

CE SAR EVALUATION REPORT

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

Product Name : Tablet

Trademark : CUBOT

Model Name : TAB KINGKONG MINI

Family Model : N/A

Report No. : S25052400904001

Prepared for

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TEST RESULT CERTIFICATION

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Product description

Product name Tablet
Trademark CUBOT
Model and/or type TAB KINGKONG MINI
reference
Family Model N/A

EN 50566:2017;
Standards 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 S250408070005

Date of Test

Date (s) of performance of tests Jun. 03, 2025 ~ Jun. 12, 2025

Date of Issue Jun. 30, 2025

Test Result **Pass**

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※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Jun. 30, 2025	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 TAB KINGKONG MINI are as follows.

RF Exposure Conditions	10-g Body (Separation distance of 0mm)	10-g Member DAS (See note ³) (Separation distance of 0mm)
	1.319	1.988
Max Simultaneous Tx	1.457	2.020

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	Tablet		
Trademark	CUBOT		
Model Name	TAB KINGKONG MINI		
Family Model	N/A		
Model Difference	N/A		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	PIFA Antenna		
Battery Information	DC 3.87V, 10200mAh, 39.474Wh		
Hardware Version	T30D-UF-V1.2		
Software Version	CUBOT_TAB_KINGKONG_MINI_P131_V1.0		
Device Operating Configurations			
Supporting Mode(s)	GSM900/1800,WCDMABand1/8,LTEBand1/3/7/8/20/28/40,WLAN2.4G/5G, Bluetooth,GPS		
Test Modulation	GSM(GMSK/8PSK),WCDMA(QPSK),LTE(QPSK/16-QAM) ,WLAN(DSS S/OFDM),WLAN(DSSS/OFDM),Bluetooth(GFSK,π/4-DQPSK,8DPSK) ,GPS(BPSK)		
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	703-736	758-791
	LTE Band 40	2300-2400	
	WLAN 2.4G	2412-2472	
	WLAN 5.2G	5180-5240	
	WLAN 5.8G	5745-5825	
	GPS	N/A	1575.42
	Bluetooth	2402-2480	
GPRS 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 40)		

1.4. Test specification(s)

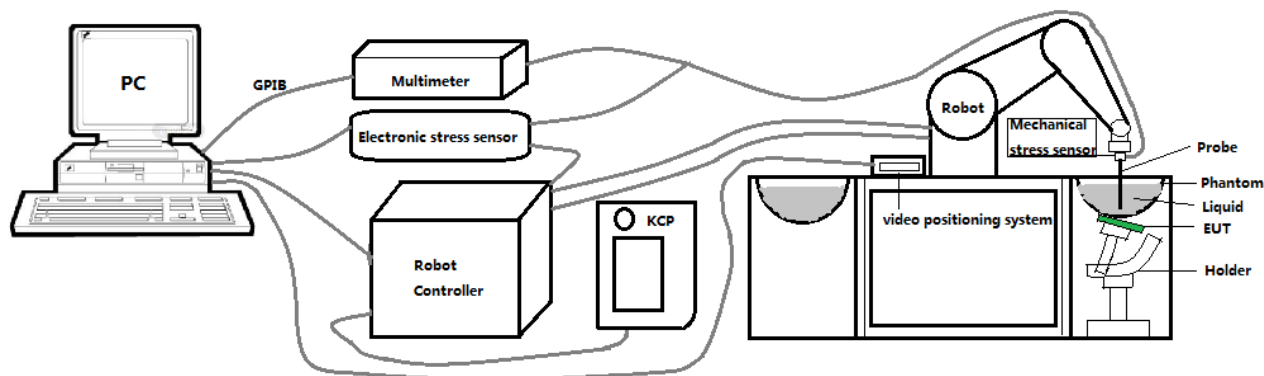
EN 50566:2017	Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body
EN 62209-2:2010	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 0725-EPGO-448 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

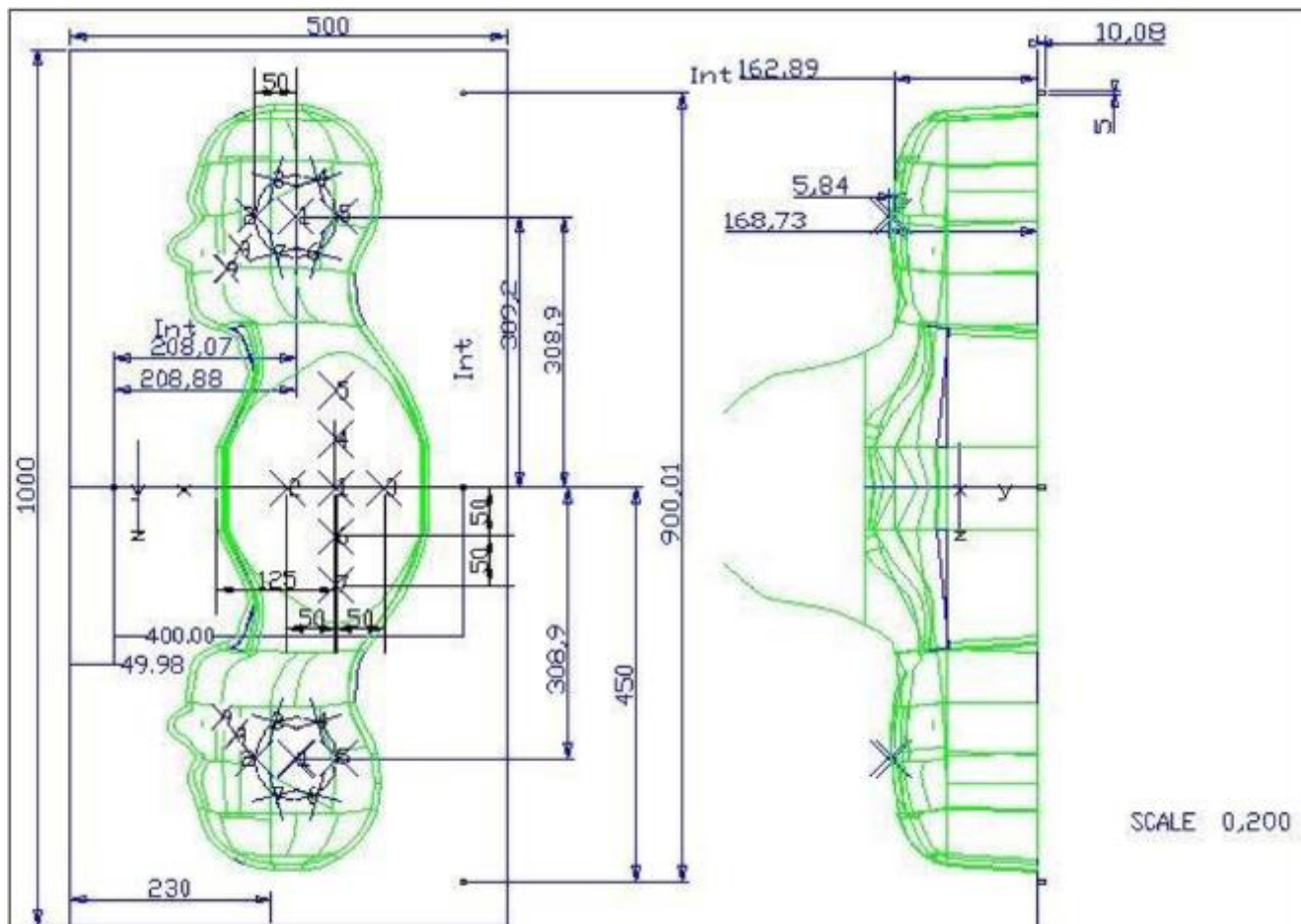
Photo of SAM phantom SN 16/15 SAM119



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

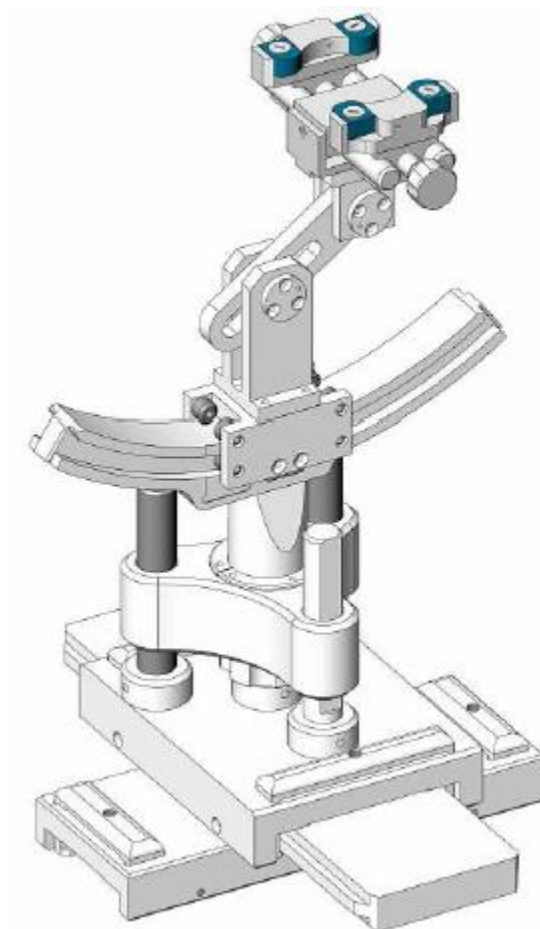


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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
<input checked="" type="checkbox"/>	MVG	E FIELD PROBE	SSE2	0725-EPGO-448	Apr. 15, 2025	Apr. 14, 2026
<input checked="" type="checkbox"/>	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
<input type="checkbox"/>	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 21, 2024	Feb. 20, 2027
<input type="checkbox"/>	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	2300 MHz Dipole	SID2300	SN 03/16 DIP 2G300-358	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Feb. 21, 2024	Feb. 20, 2027
<input checked="" type="checkbox"/>	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Feb. 21, 2024	Feb. 20, 2027
<input type="checkbox"/>	MVG	3300 MHz Dipole	SID3300	SN 03/21 DIP 3G300-359	May. 18, 2024	May. 17, 2027
<input type="checkbox"/>	MVG	3500 MHz Dipole	SID3500	SN 09/12 DIP 3WP6200-360	Oct. 15, 2022	Oct. 14, 2025
<input type="checkbox"/>	MVG	3700 MHz Dipole	SID3700	SN 09/12 DIP 3G/700-361	Oct. 15, 2022	Oct. 14, 2025
<input type="checkbox"/>	MVG	4200 MHz Dipole	SID4200	SN 03/21 DIP 4G200-363	May. 18, 2024	May. 17, 2027
<input checked="" type="checkbox"/>	MVG	5000 MHz Dipole	SWWP62500	SN 13/14 WGA 33	Feb. 22, 2024	Feb. 21, 2027
<input checked="" type="checkbox"/>	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
<input checked="" type="checkbox"/>	MVG	Power	N.A	AMPLISAR_28/14_003	NCR	NCR

		Amplifier				
<input checked="" type="checkbox"/>	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
<input type="checkbox"/>	R&S	Universal radio communication tester	CMU200	105747	Apr. 17, 2025	Apr. 16, 2026
<input type="checkbox"/>	R&S	Wideband radio communication tester	CMW500	103917	May. 12, 2025	May. 11, 2026
<input checked="" type="checkbox"/>	HP	Network Analyzer	E5071C	LPS-461	Oct. 15, 2024	Oct. 14, 2025
<input checked="" type="checkbox"/>	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 17, 2025	Apr. 16, 2026
<input checked="" type="checkbox"/>	Agilent	Power meter	E4419B	MY45102538	Apr. 17, 2025	Apr. 16, 2026
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	LES-413-C	May 06, 2025	May 05, 2026
<input checked="" type="checkbox"/>	Agilent	Power sensor	E9301A	US39212148	Apr. 17, 2025	Apr. 16, 2026
<input checked="" type="checkbox"/>	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
<input checked="" type="checkbox"/>	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
<input checked="" type="checkbox"/>	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
<input checked="" type="checkbox"/>	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V5_03_15_11

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		Delta(%)		Liquid Temp.	Test Date
		ϵ_r	σ (S/m)	ϵ_r	σ (S/m)	ϵ_r	σ (S/m)		
Head 750	750	41.90	0.89	40.88	0.89	-2.43	0.00	21.5 °C	Jun. 03, 2025
Head 900	900	41.50	0.97	42.01	0.99	1.23	1.96	21.0 °C	Jun. 04, 2025
Head 1800	1800	40.00	1.40	39.06	1.40	-2.36	0.00	21.1 °C	Jun. 05, 2025
Head 2000	2000	40.00	1.40	40.59	1.43	1.48	1.79	21.3 °C	Jun. 11, 2025
Head 2300	2300	39.47	1.66	39.83	1.69	0.92	1.63	21.3 °C	Jun. 12, 2025
Head 2450	2450	39.20	1.80	38.35	1.83	-2.16	1.44	21.1 °C	Jun. 07, 2025
Head 2600	2600	39.01	1.96	39.41	1.95	1.01	-0.46	21.8 °C	Jun. 08, 2025
Head 5200	5200	36.00	4.66	37.48	4.60	4.11	-1.27	21.3 °C	Jun. 09, 2025
Head 5800	5800	35.30	5.27	36.15	5.17	2.40	-1.84	21.0 °C	Jun. 10, 2025

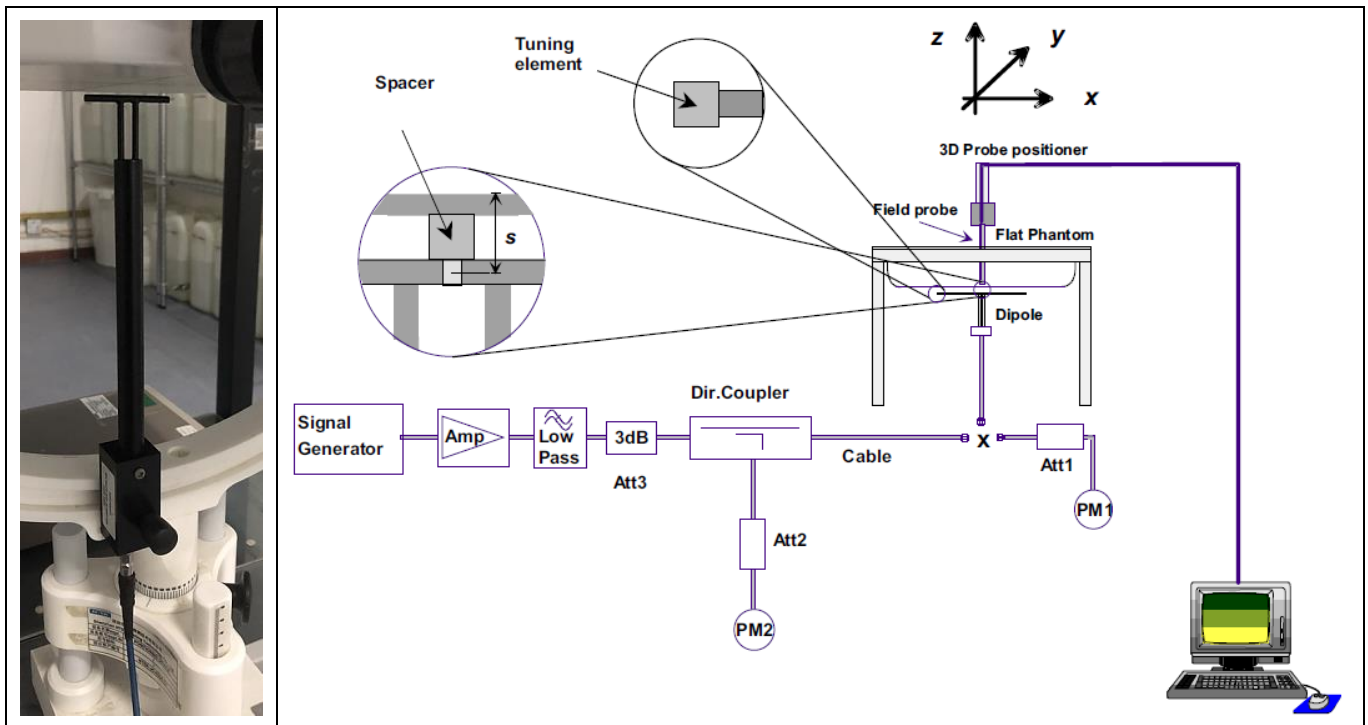
NOTE: 1The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

2. Tested by : Max Zhou , Jack Peng

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)		Measured SAR			Measured SAR		Delta (%)		Liquid Temp.	Test Date
						(Normalized to 1W)					
	1-g (W/Kg)	10-g (W/Kg)	Input Power (mW)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (%)	10-g (%)		
750MHz	8.60	5.78	100.00	0.91	0.63	9.14	6.33	6.28	9.52	21.5 °C	Jun. 03, 2025
900MHz	10.63	7.01	100.00	1.11	0.69	11.09	6.89	4.33	-1.7 1	21.0 °C	Jun. 04, 2025
1800MHz	37.06	20.01	100.00	3.82	1.93	38.21	19.30	3.10	-3.5 5	21.1 °C	Jun. 05, 2025
2000MHz	38.27	19.79	100.00	3.97	1.82	39.68	18.24	3.68	-7.8 3	21.3 °C	Jun. 11, 2025
2300MHz	50.63	23.51	100.00	5.45	2.20	54.45	22.04	7.54	-6.2 5	21.5 °C	Jun. 12, 2025
2450MHz	50.05	23.80	100.00	5.38	2.33	53.79	23.30	7.47	-2.1 0	21.1 °C	Jun. 07, 2025
2600MHz	54.16	24.85	100.00	5.64	2.46	56.38	24.62	4.10	-0.9 3	21.8 °C	Jun. 08, 2025
5200MHz	162.59	56.21	10.00	1.67	0.57	166.90	56.50	2.65	0.52	21.3 °C	Jun. 09, 2025
5800MHz	182.20	61.32	10.00	1.79	0.60	178.70	59.80	-1.92	-2.4 8	21.0 °C	Jun. 10, 2025

Tested by : Max Zhou , Jack Peng

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. Body-supported device

The example in Figure 6.1) shows a Tablet PC form factor portable computer for which SAR should be separately assessed with

- a) each surface and
- b) the separation distances

Positioned against the flat phantom that correspond to the intended use as specified by the manufacturer. If the intended use is not specified in the user instructions, the device shall be tested directly against the flat phantom in all usable orientations.

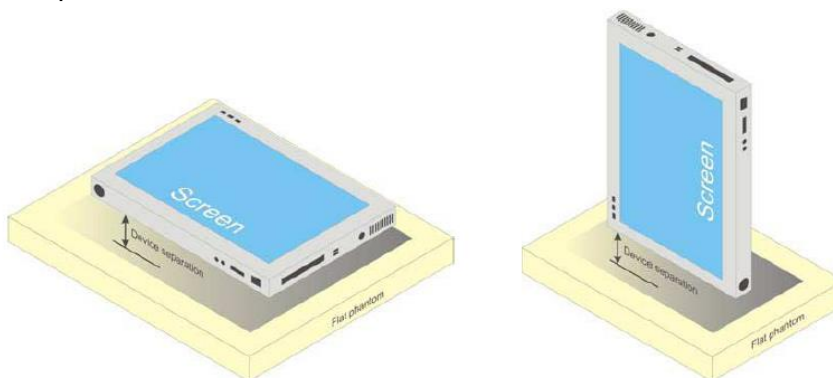


Figure 6.1 – Test positions for Body-supported device

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)	32.50	32.27	32.30	32.36	23.47	23.24	23.27	23.33
GPRS(GMSK,1 Tx slot)	27.00	26.48	26.50	26.54	17.97	17.45	17.47	17.51
GPRS(GMSK,2 Tx slot)	26.50	25.99	25.98	26.08	20.48	19.97	19.96	20.06
GPRS(GMSK,3 Tx slot)	25.00	24.75	24.68	24.85	20.74	20.49	20.42	20.59
GPRS(GMSK,4 Tx slot)	24.00	23.76	23.70	23.86	20.99	20.75	20.69	20.85
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	29.71	29.46	29.31	20.97	20.68	20.43	20.28
GPRS(GMSK,1 Tx slot)	24.00	23.87	23.70	23.56	14.97	14.84	14.67	14.53
GPRS(GMSK,2 Tx slot)	23.50	23.45	23.32	23.14	17.48	17.43	17.30	17.12
GPRS(GMSK,3 Tx slot)	22.50	22.06	21.92	21.71	18.24	17.80	17.66	17.45
GPRS(GMSK,4 Tx slot)	21.50	21.20	21.12	20.93	18.49	18.19	18.11	17.92

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	9612	9750	9888
Frequency (MHz)		1922.4	1950	1977.6
RMC12.2K	22.00	21.65	21.71	21.82
HSDPA Sub 1	21.50	21.25	21.31	21.14
HSDPA Sub 2	21.50	20.84	21.05	20.79
HSDPA Sub 3	21.00	20.54	20.75	20.76
HSDPA Sub 4	21.00	20.40	20.75	20.66
HSUPA Sub 1	21.50	21.04	21.06	21.00
HSUPA Sub 2	21.50	20.92	21.16	21.09
HSUPA Sub 3	21.50	20.41	21.11	20.72
HSUPA Sub 4	21.50	20.94	21.23	21.07
HSUPA Sub 5	21.00	20.63	20.62	20.83
WCDMA Band 8	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up	2712	2788	2863
Frequency (MHz)		882.4	897.6	912.6
RMC12.2K	22.50	22.12	22.10	22.17
HSDPA Sub 1	22.00	21.95	21.84	21.61
HSDPA Sub 2	22.00	21.63	21.60	21.31
HSDPA Sub 3	21.50	21.31	21.02	21.22
HSDPA Sub 4	21.50	21.37	21.18	20.95
HSUPA Sub 1	22.50	22.01	21.81	21.28
HSUPA Sub 2	22.00	21.88	21.86	21.58
HSUPA Sub 3	22.00	21.70	21.41	21.19
HSUPA Sub 4	22.00	21.85	21.85	21.59
HSUPA Sub 5	21.50	21.41	21.35	21.21

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	23.07
Band1	5	18025	8	#0	QPSK	23.50	23.38
Band1	5	18025	25	#0	QPSK	23.50	22.13
Band1	5	18300	1	#0	QPSK	23.50	23.06

Band1	5	18300	8	#0	QPSK	23.50	23.34
Band1	5	18300	25	#0	QPSK	23.50	22.23
Band1	5	18575	1	#0	QPSK	23.50	23.21
Band1	5	18575	8	#0	QPSK	23.50	23.20
Band1	5	18575	25	#0	QPSK	23.50	22.16
Band1	10	18050	1	#0	QPSK	23.50	23.08
Band1	10	18050	12	#0	QPSK	23.50	23.31
Band1	10	18050	50	#0	QPSK	23.50	22.22
Band1	10	18300	1	#0	QPSK	23.50	23.09
Band1	10	18300	12	#0	QPSK	23.50	23.26
Band1	10	18300	50	#0	QPSK	23.50	22.25
Band1	10	18550	1	#0	QPSK	23.50	23.23
Band1	10	18550	12	#0	QPSK	23.50	23.39
Band1	10	18550	50	#0	QPSK	23.50	22.28
Band1	20	18100	1	#0	QPSK	23.50	23.12
Band1	20	18100	18	#0	QPSK	23.50	23.22
Band1	20	18100	100	#0	QPSK	23.50	22.35
Band1	20	18300	1	#0	QPSK	23.50	23.13
Band1	20	18300	18	#0	QPSK	23.50	23.39
Band1	20	18300	100	#0	QPSK	23.50	22.41
Band1	20	18500	1	#0	QPSK	23.50	23.25
Band1	20	18500	18	#0	QPSK	23.50	23.37
Band1	20	18500	100	#0	QPSK	23.50	22.25
Band20	5	24175	1	#0	QPSK	24.00	23.29
Band20	5	24175	8	#0	QPSK	24.00	23.46
Band20	5	24175	25	#0	QPSK	24.00	22.52
Band20	5	24300	1	#0	QPSK	24.00	23.34
Band20	5	24300	8	#0	QPSK	24.00	23.48
Band20	5	24300	25	#0	QPSK	24.00	22.30
Band20	5	24425	1	#0	QPSK	24.00	23.25
Band20	5	24425	8	#0	QPSK	24.00	23.34
Band20	5	24425	25	#0	QPSK	24.00	22.44
Band20	20	24250	1	#0	QPSK	24.00	23.32
Band20	20	24250	18	#0	QPSK	24.00	23.53
Band20	20	24250	100	#0	QPSK	24.00	22.41
Band20	20	24300	1	#0	QPSK	24.00	23.34
Band20	20	24300	18	#0	QPSK	24.00	23.46
Band20	20	24300	100	#0	QPSK	24.00	22.33
Band20	20	24350	1	#0	QPSK	24.00	23.30

Band20	20	24350	18	#0	QPSK	24.00	23.34
Band20	20	24350	100	#0	QPSK	24.00	22.42
Band28(RED703-736)	3	27225	1	#0	QPSK	24.50	23.62
Band28(RED703-736)	3	27225	1	#Max	QPSK	24.50	23.56
Band28(RED703-736)	3	27225	4	#0	QPSK	24.50	23.79
Band28(RED703-736)	3	27225	4	#Max	QPSK	24.50	23.77
Band28(RED703-736)	3	27375	1	#0	QPSK	24.50	23.53
Band28(RED703-736)	3	27375	1	#Max	QPSK	24.50	23.55
Band28(RED703-736)	3	27375	4	#0	QPSK	24.50	23.90
Band28(RED703-736)	3	27375	4	#Max	QPSK	24.50	23.82
Band28(RED703-736)	3	27525	1	#0	QPSK	24.50	23.70
Band28(RED703-736)	3	27525	1	#Max	QPSK	24.50	23.51
Band28(RED703-736)	3	27525	4	#0	QPSK	24.50	23.70
Band28(RED703-736)	3	27525	4	#Max	QPSK	24.50	23.64
Band28(RED703-736)	5	27235	1	#0	QPSK	24.50	23.63
Band28(RED703-736)	5	27235	1	#Max	QPSK	24.50	23.45
Band28(RED703-736)	5	27235	8	#0	QPSK	24.50	23.87
Band28(RED703-736)	5	27235	8	#Max	QPSK	24.50	23.73
Band28(RED703-736)	5	27375	1	#0	QPSK	24.50	23.60
Band28(RED703-736)	5	27375	1	#Max	QPSK	24.50	23.64
Band28(RED703-736)	5	27375	8	#0	QPSK	24.50	23.76
Band28(RED703-736)	5	27375	8	#Max	QPSK	24.50	23.73
Band28(RED703-736)	5	27515	1	#0	QPSK	24.50	23.66
Band28(RED703-736)	5	27515	1	#Max	QPSK	24.50	23.56
Band28(RED703-736)	5	27515	8	#0	QPSK	24.50	23.78
Band28(RED703-736)	5	27515	8	#Max	QPSK	24.50	23.69
Band28(RED703-736)	20	27310	1	#0	QPSK	24.50	23.66
Band28(RED703-736)	20	27310	1	#Max	QPSK	24.50	23.61
Band28(RED703-736)	20	27310	18	#0	QPSK	24.50	23.96
Band28(RED703-736)	20	27310	18	#Max	QPSK	24.50	23.90
Band28(RED703-736)	20	27375	1	#0	QPSK	24.50	23.70

