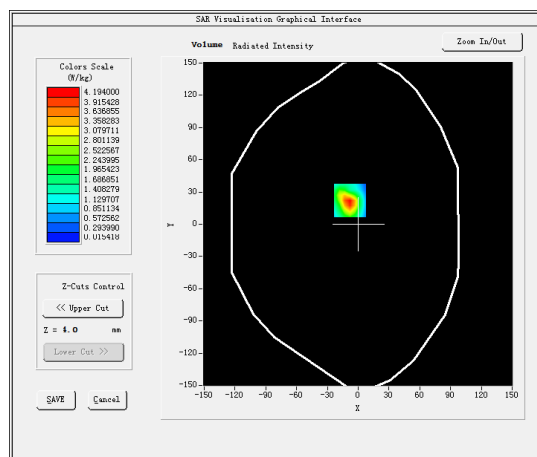
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	39.065365
Relative permittivity (imaginary part)	14.003330
Conductivity (S/m)	2.018813
Variation (%)	-0.340000

SURFACE SAR



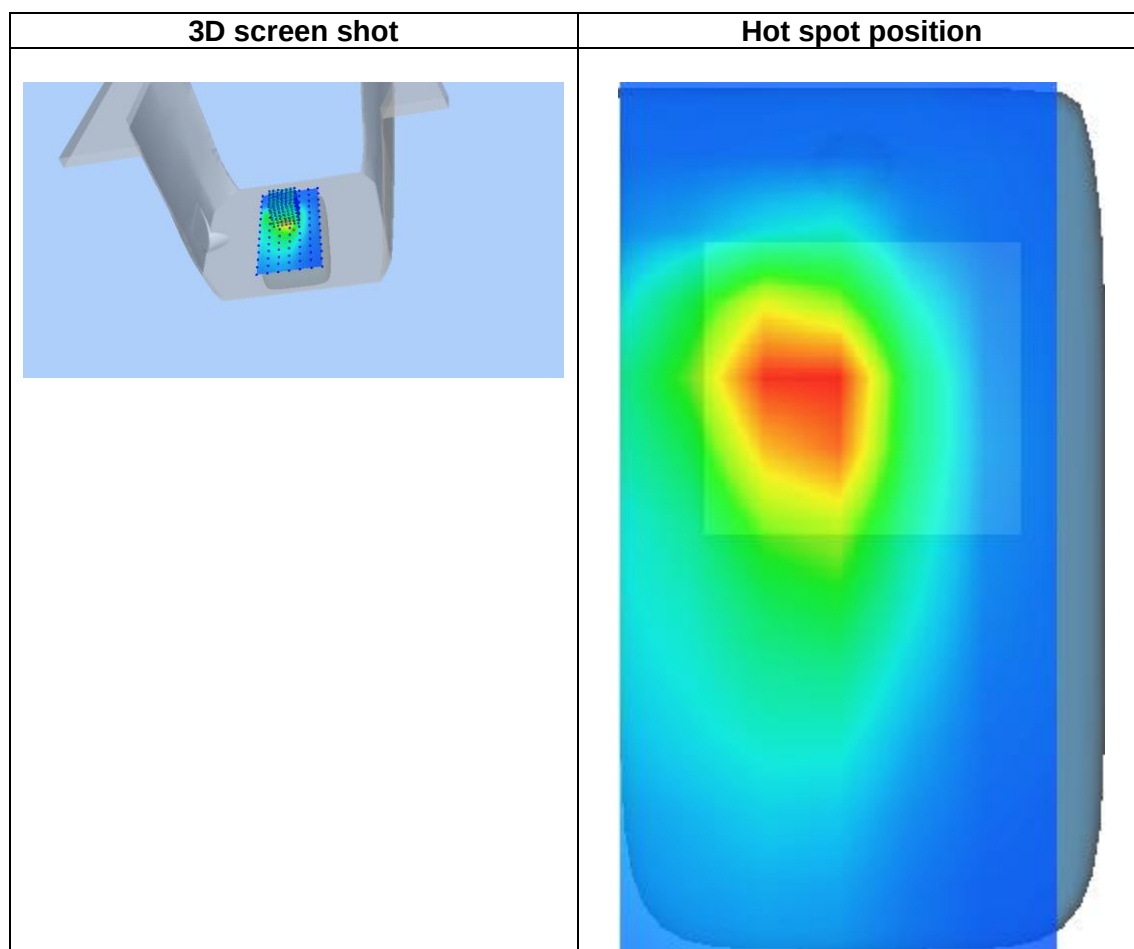
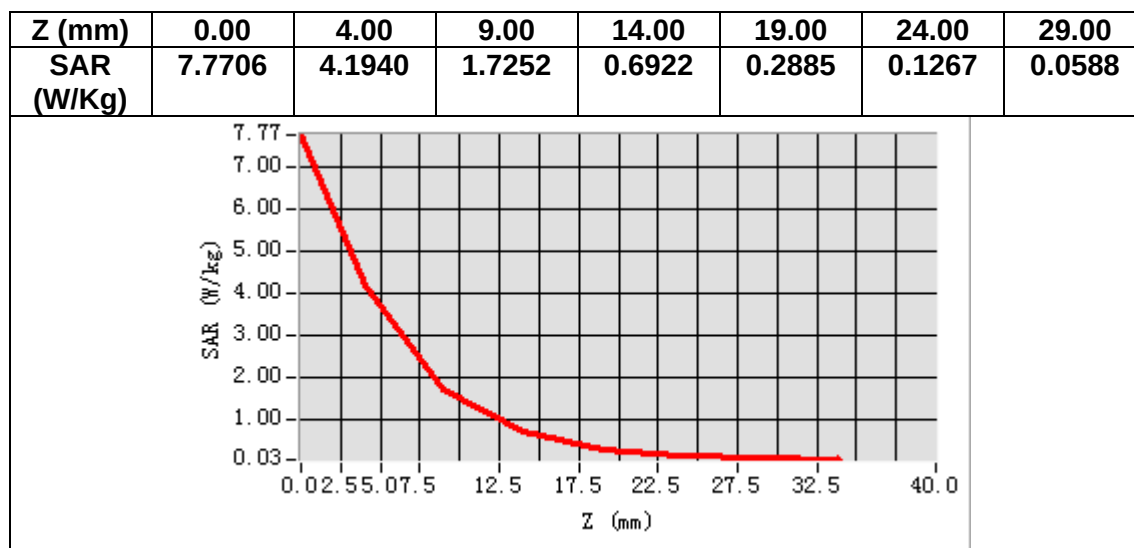
VOLUME SAR



Maximum location: X=-8.00, Y=22.00

SAR Peak: 7.72 W/kg

SAR 10g (W/Kg)	1.571356
SAR 1g (W/Kg)	3.838717



MEASUREMENT 23

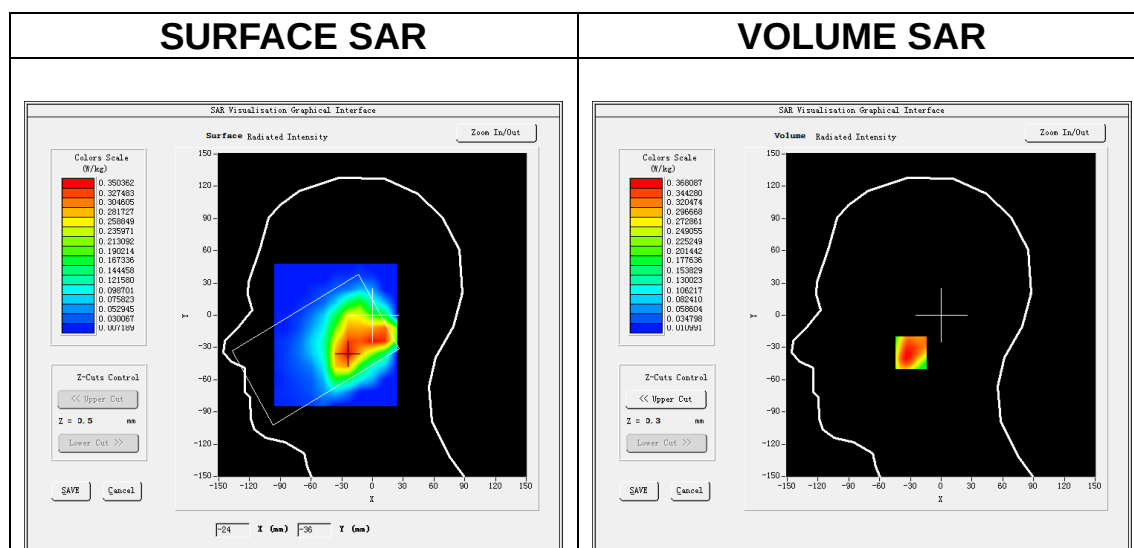
Date of measurement: 29/8/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

