

FCC SAR EVALUATION REPORT

**In accordance with the requirements of
FCC 47 CFR Part 2(2.1093), ANSI/IEEE C95.1-1992 and
IEEE Std 1528-2013**

Product Name : Tablet PC

Trademark : Compaq

Model Name : M17T11-T606

Family Model : QT11AVHE464M,
QT11AVHE464MS, QT11AVHE464MG

FCC ID : 2BLU9-QT11AVHEM

Report No. : N25081403002E

Prepared for

M&M Electronics, S.A.

**Cocosolito, Colon Free Zone, Main Entrance Warehouse10D and 11D,
Panama. Zip Code: 03050.**

Prepared by

Shenzhen NTEK Testing Technology Co., Ltd.

**No. 24 Xinfu East Road, Xiangshan Community, Xinqiao Street,
Baoan District, Shenzhen, Guangdong, People's Republic of China**

Tel. 0755-23200050 Website: <http://www.ntek.org.cn>

TEST RESULT CERTIFICATION**Applicant's name** M&M Electronics, S.A.Address Cocosolito, Colon Free Zone, Main Entrance Warehouse10D and11D
Panama. Zip Code: 03050.**Manufacturer's Name** Hena Digital Technology (Shenzhen) Co., Ltd.Address 13F, Block B, Tairan Building Tairan 8th Road, Futian District, Shenzhen
China**Product description**

Product name Tablet PC

Trademark Compaq

Model Name M17T11-T606

Family Model QT11AVHE464M, QT11AVHE464MS, QT11AVHE464MG

FCC 47 CFR Part 2(2.1093);

ANSI/IEEE C95.1-1992

Standards IEEE Std 1528-2013;

Published RF exposure KDB procedures

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. 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.

This report shall not be reproduced except in full, without the written approval of Shenzhen NTEK, this document may be altered or revised by Shenzhen NTEK, personal only, and shall be noted in the revision of the document.

Test Sample Number S2508150139-1#

Date of Test

Date (s) of performance of tests Aug. 16, 2025 ~ Aug. 25, 2025

Date of Issue Oct.13, 2025

Test Result **Pass**Prepared By : Owen Xiao
Owen Xiao
(Project Engineer)Reviewed By : Aaron Cheng
Aaron Cheng
(Supervisor)Approved By : Alex Li
Alex Li
(Manager)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Oct.13, 2025	Owen Xiao

TABLE OF CONTENTS

1. General Information	6
1.1. RF exposure limits	6
1.2. Statement of Compliance	7
1.3. EUT Description	7
1.4. Test specification(s)	8
1.5. Ambient Condition	8
2. SAR Measurement System	9
2.1. SATIMO SAR Measurement Set-up Diagram	9
2.2. Robot	10
2.3. E-Field Probe	11
2.3.1. E-Field Probe Calibration	11
2.4. SAM phantoms	12
2.4.1. Technical Data	13
2.5. Device Holder	14
2.6. Test Equipment List	15
3. SAR Measurement Procedures	17
3.1. Power Reference	17
3.2. Area scan & Zoom scan	17
3.3. Description of interpolation/extrapolation scheme	19
3.4. Volumetric Scan	19
3.5. Power Drift	19
4. System Verification Procedure	20
4.1. Tissue Verification	20
4.1.1. Tissue Dielectric Parameter Check Results	21
4.2. System Verification Procedure	22
4.2.1. System Verification Results	23
5. SAR Measurement variability and uncertainty	24
5.1. SAR measurement variability	24
5.2. SAR measurement uncertainty	24
6. RF Exposure Positions	25
6.1. Tablet host platform exposure conditions	25
7. RF Output Power	26
7.1. GSM Conducted Power	26
7.2. WCDMA Conducted Power	27
7.3. LTE Conducted Power	27
7.4. WLAN & Bluetooth Output Power	32
7.4.1. Output Power Results Of WLAN	32
7.4.2. Output Power Results Of Bluetooth	34
8. Antenna Location	35
9. Stand-alone SAR test exclusion	41

10.	SAR Results	43
10.1.	SAR measurement results	43
10.1.1.	SAR measurement Result of GSM850	43
10.1.2.	SAR measurement Result of GSM1900	43
10.1.3.	SAR measurement Result of WCDMA Band 2.....	44
10.1.4.	SAR measurement Result of WCDMA Band 5.....	45
10.1.5.	SAR measurement Result of LTE Band 4	45
10.1.6.	SAR measurement Result of LTE Band 7	47
10.1.7.	SAR measurement Result of WLAN 2.4G.....	48
10.1.8.	SAR measurement Result of WLAN 5.2G.....	49
10.1.9.	SAR measurement Result of WLAN 5.3G.....	49
10.1.10.	SAR measurement Result of WLAN 5.6G.....	50
10.1.11.	SAR measurement Result of WLAN 5.8G.....	51
10.2.	SAR Summation Scenario	51
11.	Appendix A. Photo documentation	52
12.	Appendix B. System Check Plots	53
13.	Appendix C. Plots of High SAR Measurement	72
14.	Appendix D. Calibration Certificate.....	95

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	8.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	1.6	4.0

NOTE: **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 1 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
TRUNK LIMIT
1.6 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for M17T11-T606 are as follows.

RF Exposure Conditions		Equipment Class -Highest Reported SAR (W/kg)				Max. Reported SAR (W/kg)
		PCB	DTS	NII	DSS	
1-g Body-Worn (Separation distance of 0mm)		0.900	0.143	0.443	0.133	0.900
1-g Hotspot (Separation distance of 0mm)		0.900	0.143	0.443	0.133	0.900
Max Simultaneous Tx	Body-Worn	1.343	1.042	1.343	1.033	1.343
	Hotspot	1.343	1.042	1.343	1.033	1.343

Note: The Max Simultaneous Tx is calculated based on the same configuration and test position. This device is in compliance with Specific Absorption Rate (SAR) for general population/uncontrolled exposure limits (1.6 W/kg) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992, and had been tested in accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 & KDB 865664 D01.

1.3. EUT Description

Device Information	
Product Name	Tablet PC
Trade Name	Compaq
Model Name	M17T11-T606
Family Model	QT11AVHE464M, QT11AVHE464MS, QT11AVHE464MG
Model Difference	All model are the same circuit and RF module, except for the names.
FCC ID	2BLU9-QT11AVHEM
Device Phase	Identical Prototype
Exposure Category	General population / Uncontrolled environment
Antenna	FPC Antenna
Power supply	DC 3.8V from Battery or DC 5V/9V12V from Adapter.
Battery	DC 3.8V, 8000mAh, 30.4Wh
Hardware version	T30-T616-V2.0-240715-Q
Software version	Android 15
Device Operating Configurations	
Supporting Mode(s)	GSM 850/1900, WCDMA Band 2/5, LTE Band 4/7, WLAN 2.4G/5G, Bluetooth
Test Modulation	GSM(GMSK), WCDMA(QPSK), LTE(QPSK/16QAM), WLAN(DSSS/OFDM), Bluetooth(GFSK, $\pi/4$ -DQPSK, 8DPSK)

Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 850	824-849	869-894
	GSM 1900	1850-1910	1930-1990
	WCDMA Band 2	1850-1910	1930-1990
	WCDMA Band 5	824-849	869-894
	LTE Band 4	1710-1755	2110-2155
	LTE Band 7	2500-2570	2620-2690
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.3G	5260-5320	
	WLAN 5.6G	5500-5700	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
Power Class	4, tested with power level 5(GSM 850)		
	1, tested with power level 0(GSM 1900)		
	3, tested with power control “all 1”(WCDMA Band 2)		
	3, tested with power control “all 1”(WCDMA Band 5)		
	3, tested with power control all Max.(LTE Band 4)		
	3, tested with power control all Max.(LTE Band 7)		

1.4. Test specification(s)

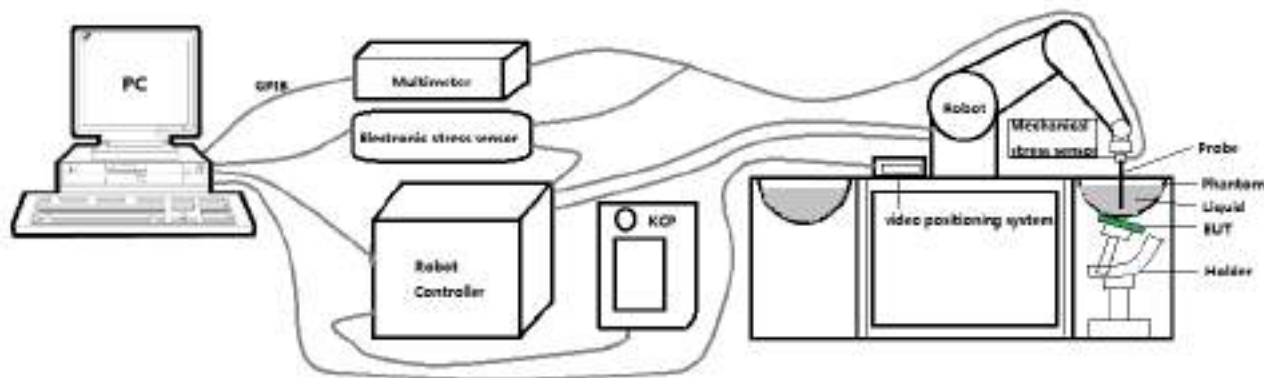
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz v01r04;
KDB 865664 D02 RF Exposure Reporting v01r02;
KDB 447498 D01 General RF Exposure Guidance v06;
KDB 248227 D01 802.11 Wi-Fi SAR v02r02;
KDB 941225 D01 3G SAR Procedures v02r01;
KDB 941225 D05 SAR for LTE Devices v01r02;
KDB 616217 D04 SAR for laptop and tablets v01r02

1.5. Ambient Condition

Ambient temperature	20℃ – 24℃
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: ± 0.08 dB
- Axial isotropy: ± 0.01 dB
- Hemispherical Isotropy: ± 0.01 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 8mW/kg