Band28(RED703-736)	20	27375	1	#Max	QPSK	24.50	23.56
Band28(RED703-736)	20	27375	18	#0	QPSK	24.50	23.79
Band28(RED703-736)	20	27375	18	#Max	QPSK	24.50	23.69
Band28(RED703-736)	20	27440	1	#0	QPSK	24.50	24.24
Band28(RED703-736)	20	27440	1	#Max	QPSK	24.50	23.52
Band28(RED703-736)	20	27440	18	#0	QPSK	24.50	23.94
Band28(RED703-736)	20	27440	18	#Max	QPSK	24.50	23.73
Band3	1.4	19207	1	#0	QPSK	24.00	23.30
Band3	1.4	19207	5	#0	QPSK	24.00	23.54
Band3	1.4	19207	6	#0	QPSK	24.00	22.53
Band3	1.4	19575	1	#0	QPSK	24.00	23.63
Band3	1.4	19575	5	#0	QPSK	24.00	23.77
Band3	1.4	19575	6	#0	QPSK	24.00	22.77
Band3	1.4	19943	1	#0	QPSK	24.00	23.54
Band3	1.4	19943	5	#0	QPSK	24.00	23.82
Band3	1.4	19943	6	#0	QPSK	24.00	22.77
Band3	5	19225	1	#0	QPSK	24.00	23.53
Band3	5	19225	8	#0	QPSK	24.00	23.54
Band3	5	19225	25	#0	QPSK	24.00	22.63
Band3	5	19575	1	#0	QPSK	24.00	23.52
Band3	5	19575	8	#0	QPSK	24.00	23.80
Band3	5	19575	25	#0	QPSK	24.00	22.78
Band3	5	19925	1	#0	QPSK	24.00	23.73
Band3	5	19925	8	#0	QPSK	24.00	23.88
Band3	5	19925	25	#0	QPSK	24.00	22.87
Band3	20	19300	1	#0	QPSK	24.00	23.35
Band3	20	19300	18	#0	QPSK	24.00	23.51
Band3	20	19300	100	#0	QPSK	24.00	22.78
Band3	20	19575	1	#0	QPSK	24.00	23.56
Band3	20	19575	18	#0	QPSK	24.00	23.76
Band3	20	19575	100	#0	QPSK	24.00	22.70
Band3	20	19850	1	#0	QPSK	24.00	23.66
Band3	20	19850	18	#0	QPSK	24.00	23.94
Band3	20	19850	100	#0	QPSK	24.00	22.78
Band40	5	38675	1	#0	QPSK	23.50	22.79
Band40	5	38675	8	#0	QPSK	23.50	22.93
Band40	5	38675	25	#0	QPSK	23.50	22.23

Band40	5	39150	1	#0	QPSK	23.50	22.57
Band40	5	39150	8	#0	QPSK	23.50	22.62
Band40	5	39150	25	#0	QPSK	23.50	21.52
Band40	5	39625	1	#0	QPSK	23.50	23.04
Band40	5	39625	8	#0	QPSK	23.50	23.07
Band40	5	39625	25	#0	QPSK	23.50	21.88
Band40	20	38750	1	#0	QPSK	23.50	23.26
Band40	20	38750	18	#0	QPSK	23.50	23.32
Band40	20	38750	100	#0	QPSK	23.50	22.05
Band40	20	39150	1	#0	QPSK	23.50	22.75
Band40	20	39150	18	#0	QPSK	23.50	22.73
Band40	20	39150	100	#0	QPSK	23.50	21.74
Band40	20	39550	1	#0	QPSK	23.50	22.95
Band40	20	39550	18	#0	QPSK	23.50	22.93
Band40	20	39550	100	#0	QPSK	23.50	21.92
Band7	5	20775	1	#0	QPSK	23.00	22.05
Band7	5	20775	8	#0	QPSK	23.00	22.31
Band7	5	20775	25	#0	QPSK	23.00	21.21
Band7	5	21100	1	#0	QPSK	23.00	22.38
Band7	5	21100	8	#0	QPSK	23.00	22.54
Band7	5	21100	25	#0	QPSK	23.00	21.54
Band7	5	21425	1	#0	QPSK	23.00	22.45
Band7	5	21425	8	#0	QPSK	23.00	22.55
Band7	5	21425	25	#0	QPSK	23.00	21.52
Band7	20	20850	1	#0	QPSK	23.00	22.07
Band7	20	20850	18	#0	QPSK	23.00	22.26
Band7	20	20850	100	#0	QPSK	23.00	21.16
Band7	20	21100	1	#0	QPSK	23.00	22.15
Band7	20	21100	18	#0	QPSK	23.00	22.50
Band7	20	21100	100	#0	QPSK	23.00	21.42
Band7	20	21350	1	#0	QPSK	23.00	22.36
Band7	20	21350	18	#0	QPSK	23.00	22.55
Band7	20	21350	100	#0	QPSK	23.00	21.53
Band8	1.4	21457	1	#0	QPSK	24.50	23.93
Band8	1.4	21457	5	#0	QPSK	24.50	24.05
Band8	1.4	21457	6	#0	QPSK	24.50	22.37
Band8	1.4	21625	1	#0	QPSK	24.50	23.95
Band8	1.4	21625	5	#0	QPSK	24.50	24.17
Band8	1.4	21625	6	#0	QPSK	24.50	22.49

Band8	1.4	21793	1	#0	QPSK	24.50	24.02
Band8	1.4	21793	5	#0	QPSK	24.50	24.08
Band8	1.4	21793	6	#0	QPSK	24.50	22.72
Band8	5	21475	1	#0	QPSK	24.50	23.93
Band8	5	21475	8	#0	QPSK	24.50	24.12
Band8	5	21475	25	#0	QPSK	24.50	22.38
Band8	5	21625	1	#0	QPSK	24.50	24.06
Band8	5	21625	8	#0	QPSK	24.50	24.20
Band8	5	21625	25	#0	QPSK	24.50	22.51
Band8	5	21775	1	#0	QPSK	24.50	23.99
Band8	5	21775	8	#0	QPSK	24.50	24.20
Band8	5	21775	25	#0	QPSK	24.50	22.70
Band8	10	21500	1	#0	QPSK	24.50	24.05
Band8	10	21500	12	#0	QPSK	24.50	24.10
Band8	10	21500	50	#0	QPSK	24.50	22.49
Band8	10	21625	1	#0	QPSK	24.50	24.12
Band8	10	21625	12	#0	QPSK	24.50	24.16
Band8	10	21625	50	#0	QPSK	24.50	22.58
Band8	10	21750	1	#0	QPSK	24.50	24.16
Band8	10	21750	12	#0	QPSK	24.50	24.24
Band8	10	21750	50	#0	QPSK	24.50	22.55

7.4. WLAN & Bluetooth Output Power

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11b	1	2412	16.50	16.03
	7	2442	16.50	15.68
	13	2472	16.50	15.42
802.11g	1	2412	17.50	17.23
	7	2442	17.50	16.95
	13	2472	17.50	16.74
802.11n (HT20)	1	2412	15.50	15.21
	7	2442	15.50	15.08
	13	2472	15.50	14.84
802.11n (HT40)	3	2422	15.50	14.97
	7	2442	15.50	15.01
	11	2462	15.50	15.14

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	36	5180	11.50	11.29
	40	5200	11.50	10.53
	48	5240	11.50	10.72
802.11n HT20	36	5180	11.50	11.49
	40	5200	11.50	10.84
	48	5240	11.50	11.11
802.11n HT40	38	5190	11.50	11.29
	46	5230	11.50	10.31
802.11ac VHT20	36	5180	12.00	11.67
	40	5200	12.00	10.92
	48	5240	12.00	10.67
802.11ac VHT40	38	5190	12.00	11.74
	46	5230	12.00	11.40
802.11ac VHT80	42	5210	11.50	11.11

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)
802.11a	149	5745	12.00	11.09
	157	5785	12.00	11.48
	165	5825	12.00	11.55
802.11n HT20	149	5745	12.00	10.95
	157	5785	12.00	11.49
	165	5825	12.00	11.50
802.11n HT40	151	5755	11.00	10.52
	159	5795	11.00	10.60
802.11ac VHT20	149	5745	11.50	10.82
	157	5785	11.50	11.21
	165	5825	11.50	11.29
802.11ac VHT40	151	5755	11.00	10.31
	159	5795	11.00	10.85
802.11ac VHT80	155	5775	11.00	10.54

NOTE: Power measurement results of WLAN 5.8G.

BR+EDR	Data Rates	Tune - up	Output Power (dBm)
	GFSK DH5	7.50	7.03
	Pi/4 DQPSK DH5	5.50	5.18
	8DPSK DH5	5.00	4.87

BLE	Channel	Tune - up	Output Power (dBm)	
			1M	2M
	0CH	3.50	3.09	2.62
	19CH	3.00	2.38	2.67
	39CH	2.50	2.48	2.33

NOTE: Power measurement results of Bluetooth. Refer to EN 62479, the available power of this EUT is 7.50dBm (5.62mW), 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.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	38/897.6	GSM Voice	0	1.600	0.781	-2.32	32.30	32.50	0.818	2025/6/04
Back Side	38/897.6	GSM Voice	0	1.440	0.668	-2.53	32.30	32.50	0.699	2025/6/04
Left Side	38/897.6	GSM Voice	0	0.432	0.209	2.35	32.30	32.50	0.219	2025/6/04
Right Side	38/897.6	GSM Voice	0	0.096	0.045	2.20	32.30	32.50	0.047	2025/6/04
Top Side	38/897.6	GSM Voice	0	0.784	0.367	3.47	32.30	32.50	0.384	2025/6/04
Bottom Side	38/897.6	GSM Voice	0	0.240	0.114	0.05	32.30	32.50	0.119	2025/6/04
Front Side	975/880.2	GSM Voice	0	1.488	0.690	-1.02	32.27	32.50	0.728	2025/6/04
Front Side	124/914.8	GSM Voice	0	1.552	0.758	-3.02	32.36	32.50	0.783	2025/6/04

Tested by : Jack Peng

Test Position	Test channel /Freq	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										

Front Side	2788/897.6	RMC12.2K	0	1.410	0.672	-0.48	22.10	22.50	0.737	2025/6/04
Back Side	2788/897.6	RMC12.2K	0	1.269	0.575	-1.64	22.10	22.50	0.630	2025/6/04
Left Side	2788/897.6	RMC12.2K	0	0.338	0.153	1.16	22.10	22.50	0.168	2025/6/04
Right Side	2788/897.6	RMC12.2K	0	0.056	0.026	3.08	22.10	22.50	0.029	2025/6/04
Top Side	2788/897.6	RMC12.2K	0	0.635	0.294	-0.27	22.10	22.50	0.322	2025/6/04
Bottom Side	2788/897.6	RMC12.2K	0	0.240	0.113	3.66	22.10	22.50	0.124	2025/6/04
Front Side	2712/882.4	RMC12.2K	0	1.283	0.587	-0.24	22.12	22.50	0.641	2025/6/04
Front Side	2863/912.6	RMC12.2K	0	1.340	0.626	1.12	22.17	22.50	0.675	2025/6/04

Tested by : Jack Peng

9.1.5. SAR measurement Result of LTE Band 1

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	18300/1950	20M QPSK(1,0)	0	1.041	0.609	-1.12	23.13	23.50	0.663	2025/6/11
Back Side	18300/1950	20M QPSK(1,0)	0	0.989	0.579	2.84	23.13	23.50	0.630	2025/6/11
Left Side	18300/1950	20M QPSK(1,0)	0	0.437	0.253	0.04	23.13	23.50	0.275	2025/6/11
Right Side	18300/1950	20M QPSK(1,0)	0	0.031	0.018	2.05	23.13	23.50	0.020	2025/6/11
Top Side	18300/1950	20M QPSK(1,0)	0	0.822	0.457	-3.78	23.13	23.50	0.498	2025/6/11
Bottom Side	18300/1950	20M QPSK(1,0)	0	0.031	0.017	-1.76	23.13	23.50	0.019	2025/6/11
Front Side	18100/1930	20M QPSK(1,0)	0	0.958	0.555	0.15	23.12	23.50	0.606	2025/6/11
Front Side	18500/1970	20M QPSK(1,0)	0	1.041	0.591	1.40	23.25	23.50	0.626	2025/6/11

Tested by : Jack Peng

9.1.6. SAR measurement Result of LTE Band 3

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					

Body & Hotspot										
Front Side	19575/1747.5	20M QPSK(1,0)	0	2.194	1.070	0.20	23.56	24.00	1.184	2025/6/05
Back Side	19575/1747.5	20M QPSK(1,0)	0	1.997	0.935	-3.99	23.56	24.00	1.035	2025/6/05
Left Side	19575/1747.5	20M QPSK(1,0)	0	0.878	0.424	0.03	23.56	24.00	0.469	2025/6/05
Right Side	19575/1747.5	20M QPSK(1,0)	0	0.044	0.021	-2.20	23.56	24.00	0.023	2025/6/05
Top Side	19575/1747.5	20M QPSK(1,0)	0	1.689	0.783	1.49	23.56	24.00	0.866	2025/6/05
Bottom Side	19575/1747.5	20M QPSK(1,0)	0	0.110	0.052	-1.38	23.56	24.00	0.058	2025/6/05
Front Side	19300/1720	20M QPSK(1,0)	0	2.084	0.986	-0.81	23.35	24.00	1.145	2025/6/05
Front Side	19850/1775	20M QPSK(1,0)	0	2.084	0.986	-3.69	23.66	24.00	1.066	2025/6/05

Tested by : Jack Peng

9.1.7. SAR measurement Result of LTE Band 7

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	21100/2535	20M QPSK(1,0)	0	1.286	0.605	-0.11	22.15	23.00	0.736	2025/6/08
Back Side	21100/2535	20M QPSK(1,0)	0	0.682	0.311	3.11	22.15	23.00	0.378	2025/6/08
Left Side	21100/2535	20M QPSK(1,0)	0	0.231	0.104	3.30	22.15	23.00	0.126	2025/6/08
Right Side	21100/2535	20M QPSK(1,0)	0	0.051	0.024	0.34	22.15	23.00	0.029	2025/6/08
Top Side	21100/2535	20M QPSK(1,0)	0	0.926	0.427	-0.62	22.15	23.00	0.519	2025/6/08
Bottom Side	21100/2535	20M QPSK(1,0)	0	0.051	0.023	1.77	22.15	23.00	0.028	2025/6/08
Front Side	20850/2510	20M QPSK(1,0)	0	1.196	0.551	1.92	22.07	23.00	0.683	2025/6/08

Front Side	21350/2560	20M QPSK(1,0)	0	1.235	0.575	3.63	22.36	23.00	0.666	2025/6/08
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Tested by : Jack Peng

9.1.8. SAR measurement Result of LTE Band 8

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				(W/kg)						
				1-g	10-g					
Body & Hotspot										
Front Side	21625/897.5	10M QPSK(1,0)	0	1.792	0.873	-1.62	24.12	24.50	0.953	2025/6/04
Back Side	21625/897.5	10M QPSK(1,0)	0	1.577	0.738	1.17	24.12	24.50	0.805	2025/6/04
Left Side	21625/897.5	10M QPSK(1,0)	0	0.394	0.182	1.38	24.12	24.50	0.199	2025/6/04
Right Side	21625/897.5	10M QPSK(1,0)	0	0.018	0.016	2.65	24.12	24.50	0.017	2025/6/04
Top Side	21625/897.5	10M QPSK(1,0)	0	0.842	0.410	2.94	24.12	24.50	0.447	2025/6/04
Bottom Side	21625/897.5	10M QPSK(1,0)	0	0.287	0.140	2.54	24.12	24.50	0.153	2025/6/04
Front Side	21500/885	10M QPSK(1,0)	0	1.667	0.796	0.19	24.05	24.50	0.883	2025/6/04
Front Side	21750/910	10M QPSK(1,0)	0	1.792	0.829	0.42	24.16	24.50	0.897	2025/6/04

Tested by : Jack Peng

9.1.9. SAR measurement Result of LTE Band 20

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	24300/847	20M QPSK(1,0)	0	2.082	1.038	-0.31	23.34	24.00	1.208	2025/6/04
Back Side	24300/847	20M QPSK(1,0)	0	1.832	0.913	0.85	23.34	24.00	1.063	2025/6/04
Left Side	24300/847	20M	0	0.521	0.252	-0.93	23.34	24.00	0.293	2025/6/04

		QPSK(1,0)								
Right Side	24300/847	20M QPSK(1,0)	0	0.062	0.030	-3.48	23.34	24.00	0.035	2025/6/04
Top Side	24300/847	20M QPSK(1,0)	0	0.937	0.453	-1.33	23.34	24.00	0.527	2025/6/04
Bottom Side	24300/847	20M QPSK(1,0)	0	0.416	0.197	-0.42	23.34	24.00	0.229	2025/6/04
Front Side	24250/842	20M QPSK(1,0)	0	1.936	0.965	3.86	23.32	24.00	1.129	2025/6/04
Front Side	24350/852	20M QPSK(1,0)	0	2.040	0.987	0.48	23.30	24.00	1.160	2025/6/04

Tested by : Jack Peng

9.1.10. SAR measurement Result of LTE Band 28

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
				Body & Hotspot						
Front Side	27375/719.5	20M QPSK(1,0)	0	0.568	0.273	0.72	23.70	24.50	0.328	2025/6/03
Back Side	27375/719.5	20M QPSK(1,0)	0	0.511	0.243	-3.95	23.70	24.50	0.292	2025/6/03
Left Side	27375/719.5	20M QPSK(1,0)	0	0.148	0.069	2.11	23.70	24.50	0.083	2025/6/03
Right Side	27375/719.5	20M QPSK(1,0)	0	0.023	0.011	0.27	23.70	24.50	0.013	2025/6/03
Top Side	27375/719.5	20M QPSK(1,0)	0	0.261	0.124	2.48	23.70	24.50	0.149	2025/6/03
Bottom Side	27375/719.5	20M QPSK(1,0)	0	0.114	0.053	-0.68	23.70	24.50	0.064	2025/6/03
Front Side	27310/713	20M QPSK(1,0)	0	0.523	0.241	3.26	23.66	24.50	0.292	2025/6/03
Front Side	27440/726	20M QPSK(1,0)	0	0.551	0.252	-0.89	24.24	24.50	0.268	2025/6/03

Tested by : Jack Peng

9.1.11. SAR measurement Result of LTE Band 40

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	39150/2350	20M QPSK(1,0)	0	1.237	0.510	-0.50	22.75	23.50	0.606	2025/6/12
Back Side	39150/2350	20M QPSK(1,0)	0	0.643	0.254	-2.72	22.75	23.50	0.302	2025/6/12
Left Side	39150/2350	20M QPSK(1,0)	0	0.210	0.087	2.93	22.75	23.50	0.103	2025/6/12
Right Side	39150/2350	20M QPSK(1,0)	0	0.049	0.020	4.00	22.75	23.50	0.024	2025/6/12
Top Side	39150/2350	20M QPSK(1,0)	0	0.891	0.353	-2.05	22.75	23.50	0.420	2025/6/12
Bottom Side	39150/2350	20M QPSK(1,0)	0	0.074	0.029	0.25	22.75	23.50	0.034	2025/6/12
Front Side	38750/2310	20M QPSK(1,0)	0	1.113	0.454	0.09	23.26	23.50	0.480	2025/6/12
Front Side	39550/2390	20M QPSK(1,0)	0	1.225	0.490	-2.01	22.95	23.50	0.556	2025/6/12

Tested by : Jack Peng

9.1.12. SAR measurement Result of WLAN 2.4G

Test Position	Test channel /Freq.	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	7/2442	802.11 g	0	0.381	0.122	0.21	16.95	17.50	0.138	2025/6/07
Back Side	7/2442	802.11 g	0	0.095	0.030	0.62	16.95	17.50	0.034	2025/6/07
Left Side	7/2442	802.11 g	0	0.019	0.017	-2.99	16.95	17.50	0.019	2025/6/07
Right Side	7/2442	802.11 g	0	0.030	0.010	-3.27	16.95	17.50	0.011	2025/6/07
Top Side	7/2442	802.11 g	0	0.213	0.067	1.07	16.95	17.50	0.076	2025/6/07

Bottom Side	7/2442	802.11 g	0	0.007	0.005	-2.22	16.95	17.50	0.006	2025/6/07
Front Side	1/2412	802.11 g	0	0.347	0.108	2.84	17.23	17.50	0.115	2025/6/07
Front Side	13/2472	802.11 g	0	0.362	0.112	-2.25	16.74	17.50	0.133	2025/6/07

Tested by : Jack Peng

9.1.13. SAR measurement Result of WLAN 5.2G

Test Position	Test channel /Freq	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
Body & Hotspot										
Front Side	38/5180	802.11 ac VHT40	0	0.223	0.061	-2.22	11.74	12.00	0.065	2025/6/09
Back Side	38/5180	802.11 ac VHT40	0	0.354	0.100	1.99	11.74	12.00	0.106	2025/6/09
Left Side	38/5180	802.11 ac VHT40	0	0.014	0.012	0.14	11.74	12.00	0.013	2025/6/09
Right Side	38/5180	802.11 ac VHT40	0	0.170	0.047	2.94	11.74	12.00	0.050	2025/6/09
Top Side	38/5180	802.11 ac VHT40	0	0.156	0.042	2.83	11.74	12.00	0.045	2025/6/09
Bottom Side	38/5180	802.11 ac VHT40	0	0.035	0.009	2.02	11.74	12.00	0.010	2025/6/09
Back Side	46/5230	802.11 ac VHT40	0	0.326	0.087	-2.84	11.40	12.00	0.100	2025/6/09

Tested by : Jack Peng

9.1.14. SAR measurement Result of WLAN 5.8G

Test Position	Test channel /Freq	Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 10-g (W/Kg)	Date
				1-g	10-g					
				Body & Hotspot						
Front Side	157/5785	802.11 a	0	0.207	0.063	-2.80	11.48	12.00	0.071	2025/6/10
Back Side	157/5785	802.11	0	0.318	0.097	0.61	11.48	12.00	0.109	2025/6/10

		a								
Left Side	157/5785	802.11 a	0	0.003	0.001	0.19	11.48	12.00	0.001	2025/6/10
Right Side	157/5785	802.11 a	0	0.153	0.047	-1.68	11.48	12.00	0.053	2025/6/10
Top Side	157/5785	802.11 a	0	0.140	0.041	-0.26	11.48	12.00	0.046	2025/6/10
Bottom Side	157/5785	802.11 a	0	0.032	0.009	-3.09	11.48	12.00	0.010	2025/6/10
Back Side	149/5745	802.11 a	0	0.289	0.085	0.64	11.09	12.00	0.105	2025/6/10
Back Side	165/5825	802.11 a	0	0.312	0.091	-0.58	11.55	12.00	0.101	2025/6/10

Tested by : Jack Peng

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	7.50	5.62	20	2	1.319	6.81	YES


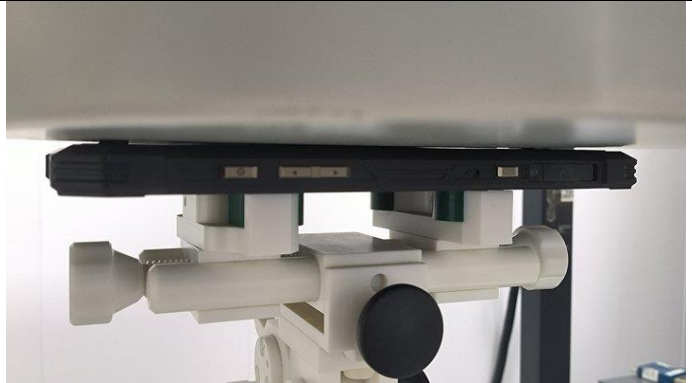




9.3. Exposure Conditions

Exposure Position		WWAN Band	WLAN Band	Simultaneous Tx SAR(W/Kg)
		SAR(W/Kg)	SAR(W/Kg)	
Body&Hotspot	Front Side	1.319	0.138	1.457
	Back Side	1.175	0.109	1.284
	Left Side	0.554	0.019	0.573
	Right Side	0.047	0.053	0.100
	Top Side	0.988	0.076	1.064
	Bottom Side	0.229	0.010	0.239

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

10. Appendix A. Photo documentation

Test Positions

<p>Front Side (Separation distance of 0mm)</p> 	<p>Back Side (Separation distance of 0mm)</p> 
<p>Left Side (Separation distance of 0mm)</p> 	<p>Right Side (Separation distance of 0mm)</p> 
<p>Top Side (Separation distance of 0mm)</p> 	<p>Bottom Side (Separation distance of 0mm)</p> 
<p>Back Side (Separation distance of 5mm)</p>	

11. Appendix B. System Check Plots

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1# System check at 750 MHz
Date of measurement: 3/6/2025

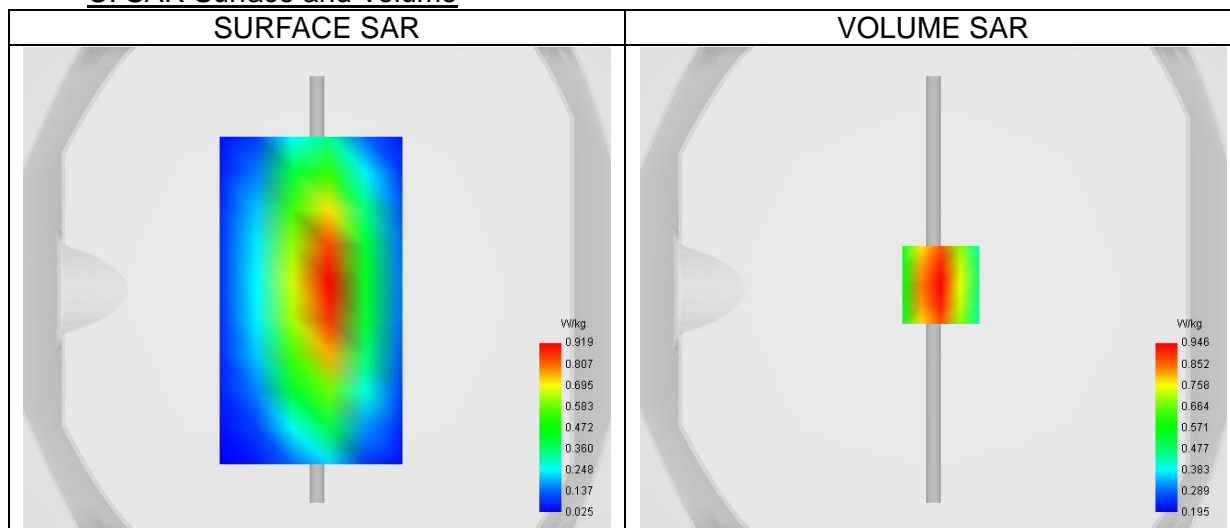
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.39
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	750.000
Relative permittivity (real part)	40.88
Relative permittivity (imaginary part)	21.35
Conductivity (S/m)	0.89

C. SAR Surface and Volume



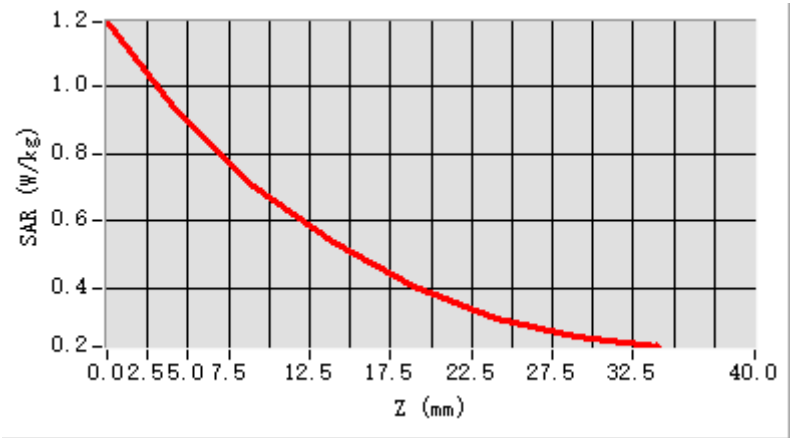
Maximum location: X=3.00, Y=2.00 ; SAR Peak: 1.20 W/kg