B. SAR Measurement Results

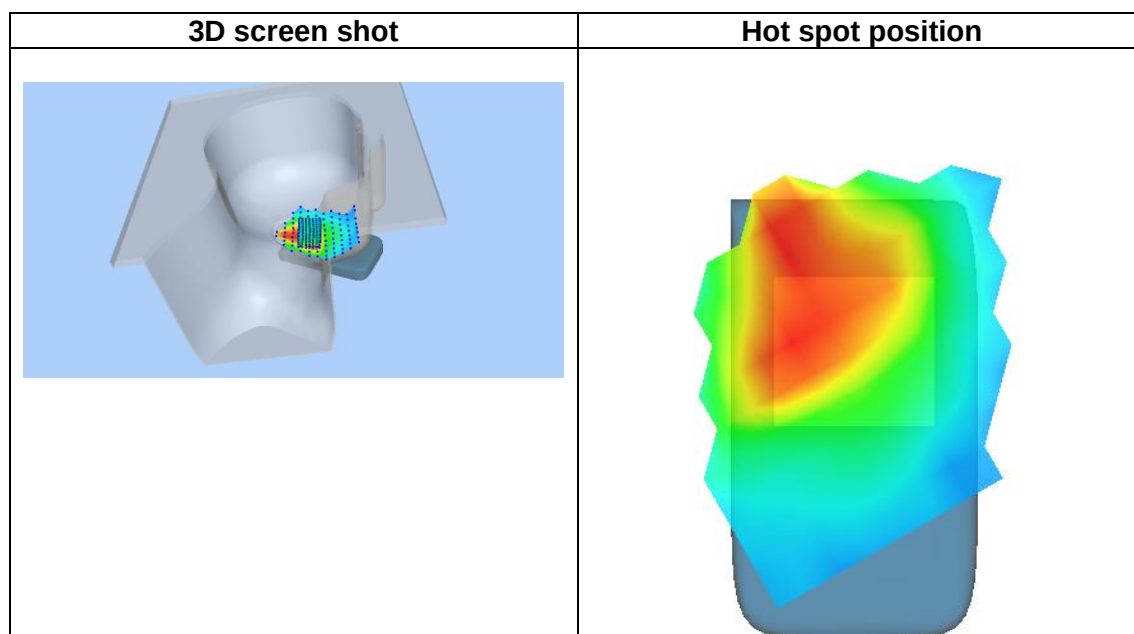
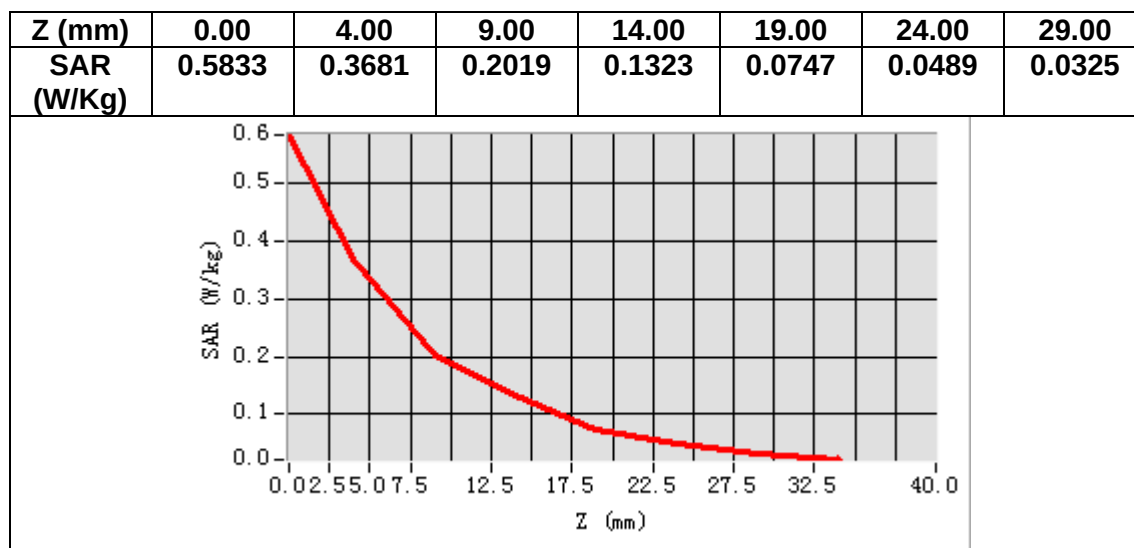
Frequency (MHz)	2350.000000
Relative permittivity (real part)	38.991489
Relative permittivity (imaginary part)	12.863556
Conductivity (S/m)	1.679409
Variation (%)	0.110000



Maximum location: X=-24.00, Y=-35.00

SAR Peak: 0.55 W/kg

SAR 10g (W/Kg)	0.199976
SAR 1g (W/Kg)	0.348342



MEASUREMENT 24

Date of measurement: 29/8/2024

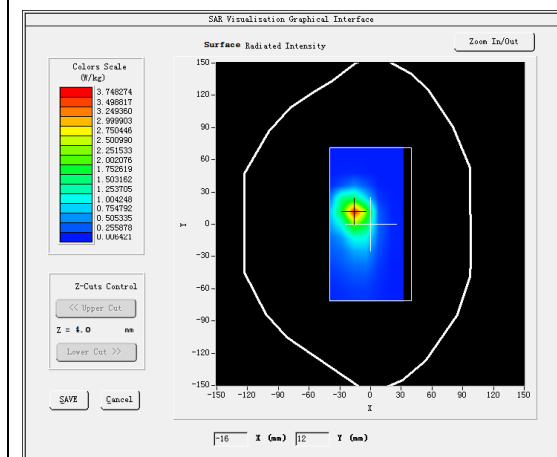
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

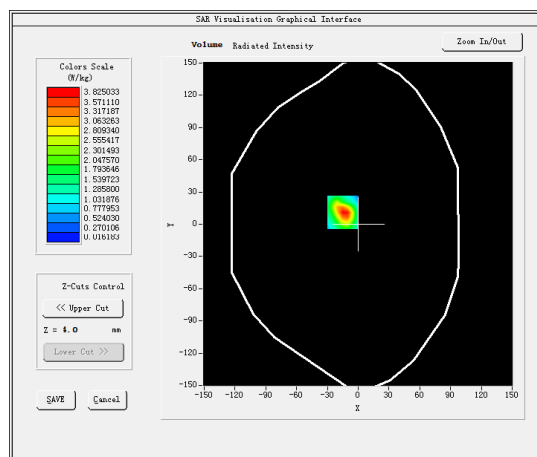
B. SAR Measurement Results

Frequency (MHz)	2350.000000
Relative permittivity (real part)	38.991489
Relative permittivity (imaginary part)	12.863556
Conductivity (S/m)	1.679409
Variation (%)	-0.690000