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

2.3.1. E-Field Probe Calibration

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

2.4. SAM phantoms

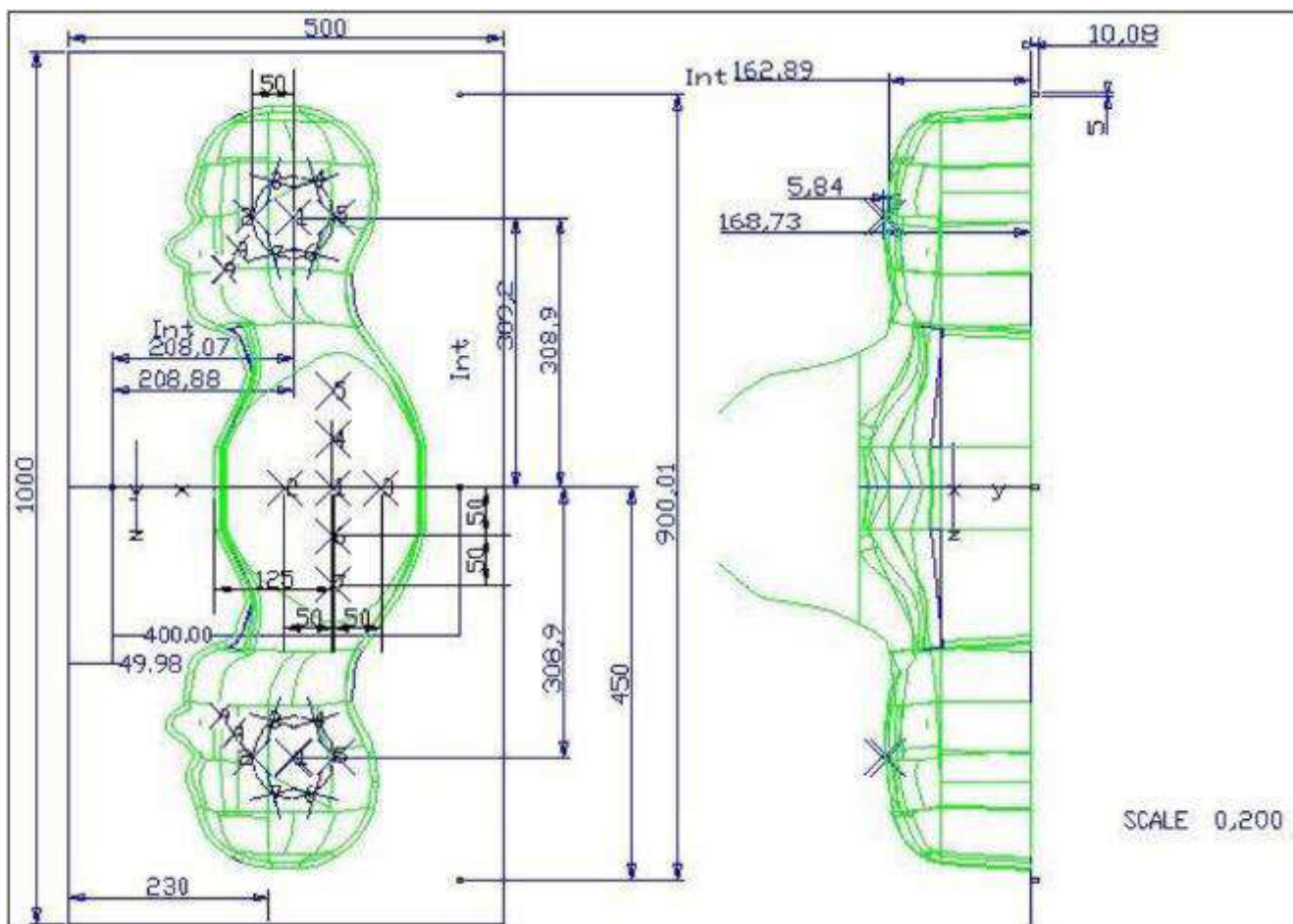
Photo of SAM phantom SN 16/15 SAM119



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

2.4.1. Technical Data

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

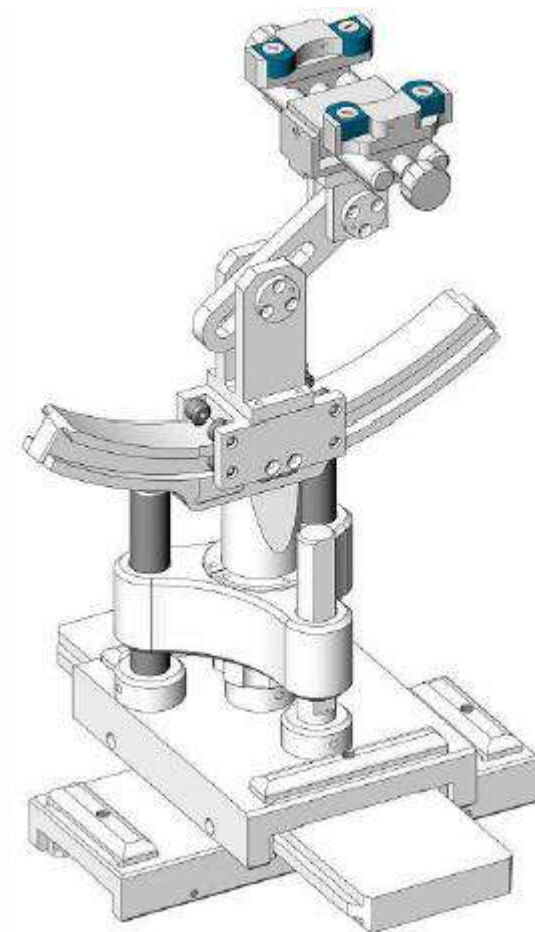


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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

2.5. Device Holder

The positioning system allows obtaining cheek and tilting position with a very good accuracy. In compliance with CENELEC, the tilt angle uncertainty is lower than 1 degree.



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

2.6. Test Equipment List

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

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	0725-EPGO-448	Apr. 15, 2025	Apr. 14, 2026
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	Liquid measurement Kit	SCLMP	SN 21/15 OCPG 72	NCR	NCR
☒	MVG	Power Amplifier	N/A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	May. 12 2025	May. 11 2026
☒	R&S	Universal radio communication tester	CMU200	105747	Apr. 17, 2025	Apr. 16, 2026
☒	R&S	Wideband radio communication tester	CMW500	103917	May. 12, 2025	May. 11, 2026
☐	Anritsu	4G LTE	MT8821C	6262192315	July.17	July.16

		comprehensive tester			2024	2025
☐	Anritsu	5G NR comprehensive tester	MT8000A	6262186364	July.17 2024	July.16 2025
☒	HP	Network Analyzer	E5071C	LPS-461	Oct. 15, 2024	Oct. 14, 2025
☒	Agilent	Calibration Kit	85033E	N/A	May. 31, 2024	May. 30, 2027
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 17, 2025	Apr. 16, 2026
☒	Agilent	Power sensor	E9301A	LES-413-C	May. 6, 2025	May. 5, 2026
☒	Agilent	Power sensor	E9301A	US39212148	Apr. 17, 2025	Apr. 16, 2026
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
☒	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V5.3.15.11

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

- (a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.
- (b) Read the WWAN RF power level from the base station simulator.
- (c) For WLAN/Bluetooth power measurement, use engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power in each supported wireless interface and frequency band.
- (d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/Bluetooth output power.

<SAR measurement>

- (a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power, in the highest power channel.
- (b) Place the EUT in the positions as Appendix A demonstrates.
- (c) Set scan area, grid size and other setting on the OPENSAR software.
- (d) Measure SAR results for the highest power channel on each testing position.
- (e) Find out the largest SAR result on these testing positions of each band.
- (f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

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

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

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).

Area scan & Zoom scan scan parameters extracted from FCC KDB 865664 D01 SAR measurement 100 MHz to 6 GHz.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	$\frac{1}{2} \cdot \delta \cdot \ln(2) \pm 0.5$ mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area} , Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom} , Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1 st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5 · $\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details.				
* When zoom scan is required and the <i>reported</i> SAR from the <i>area scan based 1-g SAR estimation</i> procedures of KDB 447498 is ≤ 1.4 W/kg, ≤ 8 mm, ≤ 7 mm and ≤ 5 mm zoom scan resolution may be applied, respectively, for 2 GHz to 3 GHz, 3 GHz to 4 GHz and 4 GHz to 6 GHz.				

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

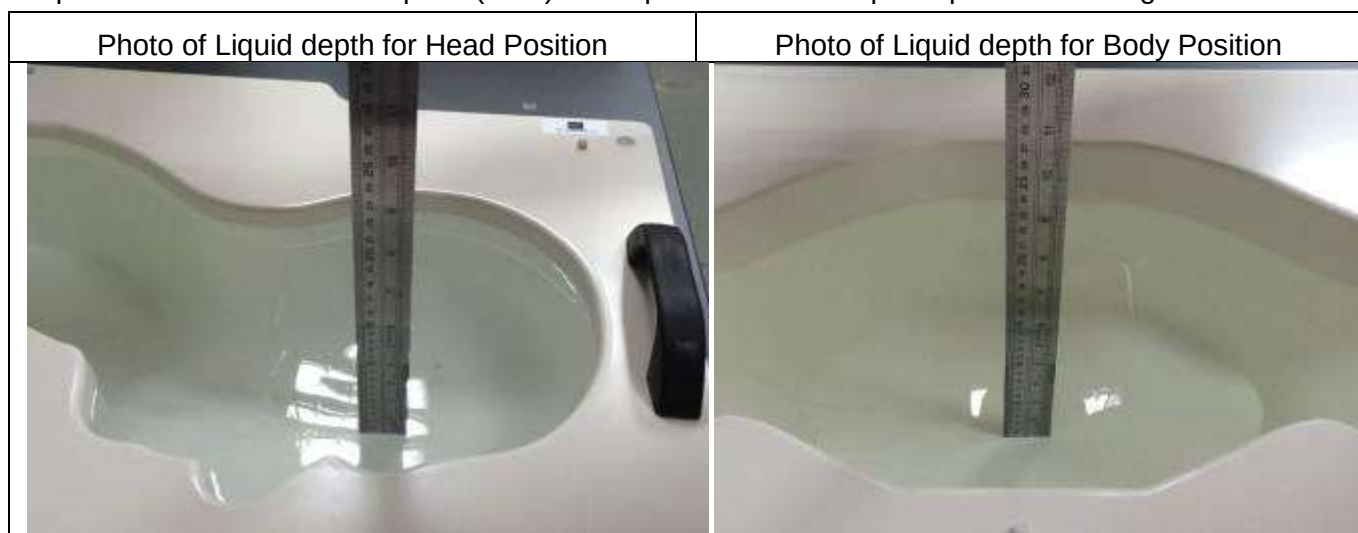
4. System Verification Procedure

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.