D. SAR 1g & 10g

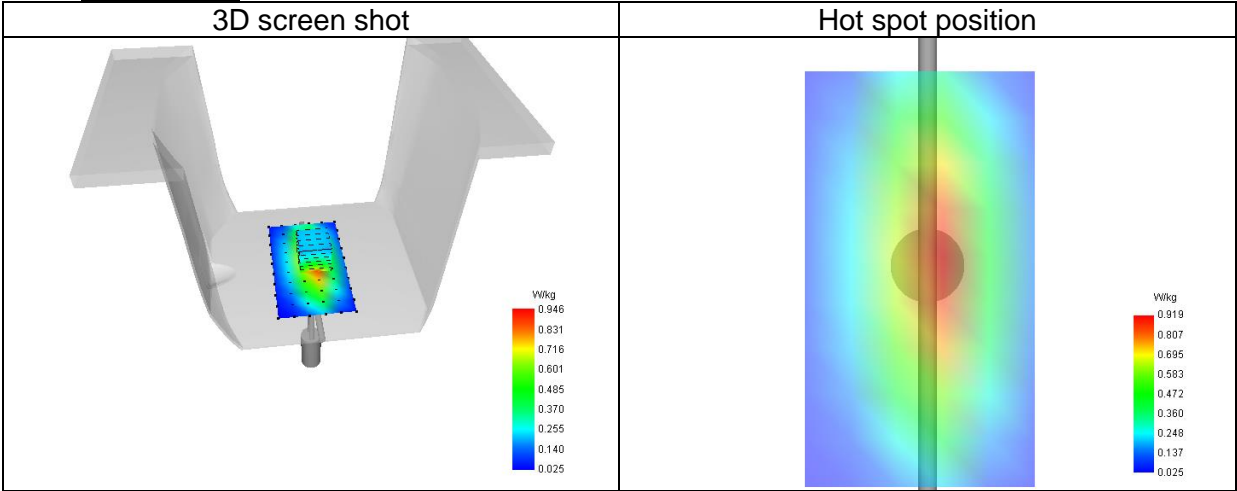
SAR 10g (W/Kg)	0.633
SAR 1g (W/Kg)	0.914
Variation (%)	-0.16
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	74.54

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.193	0.946	0.705	0.534	0.402	0.307	0.253



F. 3D Image



2# System check at 900 MHz

Date of measurement: 4/6/2025

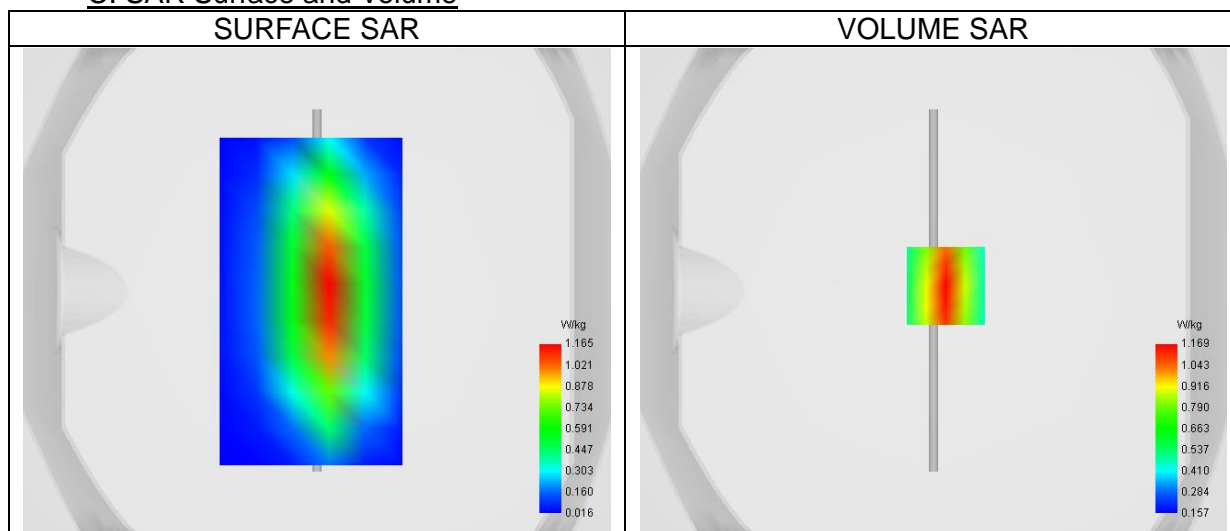
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.33
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW900
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	900.000
Relative permittivity (real part)	42.01
Relative permittivity (imaginary part)	19.79
Conductivity (S/m)	0.99

C. SAR Surface and Volume



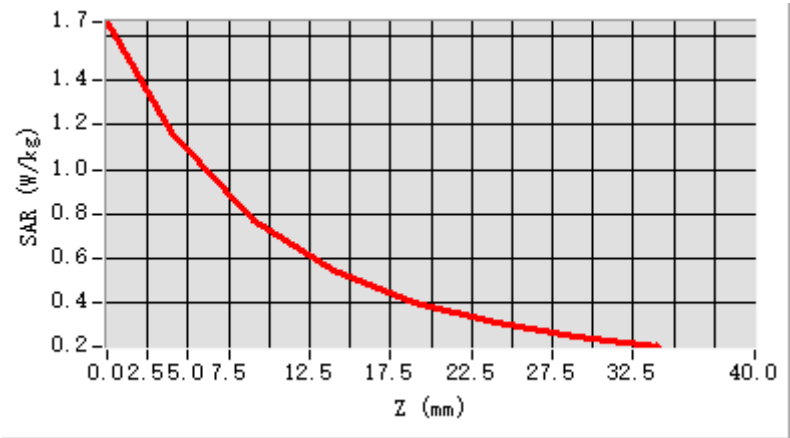
Maximum location: X=5.00, Y=2.00 ; SAR Peak: 1.65 W/kg

D. SAR 1g & 10g

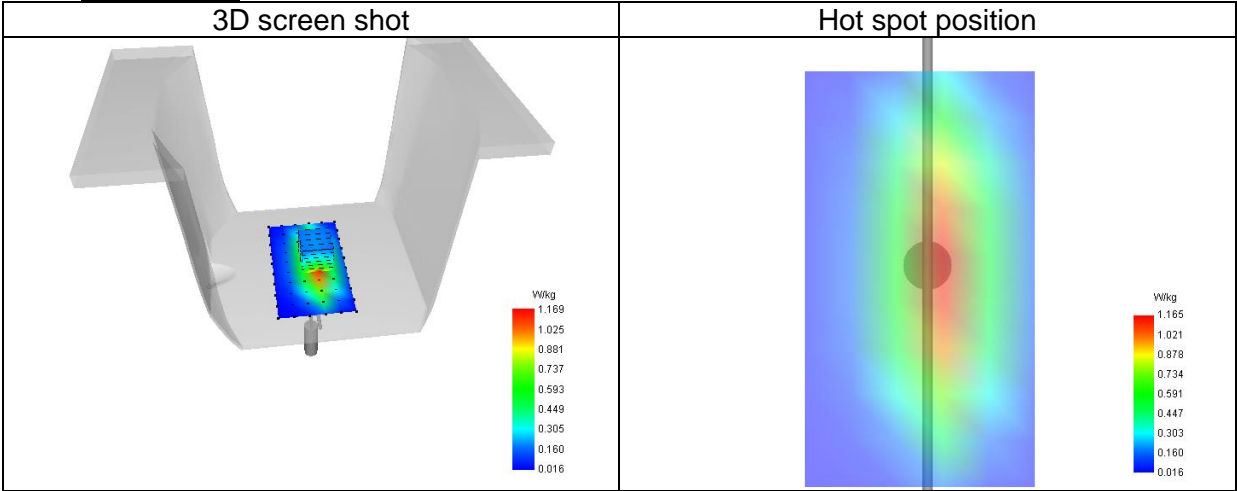
SAR 10g (W/Kg)	0.689
SAR 1g (W/Kg)	1.109
Variation (%)	-0.57
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	65.88

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.662	1.169	0.770	0.545	0.403	0.315	0.254



F. 3D Image



3# System check at 1800 MHz
Date of measurement: 5/6/2025

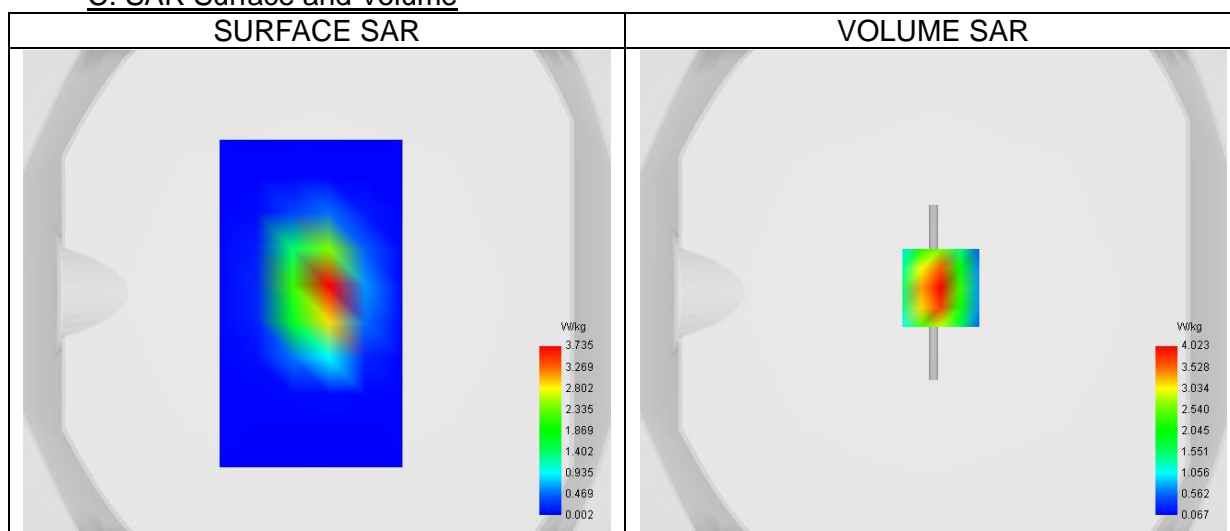
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.50
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW1800
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	1800.00
Relative permittivity (real part)	39.06
Relative permittivity (imaginary part)	14.01
Conductivity (S/m)	1.40

C. SAR Surface and Volume



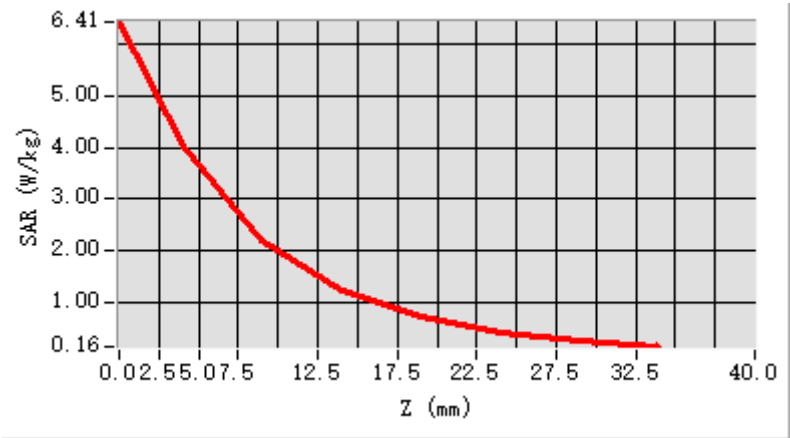
Maximum location: X=3.00, Y=2.00 ; SAR Peak: 6.50 W/kg

D. SAR 1g & 10g

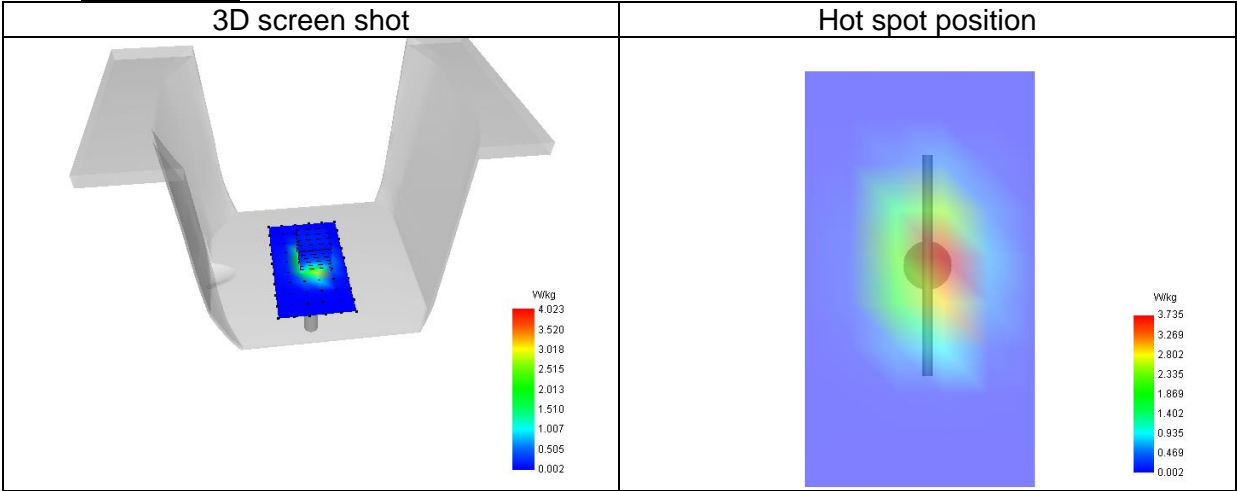
SAR 10g (W/Kg)	1.930
SAR 1g (W/Kg)	3.821
Variation (%)	-0.07
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	54.62

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.415	4.023	2.197	1.261	0.738	0.438	0.265



F. 3D Image



4# System check at 2000 MHz
Date of measurement: 11/6/2025

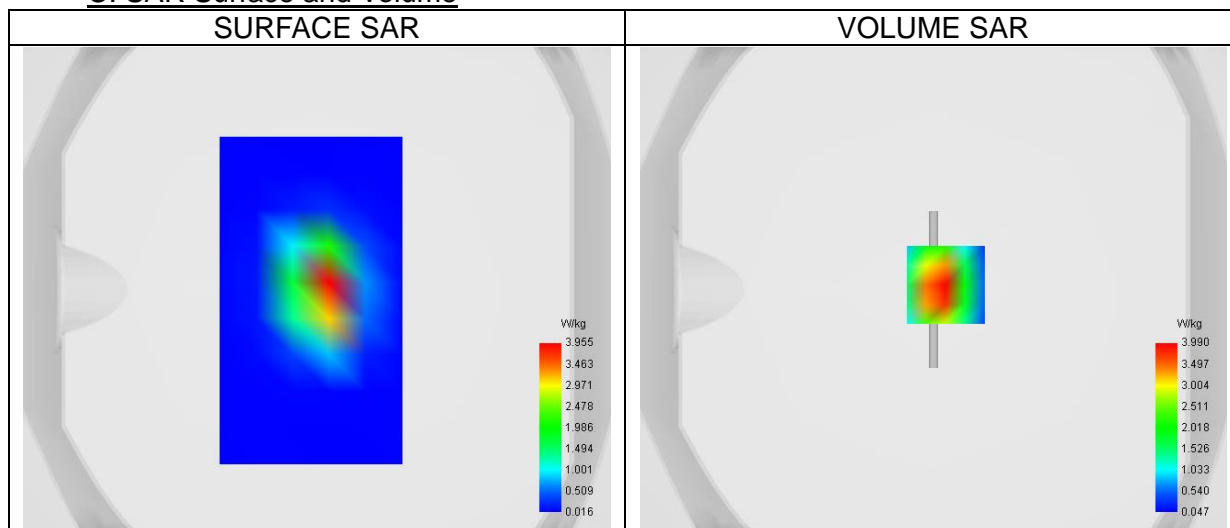
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.63
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2000
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	2000.000
Relative permittivity (real part)	40.59
Relative permittivity (imaginary part)	12.83
Conductivity (S/m)	1.42

C. SAR Surface and Volume



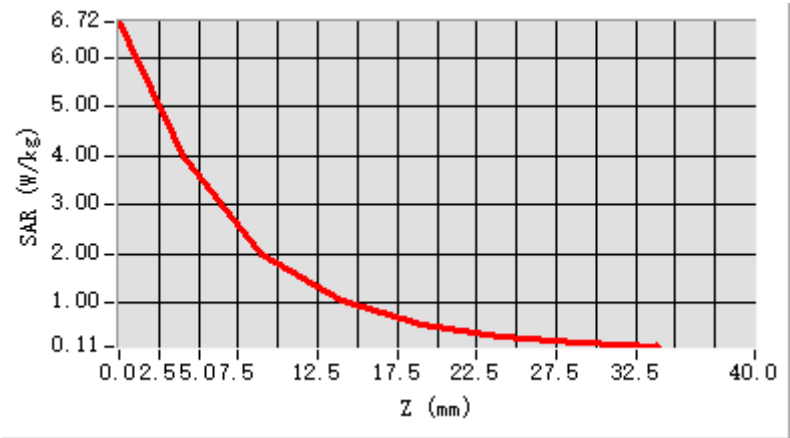
Maximum location: X=5.00, Y=2.00 ; SAR Peak: 7.00 W/kg

D. SAR 1g & 10g

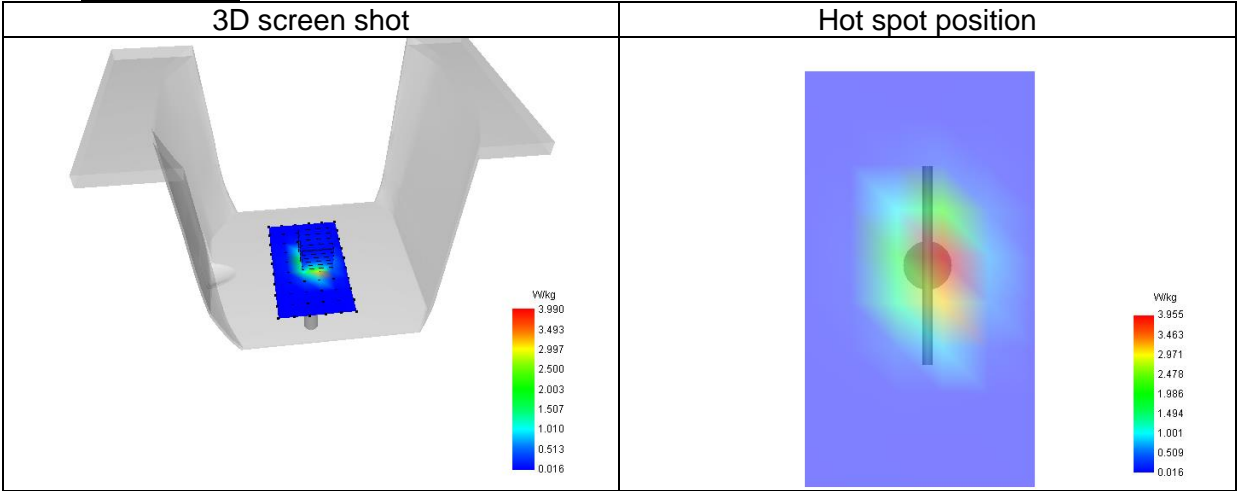
SAR 10g (W/Kg)	1.824
SAR 1g (W/Kg)	3.968
Variation (%)	-0.15
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	49.88

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.718	3.990	1.990	1.048	0.566	0.318	0.182



F. 3D Image



5# System check at 2300 MHz
Date of measurement: 12/6/2025

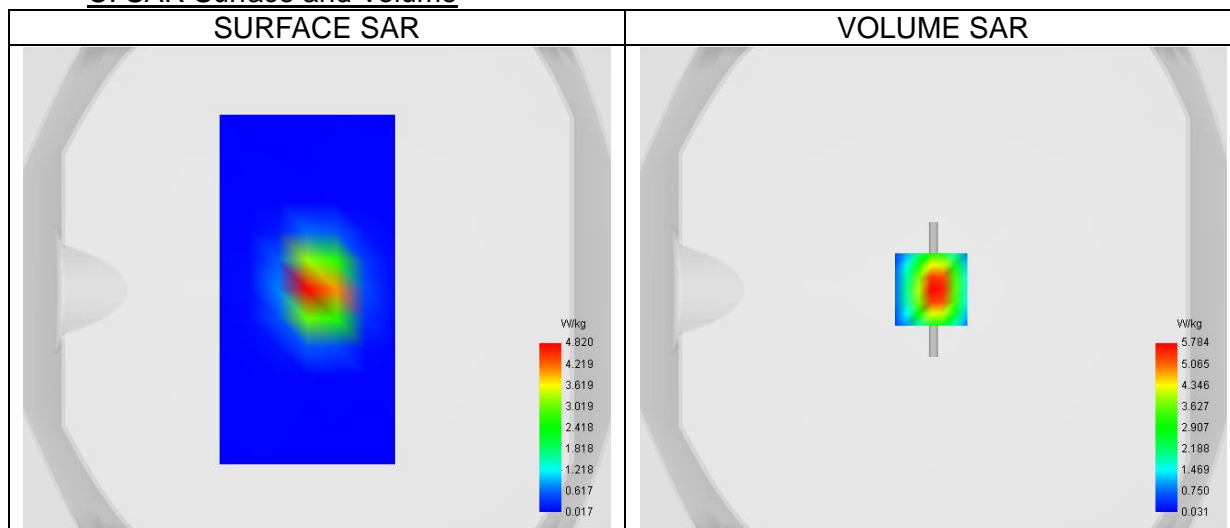
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.64
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2300
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	2300.000
Relative permittivity (real part)	39.83
Relative permittivity (imaginary part)	13.20
Conductivity (S/m)	1.69

C. SAR Surface and Volume



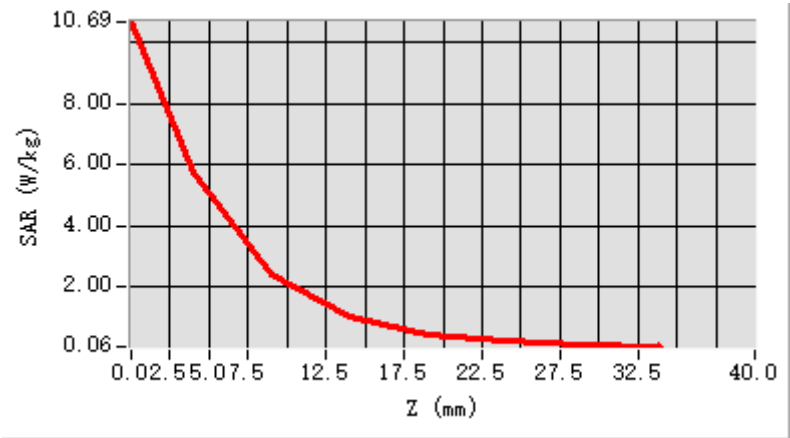
Maximum location: X=-1.00, Y=0.00 ; SAR Peak: 10.88 W/kg

D. SAR 1g & 10g

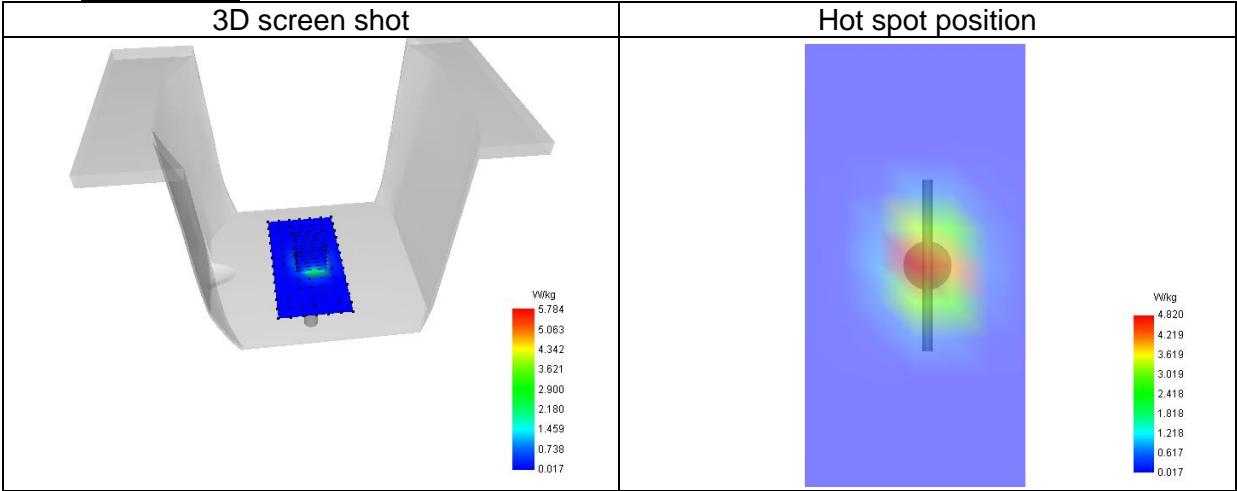
SAR 10g (W/Kg)	2.204
SAR 1g (W/Kg)	5.445
Variation (%)	0.29
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	41.79

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.687	5.784	2.417	1.065	0.487	0.229	0.115



F. 3D Image



6# System check at 2450 MHz
Date of measurement: 7/6/2025

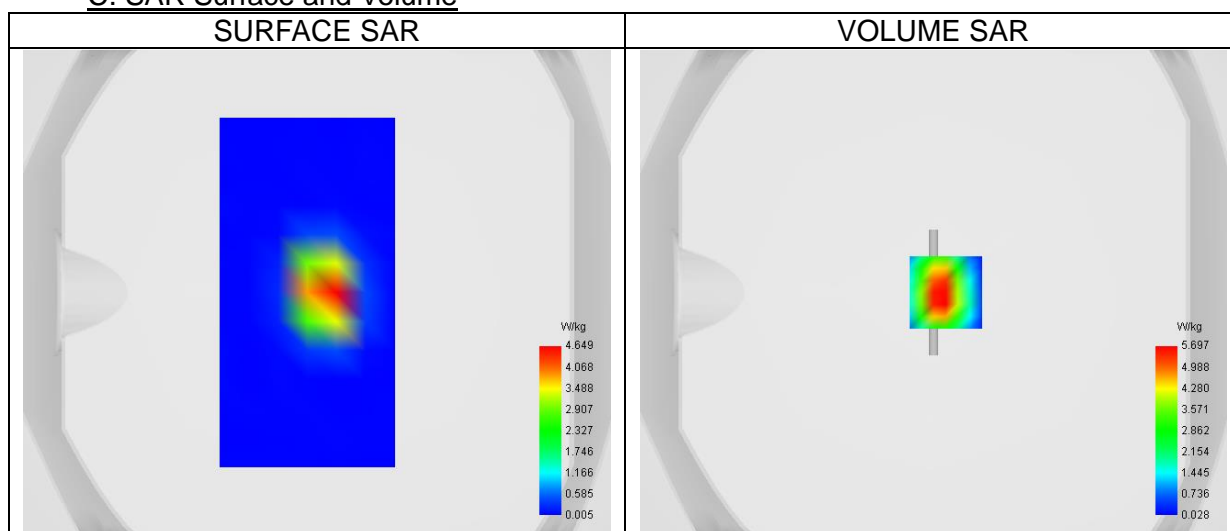
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.63
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2450
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	2450.00
Relative permittivity (real part)	38.35
Relative permittivity (imaginary part)	13.42
Conductivity (S/m)	1.83