SURFACE SAR



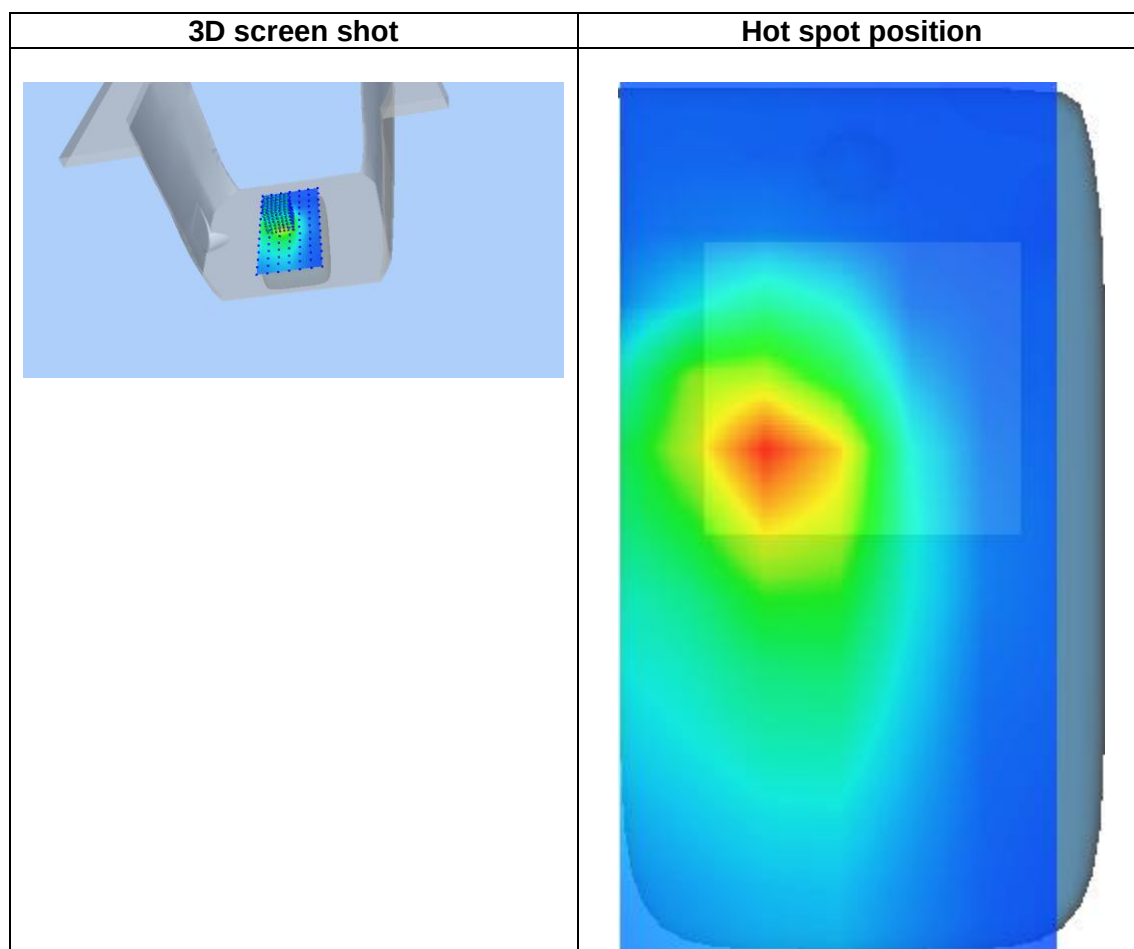
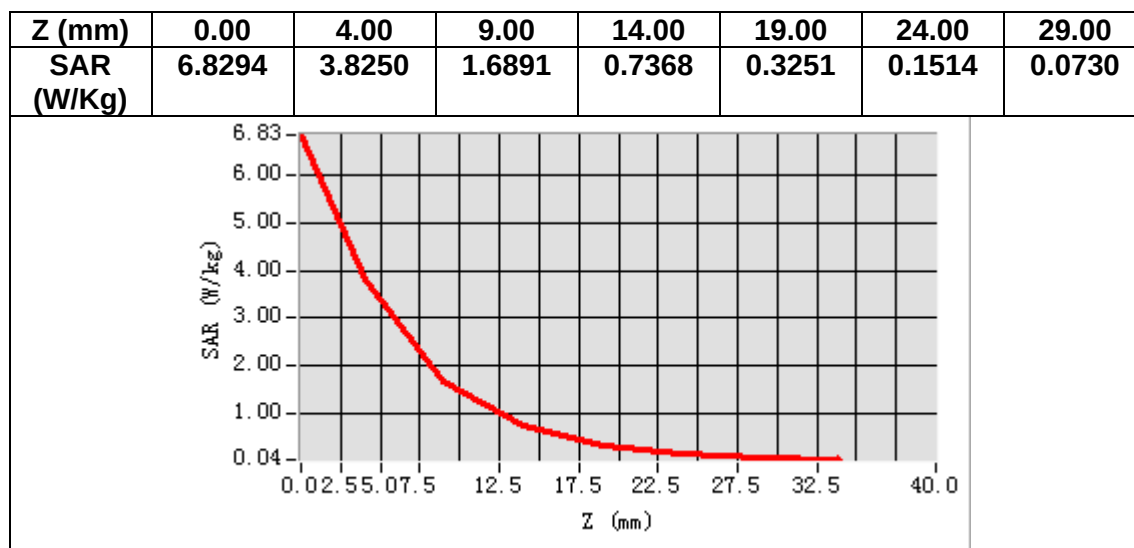
VOLUME SAR



Maximum location: X=-15.00, Y=11.00

SAR Peak: 6.92 W/kg

SAR 10g (W/Kg)	1.511752
SAR 1g (W/Kg)	3.508119



MEASUREMENT 25

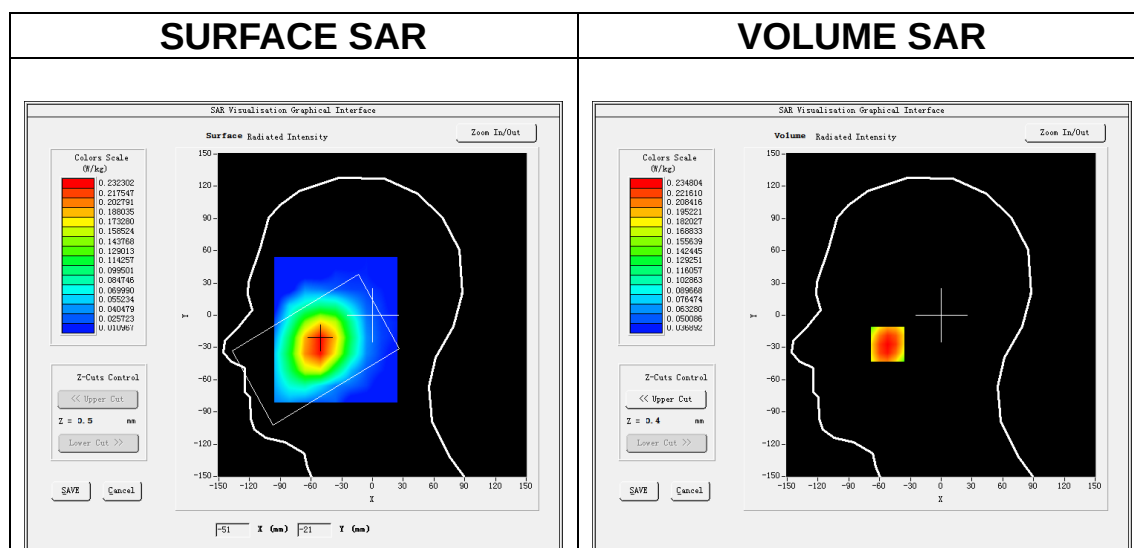
Date of measurement: 9/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>FDDBand28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