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 835	835	41.50	0.90	41.92	0.92	1.01	2.22	21.4 °C	Aug. 16, 2025
Head 1800	1800	40.00	1.40	38.65	1.37	-3.38	-2.14	21.4 °C	Aug. 20, 2025
Head 1900	1900	40.00	1.40	38.23	1.42	-4.43	1.43	21.2 °C	Aug. 17, 2025
Head 2450	2450	39.20	1.80	38.04	1.80	-2.96	0.00	21.7 °C	Aug. 25, 2025
Head 2600	2600	39.01	1.96	39.47	1.92	1.18	-2.04	21.6 °C	Aug. 18, 2025
Head 5200	5200	36.00	4.66	36.87	4.51	2.42	-3.22	21.8 °C	Aug. 21, 2025
Head 5400	5400	35.80	4.86	34.90	4.96	-2.51	2.06	21.1 °C	Aug. 22, 2025
Head 5600	5600	35.50	5.07	35.33	5.02	-0.48	-0.99	21.3 °C	Aug. 23, 2025
Head 5800	5800	35.30	5.27	35.47	5.14	0.48	-2.47	21.6 °C	Aug. 24, 2025

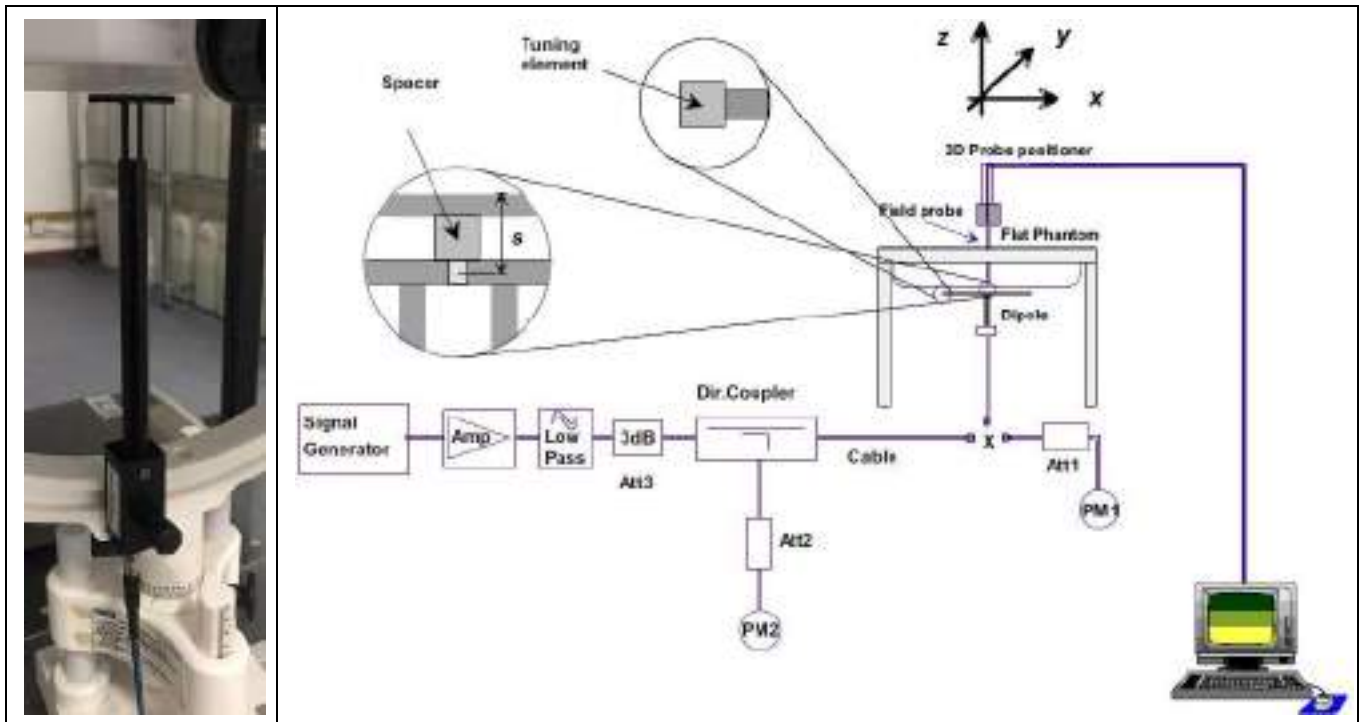
NOTE: 1. The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

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. 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 (%)		
835MHz	9.40	6.28	100.00	0.99	0.59	9.93	5.87	5.64	-6.53	21.4 °C	Aug. 16, 2025
1800MHz	37.06	20.01	100.00	3.64	1.84	36.43	18.38	-1.70	-8.15	21.4 °C	Aug. 20, 2025
1900MHz	39.69	20.92	100.00	4.08	1.95	40.75	19.45	2.67	-7.03	21.2 °C	Aug. 17, 2025
2450MHz	50.05	23.80	100.00	5.18	2.24	51.75	22.41	3.40	-5.84	21.7 °C	Aug. 25, 2025
2600MHz	54.16	24.85	100.00	5.43	2.32	54.30	23.22	0.26	-6.56	21.6 °C	Aug. 18, 2025
5200MHz	162.59	56.21	10.00	1.61	0.59	161.00	59.40	-0.98	5.68	21.8 °C	Aug. 21, 2025
5400MHz	159.81	55.00	10.00	1.53	0.52	152.60	51.70	-4.51	-6.00	21.1 °C	Aug. 22, 2025
5600MHz	179.15	61.01	10.00	1.36	0.65	136.20	64.50	-23.97	5.72	21.3 °C	Aug. 23, 2025
5800MHz	182.20	61.32	10.00	1.50	0.58	149.90	58.00	-17.73	-5.41	21.6 °C	Aug. 24, 2025

NOTE: Tested by : Max Zhou, Jack Peng

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

Per KDB865664 D01 SAR measurement 100 MHz to 6 GHz, SAR measurement variability must be assessed for each frequency band, which is determined by the SAR probe calibration point and tissue-equivalent medium used for the device measurements. The additional measurements are repeated after the completion of all measurements requiring the same head or body tissue-equivalent medium in a frequency band. The test device should be returned to ambient conditions (normal room temperature) with the battery fully charged before it is re-mounted on the device holder for the repeated measurement(s) to minimize any unexpected variations in the repeated results.

- 1) Repeated measurement is not required when the original highest measured SAR is < 0.80 W/kg; steps 2) through 4) do not apply.
- 2) When the original highest measured SAR is ≥ 0.80 W/kg, repeat that measurement once.
- 3) Perform a second repeated measurement only if the ratio of largest to smallest SAR for the original and first repeated measurements is > 1.20 or when the original or repeated measurement is ≥ 1.45 W/kg ($\sim 10\%$ from the 1-g SAR limit).
- 4) Perform a third repeated measurement only if the original, first or second repeated measurement is ≥ 1.5 W/kg and the ratio of largest to smallest SAR for the original, first and second repeated measurements is > 1.20 .

5.2. SAR measurement uncertainty

Per KDB865664 D01 SAR Measurement 100 MHz to 6 GHz, when the highest measured 1-g SAR within a frequency band is < 1.5 W/kg, the extensive SAR measurement uncertainty analysis described in IEEE Std 1528-2013 is not required in SAR reports submitted for equipment approval. The equivalent ratio (1.5/1.6) is applied to extremity and occupational exposure conditions.

6. RF Exposure Positions

6.1. Tablet host platform exposure conditions

Refer to KDB616217 D04, when the modular approach is used, transmitters and modules must be initially tested for standalone operations in generic host conditions according to the following minimum test separation distance and antenna installation requirements for incorporation in the tablet platform. The separation distance required for incorporation in qualified hosts is described in KDB 447498; item 5) of section 4.1 and item 1) of section 5.2.2 etc.