C. SAR Surface and Volume



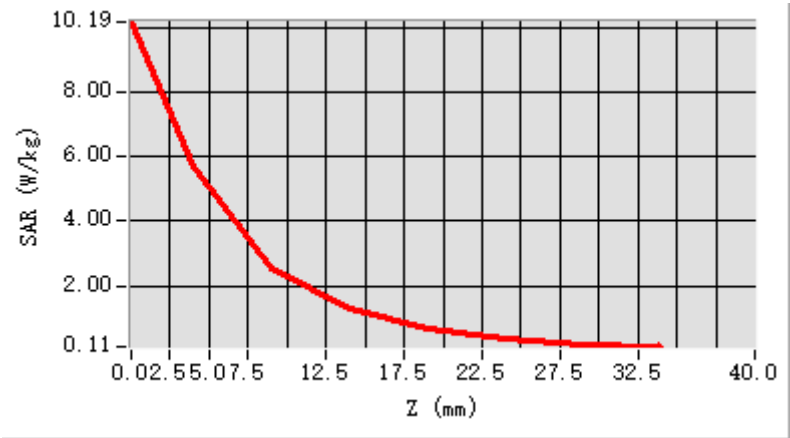
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 10.08 W/kg

D. SAR 1g & 10g

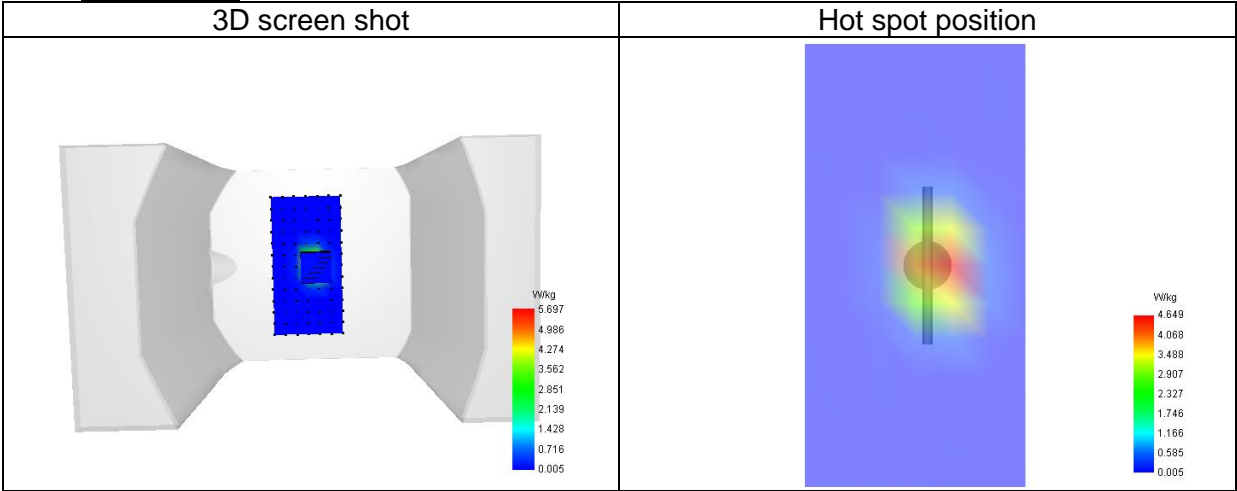
SAR 10g (W/Kg)	2.330
SAR 1g (W/Kg)	5.379
Variation (%)	1.92
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	49.27

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.194	5.697	2.563	1.303	0.649	0.354	0.176



F. 3D Image



7# System check at 2600 MHz
Date of measurement: 8/6/2025

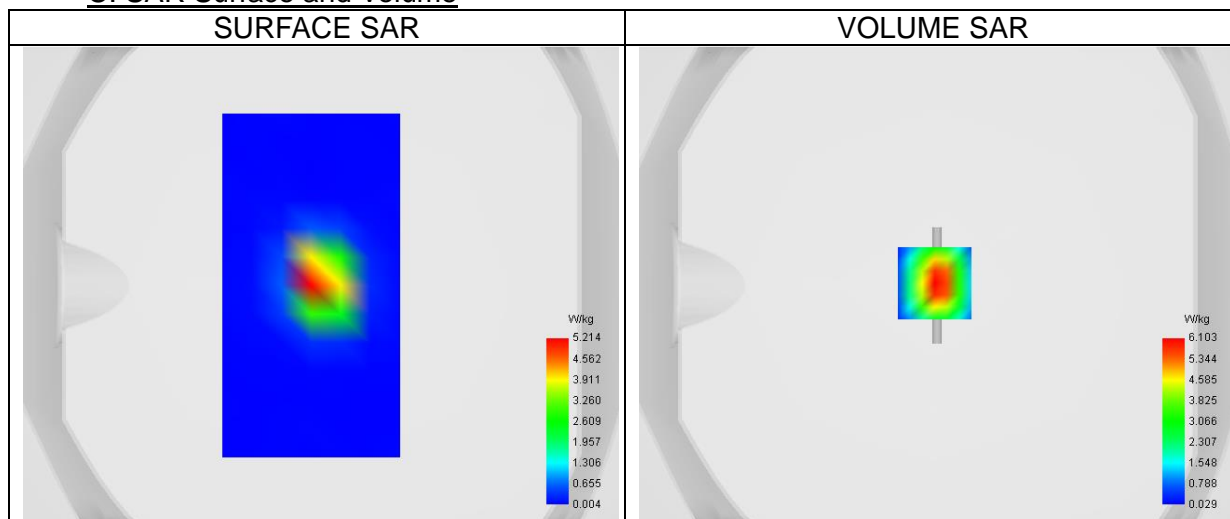
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.52
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	2600.00
Relative permittivity (real part)	39.40
Relative permittivity (imaginary part)	13.51
Conductivity (S/m)	1.95

C. SAR Surface and Volume



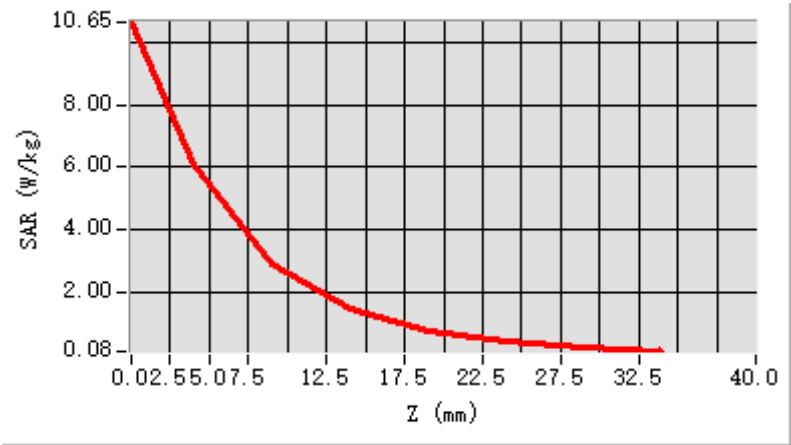
Maximum location: X=-1.00, Y=1.00 ; SAR Peak: 10.66 W/kg

D. SAR 1g & 10g

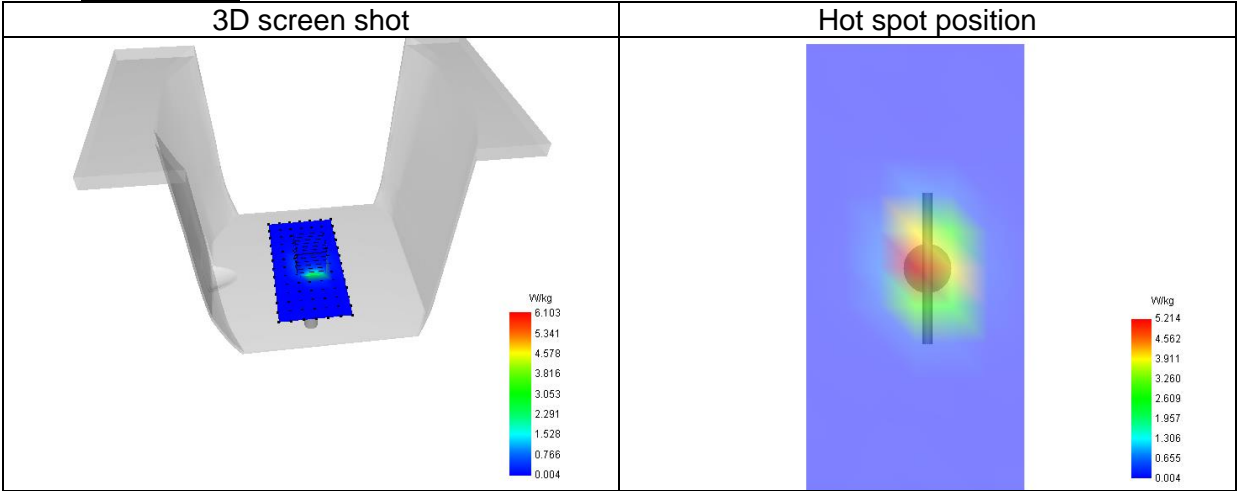
SAR 10g (W/Kg)	2.462
SAR 1g (W/Kg)	5.638
Variation (%)	-1.28
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	47.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.645	6.103	2.869	1.465	0.758	0.375	0.189



F. 3D Image



8# System check at 5200 MHz
Date of measurement: 9/6/2025

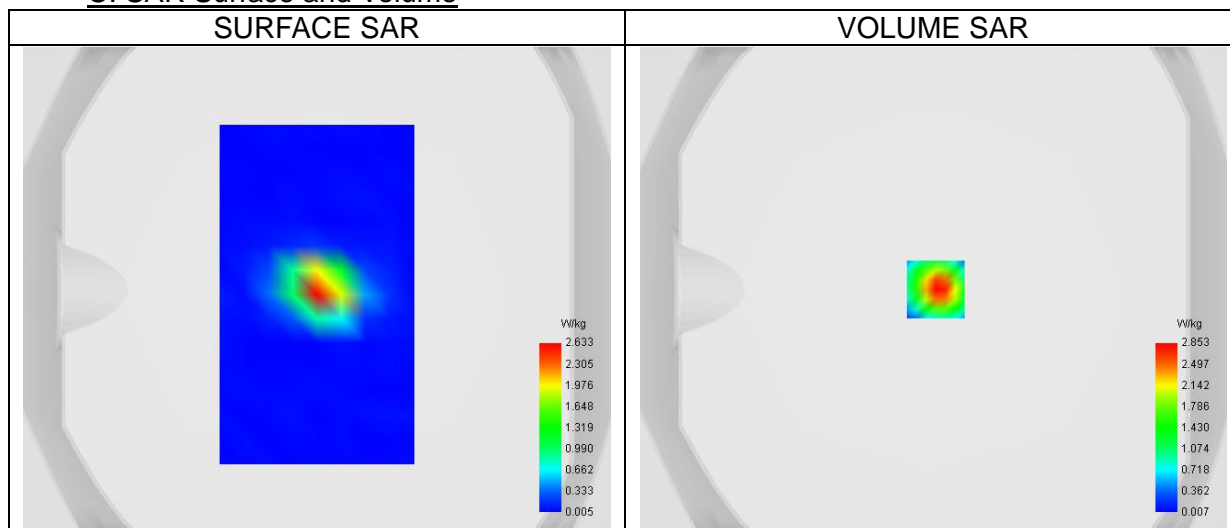
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.37
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	5200.00
Relative permittivity (real part)	37.48
Relative permittivity (imaginary part)	15.93
Conductivity (S/m)	4.60

C. SAR Surface and Volume



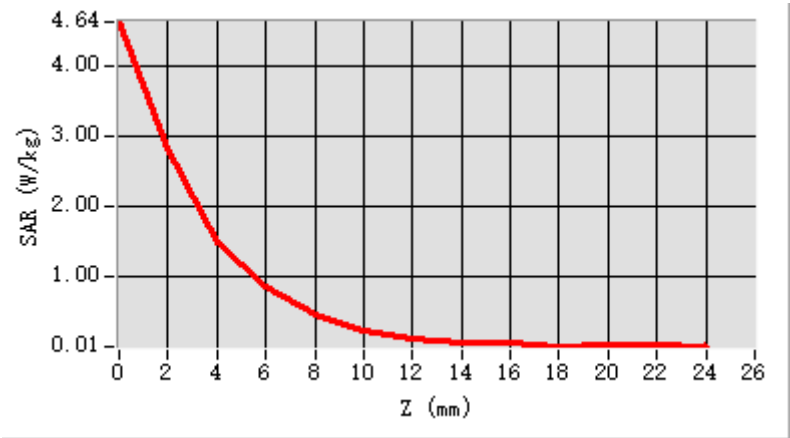
Maximum location: X=1.00, Y=0.00 ; SAR Peak: 5.01 W/kg

D. SAR 1g & 10g

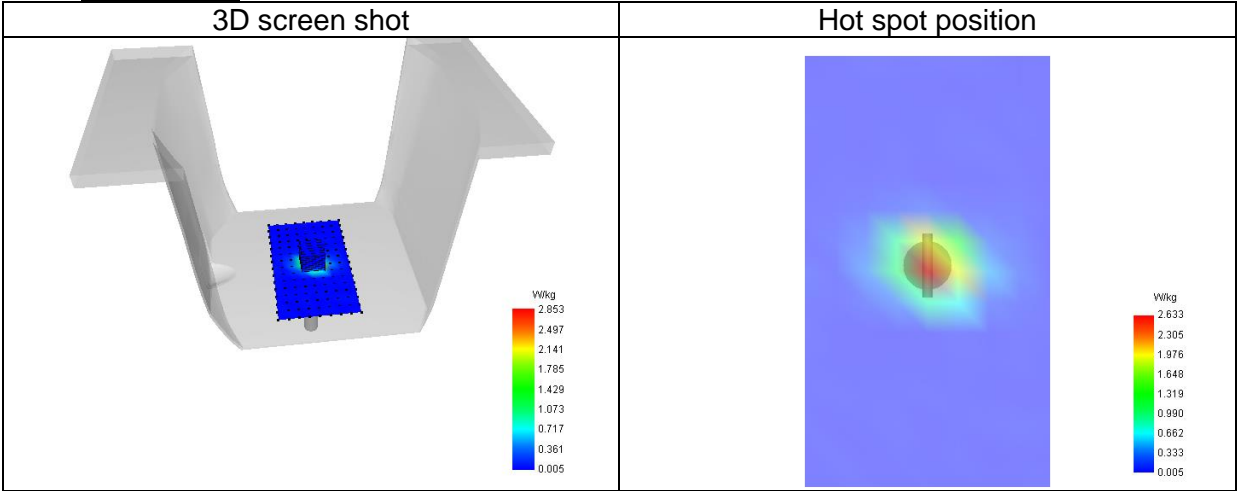
SAR 10g (W/Kg)	0.565
SAR 1g (W/Kg)	1.669
Variation (%)	-0.87
Horizontal validation criteria: minimum distance (mm)	8.94
Vertical validation criteria: SAR ratio M2/M1 (%)	52.85

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
						0	0	0	0	0	0	0
SAR (W/Kg)	4.64	2.85	1.50	0.86	0.46	0.23	0.12	0.08	0.07	0.02	0.04	0.04
	2	3	8	7	2	6	2	1	3	4	8	3



F. 3D Image



9# System check at 5800 MHz
Date of measurement: 10/6/2025

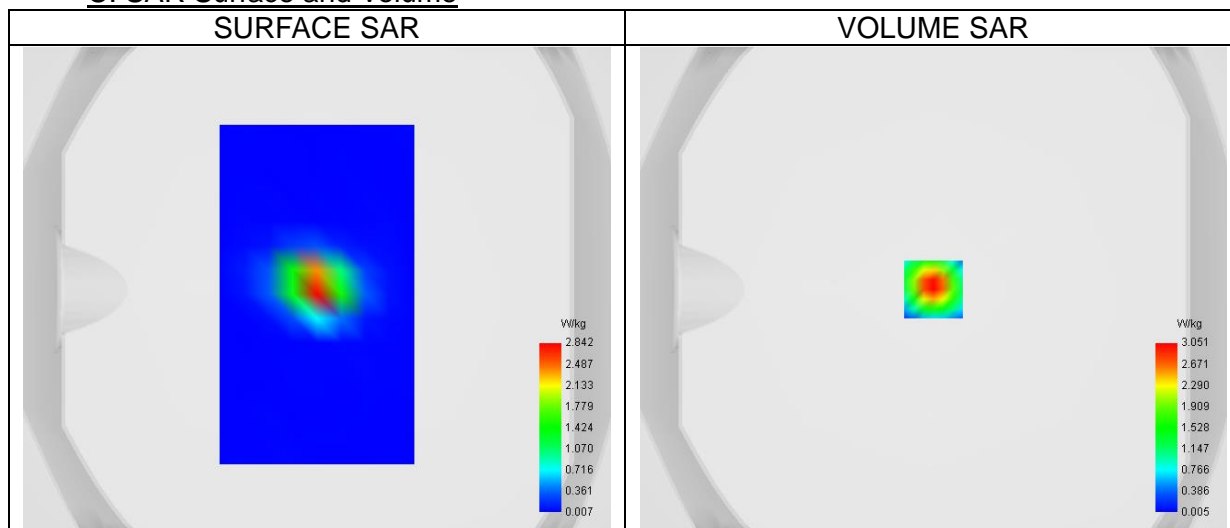
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.35
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	5800.00
Relative permittivity (real part)	36.15
Relative permittivity (imaginary part)	16.05
Conductivity (S/m)	5.17

C. SAR Surface and Volume



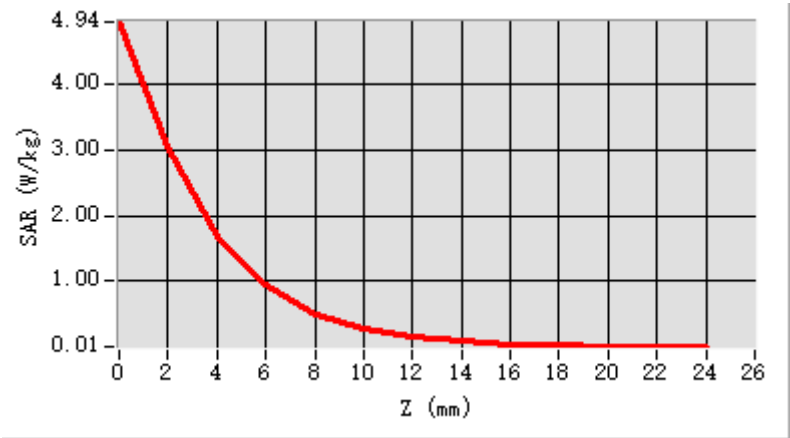
Maximum location: X=0.00, Y=0.00 ; SAR Peak: 5.33 W/kg

D. SAR 1g & 10g

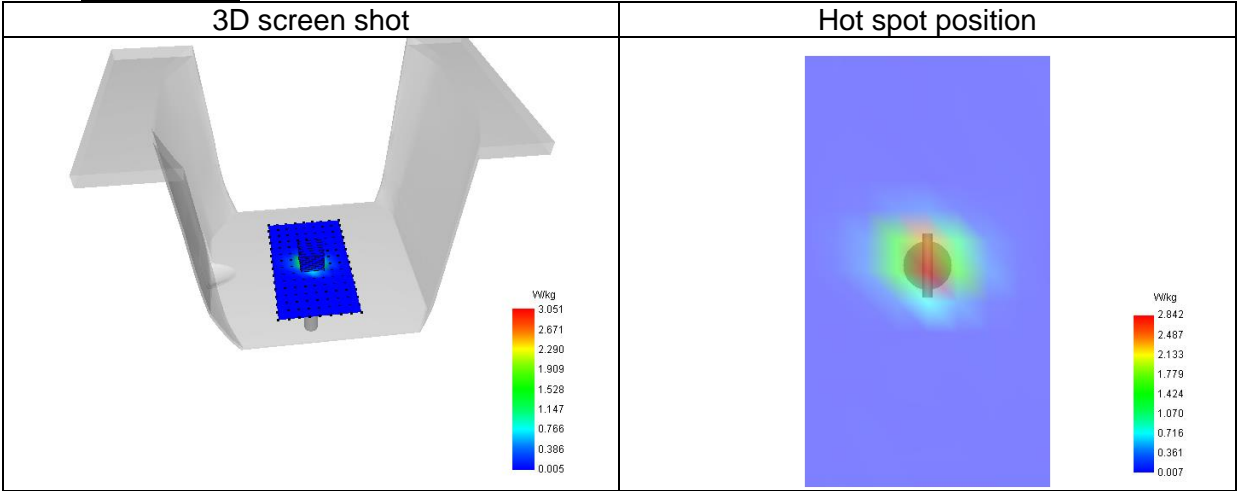
SAR 10g (W/Kg)	0.598
SAR 1g (W/Kg)	1.787
Variation (%)	0.25
Horizontal validation criteria: minimum distance (mm)	8.94
Vertical validation criteria: SAR ratio M2/M1 (%)	54.88

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
						0	0	0	0	0	0	0
SAR (W/Kg)	4.94	3.05	1.67	0.95	0.50	0.27	0.15	0.08	0.04	0.02	0.01	0.01
	5	1	5	6	9	5	7	6	6	4	1	1



F. 3D Image



12. Appendix C. Plots of High SAR Measurement

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1# SAR Measurement at GSM900 (Body, Validation Plane)

Date of measurement: 4/6/2025

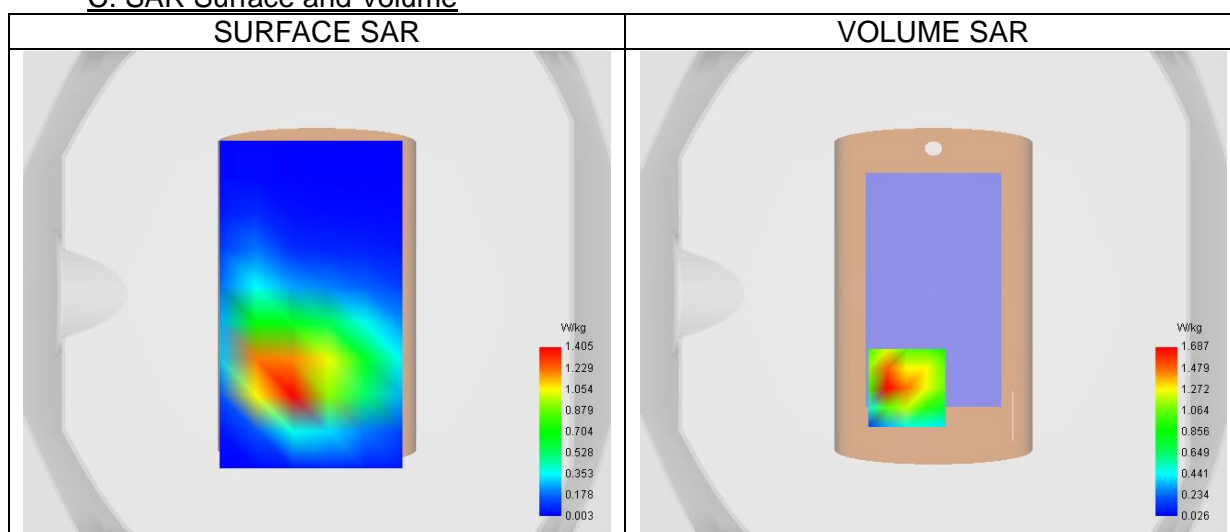
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.33
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GSM900
Signal	TDMA (GSM)
Channels/Frequency	Middle (38)/ frequency 897.60 Mhz
Modulation	GMSK

B. Permittivity

Middle TX Frequency (MHz)	897.60
Relative permittivity (real part)	42.09
Relative permittivity (imaginary part)	19.84
Conductivity (S/m)	0.99

C. SAR Surface and Volume



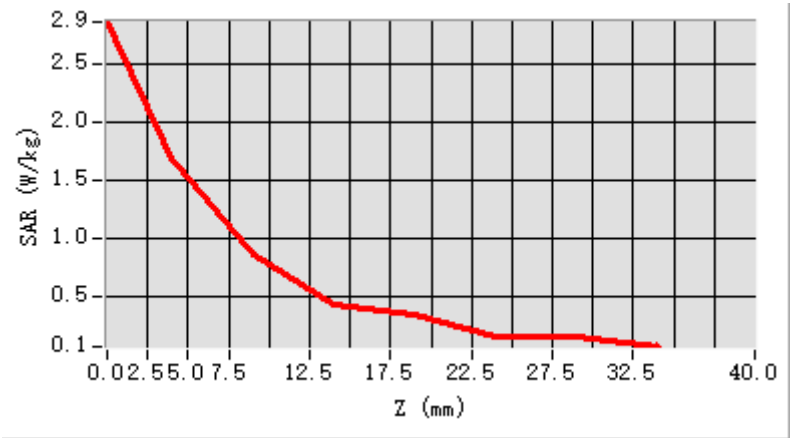
Maximum location: X=-11.00, Y=-39.00 ; SAR Peak: 2.96 W/kg

D. SAR 1g & 10g

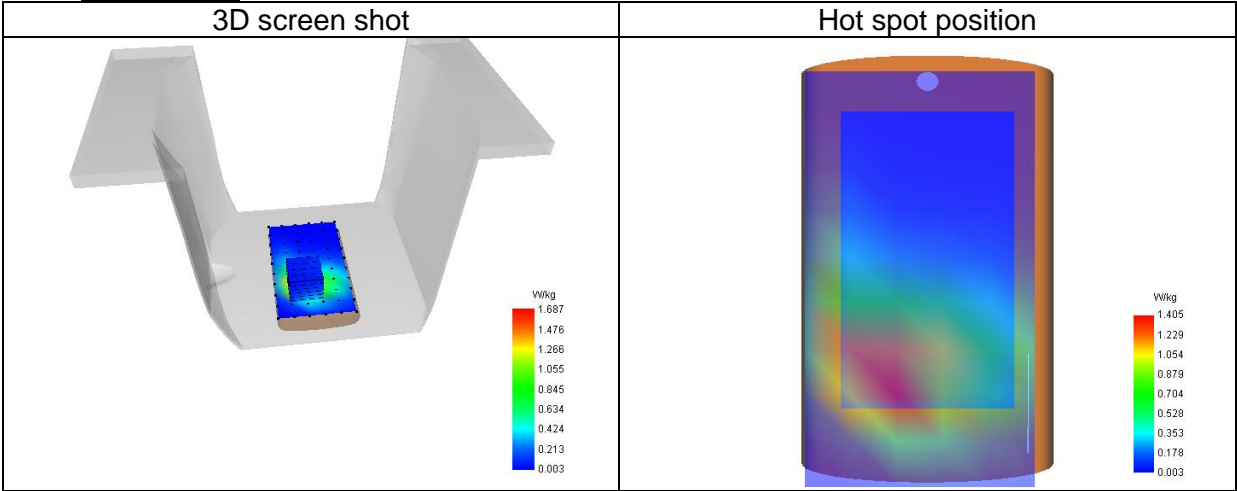
SAR 10g (W/Kg)	0.781
SAR 1g (W/Kg)	1.600
Variation (%)	-2.32
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	50.85