B. SAR Measurement Results

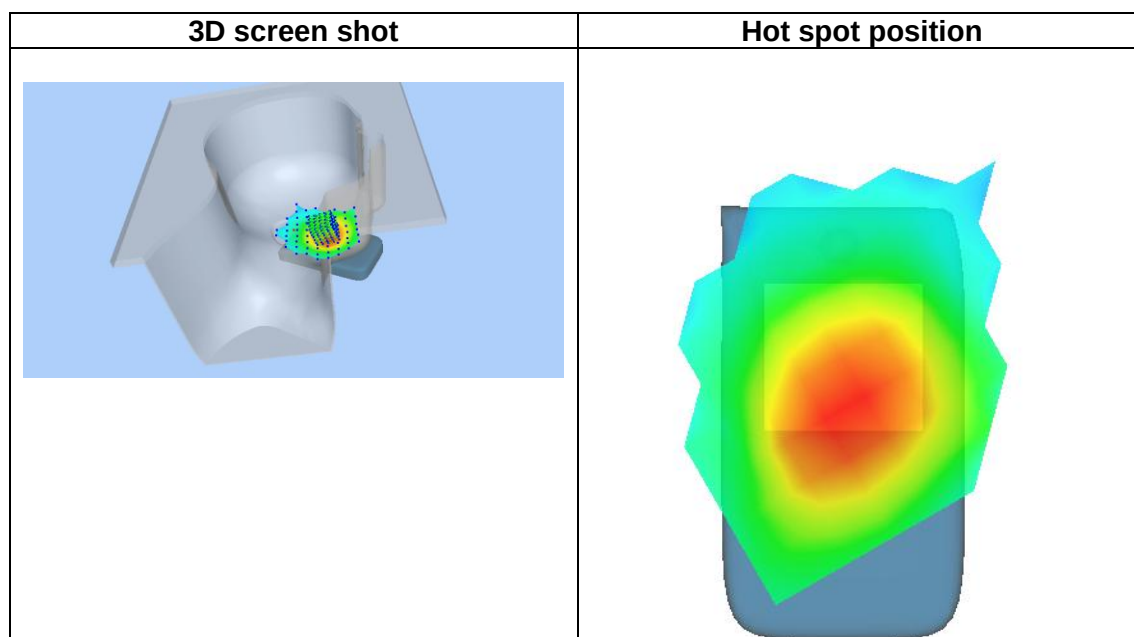
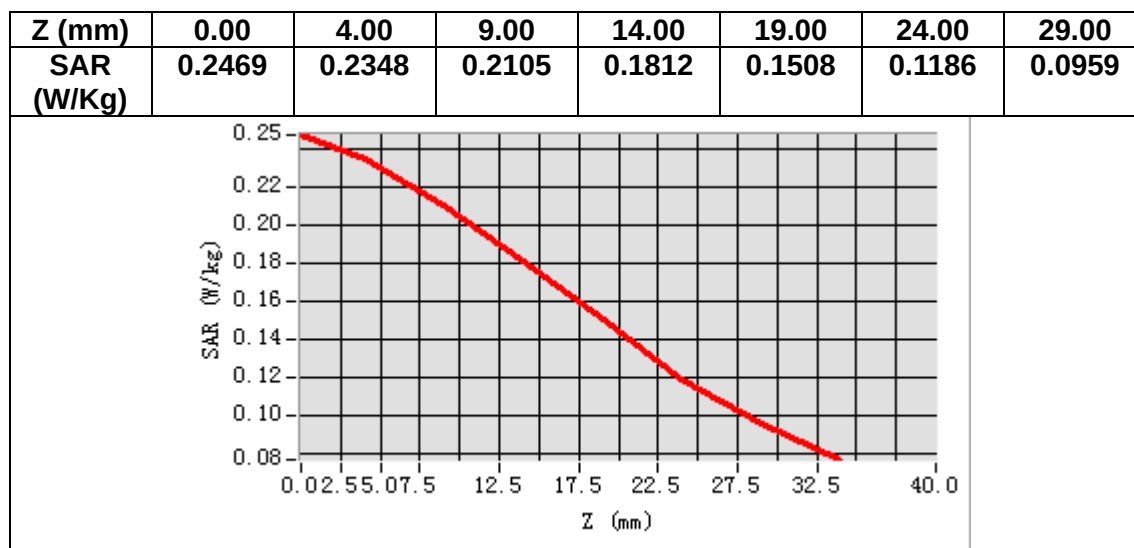
Frequency (MHz)	728.000000
Relative permittivity (real part)	40.873482
Relative permittivity (imaginary part)	21.639246
Conductivity (S/m)	0.875187
Variation (%)	0.850000



Maximum location: X=-52.00, Y=-27.00

SAR Peak: 0.25 W/kg

SAR 10g (W/Kg)	0.184949
SAR 1g (W/Kg)	0.228384



MEASUREMENT 26

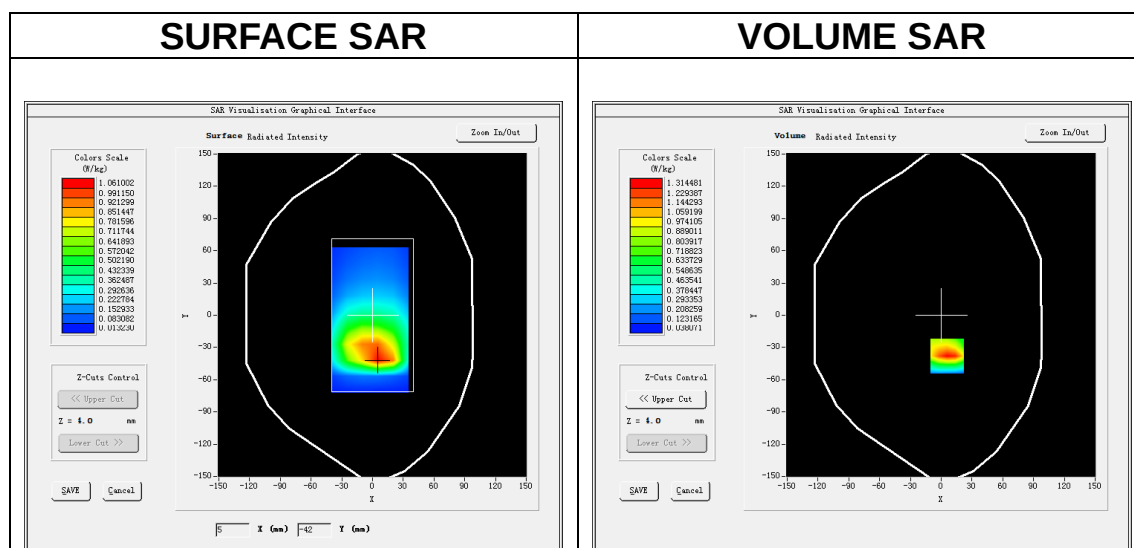
Date of measurement: 9/9/2024

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>FDDBand28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