- ≤ 5 mm between the antenna and user for both back surface and edge exposure conditions
- the antennas used by the host must have been tested for equipment approval or qualify for SAR test exclusion
- the antenna polarization, physical orientation, rotation and installation configurations used by the host must have been tested for compliance or qualify for test exclusion
- when the *SAR Test Exclusion Threshold* in KDB 447498 applies, a *test separation distance of 5 mm* is required to determine test exclusion for the tablet platform

The antennas embedded in tablets are typically ≤ 5 mm from the outer housing. The required antenna to user test separation distance is a “not to exceed test” distance required to apply the modular approach. Instead of the typical zero gap tablet edge test requirement between the edge of a tablet and the user, when an antenna has been tested at ≤ 5 mm according to the modular approach it can be incorporated into tablets with at least twice the tested distance from the outer housing of the tablet edge; otherwise, the tablet edge zero gap test requirement applies. When the dedicated host approach is applied, the back surface and edges of the tablet should be tested for SAR compliance with the tablet touching the phantom.

7.2. WCDMA Conducted Power

WCDMA Band 2		Burst-Averaged output Power (dBm)			
Tx Channel	Frequency (MHz)	Tune-up (dBm)	9262	9400	9538
			1852.4	1880	1907.6
RMC12.2K		21.50	21.43	21.23	21.22
HSDPA Sub 1		21.00	20.80	20.25	20.46
HSDPA Sub 2		20.50	20.38	19.95	20.30
HSDPA Sub 3		20.50	20.22	19.61	19.94
HSDPA Sub 4		20.00	19.92	19.55	19.88
HSUPA Sub 1		21.00	20.63	20.04	20.42
HSUPA Sub 2		21.00	20.64	20.17	20.45
HSUPA Sub 3		20.50	20.31	19.84	20.11
HSUPA Sub 4		21.00	20.61	20.07	20.45
HSUPA Sub 5		20.50	20.34	20.00	20.21
WCDMA Band 5		Burst-Averaged output Power (dBm)			
Tx Channel	Frequency (MHz)	Tune-up (dBm)	4132	4182	4233
			826.4	836.4	846.6
RMC12.2K		22.00	21.82	21.85	21.67
HSDPA Sub 1		22.00	21.71	21.46	21.66
HSDPA Sub 2		22.00	21.45	21.24	21.56
HSDPA Sub 3		21.50	21.24	21.01	21.12
HSDPA Sub 4		21.00	20.87	20.54	20.82
HSUPA Sub 1		22.00	21.74	21.44	21.64
HSUPA Sub 2		22.00	21.77	21.50	21.63
HSUPA Sub 3		22.00	21.52	21.25	21.51
HSUPA Sub 4		22.00	21.69	21.73	21.60
HSUPA Sub 5		22.00	21.67	21.65	21.34

7.3. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band 4	1.4MHz	QPSK	1	0	24.00	23.02	23.29	23.54
			1	2	24.00	23.06	23.54	23.59
			1	5	24.00	23.04	23.59	23.59
			3	0	24.00	23.08	23.47	23.45
			3	1	24.00	23.15	23.48	23.51

			3	2	24.00	23.15	23.57	23.45
			6	0	22.50	22.10	22.42	22.34
		16QAM	1	0	24.00	22.63	23.34	23.58
			1	2	24.00	22.73	23.43	23.51
			1	5	24.00	22.56	23.57	23.60
			3	0	23.00	22.36	22.68	22.66
			3	1	23.00	22.29	22.68	22.63
			3	2	23.00	22.29	22.76	22.67
			6	0	21.50	21.02	21.23	21.09
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band 4	3MHz	QPSK	1	0	24.00	23.14	23.30	23.47
			1	7	24.00	23.44	23.46	23.66
			1	14	24.00	23.47	23.74	23.67
			8	0	22.50	22.11	22.29	22.35
			8	4	22.50	22.16	22.39	22.44
			8	7	22.50	22.22	22.44	22.41
			15	0	22.50	22.12	22.37	22.39
		16QAM	1	0	24.00	22.69	23.37	23.71
			1	7	24.00	22.77	23.55	23.57
			1	14	24.00	22.68	23.53	23.66
			8	0	22.00	21.32	21.43	21.65
			8	4	22.00	21.29	21.64	21.63
			8	7	22.00	21.33	21.59	21.59
			15	0	22.00	21.28	21.51	21.66
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
LTE Band 4	5MHz	QPSK	1	0	24.00	23.09	23.68	23.69
			1	12	24.00	23.18	23.90	23.97
			1	24	24.00	23.09	23.84	23.77
			12	0	22.50	22.07	22.29	22.41
			12	6	22.50	22.16	22.40	22.42
			12	11	22.50	22.13	22.38	22.42
			25	0	22.50	22.14	22.40	22.37
		16QAM	1	0	24.00	23.17	23.41	22.95
			1	12	24.00	23.30	23.55	23.01
			1	24	24.00	23.26	23.47	23.07
			12	0	22.00	21.21	21.51	21.43

			12	6	22.00	21.16	21.51	21.47
			12	11	22.00	21.27	21.51	21.52
			25	0	22.00	21.11	21.51	21.48
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
LTE Band 4	10MHz	QPSK	1	0	24.00	23.36	23.34	23.26
			1	24	24.00	23.47	23.56	23.32
			1	49	24.00	23.53	23.44	23.33
			25	0	22.50	22.13	22.33	22.42
			25	12	22.50	22.11	22.43	22.40
			25	24	22.50	22.27	22.31	22.39
			50	0	22.50	22.11	22.36	22.36
		16QAM	1	0	24.00	22.73	23.43	23.47
			1	24	24.00	22.82	23.56	23.65
			1	49	24.00	22.83	23.44	23.68
			25	0	22.00	21.39	21.32	21.44
			25	12	22.00	21.44	21.44	21.49
			25	24	22.00	21.49	21.36	21.55
			50	0	22.00	21.21	21.52	21.46
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band 4	15MHz	QPSK	1	0	24.00	23.44	23.62	23.50
			1	37	24.00	23.38	23.69	23.55
			1	74	24.00	23.70	23.56	23.57
			36	0	22.50	22.07	22.32	22.40
			36	18	22.50	22.26	22.39	22.42
			36	37	22.50	22.19	22.30	22.30
			75	0	22.50	22.19	22.40	22.37
		16QAM	1	0	23.50	22.58	22.94	22.81
			1	37	23.50	22.82	22.93	22.92
			1	74	23.50	22.85	22.92	23.06
			36	0	22.00	21.21	21.47	21.53
			36	18	22.00	21.31	21.52	21.57
			36	37	22.00	21.42	21.48	21.59
			75	0	22.00	21.35	21.50	21.50
Band	Band	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		