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.868	1.687	0.858	0.420	0.334	0.143	0.143



F. 3D Image



2# SAR Measurement at GSM1800 (Body, Validation Plane)

Date of measurement: 5/6/2025

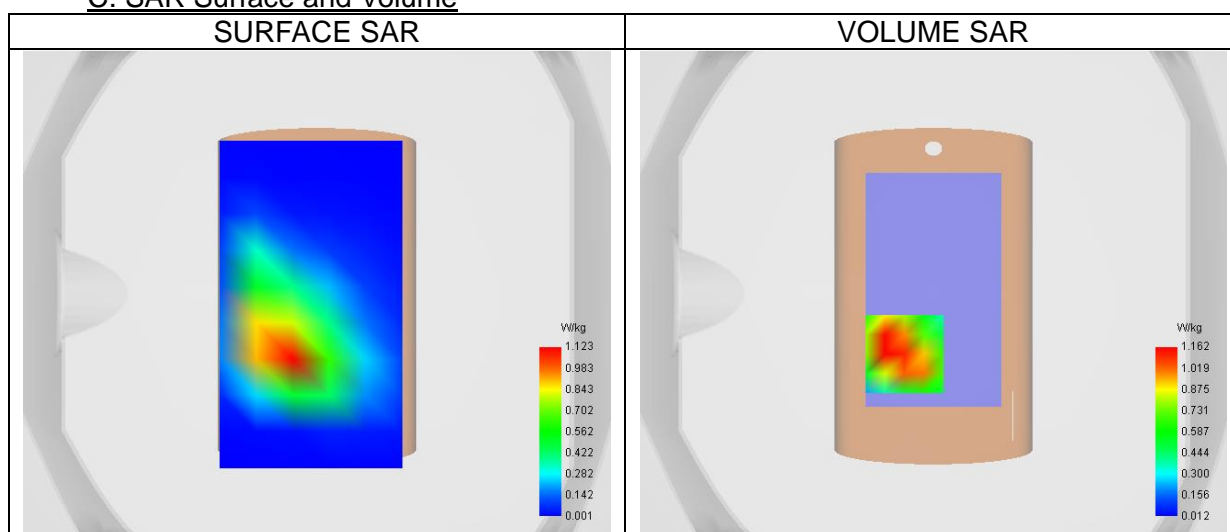
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.50
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	GSM1800
Signal	TDMA (GSM)
Channels/Frequency	Middle (698)/ frequency 1747.40 Mhz
Modulation	GMSK

B. Permittivity

Middle TX Frequency (MHz)	1747.40
Relative permittivity (real part)	39.41
Relative permittivity (imaginary part)	13.97
Conductivity (S/m)	1.36

C. SAR Surface and Volume



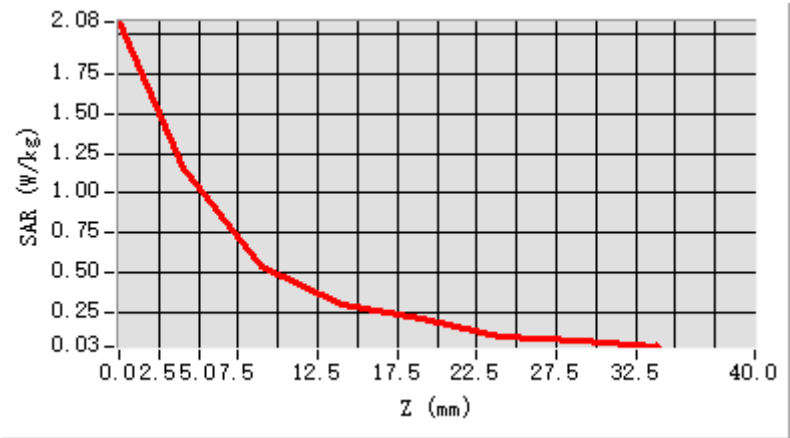
Maximum location: X=-12.00, Y=-25.00 ; SAR Peak: 2.07 W/kg

D. SAR 1g & 10g

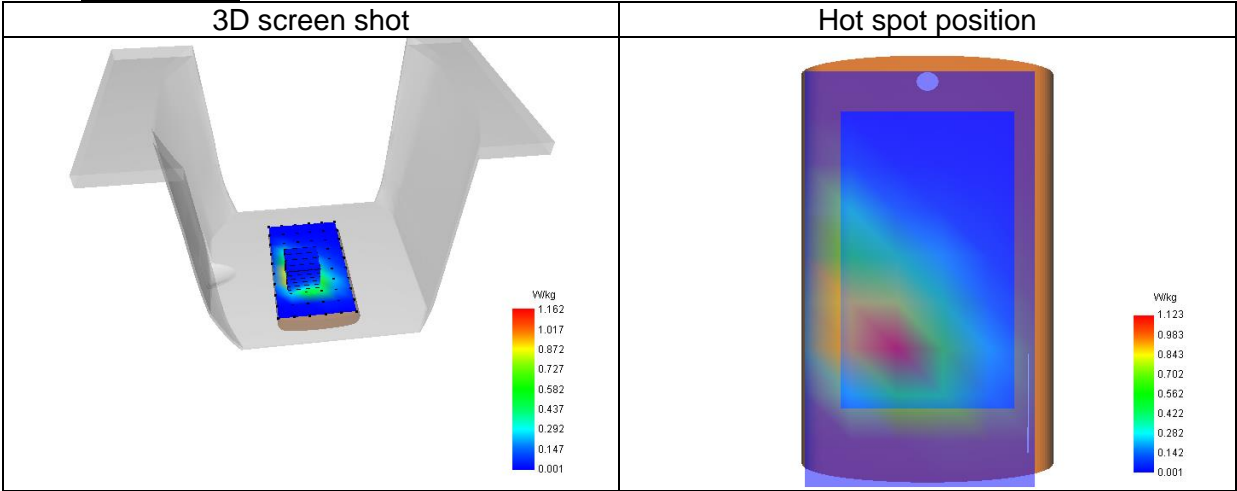
SAR 10g (W/Kg)	0.570
SAR 1g (W/Kg)	1.143
Variation (%)	-3.70
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	52.50

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.081	1.162	0.544	0.297	0.208	0.090	0.074



F. 3D Image



3# SAR Measurement at Band 1 (UMTS) (Body, Validation Plane)

Date of measurement: 11/6/2025

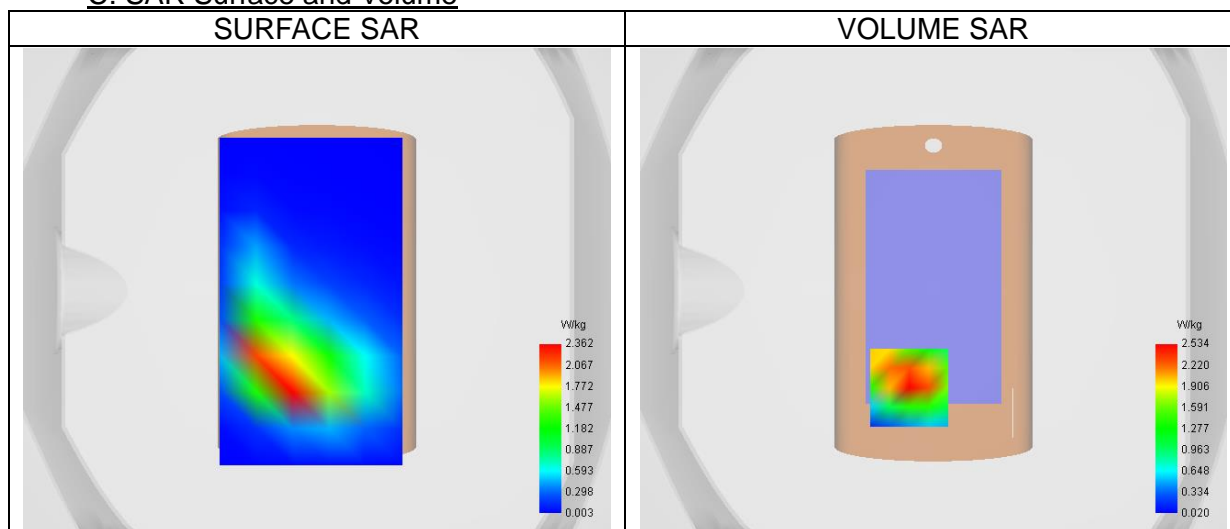
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.58
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Band 1 (UMTS)
Signal	WCDMA
Channels/Frequency	Middle (9750)/ frequency 1950.00 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Middle TX Frequency (MHz)	1950.00
Relative permittivity (real part)	40.49
Relative permittivity (imaginary part)	12.91
Conductivity (S/m)	1.40

C. SAR Surface and Volume



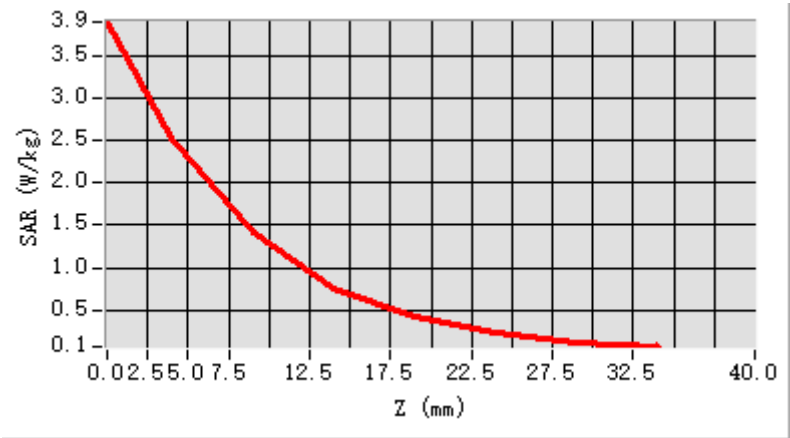
Maximum location: X=-10.00, Y=-40.00 ; SAR Peak: 3.98 W/kg

D. SAR 1g & 10g

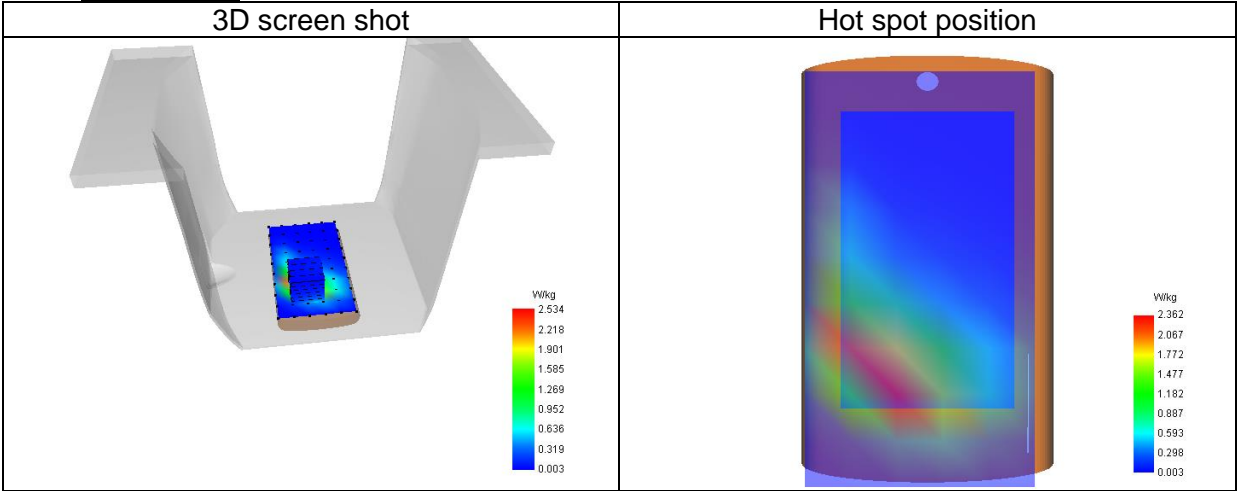
SAR 10g (W/Kg)	1.234
SAR 1g (W/Kg)	2.408
Variation (%)	0.16
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	56.52

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	3.901	2.534	1.422	0.765	0.415	0.223	0.122



F. 3D Image



4# SAR Measurement at Band 8 (900) (Body, Validation Plane)

Date of measurement: 4/6/2025

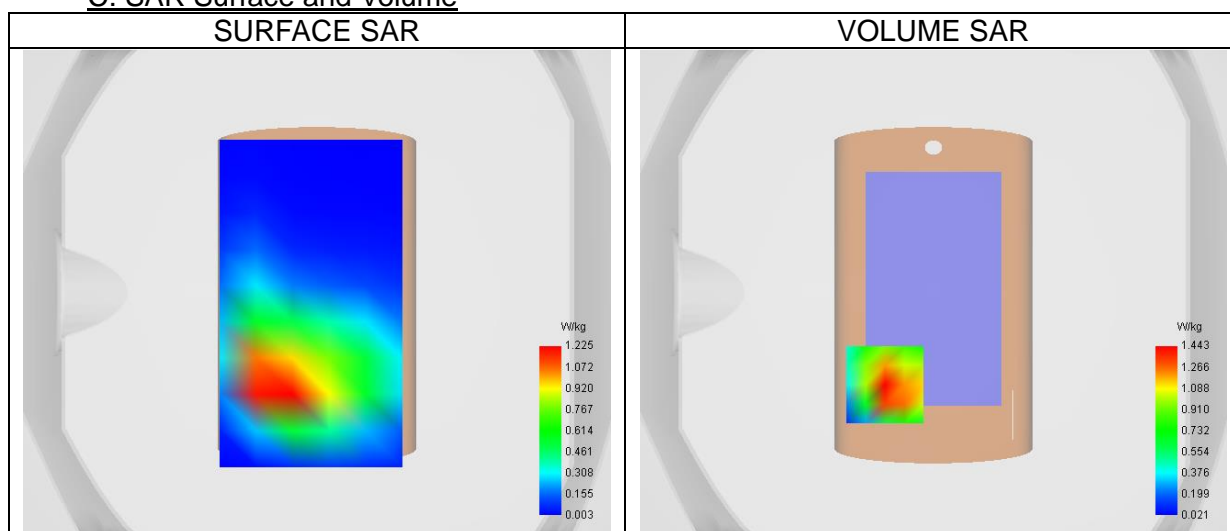
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.33
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	Band 8 (900)
Signal	WCDMA
Channels/Frequency	Middle (2788)/ frequency 897.60 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Middle TX Frequency (MHz)	897.60
Relative permittivity (real part)	42.09
Relative permittivity (imaginary part)	19.84
Conductivity (S/m)	0.99

C. SAR Surface and Volume



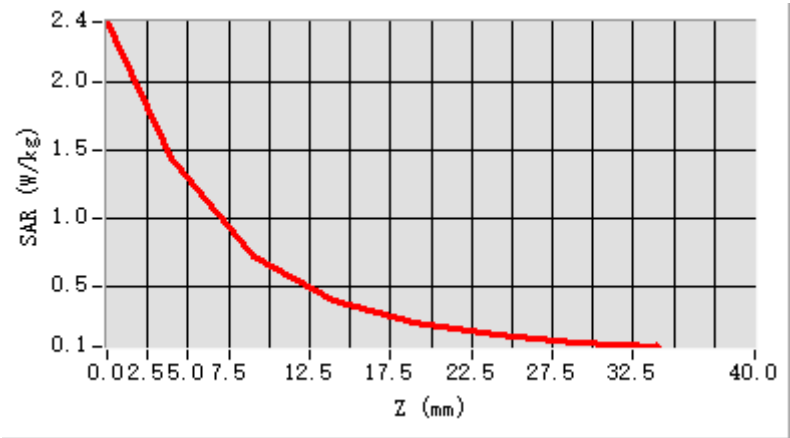
Maximum location: X=-20.00, Y=-38.00 ; SAR Peak: 2.54 W/kg

D. SAR 1g & 10g

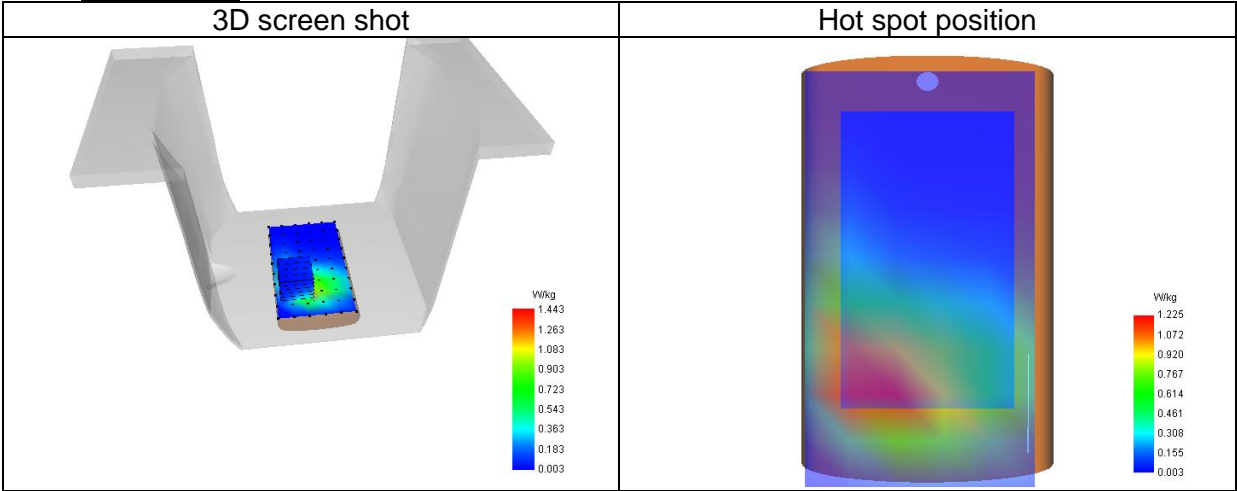
SAR 10g (W/Kg)	0.672
SAR 1g (W/Kg)	1.410
Variation (%)	-0.48
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	53.22

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.441	1.443	0.725	0.395	0.231	0.140	0.088



F. 3D Image



5# SAR Measurement at U-NII-1 (Body, Validation Plane)

Date of measurement: 9/6/2025

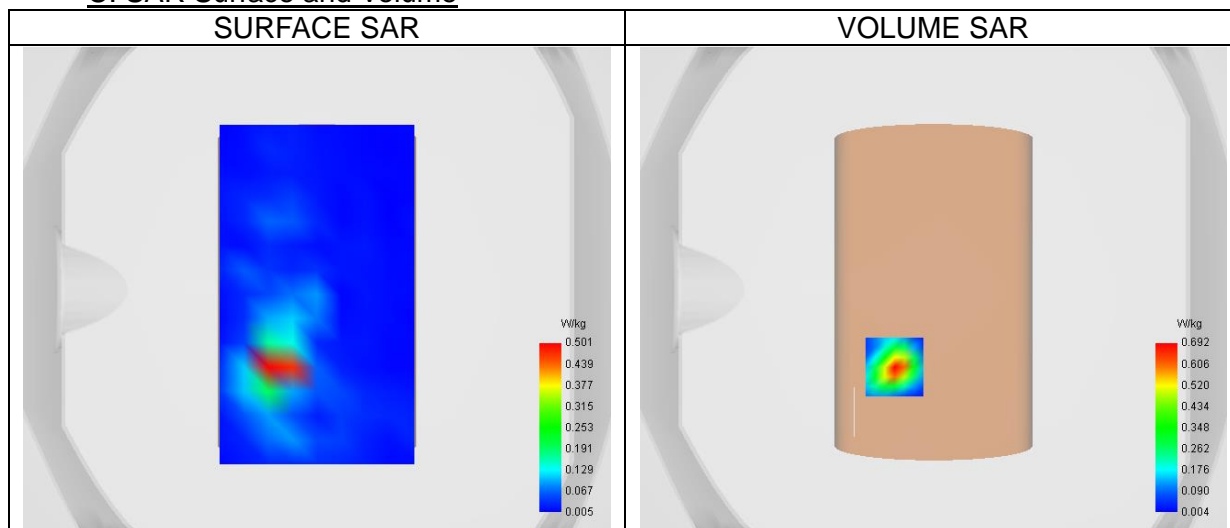
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.37
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-1
Signal	IEEE 802.11 ac
Channels/Frequency	Middle (38)/ frequency 5180.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5180.00
Relative permittivity (real part)	37.54
Relative permittivity (imaginary part)	15.94
Conductivity (S/m)	4.59

C. SAR Surface and Volume



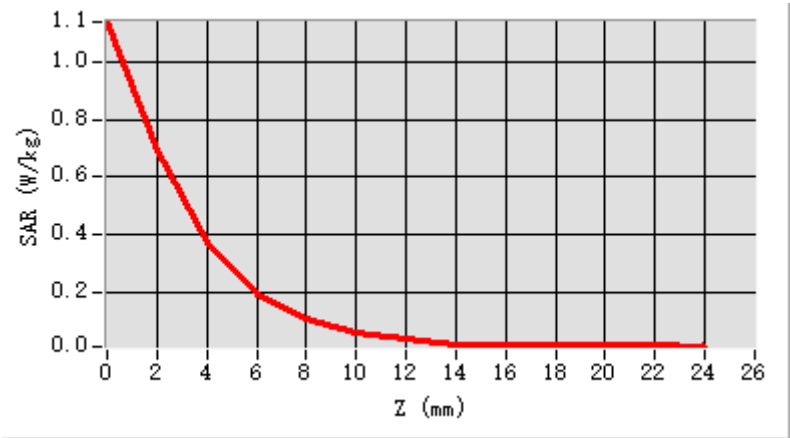
Maximum location: X=-16.00, Y=-32.00 ; SAR Peak: 1.19 W/kg

D. SAR 1g & 10g

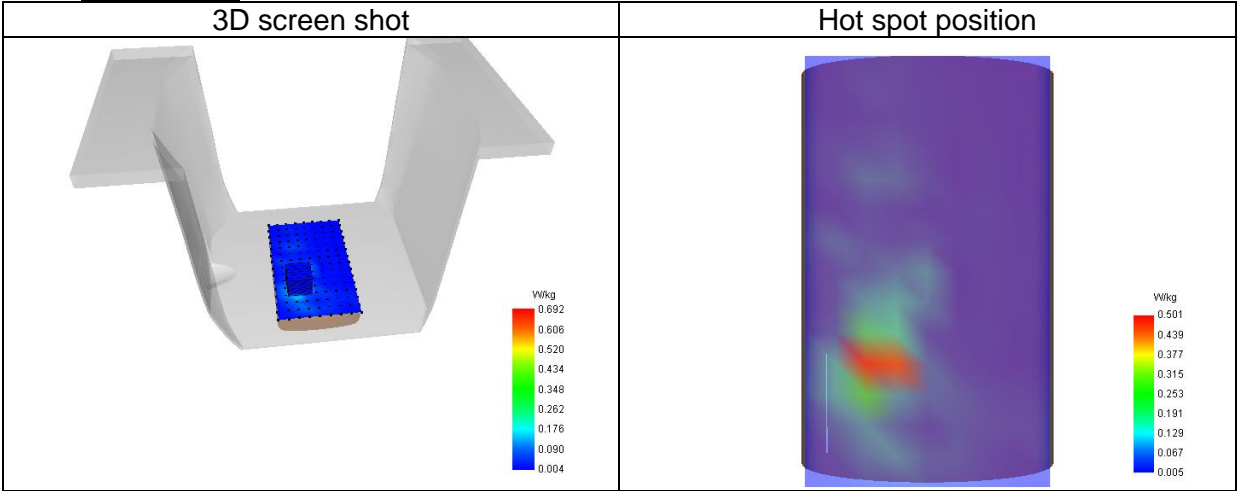
SAR 10g (W/Kg)	0.100
SAR 1g (W/Kg)	0.354
Variation (%)	1.99
Horizontal validation criteria: minimum distance (mm)	5.66
Vertical validation criteria: SAR ratio M2/M1 (%)	54.07

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
						0	0	0	0	0	0	0
SAR (W/Kg)	1.14	0.69	0.37	0.19	0.10	0.06	0.03	0.01	0.01	0.01	0.01	0.01
	2	2	4	1	5	0	7	3	5	3	5	6



F. 3D Image



6# SAR Measurement at U-NII-3 (Body, Validation Plane)

Date of measurement: 10/6/2025

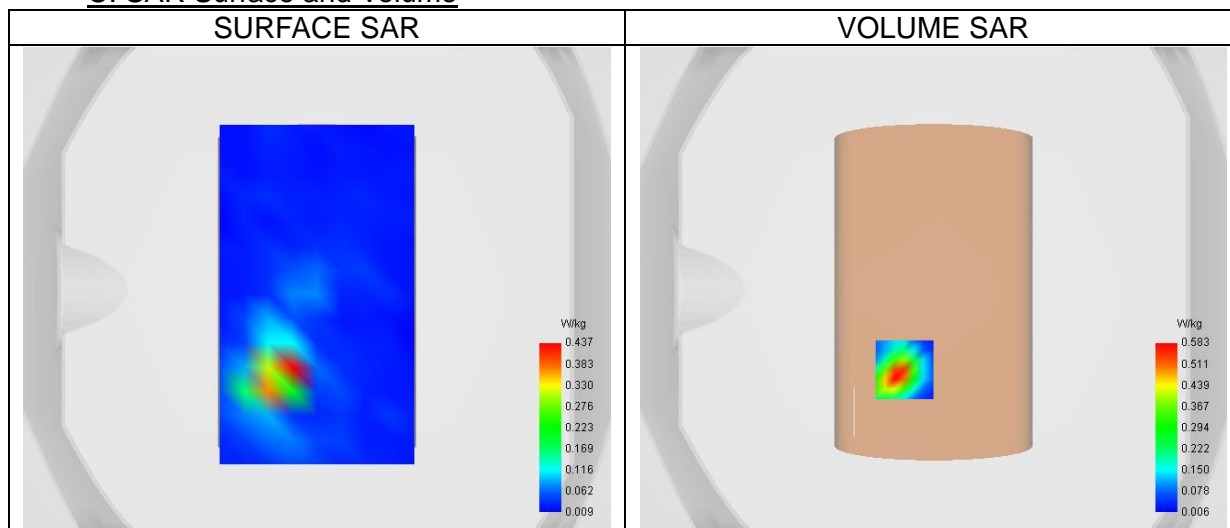
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.35
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-3
Signal	IEEE 802.11 a
Channels/Frequency	Middle (157)/ frequency 5785.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5785.00
Relative permittivity (real part)	36.22
Relative permittivity (imaginary part)	15.93
Conductivity (S/m)	5.12

C. SAR Surface and Volume



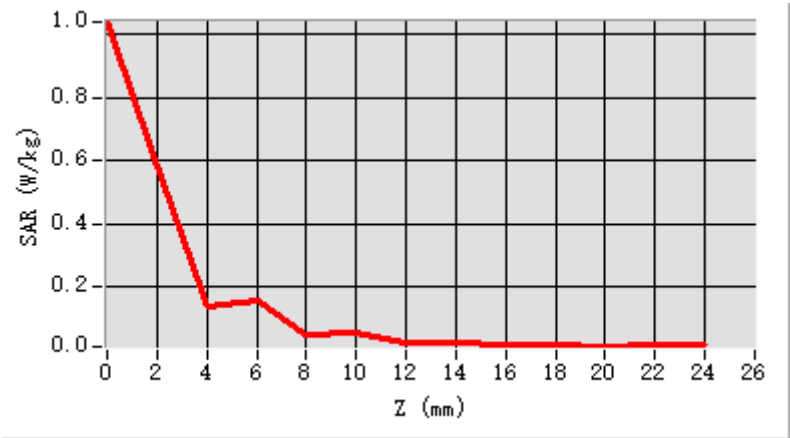
Maximum location: X=-12.00, Y=-33.00 ; SAR Peak: 1.08 W/kg