B. SAR Measurement Results

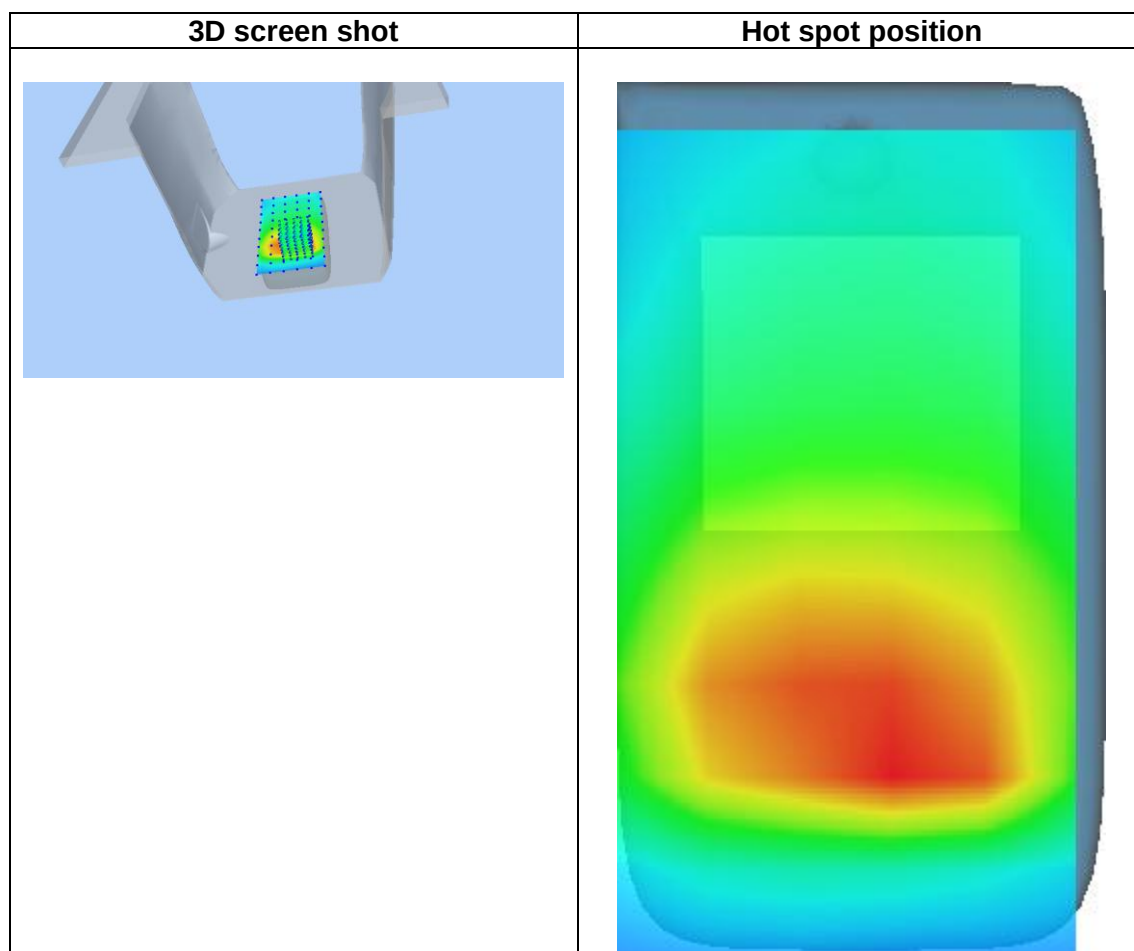
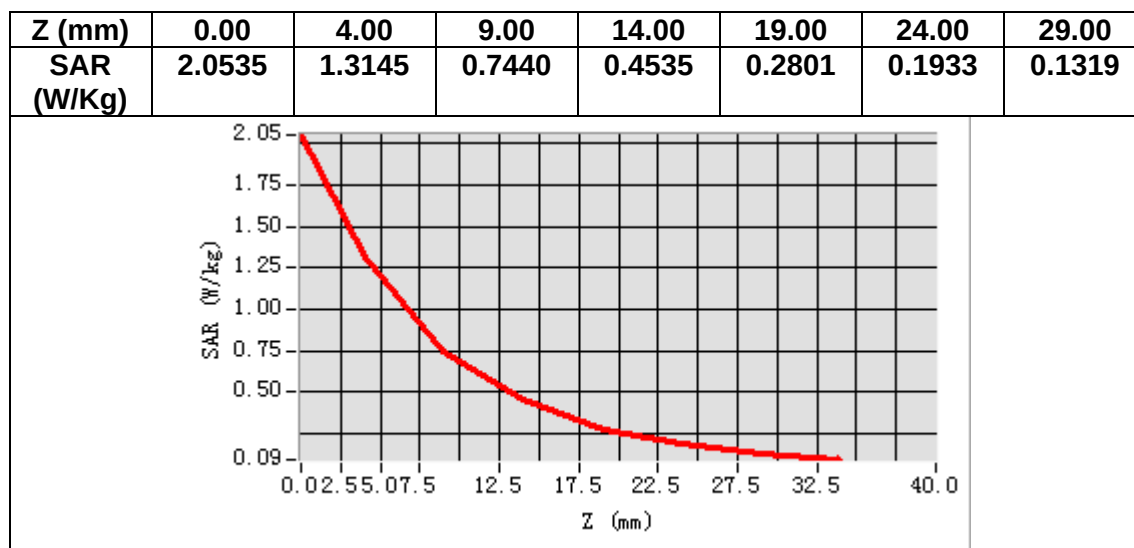
Frequency (MHz)	728.000000
Relative permittivity (real part)	40.873482
Relative permittivity (imaginary part)	21.639246
Conductivity (S/m)	0.875187
Variation (%)	1.810000



Maximum location: X=6.00, Y=-38.00

SAR Peak: 2.10 W/kg

SAR 10g (W/Kg)	0.684878
SAR 1g (W/Kg)	1.220941



13. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 3423-EPGO-426
750 MHz Dipole - SN 03/15 DIP 0G750-355
900 MHz Dipole - SN 03/15 DIP 0G900-348
1800 MHz Dipole - SN 03/15 DIP 1G800-349
2000 MHz Dipole - SN 03/15 DIP 2G000-351
2300 MHz Dipole - SN 03/16 DIP 2G300-358
2450 MHz Dipole - SN 03/15 DIP 2G450-352
2600 MHz Dipole - SN 03/15 DIP 2G600-356



COMOSAR E-Field Probe Calibration Report

Ref : ACR.261.11.23.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: 3423-EPGO-426

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE

Calibration date: 09/18/2023



Accreditations #2-6789
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).



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Cyrille ONNEE	Measurement Responsible	9/18/2023	
<i>Checked & approved by:</i>	Jérôme Luc	Technical Manager	9/18/2023	
<i>Authorized by:</i>	Yann Toutain	Laboratory Director	9/19/2023	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2023.09.19
09:08:14 +02'00'

	<i>Customer Name</i>
<i>Distribution :</i>	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

<i>Issue</i>	<i>Name</i>	<i>Date</i>	<i>Modifications</i>
A	Cyrille ONNEE	9/18/2023	Initial release



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	3423-EPGO-426
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.261 MΩ Dipole 2: R2=0.213 MΩ Dipole 3: R3=0.233 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	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 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.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

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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:

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

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., $\delta \approx 14$ 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%).



COMOSAR E-FIELD PROBE CALIBRATION REPORT

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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.

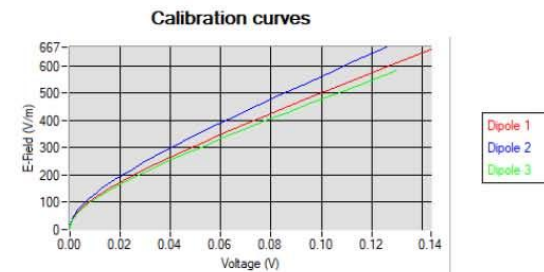
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

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

Vi=voltage readings on the 3 channels of the probe

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

Normi=dipole sensitivity given below for the 3 channels of the probe



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.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 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.78	0.62	0.85

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
105	108	107

5.2 CALIBRATION IN LIQUID

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

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

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

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

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:

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

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:

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

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



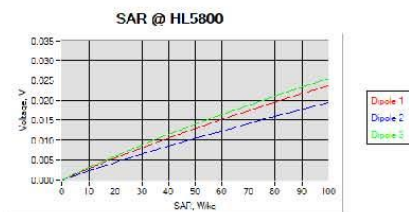
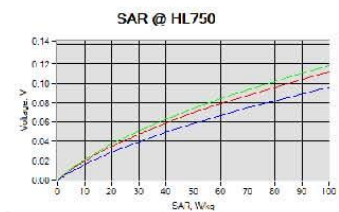
COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.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.