	Width		RB Size	RB Offset	(dBm)	20050/1720	20175/1732.5	20300/1745
LTE Band 4	20MHz	QPSK	1	0	24.00	23.38	23.59	23.43
			1	49	24.00	23.46	23.69	23.57
			1	99	24.00	23.78	23.57	23.57
			50	0	22.50	22.14	22.34	22.43
			50	24	22.50	22.13	22.37	22.28
			50	49	22.50	22.29	22.40	22.49
			100	0	22.50	22.25	22.35	22.35
		16QAM	1	0	23.50	22.71	22.75	23.04
			1	49	23.50	22.78	22.91	23.14
			1	99	23.50	22.91	23.04	23.09
			50	0	22.00	21.23	21.40	21.54
			50	24	22.00	21.33	21.50	21.51
			50	49	22.00	21.37	21.43	21.58
			100	0	22.00	21.32	21.46	21.50

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20775/2502.5	21100/2535	21425/2567.5
LTE Band 7	5MHz	QPSK	1	0	23.50	22.53	22.98	23.10
			1	12	23.50	22.64	23.09	23.24
			1	24	23.50	22.70	23.39	23.20
			12	0	22.50	21.68	22.02	22.14
			12	6	22.50	21.72	22.16	22.14
			12	11	22.50	21.73	22.01	22.02
			25	0	22.50	21.68	22.02	22.01
		16QAM	1	0	23.50	22.88	22.65	23.38
			1	12	23.50	22.83	22.65	23.13
			1	24	23.50	22.78	22.65	23.17
			12	0	21.50	20.80	21.29	21.26
			12	6	21.50	20.82	21.18	21.20
			12	11	21.50	20.86	21.25	21.19
			25	0	21.50	20.89	21.43	21.10
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20800/2505	21100/2535	21400/2565
LTE Band 7	10MHz	QPSK	1	0	24.00	22.73	23.32	23.47
			1	24	24.00	22.69	23.69	23.34
			1	49	24.00	22.97	23.67	23.25

			25	0	22.50	21.77	22.02	22.14
			25	12	22.50	21.77	22.10	22.12
			25	24	22.50	21.88	22.17	22.14
			50	0	22.50	21.83	22.12	22.26
		16QAM	1	0	23.50	22.94	22.53	22.73
			1	24	23.50	22.83	22.72	22.71
			1	49	23.50	23.01	22.53	22.59
			25	0	22.00	20.86	21.51	21.49
			25	12	22.00	20.90	21.50	21.49
			25	24	22.00	20.92	21.42	21.38
			50	0	21.50	20.96	21.18	21.29
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20825/2507.5	21100/2535	21375/2562.5
LTE Band 7	15MHz	QPSK	1	0	24.00	22.78	23.22	23.43
			1	37	24.00	22.78	23.34	23.27
			1	74	24.00	22.72	23.29	23.54
			36	0	22.50	21.77	22.12	22.14
			36	18	22.50	21.83	22.03	22.23
			36	37	22.50	21.87	22.04	22.01
			75	0	22.50	21.89	22.04	22.18
		16QAM	1	0	23.50	23.08	22.52	22.65
			1	37	23.50	23.17	22.66	23.45
			1	74	23.50	23.00	22.60	23.38
			36	0	21.50	20.89	21.22	21.21
			36	18	21.50	20.91	21.08	21.21
			36	37	21.50	20.88	21.02	21.12
			75	0	21.50	21.09	21.17	21.30
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20850/2510	21100/2535	21350/2560
LTE Band 7	20MHz	QPSK	1	0	24.00	23.73	23.83	23.16
			1	49	24.00	23.71	23.69	23.30
			1	99	24.00	23.62	23.20	23.17
			50	0	23.00	22.77	22.12	22.17
			50	24	23.00	22.63	22.02	22.16
			50	49	23.00	22.51	22.03	22.12
			100	0	22.50	22.42	22.02	22.07
		16QAM	1	0	23.00	22.96	22.58	22.57

			1	49	23.00	22.31	22.68	22.62
			1	99	23.00	22.22	22.69	22.53
			50	0	21.50	20.97	21.23	21.28
			50	24	21.50	20.92	21.26	21.29
			50	49	21.50	20.87	21.14	21.20
			100	0	21.50	20.87	21.18	21.24

7.4. WLAN & Bluetooth Output Power

7.4.1. Output Power Results Of WLAN

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11b	1	2412	14.00	13.34
	6	2437	14.00	13.87
	11	2462	14.00	13.15
802.11g	1	2412	14.00	13.20
	6	2437	14.00	13.54
	11	2462	14.00	12.98
802.11n HT20	1	2412	13.50	11.91
	6	2437	13.50	13.04
	11	2462	13.50	12.00
802.11n HT40	3	2422	12.00	11.75
	6	2437	12.00	11.98
	9	2452	12.00	10.35

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	36	5180	12.50	12.00
	40	5200	12.50	11.97
	48	5240	12.50	12.07
802.11n HT20	36	5180	12.50	12.04
	40	5200	12.50	11.95
	48	5240	12.50	12.12
802.11n HT40	38	5190	12.50	12.44
	46	5230	12.50	12.44
802.11ac VHT20	36	5180	12.50	11.64
	40	5200	12.50	11.90
	48	5240	12.50	12.12

802.11ac VHT40	38	5190	12.50	12.40
	46	5230	12.50	12.48
802.11ac VHT80	42	5210	13.00	12.59

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	52	5260	13.50	13.01
	56	5280	13.50	12.86
	64	5320	13.50	12.40
802.11n HT20	52	5260	13.00	12.90
	56	5280	13.00	12.96
	64	5320	13.00	12.59
802.11n HT40	54	5270	13.50	13.27
	62	5310	13.50	13.05
802.11ac VHT20	52	5260	13.00	13.00
	56	5280	13.00	12.57
	64	5320	13.00	12.71
802.11ac VHT40	54	5270	14.00	13.61
	62	5310	14.00	13.26
802.11ac VHT80	58	5290	13.50	13.13

NOTE: Power measurement results of WLAN 5.3G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	100	5500	13.50	12.53
	120	5600	13.50	13.30
	140	5700	13.50	12.86
802.11n	100	5500	13.50	12.22
	120	5600	13.50	13.27
	140	5700	13.50	12.89
802.11n	102	5510	14.00	12.94
	118	5590	14.00	13.68
	134	5670	14.00	13.33
802.11ac (VHT20)	100	5500	13.50	12.46
	120	5600	13.50	13.22
	140	5700	13.50	12.82
802.11ac (VHT40)	102	5510	14.00	12.73

802.11ac (VHT80)	118	5590	14.00	13.62
	134	5670	14.00	13.28
	106	5530	14.00	12.71
	122	5610	14.00	13.51

NOTE: Power measurement results of WLAN 5.6G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	13.00	12.70
	157	5785	13.00	12.48
	165	5825	13.00	12.10
802.11n HT20	149	5745	13.00	12.64
	157	5785	13.00	12.52
	165	5825	13.00	12.60
802.11n HT40	151	5755	13.50	13.18
	159	5795	13.50	13.10
802.11ac VHT20	149	5745	13.00	12.73
	157	5785	13.00	12.69
	165	5825	13.00	12.47
802.11ac VHT40	151	5755	13.50	13.27
	159	5795	13.50	13.08
802.11ac VHT80	155	5775	13.00	12.94

NOTE: Power measurement results of WLAN 5.8G.