D. SAR 1g & 10g

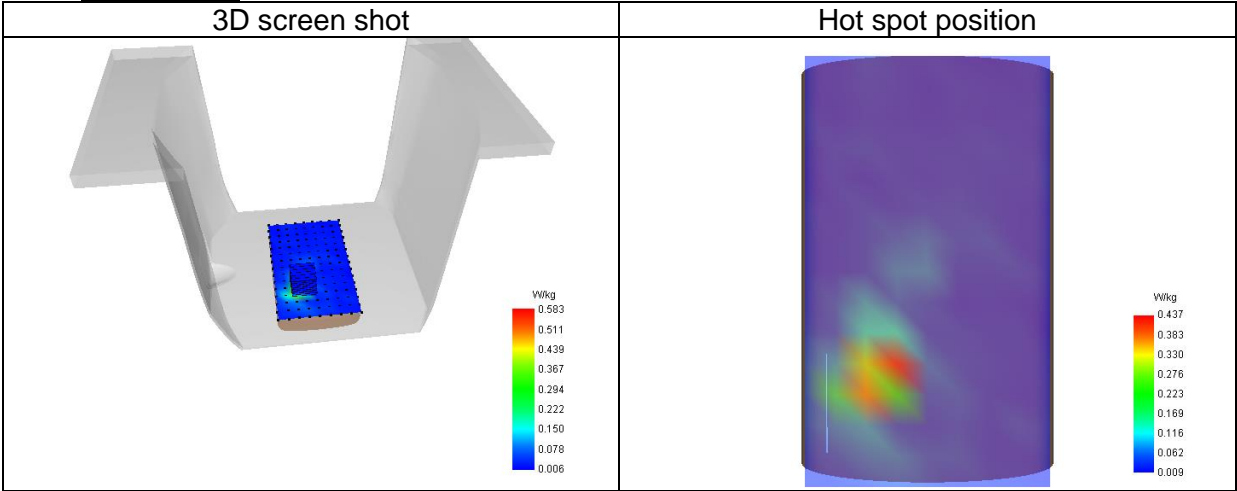
SAR 10g (W/Kg)	0.097
SAR 1g (W/Kg)	0.318
Variation (%)	0.61
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	50.82

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.0	12.0	14.0	16.0	18.0	20.0	22.0
						0	0	0	0	0	0	0
SAR (W/Kg)	1.03	0.58	0.13	0.15	0.05	0.05	0.02	0.02	0.02	0.01	0.01	0.01
	8	3	7	4	0	5	3	6	0	7	0	7



F. 3D Image



7# SAR Measurement at ISM (Body, Validation Plane)

Date of measurement: 7/6/2025

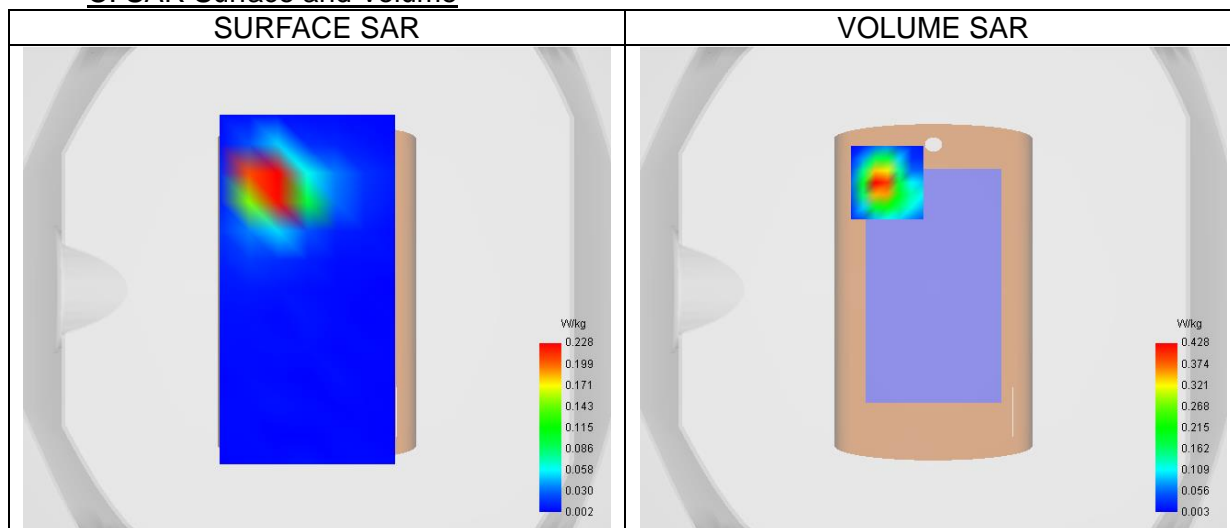
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.63
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (7)/ frequency 2442.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2442.00
Relative permittivity (real part)	38.43
Relative permittivity (imaginary part)	13.41
Conductivity (S/m)	1.82

C. SAR Surface and Volume



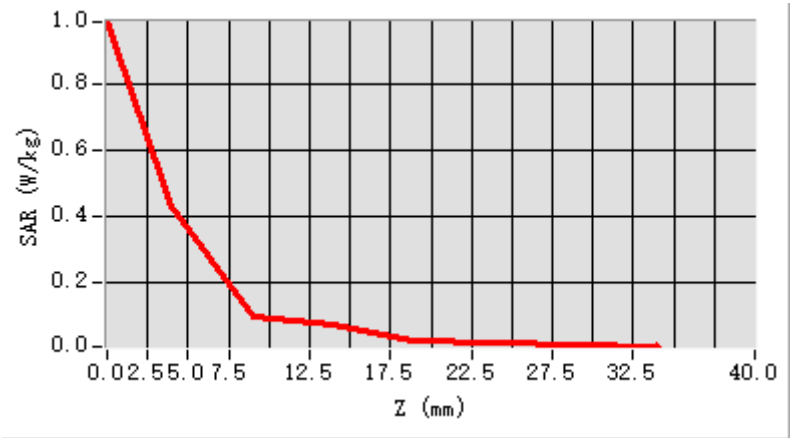
Maximum location: X=-19.00, Y=44.00 ; SAR Peak: 0.86 W/kg

D. SAR 1g & 10g

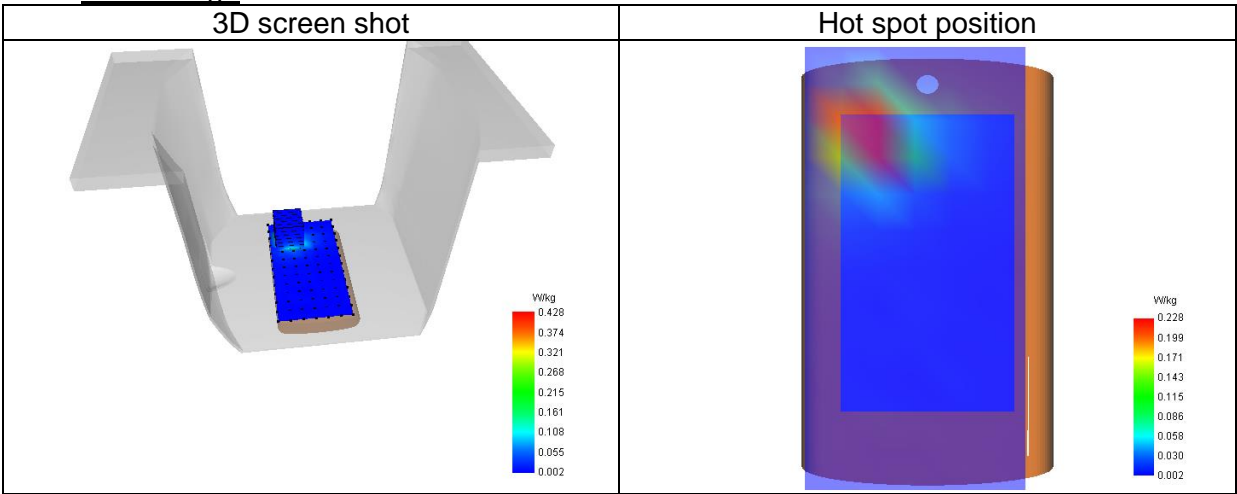
SAR 10g (W/Kg)	0.122
SAR 1g (W/Kg)	0.381
Variation (%)	0.21
Horizontal validation criteria: minimum distance (mm)	5.00
Vertical validation criteria: SAR ratio M2/M1 (%)	40.05

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.985	0.428	0.094	0.072	0.022	0.016	0.007



F. 3D Image



8# SAR Measurement at LTE band 1 (Body, Validation Plane)

Date of measurement: 11/6/2025

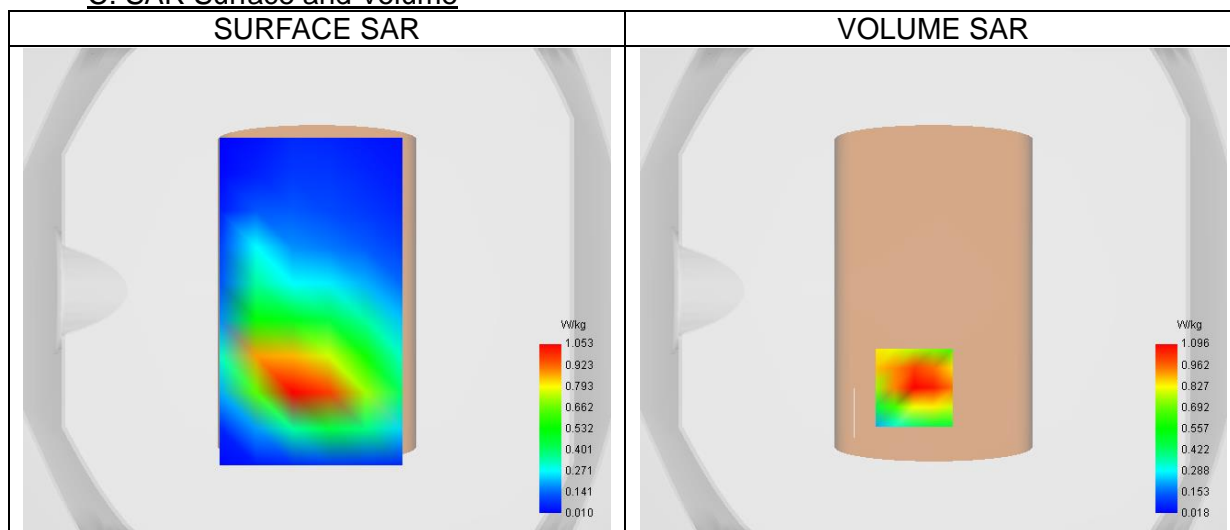
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.58
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 1
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (18300)/ frequency 1950.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1950.00

B. Permittivity

Middle TX Frequency (MHz)	1950.00
Relative permittivity (real part)	40.49
Relative permittivity (imaginary part)	12.91
Conductivity (S/m)	1.40

C. SAR Surface and Volume



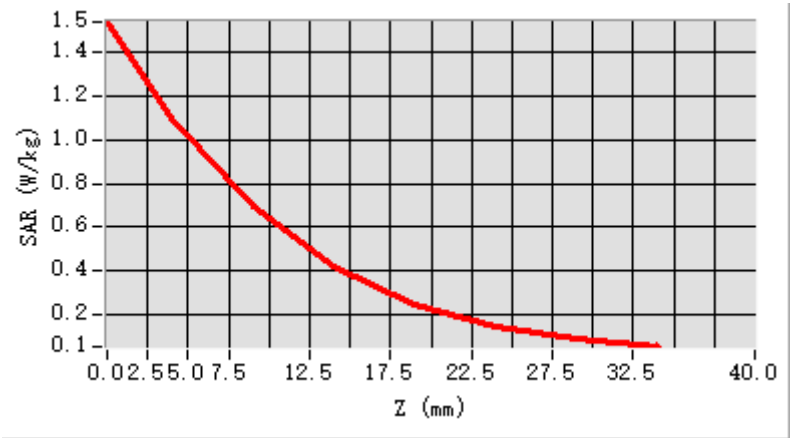
Maximum location: X=-8.00, Y=-40.00 ; SAR Peak: 1.55 W/kg

D. SAR 1g & 10g

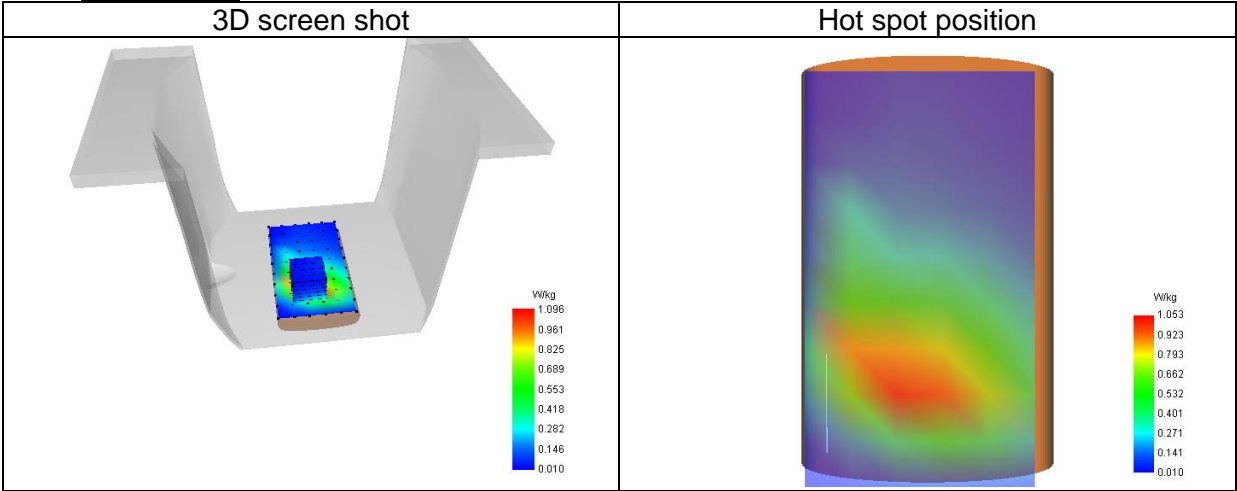
SAR 10g (W/Kg)	0.609
SAR 1g (W/Kg)	1.041
Variation (%)	-1.12
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	63.66

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.540	1.096	0.694	0.419	0.248	0.148	0.087



F. 3D Image



9# SAR Measurement at LTE band 3 (Body, Validation Plane)

Date of measurement: 5/6/2025

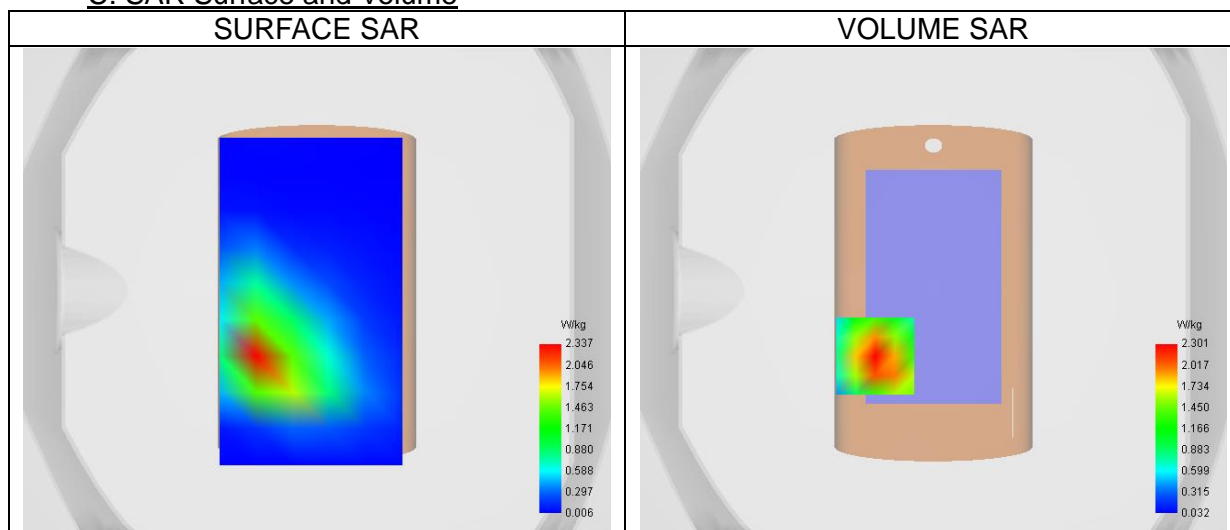
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.50
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 3
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (19575)/ frequency 1747.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1747.50

B. Permittivity

Middle TX Frequency (MHz)	1747.50
Relative permittivity (real part)	39.41
Relative permittivity (imaginary part)	13.98
Conductivity (S/m)	1.36

C. SAR Surface and Volume



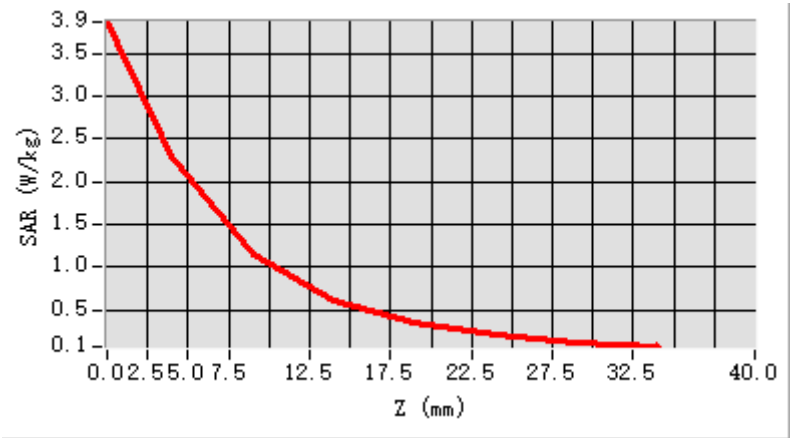
Maximum location: X=-24.00, Y=-27.00 ; SAR Peak: 3.85 W/kg

D. SAR 1g & 10g

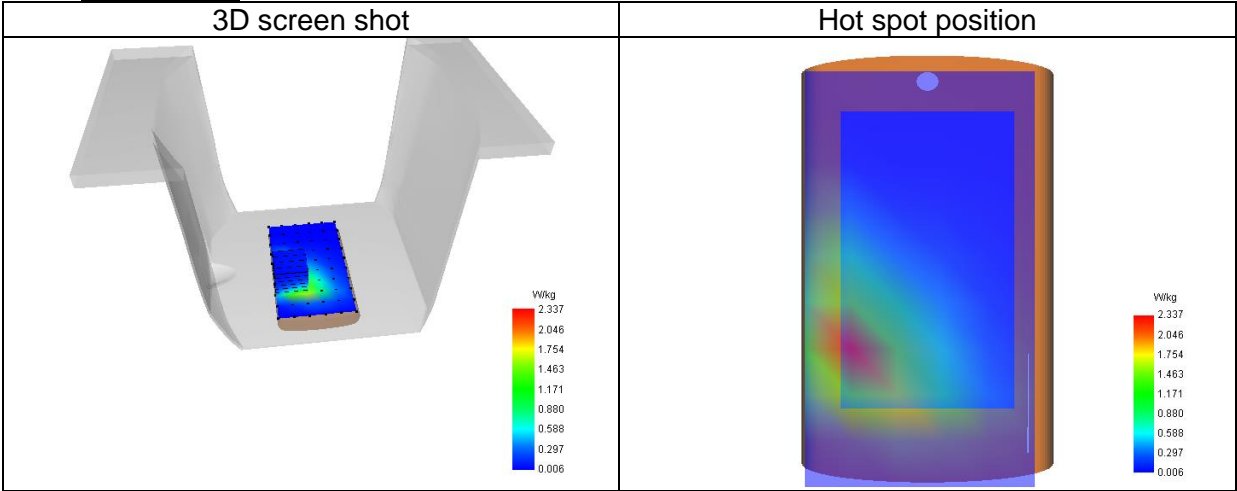
SAR 10g (W/Kg)	1.070
SAR 1g (W/Kg)	2.194
Variation (%)	0.20
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	50.16

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	3.872	2.301	1.154	0.617	0.340	0.199	0.115



F. 3D Image



10# SAR Measurement at LTE band 7 (Body, Validation Plane)

Date of measurement: 8/6/2025

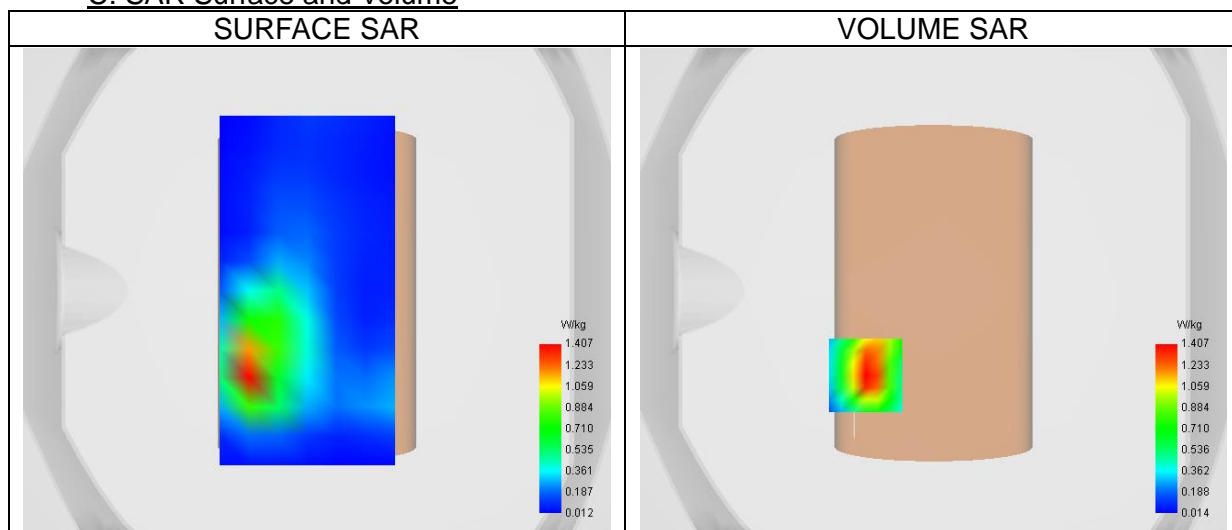
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.52
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 7
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (21100)/ frequency 2535.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2535.00

B. Permittivity

Middle TX Frequency (MHz)	2535.00
Relative permittivity (real part)	39.74
Relative permittivity (imaginary part)	13.38
Conductivity (S/m)	1.88

C. SAR Surface and Volume



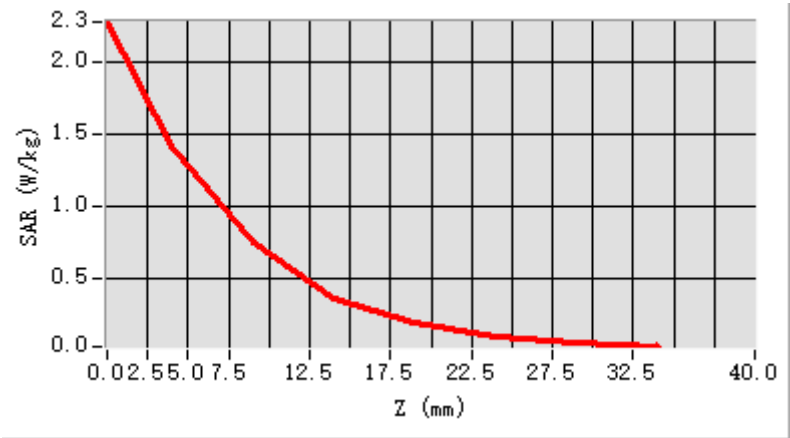
Maximum location: X=-28.00, Y=-35.00 ; SAR Peak: 2.31 W/kg

D. SAR 1g & 10g

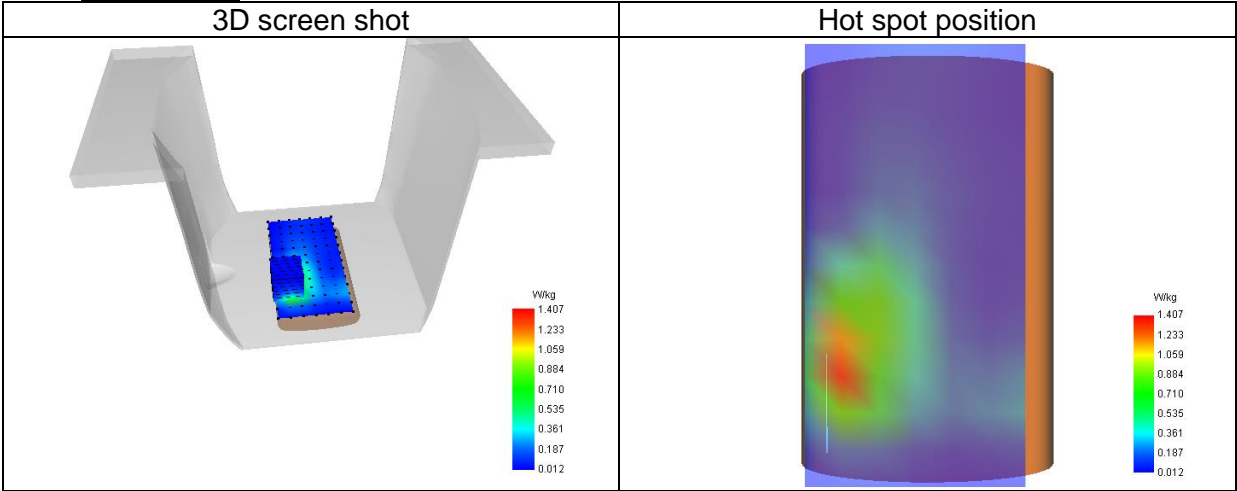
SAR 10g (W/Kg)	0.605
SAR 1g (W/Kg)	1.286
Variation (%)	-0.11
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	52.86

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.273	1.407	0.744	0.359	0.199	0.099	0.050



F. 3D Image



11# SAR Measurement at LTE band 8 (Body, Validation Plane)

Date of measurement: 4/6/2025

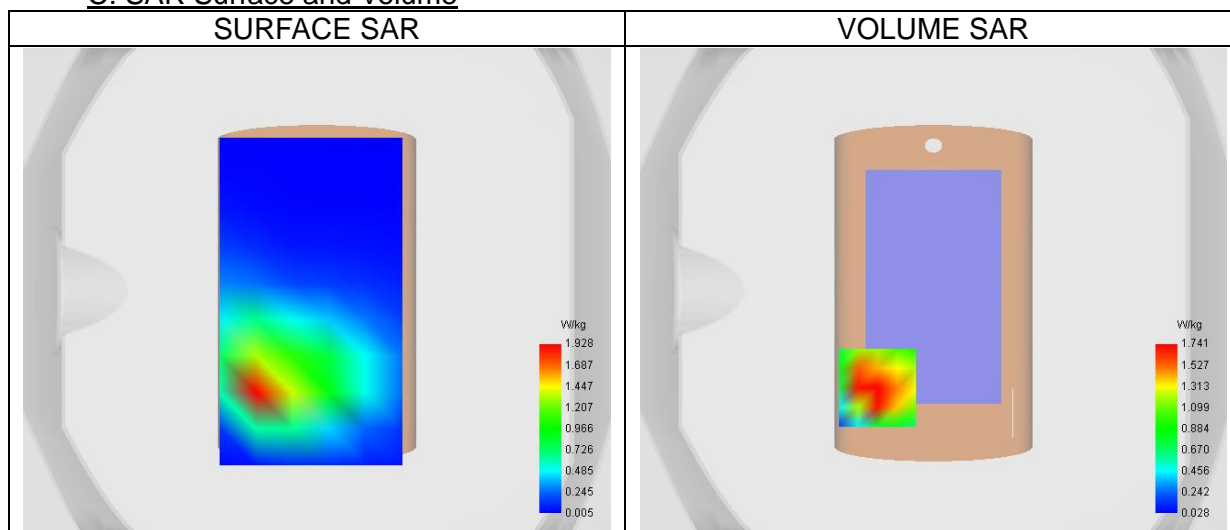
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.33
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 8
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (21625)/ frequency 897.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	897.50