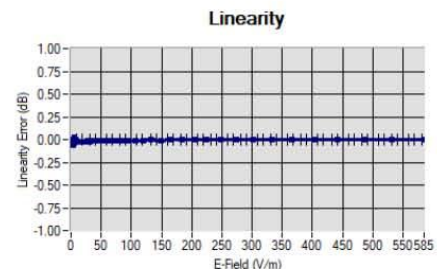
Liquid	Frequency (MHz*)	ConvF
HL750	750	2.37
HL850	835	2.32
HL900	900	2.23
HL1800	1800	2.45
HL1900	1900	2.63
HL2000	2000	2.83
HL2300	2300	2.81
HL2450	2450	2.85
HL2600	2600	2.65
HL3300	3300	2.21
HL3500	3500	2.20
HL3700	3700	2.11
HL3900	3900	2.40
HL4200	4200	2.40
HL4600	4600	2.33
HL4900	4900	2.37
HL5200	5200	2.07
HL5400	5400	2.11
HL5600	5600	2.20
HL5800	5800	2.04

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

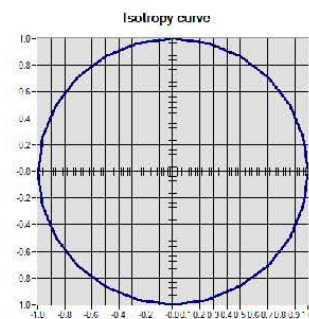


6 VERIFICATION RESULTS

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.



Linearity: +/-1.42% (+/-0.06dB)



Isotropy: +/-0.21% (+/-0.01dB)



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	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	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2023
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	06/2021	06/2024
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_1	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_1	Validated. No cal required.	Validated. No cal required.

Page: 9/10

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_1	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_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.
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_1	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_1	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_1	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	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.23.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 750 MHZ

SERIAL NO.: SN 03/15DIP0G750-355

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 02/21/2024



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:54:37 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

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7	List of Equipment	8



SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

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 750 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID750
Serial Number	SN 03/15DIP0G 750-355
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

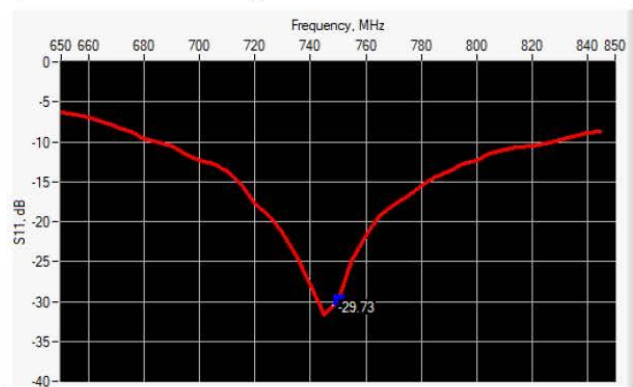
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	176.00 +/- 2%	-	100.00 +/- 2%	-	6.35 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
750	-29.73	-20	$52.5\Omega + 2.2j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

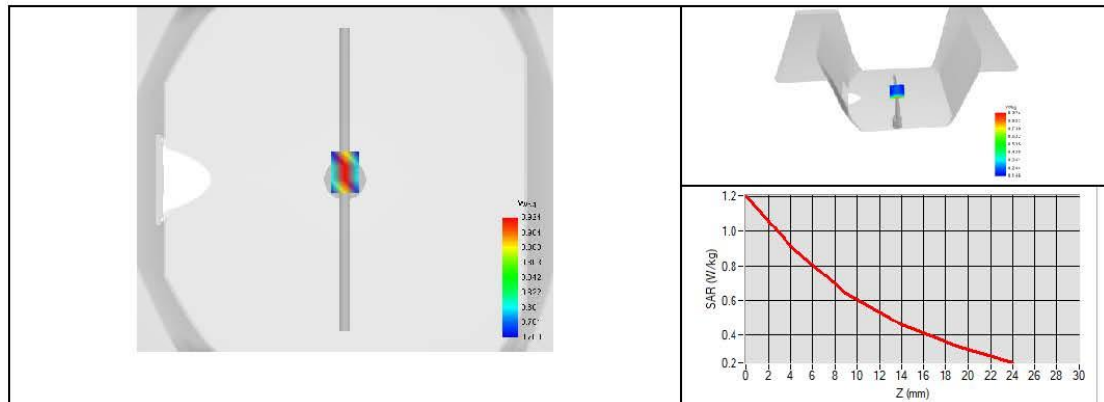


SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: $\epsilon_{ps}' : 45.0$ $\sigma : 0.87$
Distance between dipole center and liquid	15.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
750 MHz	0.86	8.60	8.49	0.58	5.78	5.55





SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.25.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 900 MHZ

SERIAL NO.: SN 03/15DIP0G900-348

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 21/02/2024



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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.25.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:55:46 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.25.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.25.24.BES.A

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 900 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID900
Serial Number	SN 03/15DIP0G900-348
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.25.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.25.24.BES.A

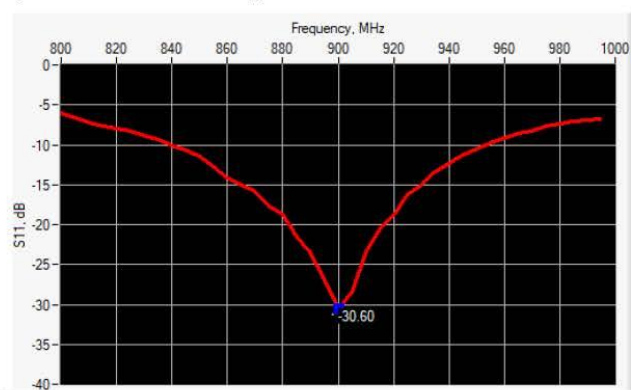
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	149.00 +/- 2%	-	83.30 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
900	-30.60	-20	$51.5\Omega + 2.6j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

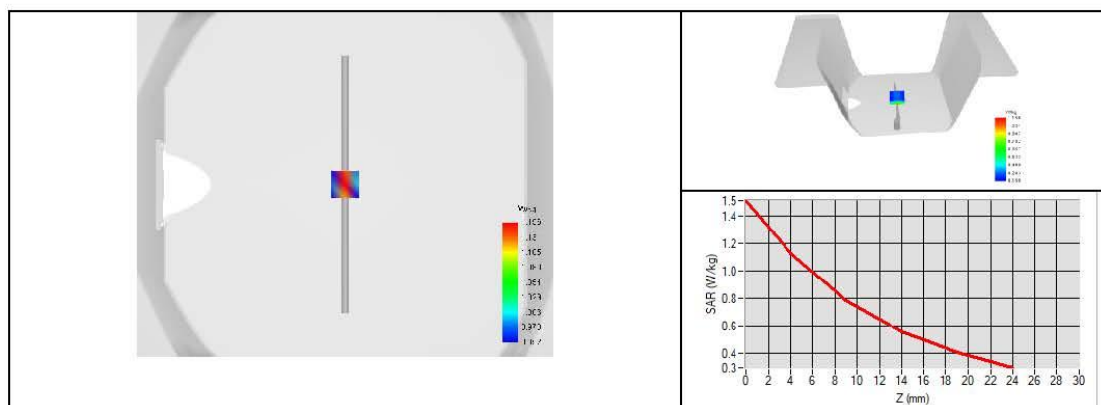


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.25.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: $\epsilon_{ps}' : 44.6$ $\sigma : 0.92$
Distance between dipole center and liquid	15.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	900 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
900 MHz	1.06	10.63	10.90	0.70	7.01	6.99





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.25.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.26.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
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**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 1800 MHZ

SERIAL NO.: SN 03/15DIP1G800-349

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 02/21/2024



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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.26.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain IDSignature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:56:12 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

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 1800 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID1800
Serial Number	SN 03/15DIP1G800-349
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