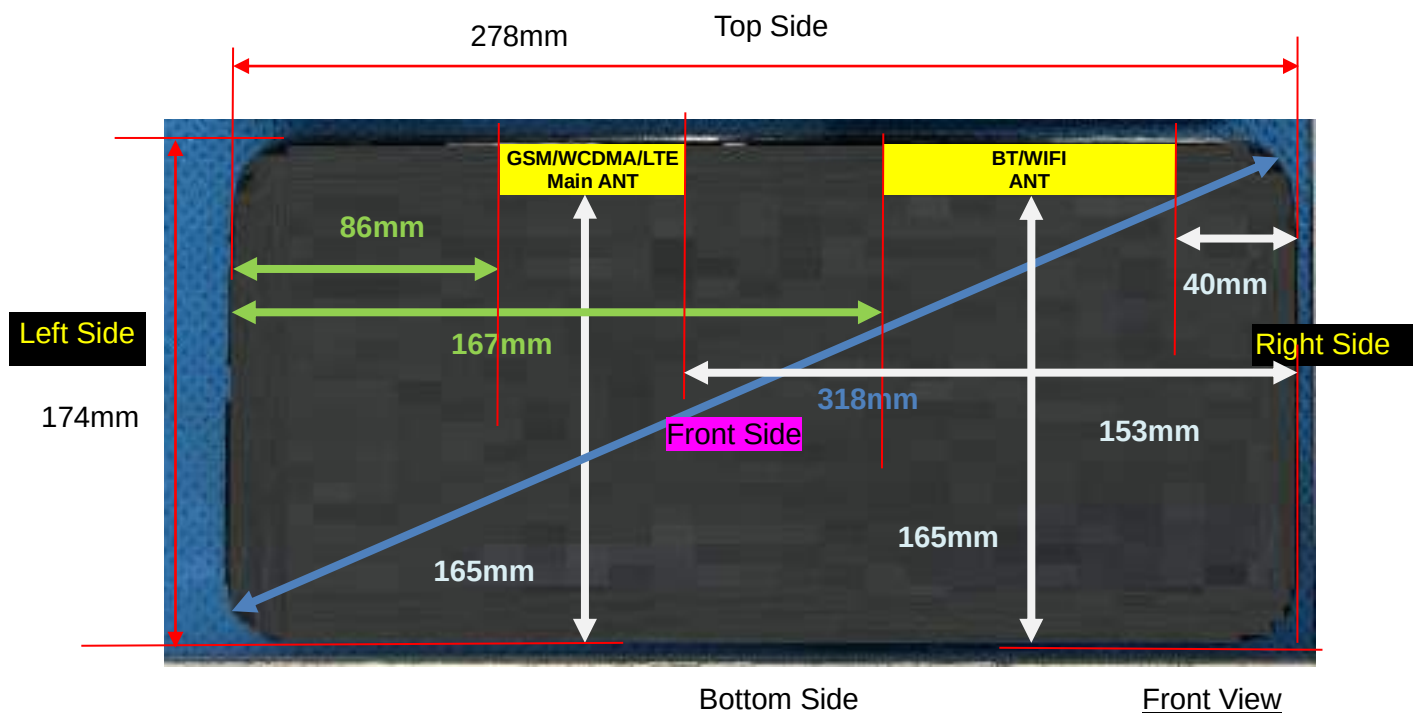
7.4.2. Output Power Results Of Bluetooth

Output Power Results Of Bluetooth

BR+EDR	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channel		
			0CH	39CH	78CH
	1M	4.00	2.44	3.22	2.08
	2M	4.50	2.88	4.24	2.89
	3M	5.00	3.50	4.79	3.05

BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	0.50	-0.85	0.15	-0.81
	2M	0.50	-0.94	0.05	-0.92

8. Antenna Location



Note: Since the confidentiality request of EUT, the antenna location example diagram see as above.

Distance of the Antenna to the EUT surface/edge						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WLAN & Bluetooth	5	5	86	153	5	165
WWAN	5	5	167	40	5	165

Note: When the minimum separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Positions for SAR tests		
Test separation distances ≤ 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	14.00dBm	25.12mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	10.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	10.00
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	10.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	

	13.00dBm	19.95mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	14.00dBm	25.12mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	14.00dBm	25.12mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	7.00
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	13.50dBm	22.39mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	6.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	6.00
	SAR testing required?	YES

Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	6.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of GSM 850	
	32.00dBm	1584.89mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40
	SAR exclusion threshold (mW)	131
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of GSM 1900	
	29.00dBm	794.39mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40
	SAR exclusion threshold (mW)	87
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WCDMA Band 2	
	21.50dBm	141.25mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40

	SAR exclusion threshold (mW)	87
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	11.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of WCDMA Band 5	
	22.00dBm	158.49mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40
	SAR exclusion threshold (mW)	131
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of LTE Band 4	
	24.00dBm	251.19dBm
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	12.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	12.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40
	SAR exclusion threshold (mW)	98
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	12.00
	SAR testing required?	YES
Exposure Positions	Tune-up Maximum power of LTE Band 7	
	24.00dBm	251.19mW
Front Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Back Side	Antenna to user(mm)	5

	SAR exclusion threshold (mW)	16.00
	SAR testing required?	YES
Right Side	Antenna to user(mm)	40
	SAR exclusion threshold (mW)	131
	SAR testing required?	YES
Top Side	Antenna to user(mm)	5
	SAR exclusion threshold (mW)	16.00

Positions for SAR tests		
Test separation distances > 50 mm		
Exposure Positions	Tune-up Maximum power of WLAN 2.4G	
	14.00dBm	25.12mW
Left Side	Antenna to user(mm)	86
	SAR exclusion threshold (mW)	456
	SAR testing required?	NO
Right Side	Antenna to user(mm)	153
	SAR exclusion threshold (mW)	453
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	465
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.2G	
	13.00dBm	19.95mW
Left Side	Antenna to user(mm)	86
	SAR exclusion threshold (mW)	426
	SAR testing required?	NO
Right Side	Antenna to user(mm)	153
	SAR exclusion threshold (mW)	1096
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1216
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.3G	
	14.00dBm	25.12mW
Left Side	Antenna to user(mm)	86
	SAR exclusion threshold (mW)	426
	SAR testing required?	NO
Right Side	Antenna to user(mm)	153
	SAR exclusion threshold (mW)	1096

	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1216
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.6G	
	14.00dBm	25.12mW
Left Side	Antenna to user(mm)	86
	SAR exclusion threshold (mW)	426
	SAR testing required?	NO
Right Side	Antenna to user(mm)	153
	SAR exclusion threshold (mW)	1096
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1216
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WLAN 5.8G	
	13.50dBm	22.39mW
Left Side	Antenna to user(mm)	86
	SAR exclusion threshold (mW)	422
	SAR testing required?	NO
Right Side	Antenna to user(mm)	153
	SAR exclusion threshold (mW)	1092
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1212
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of GSM 850	
	32.00dBm	1584.89mW
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	815
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	804
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of GSM 1900	
	29.00dBm	794.39mW
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	1279
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165

	SAR exclusion threshold (mW)	1259
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WCDMA Band 2	
	21.50dBm	141.25mW
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	1279
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1259
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of WCDMA Band 5	
	22.00dBm	158.49dBm
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	815
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	804
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of LTE Band 4	
	24.00dBm	251.19dBm
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	773
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	762
	SAR testing required?	NO
Exposure Positions	Tune-up Maximum power of LTE Band 7	
	24.00dBm	251.19mW
Right Side	Antenna to user(mm)	167
	SAR exclusion threshold (mW)	1266
	SAR testing required?	NO
Bottom Side	Antenna to user(mm)	165
	SAR exclusion threshold (mW)	1246
	SAR testing required?	NO

NOTE: Refer to section 4.3.1 of KDB 447498 D01.