B. Permittivity

Middle TX Frequency (MHz)	897.50
Relative permittivity (real part)	42.09
Relative permittivity (imaginary part)	19.83
Conductivity (S/m)	0.99

C. SAR Surface and Volume



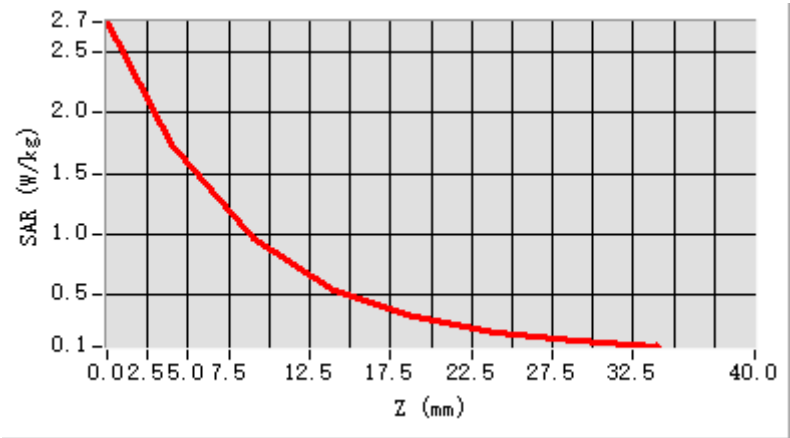
Maximum location: X=-23.00, Y=-40.00 ; SAR Peak: 3.18 W/kg

D. SAR 1g & 10g

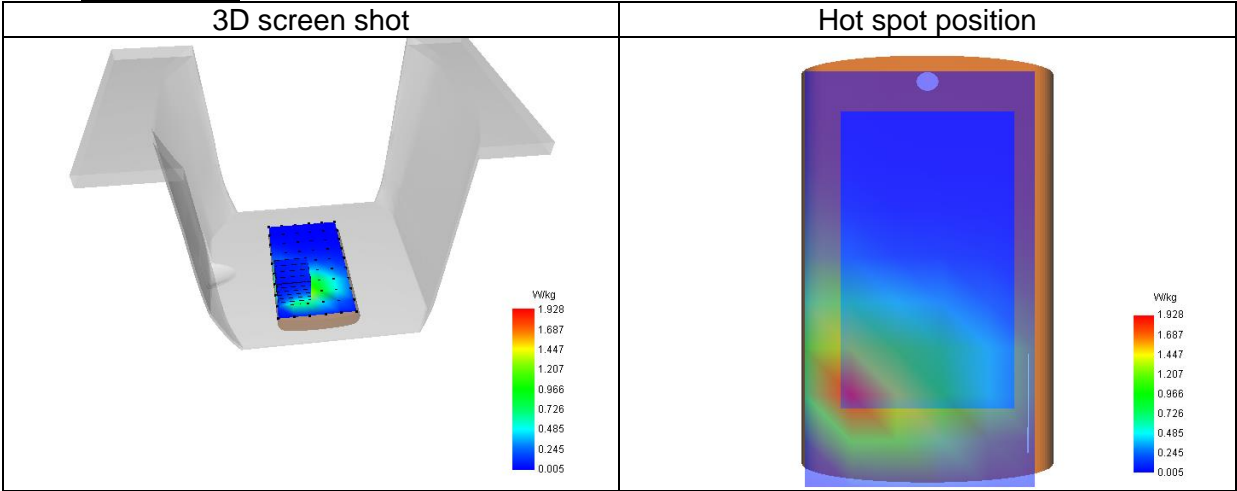
SAR 10g (W/Kg)	0.873
SAR 1g (W/Kg)	1.792
Variation (%)	-1.62
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	55.65

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.747	1.741	0.962	0.542	0.319	0.196	0.123



F. 3D Image



12# SAR Measurement at LTE band 20 (Body, Validation Plane)

Date of measurement: 4/6/2025

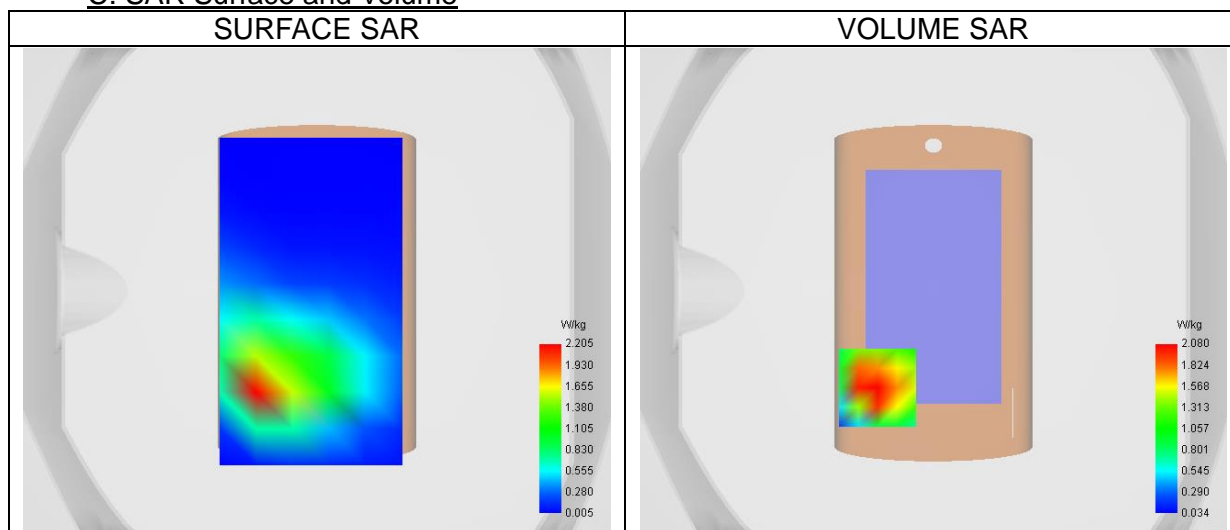
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.32
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 20
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (24300)/ frequency 847.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	847.00

B. Permittivity

Middle TX Frequency (MHz)	847.00
Relative permittivity (real part)	42.72
Relative permittivity (imaginary part)	19.59
Conductivity (S/m)	0.92

C. SAR Surface and Volume



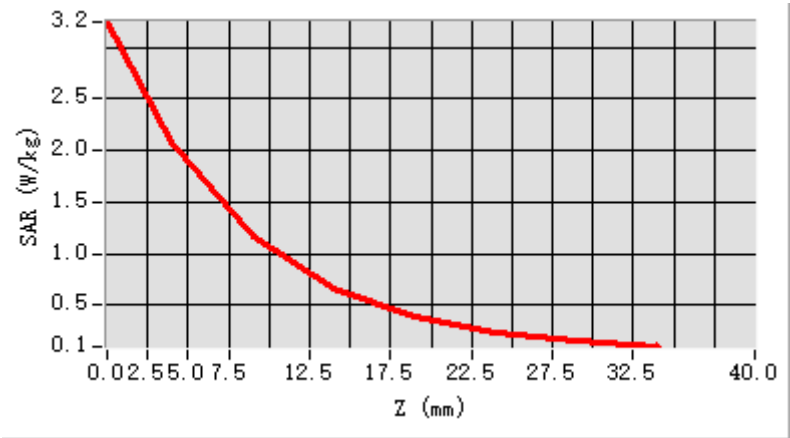
Maximum location: X=-23.00, Y=-40.00 ; SAR Peak: 3.71 W/kg

D. SAR 1g & 10g

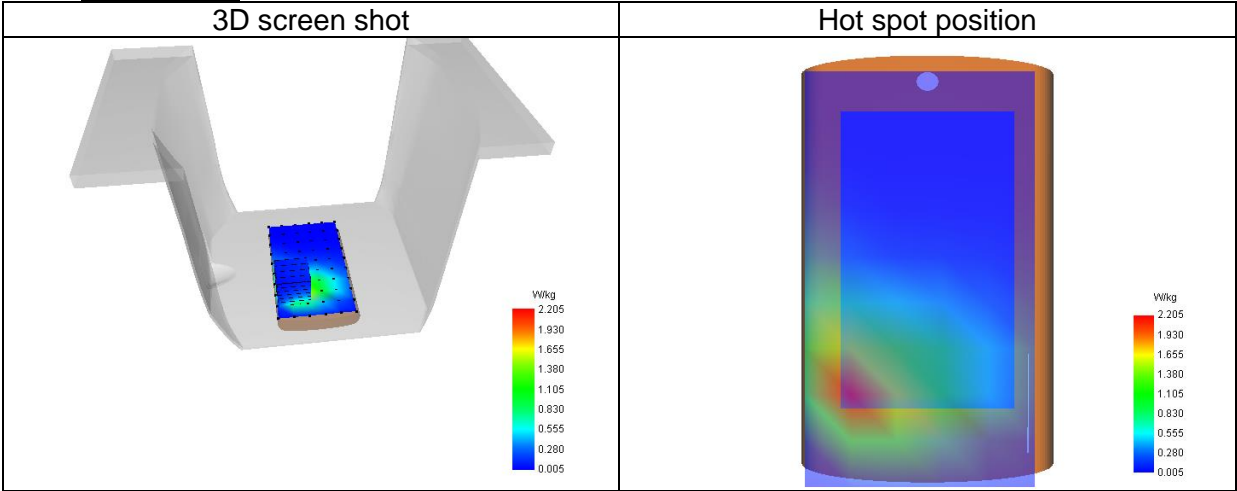
SAR 10g (W/Kg)	1.038
SAR 1g (W/Kg)	2.082
Variation (%)	-0.31
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	56.07

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	3.248	2.080	1.166	0.655	0.389	0.238	0.149



F. 3D Image



13# SAR Measurement at LTE band 28 (Body, Validation Plane)

Date of measurement: 3/6/2025

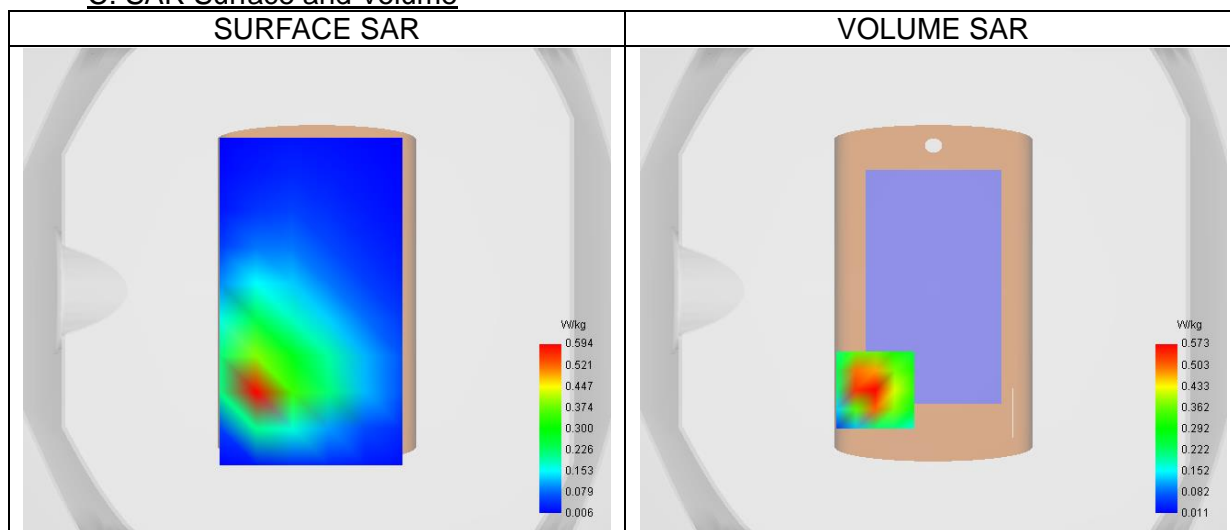
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.39
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 28
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (27460)/ frequency 728.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	728.00

B. Permittivity

Middle TX Frequency (MHz)	728.00
Relative permittivity (real part)	41.18
Relative permittivity (imaginary part)	21.44
Conductivity (S/m)	0.87

C. SAR Surface and Volume



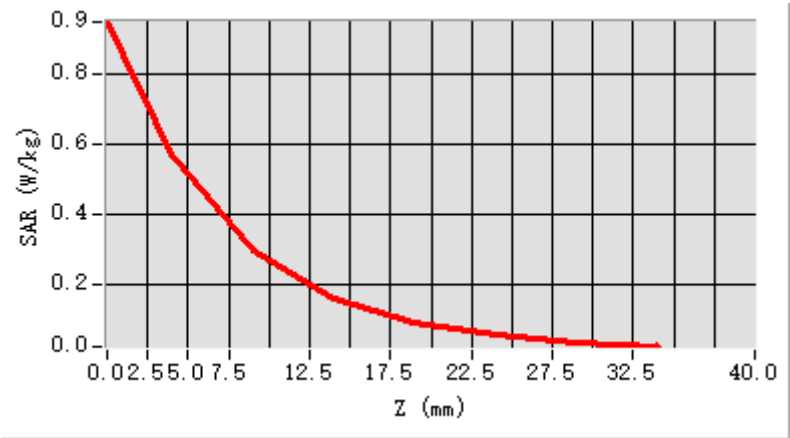
Maximum location: X=-24.00, Y=-41.00 ; SAR Peak: 1.05 W/kg

D. SAR 1g & 10g

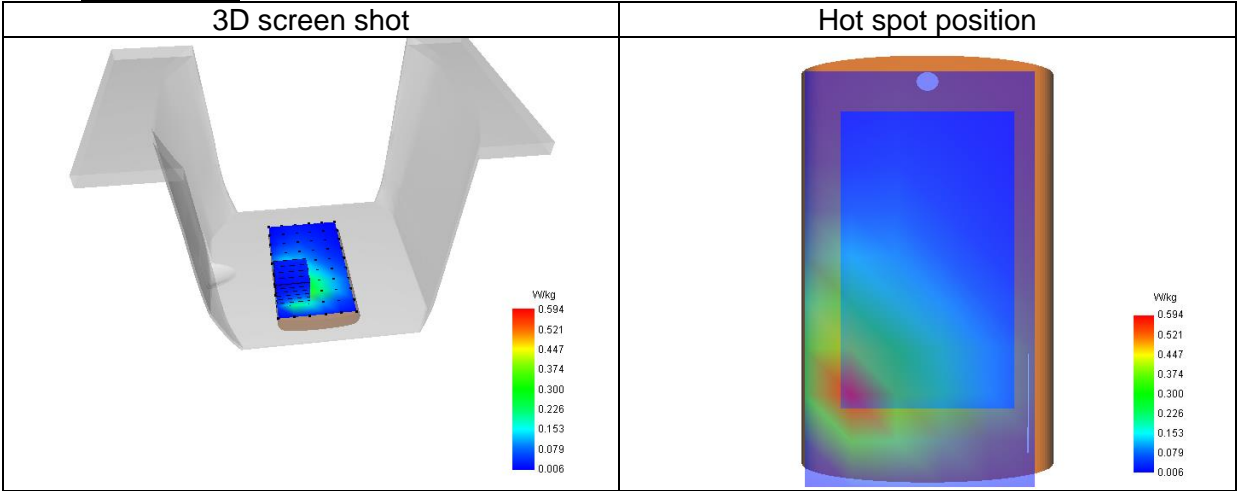
SAR 10g (W/Kg)	0.273
SAR 1g (W/Kg)	0.568
Variation (%)	0.72
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	52.09

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.946	0.573	0.299	0.162	0.097	0.060	0.039



F. 3D Image



14# SAR Measurement at LTE band 40 (Body, Validation Plane)

Date of measurement: 12/6/2025

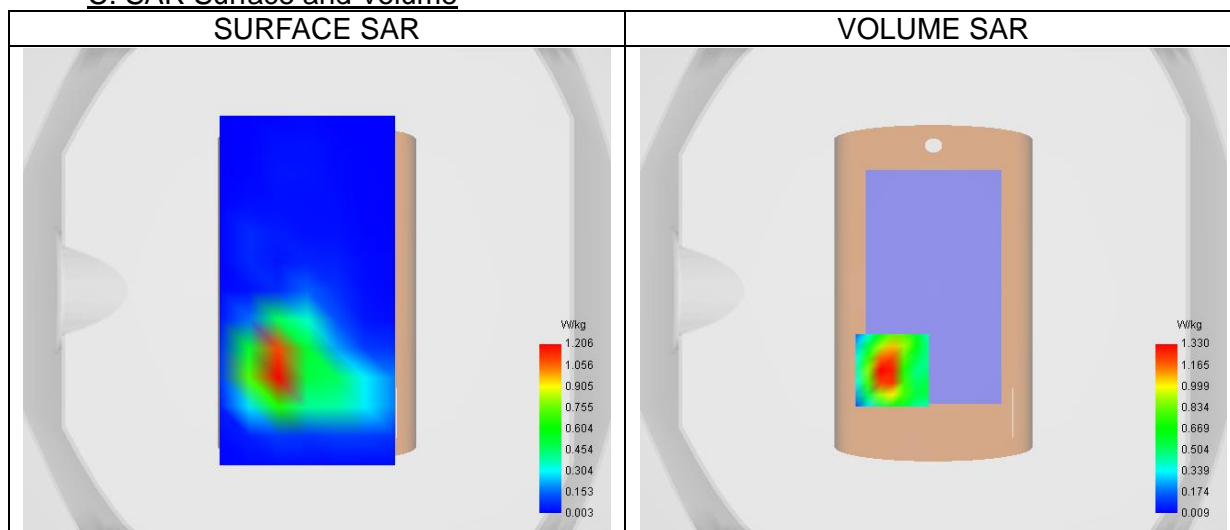
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.64
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	LTE band 40
Signal	LTE TDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (39150)/ frequency 2350.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2350.00

B. Permittivity

Middle TX Frequency (MHz)	2350.00
Relative permittivity (real part)	40.01
Relative permittivity (imaginary part)	13.03
Conductivity (S/m)	1.70

C. SAR Surface and Volume



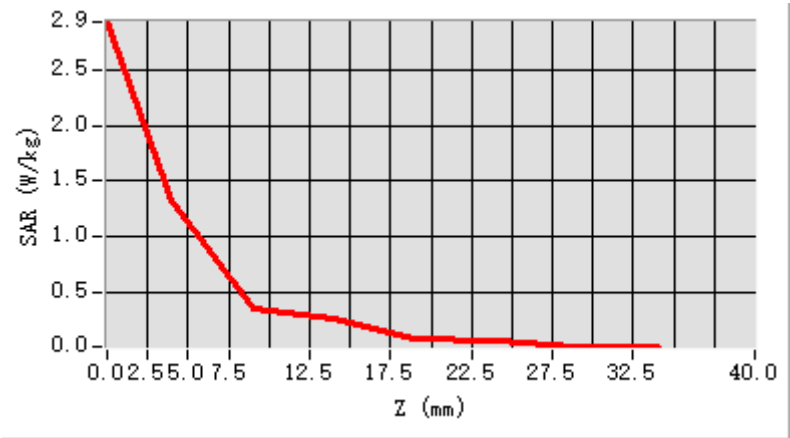
Maximum location: X=-17.00, Y=-33.00 ; SAR Peak: 2.50 W/kg

D. SAR 1g & 10g

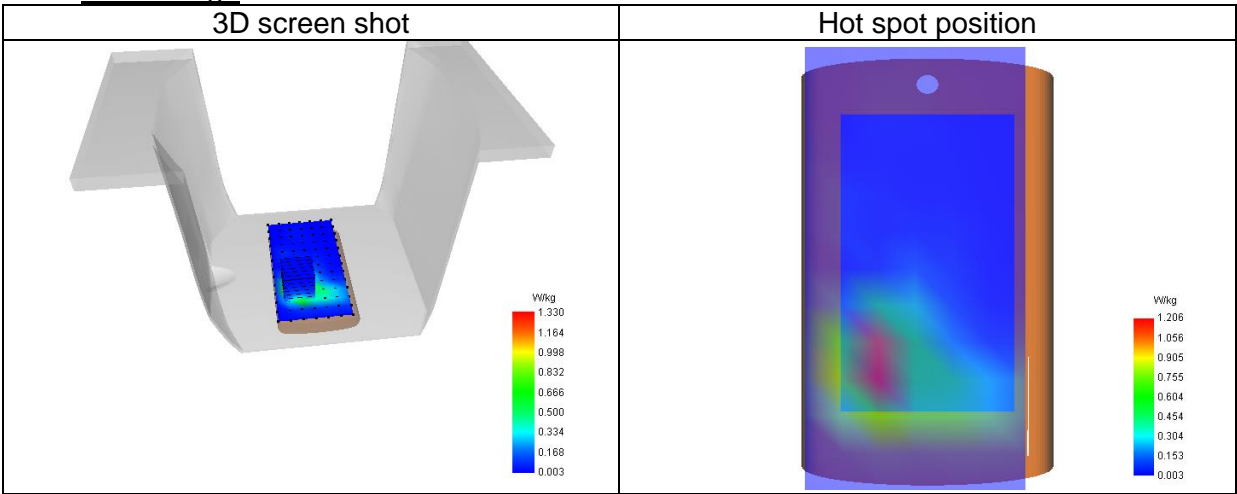
SAR 10g (W/Kg)	0.510
SAR 1g (W/Kg)	1.237
Variation (%)	-0.50
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	45.39

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.924	1.330	0.352	0.277	0.086	0.064	0.024



F. 3D Image



13. Appendix D. Calibration Certificate

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E Field Probe - 0725-EPGO-448
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
5000-6000 MHz Dipole - SN 13/14 WGA 33

Docusign Envelope ID: 8D8CB647-C2B4-4414-A550-C6E3F74EB7AD



COMOSAR E-Field Probe Calibration Report

Ref : ACR.108.1.25.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.: 0725-EPGO-448

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 04/15/2025



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).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.108.1.25.BES.A

	<i>Name</i>	<i>Function</i>	<i>Date</i>	<i>Signature</i>
<i>Prepared by :</i>	Pedro Ruiz	Technical Manager	4/18/2025	
<i>Checked & approved by:</i>	Pedro Ruiz	Technical Manager	4/18/2025	
<i>Authorized by:</i>	Kim Rutkowski	Quality Manager	4/23/2025	<div> <div>Signed by:</div> <div>Kimberly ROTKOWSKI</div> <div>2B88B547AD17437...</div> </div>

	<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	Pedro Ruiz	4/18/2025	Initial release

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.108.1.25.BES.A

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.108.1.25.BES.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	0725-EPGO-448
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.191 MΩ Dipole 2: R2=0.212 MΩ Dipole 3: R3=0.208 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.

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.108.1.25.BES.A

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 0.01W/kg to 100W/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:

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

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%).

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

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3.5 PROBE MODULATION RESPONSE

MVG's probe were evaluated experimentally with various modulated signal and the deviation from CW response were found neglectable in the used power range of the probe. So the correction to taking into account the linearization parameters for different modulation is null, therefore the CW factor given in this report can be used whatever the measured modulation

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.

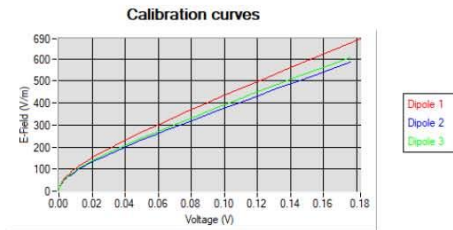
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

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.

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

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Ref: ACR.108.1.25.BES.A

where

V_i =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

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
1.03	1.37	1.26

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
109	107	108

5.2 CALIBRATION IN LIQUID

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

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

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

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

where

σ =the conductivity of the liquid

ρ =the volumetric density of the liquid

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

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

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

where

c =the specific heat for the liquid

dT/dt =the temperature rises over the time

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

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

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

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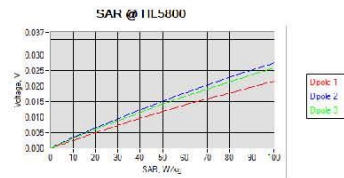
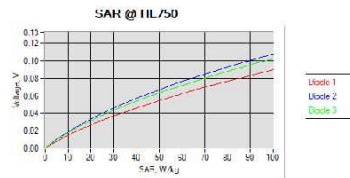
where

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

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	1.39
HL850	850	1.32
HL900	900	1.33
HL1800	1800	1.50
HL1900	1900	1.58
HL2000	2000	1.63
HL2300	2300	1.64
HL2450	2450	1.63
HL2600	2600	1.52
HL3300	3300	1.36
HL3500	3500	1.39
HL3700	3700	1.35
HL3900	3900	1.41
HL4200	4200	1.58
HL4600	4600	1.61
HL4900	4900	1.38
HL5200	5200	1.37
HL5400	5400	1.37
HL5600	5600	1.36
HL5800	5800	1.35

(*) Frequency validity is ± 50 MHz below 600MHz, ± 100 MHz from 600MHz to 6GHz and ± 700 MHz 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.

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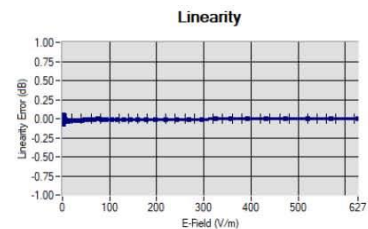
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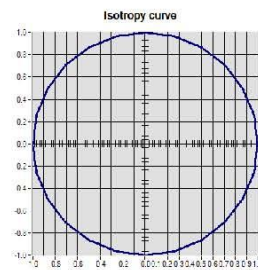


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.108.1.25.BES.A



Linearity: $\pm 1.54\%$ ($\pm 0.07\text{dB}$)



Isotropy: $\pm 0.18\%$ ($\pm 0.01\text{dB}$)

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

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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	08/2026
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2027
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	183277	05/2022	05/2026
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	06/2026
USB Sensor	Keysight U2000A	SN: MY62340002	10/2024	10/2027
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.
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.

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Ref: ACR.108.1.25.BES.A

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	44235403	02/2024	02/2027



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



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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	

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Toutain ID

Signature
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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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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 03/15DIP0G750-355
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



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.



SAR REFERENCE DIPOLE CALIBRATION REPORT

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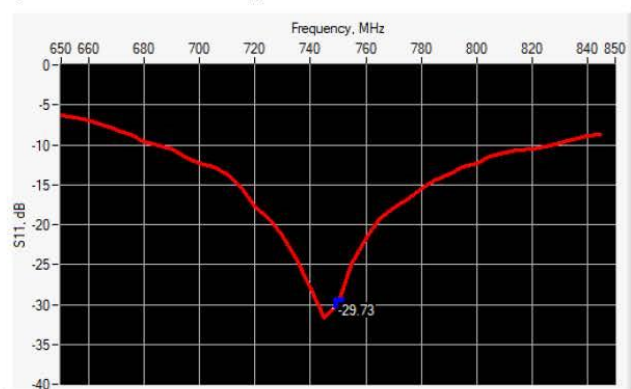
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	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.