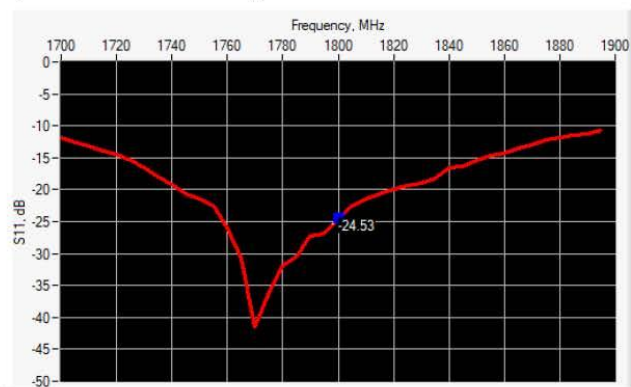
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	72.00 +/- 2%	-	41.70 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
1800	-24.53	-20	44.8Ω + 2.0jΩ

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

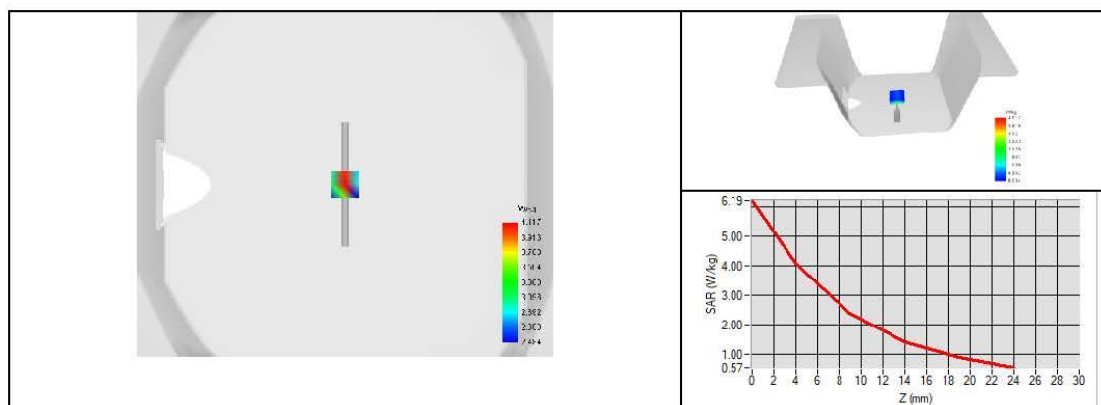


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.26.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: $\epsilon_p' : 42.7$ $\sigma : 1.36$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
1800 MHz	3.71	37.06	38.40	2.00	20.01	20.10





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.28.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 2000 MHZ

SERIAL NO.: SN 03/15DIP2G000-351

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 02/21/2024



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

The use of the Cofrac brand and the accreditation references is prohibited from any reproduction.

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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.28.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain IDSignature numérique
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Date : 2024.02.27
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	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.28.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.28.24.BES.A

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 2000 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2000
Serial Number	SN 03/15DIP2G000-351
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.28.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.28.24.BES.A

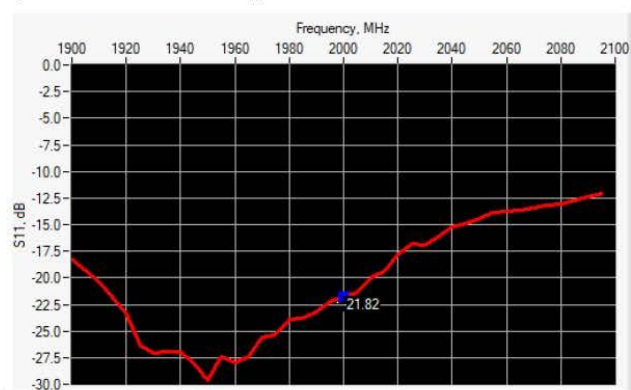
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	64.50 +/- 2%	-	37.50 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2000	-21.82	-20	$58.3\Omega + 2.9j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

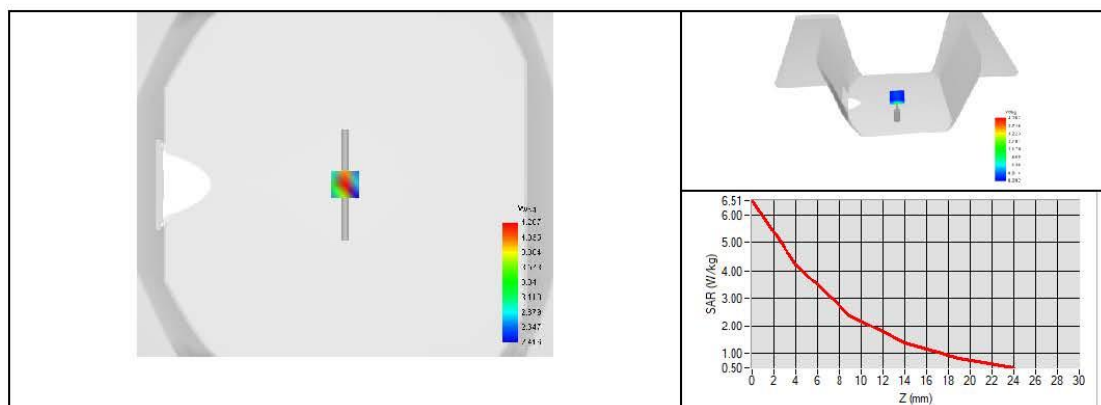


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.28.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 42.6 σ : 1.46
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2000 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2000 MHz	3.83	38.27	41.10	1.98	19.79	21.10





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.28.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.32.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 2300 MHZ

SERIAL NO.: SN 03/16DIP2G300-358

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.32.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:57:39 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.32.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.32.24.BES.A

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 2300 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2300
Serial Number	SN 03/16DIP2G300-358
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.32.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.32.24.BES.A

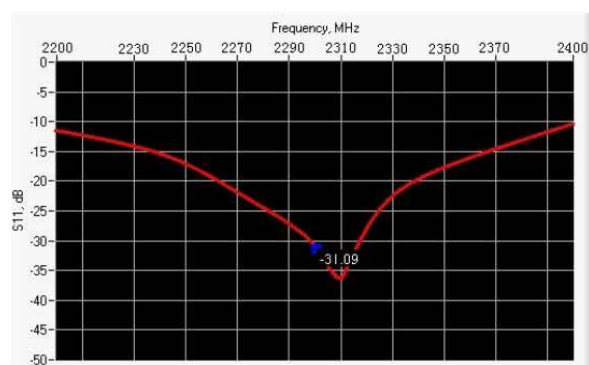
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	55.50 +/- 2%	-	32.60 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2300	-31.09	-20	$56.3\Omega - 2.9j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

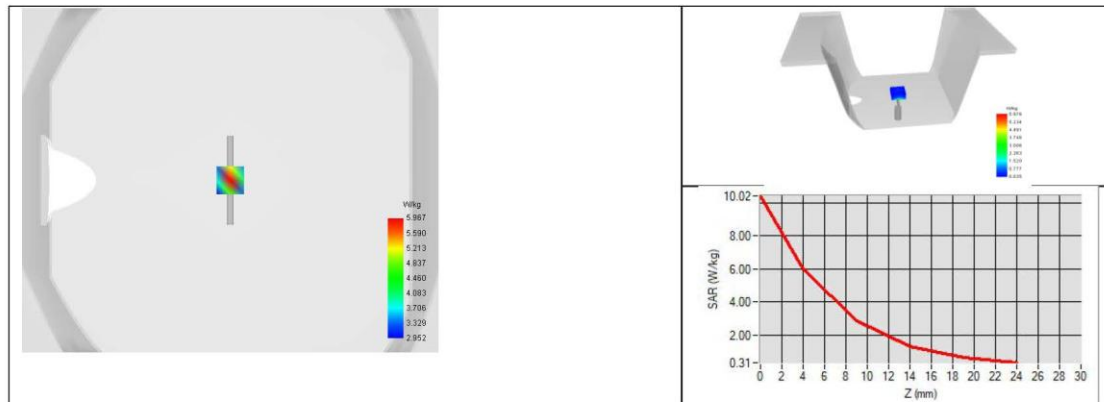


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.32.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_{ps} : 42.0 σ : 1.80
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2300 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2300 MHz	5.06	50.63	48.70	2.35	23.51	23.30





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.32.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.29.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 03/15DIP2G450-352

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 02/21/2024



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

Yann
Toutain ID

Signature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:57:39 +01'00'

	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

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 2450 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2450
Serial Number	SN 03/15DIP2G450-352
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

4 MEASUREMENT METHOD

4.1 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.