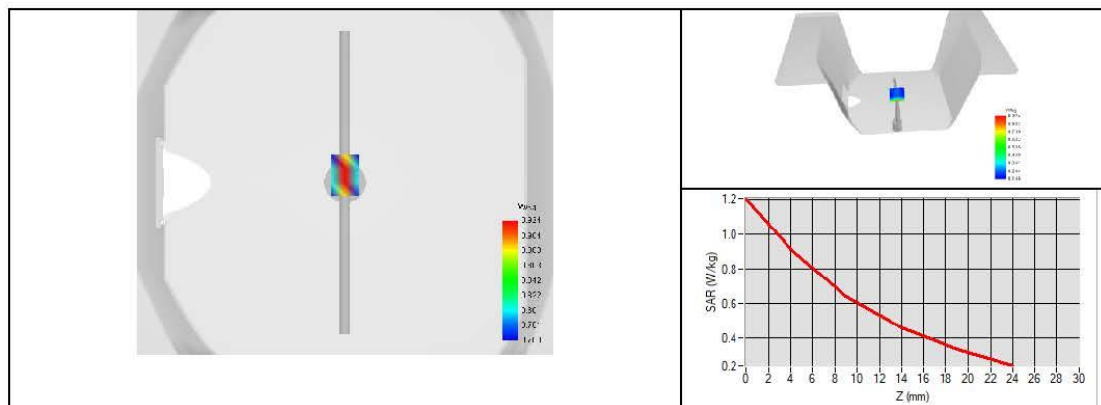


SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 45.0 σ : 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
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.53.25.24.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

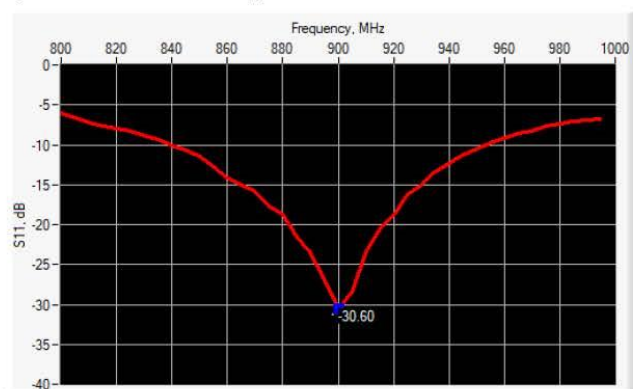
6 CALIBRATION RESULTS

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.

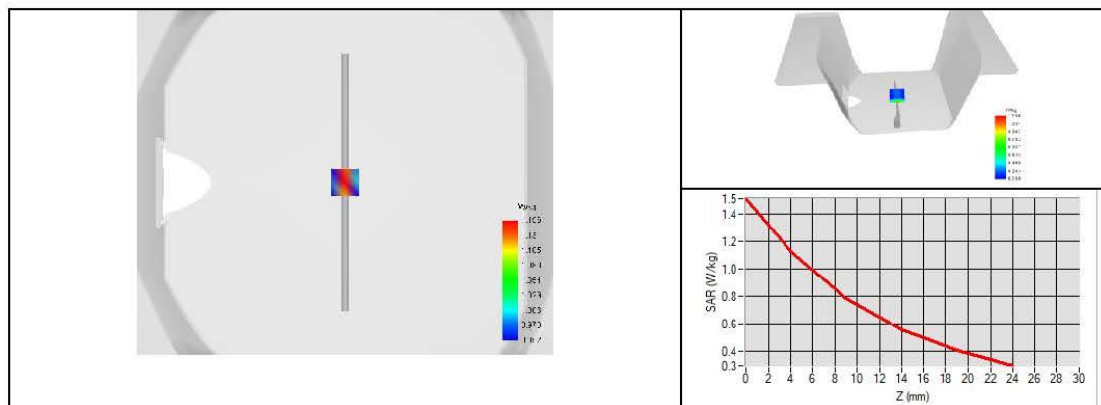


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.25.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 44.6 σ : 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

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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 ID

Signature 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.53.2624.BES.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.2624.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.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.26.24.BES.A

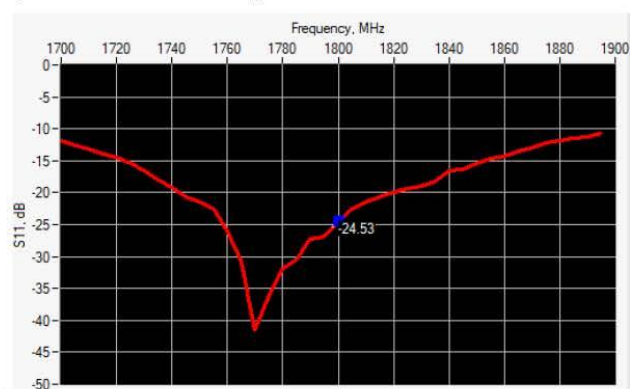
6 CALIBRATION RESULTS

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	$44.8\Omega + 2.0j\Omega$

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.

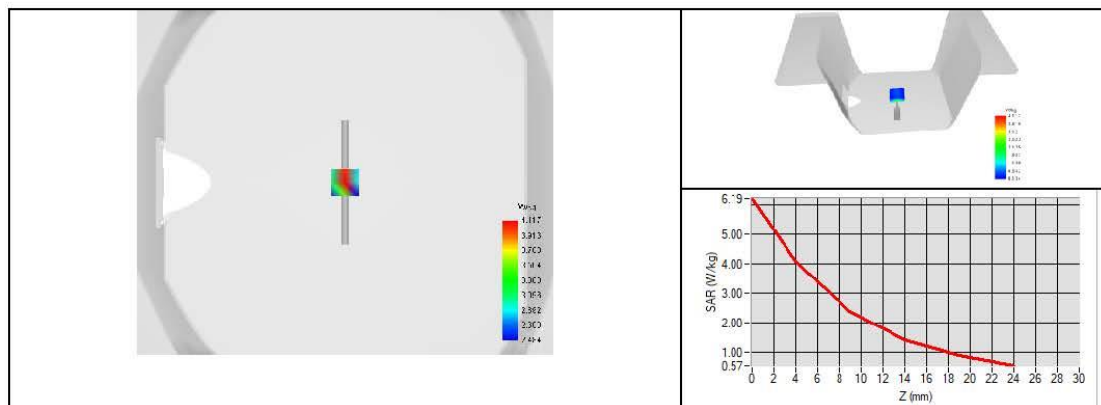


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.26.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p' : 42.7 σ : 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.53.2624.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

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**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
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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.53.28.24.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 ID

Signature numérique
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Date : 2024.02.27
08:57:13 +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.53.28.24.BES.A

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5	Measurement Uncertainty	5
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5.2	S11 Parameter	5
5.3	SAR	5
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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

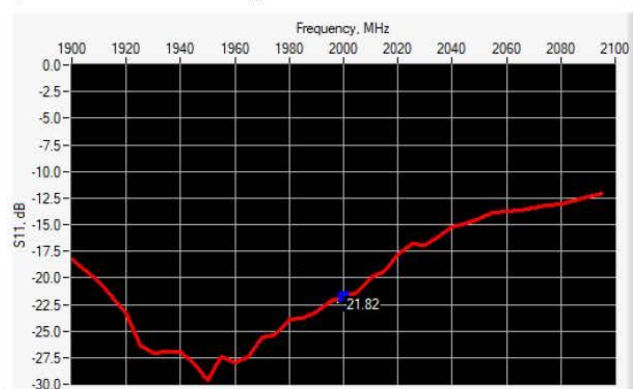
6 CALIBRATION RESULTS

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.

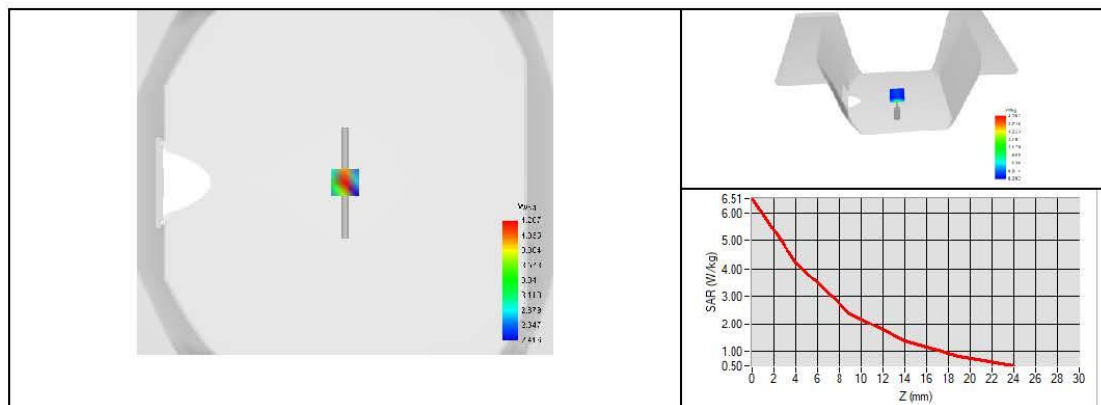


SAR REFERENCE DIPOLE CALIBRATION REPORT

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
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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.53.32.24.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

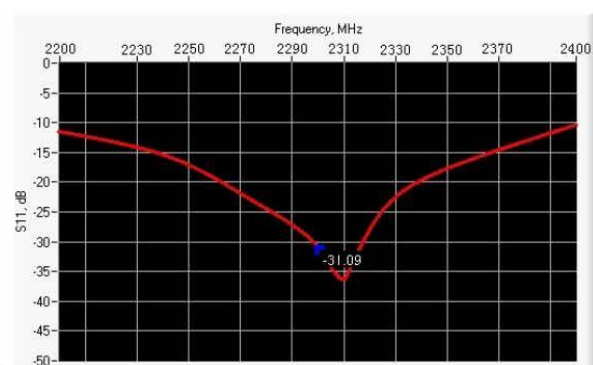
6 CALIBRATION RESULTS

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	56.3Ω - 2.9jΩ

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.

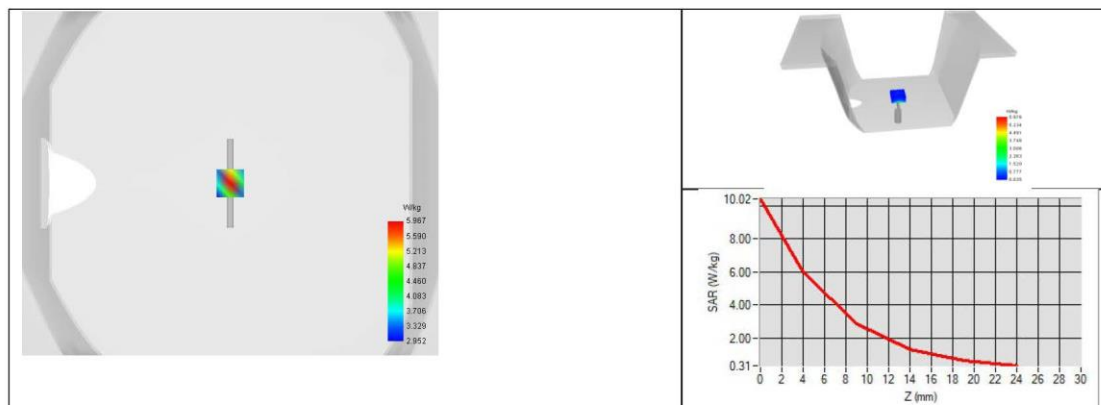


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.32.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: ϵ_p : 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

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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.

Page: 5/8

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.29.24.BES.A

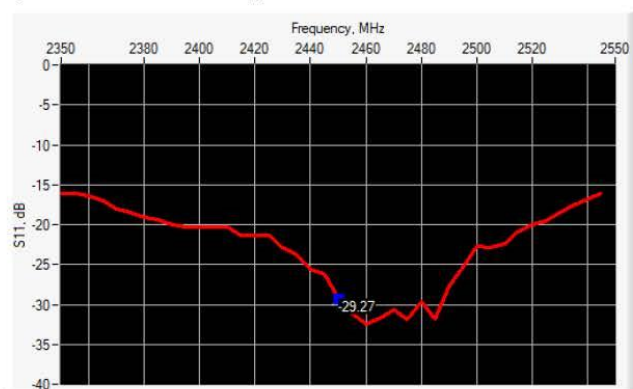
6 CALIBRATION RESULTS

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.

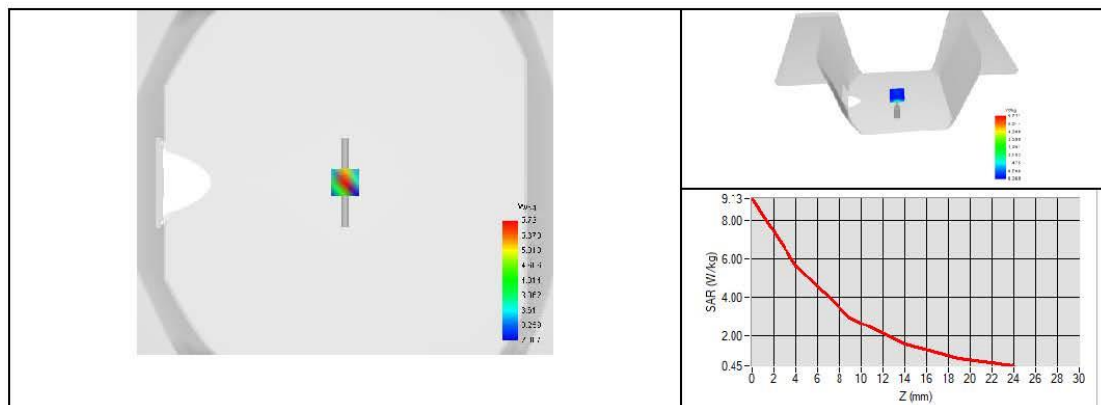


SAR REFERENCE DIPOLE CALIBRATION REPORT

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

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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
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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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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.53.30.24.BES.A

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4.3	SAR Requirements	5
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5.2	S11 Parameter	5
5.3	SAR	5
6	Calibration Results	6
6.1	Mechanical Dimensions	6
6.2	S11 parameter	6
6.3	SAR	6
7	List of Equipment	8



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

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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Template ACR.DDD.N.YY.MVGB.ISSUE SAR Reference Dipole vL

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref.: ACR.53.30.24.BES.A

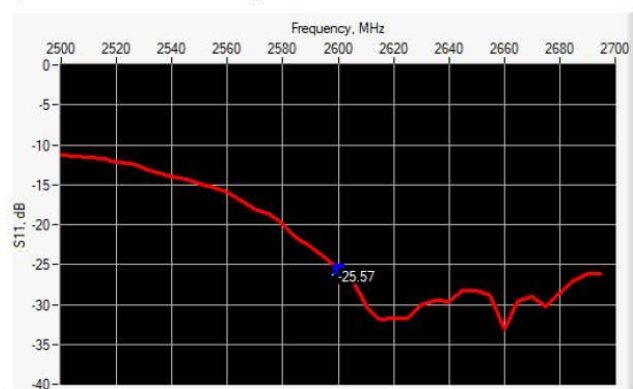
6 CALIBRATION RESULTS

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.

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.

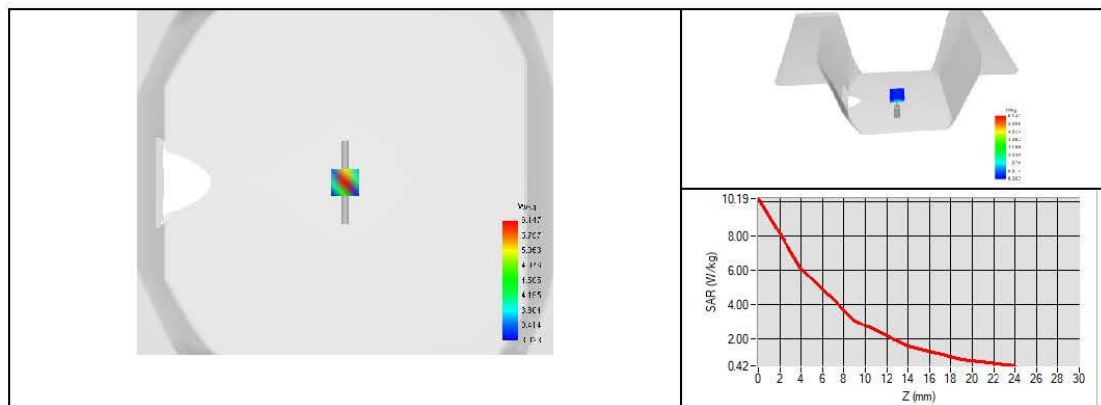


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.53.30.24.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 Waveguide Calibration Report

Ref : ACR.53.31.24.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 WAVEGUIDE**

FREQUENCY: 5000-6000 MHZ

SERIAL NO.: SN 13/14 WGA 33

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 waveguide calibration performed at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref.: ACR.53.31.24.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

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Date : 2024.02.27 08:58:45 +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 WAVEGUIDE CALIBRATION REPORT

Ref.: ACR.53.31.24.BES.A

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SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.31.24.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 waveguides 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 5000-6000 MHz REFERENCE WAVEGUIDE
Manufacturer	MVG
Model	SWG5500
Serial Number	SN 13/14 WGA 33
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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

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 -8 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.



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.31.24.BES.A

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

The estimated expanded uncertainty (k=2) in calibration for the dimension measurement in mm is +/- 0.20 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 +/-19% with respect to measurement conditions.

6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

Frequency (MHz)	L (mm)		W (mm)		L _f (mm)		W _f (mm)	
	Required	Measured	Required	Measured	Required	Measured	Required	Measured
5800	40.39 ± 0.13	-	20.19 ± 0.13	-	81.03 ± 0.13	-	61.98 ± 0.13	-

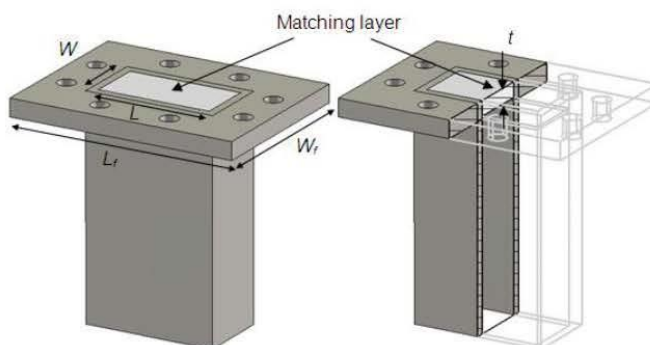


Figure 1: Validation Waveguide Dimensions

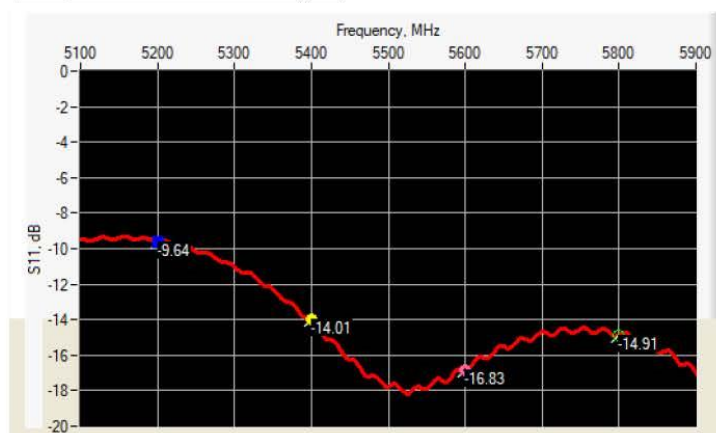


SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.31.24.BES.A

6.2 S11 PARAMETER

6.2.1 S11 parameter In Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
5200	-9.64	-8	$25.80 \Omega - 6.58 j\Omega$
5400	-14.01	-8	$51.53 \Omega + 20.60 j\Omega$
5600	-16.83	-8	$44.12 \Omega - 12.35 j\Omega$
5800	-14.91	-8	$38.53 \Omega + 11.21 j\Omega$

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 waveguide meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed with the matching layer placed in the open end of the waveguide, with the waveguide and matching layer in direct contact with the phantom shell.

6.3.1 SAR With Head Liquid

At those frequencies, the target SAR value can not be generic. Hereunder is the target SAR value defined by MVG, within the uncertainty for the system validation. All SAR values are normalized to 1 W net power. In bracket, the measured SAR is given with the used input power.



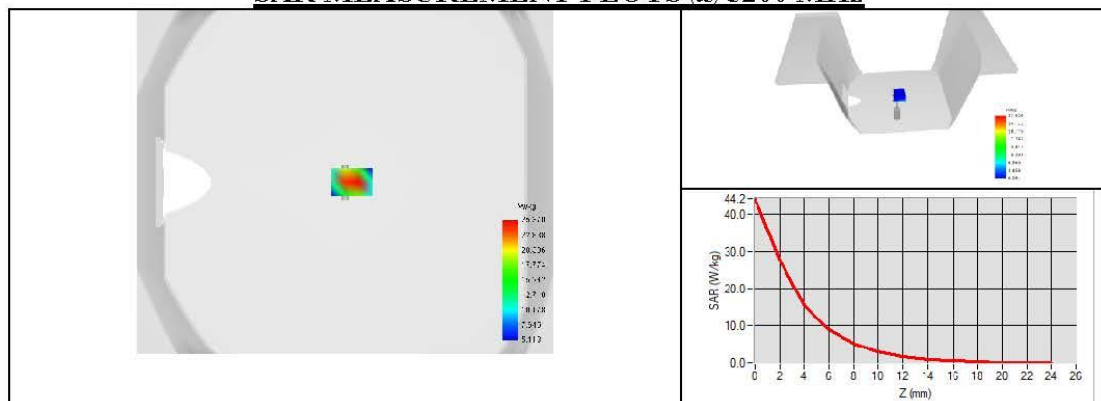
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.31.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values 5200 MHz: eps' :34.16 sigma : 4.42 Head Liquid Values 5400 MHz: eps' :33.63 sigma : 4.64 Head Liquid Values 5600 MHz: eps' :33.12 sigma : 4.87 Head Liquid Values 5800 MHz: eps' :32.57 sigma : 5.12
Distance between dipole waveguide and liquid	0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4m/dz=2mm
Frequency	5200 MHz 5400 MHz 5600 MHz 5800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

Frequency (MHz)	1 g SAR (W/kg)			10 g SAR (W/kg)		
	Measured	Measured normalized to 1W	Target normalized to 1W	Measured	Measured normalized to 1W	Target normalized to 1W
5200	16.26	162.59	159.00	5.62	56.21	56.90
5400	15.98	159.81	166.40	5.50	55.00	58.43
5600	17.91	179.15	173.80	6.10	61.01	59.97
5800	18.22	182.20	181.20	6.13	61.32	61.50

SAR MEASUREMENT PLOTS @ 5200 MHz

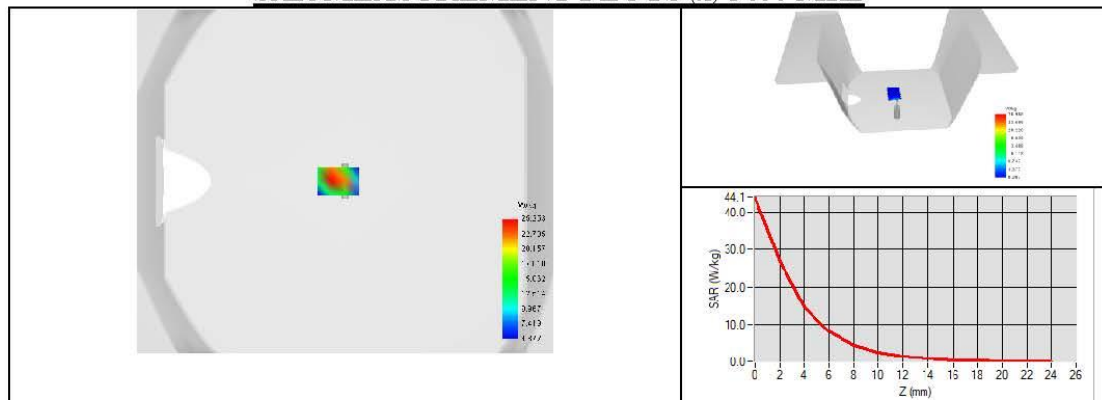




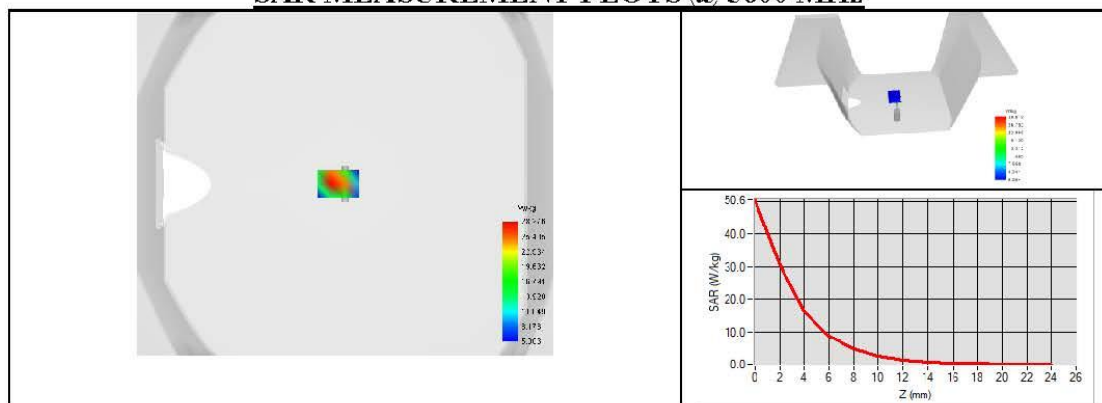
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref.: ACR.53.31.24.BES.A

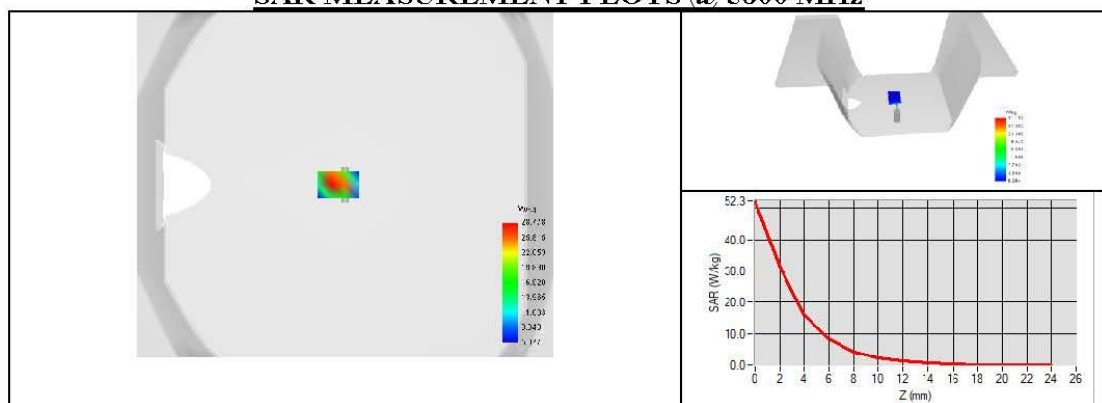
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz





SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.31.24.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	3623-EPGO-431	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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