4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

4.3 SAR REQUIREMENTS

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.

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

For the measurement in the range 0-300mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.20 mm with respect to measurement conditions.

For the measurement in the range 300-450mm, the estimated expanded uncertainty ($k=2$) in calibration for the dimension measurement in mm is ± 0.44 mm with respect to measurement conditions.

5.2 S11 PARAMETER

The estimated expanded uncertainty ($k=2$) in calibration for the S11 parameter in linear is ± 0.08 with respect to measurement conditions.

5.3 SAR

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

The estimated expanded uncertainty ($k=2$) in calibration for the 1g and 10g SAR measurement in W/kg is $\pm 19\%$ with respect to measurement conditions.

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

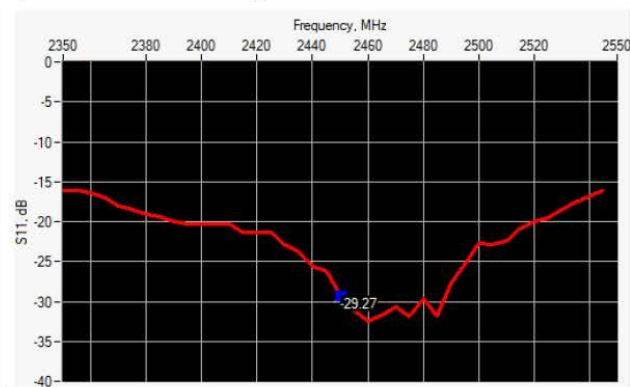
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	51.50 +/- 2%	-	30.40 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2450	-29.27	-20	$53.6\Omega + 0.1j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

6.3.1 SAR with Head Liquid

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is given with the used input power.

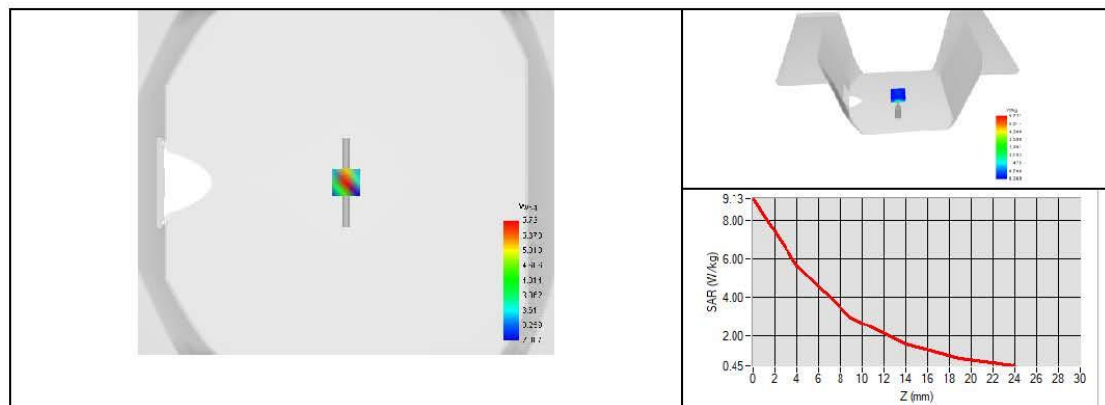


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 42.1 σ : 1.83
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2450 MHz	5.00	50.05	52.40	2.38	23.80	24.00





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.30.24.BES.A

**SHENZHEN NTEK TESTING TECHNOLOGY
CO., LTD.**

**BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE**

FREQUENCY: 2600 MHZ

SERIAL NO.: SN 03/15DIP2G600-356

Calibrated at MVG

Z.I. de la pointe du diable

**Technopôle Brest Iroise – 295 avenue Alexis de Rochon
29280 PLOUZANE - FRANCE**

Calibration date: 02/21/2024



Accreditations #2-6789 and #2-6814
Scope available on www.cofrac.fr

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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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.30.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Pedro Ruiz	Measurement Responsible	2/22/2024	
Checked & approved by:	Jérôme Luc	Technical Manager	2/22/2024	
Authorized by:	Yann Toutain	Laboratory Director	2/27/2024	

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	Customer Name
Distribution :	SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

Issue	Name	Date	Modifications
A	Pedro Ruiz	2/22/2024	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.30.24.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.30.24.BES.A

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 2600 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2600
Serial Number	SN 03/15DIP2G600-356
Product Condition (new / used)	Used

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.30.24.BES.A

4 MEASUREMENT METHOD

4.1 MECHANICAL REQUIREMENTS

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4.2 S11 PARAMETER REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a S11 of -20 dB or better. The S11 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.

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

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SAR REFERENCE DIPOLE CALIBRATION REPORT

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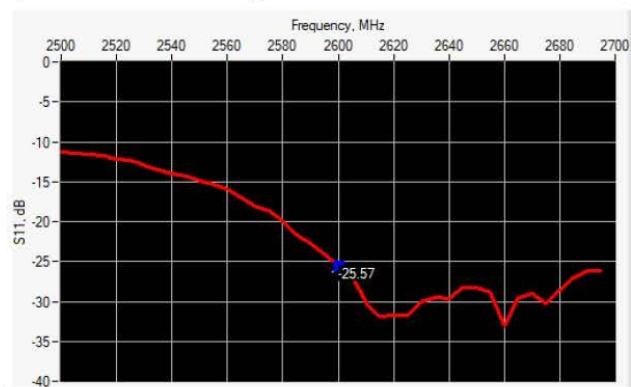
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	48.50 +/- 2%	-	28.80 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2600	-25.57	-20	$54.5\Omega - 3.2j\Omega$

6.3 SAR

The IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards state that the system validation measurements must be performed using a reference dipole meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. Per the standards, the dipole shall be positioned below the bottom of the phantom, with the dipole length centered and parallel to the longest dimension of the flat phantom, with the top surface of the dipole at the described distance from the bottom surface of the phantom.

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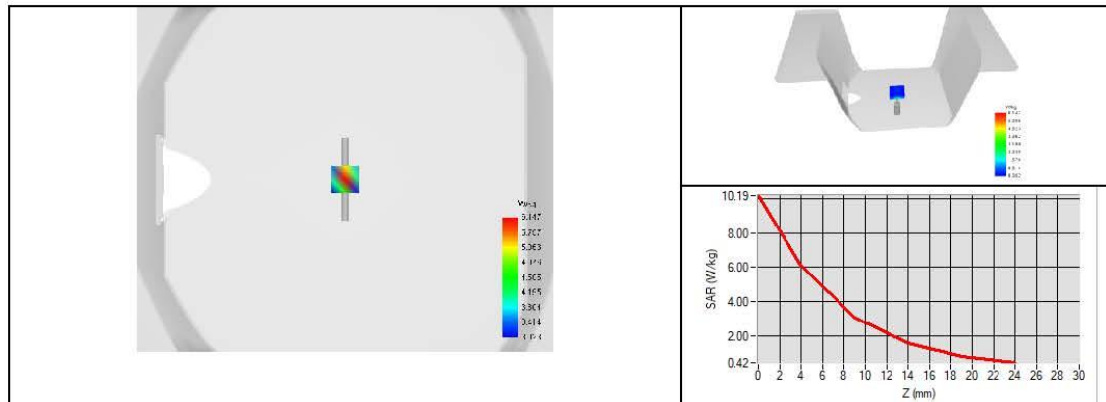


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.30.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 41.3 σ : 1.95
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency	1g SAR (W/kg)			10g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
2600 MHz	5.42	54.16	55.30	2.49	24.85	24.60





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.30.24.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
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	06/2021	06/2024
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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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