9. Stand-alone SAR test exclusion

Refer to FCC KDB 447498D01, the 1-g SAR and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances ≤ 50 mm are determined by:

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

- $f_{\text{(GHz)}}$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation
- The result is rounded to one decimal place for comparison

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR exclusion threshold (mW)	SAR test exclusion
Bluetooth	5.00	3.162	5	2.480	1.987	3	Yes

NOTE: Standalone SAR test exclusion for Bluetooth.

When standalone SAR test exclusion applies to an antenna that transmits simultaneously with other antennas, the standalone SAR must be estimated according to following to determine simultaneous transmission SAR test exclusion:

$[(\text{max. power of channel, including tune-up tolerance, mW})/(\text{min. test separation distance, mm})] \cdot [\sqrt{f_{\text{(GHz)}}}/x]$ W/kg for test separation distances $\leq 50\text{mm}$, where $x = 7.5$ for 1-g SAR and $x = 18.75$ for 10-g SAR.

When the minimum test separation distance is < 5 mm, a distance of 5 mm is applied to determine SAR test exclusion.

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
Bluetooth	Body	5.00	3.162	5	2.48	7.5	0.133
Bluetooth	Hotspot	5.00	3.162	5	2.48	7.5	0.133

NOTE: Estimated SAR calculation for Bluetooth

10. SAR Results

10.1. SAR measurement results

10.1.1. SAR measurement Result of GSM850

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	189/836.4	GSM Voice	0.171	0.074	2.37	31.96	32.00	0.173	2025/8/16	1#
Back Side	189/836.4	GSM Voice	0.053	0.022	3.12	31.96	32.00	0.053	2025/8/16	
Left Side	189/836.4	GSM Voice	0.021	0.009	3.85	31.96	32.00	0.021	2025/8/16	
Right Side	189/836.4	GSM Voice	0.011	0.009	1.05	31.96	32.00	0.011	2025/8/16	
Bottom Side	189/836.4	GSM Voice	0.147	0.063	2.45	31.96	32.00	0.148	2025/8/16	

NOTE: 1.Hotspot SAR test results of GSM850

2.Tested by : Max Zhou

10.1.2. SAR measurement Result of GSM1900

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	661/1880	GSM Voice	0.710	0.331	0.97	28.50	29.00	0.797	2025/8/17	2#
Back Side	661/1880	GSM Voice	0.185	0.086	3.79	28.50	29.00	0.208	2025/8/17	
Left Side	661/1880	GSM Voice	0.075	0.034	0.33	28.50	29.00	0.084	2025/8/17	
Right Side	661/1880	GSM Voice	0.037	0.017	1.41	28.50	29.00	0.042	2025/8/17	
Bottom Side	661/1880	GSM Voice	0.525	0.233	-3.47	28.50	29.00	0.589	2025/8/17	
Back Side	512/1850.2	GSM Voice	0.674	0.314	-1.62	28.36	29.00	0.781	2025/8/17	
Back Side	810/1909.8	GSM Voice	0.628	0.251	0.69	28.51	29.00	0.703	2025/8/17	

BackSide Repeated	661/1880	GSM Voice	0.697	0.324	-1.74	28.50	29.00	0.782	2025/8/17	
-------------------	----------	-----------	-------	-------	-------	-------	-------	-------	-----------	--

NOTE: 1.Hotspot SAR test results of GSM1900

2.Tested by : Max Zhou

10.1.3. SAR measurement Result of WCDMA Band 2

Test Position of Body-Worn with 0mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Front Side	9400/1880	RMC12.2K	0.600	0.246	-1.06	21.23	21.50	0.638	2025/8/17	3#
Back Side	9400/1880	RMC12.2K	0.150	0.058	-1.28	21.23	21.50	0.160	2025/8/17	

NOTE: 1.Body-Worn SAR test results of WCDMA Band 2

2.Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	9400/1880	RMC12.2K	0.600	0.246	-1.06	21.23	21.50	0.638	2025/8/17	3#
Back Side	9400/1880	RMC12.2K	0.150	0.058	-1.28	21.23	21.50	0.160	2025/8/17	
Left Side	9400/1880	RMC12.2K	0.060	0.025	-3.35	21.23	21.50	0.064	2025/8/17	
Right Side	9400/1880	RMC12.2K	0.031	0.013	1.45	21.23	21.50	0.033	2025/8/17	
Bottom Side	9400/1880	RMC12.2K	0.448	0.180	-1.72	21.23	21.50	0.477	2025/8/17	

NOTE: 1.Hotspot SAR test results of WCDMA Band 2

2.Tested by : Max Zhou

10.1.4. SAR measurement Result of WCDMA Band 5

Test Position of Body-Worn with 0mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift ($\pm 5\%$)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
Front Side	4182/836.4	RMC12.2K	0.201	0.082	-3.10	21.85	22.00	0.208	2025/8/16	4#
Back Side	4182/836.4	RMC12.2K	0.058	0.023	2.62	21.85	22.00	0.060	2025/8/16	

NOTE:1. Body-Worn SAR test results of WCDMA Band 5

2.Tested by : Jack Peng

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	4182/836.4	RMC12.2K	0.201	0.082	-3.10	21.85	22.00	0.208	2025/8/16	4#
Back Side	4182/836.4	RMC12.2K	0.058	0.023	2.62	21.85	22.00	0.060	2025/8/16	
Left Side	4182/836.4	RMC12.2K	0.023	0.009	3.59	21.85	22.00	0.024	2025/8/16	
Right Side	4182/836.4	RMC12.2K	0.012	0.010	-0.58	21.85	22.00	0.012	2025/8/16	
Bottom Side	4182/836.4	RMC12.2K	0.147	0.059	0.48	21.85	22.00	0.152	2025/8/16	

NOTE:1. Hotspot SAR test results of WCDMA Band 5

2.Tested by : Jack Peng

10.1.5. SAR measurement Result of LTE Band 4

Test Position of Body-Worn with 0mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	20175/1732.5	20M QPSK(1,49)	0.838	0.414	2.52	23.69	24.00	0.900	2025/8/20	10#
Back Side	20175/1732.5	20M QPSK(1,49)	0.210	0.099	0.59	23.69	24.00	0.226	2025/8/20	

Back Side	20050/1720	20M QPSK(1,49)	0.782	0.362	1.35	23.46	24.00	0.886	2025/8/20	
Back Side	20300/1745	20M QPSK(50,49)	0.798	0.394	-2.84	23.57	24.00	0.881	2025/8/20	
BackSide Repeated	20175/1732.5	20M QPSK(50,49)	0.837	0.413	3.99	23.69	24.00	0.899	2025/8/20	
Front Side										
Front Side	20175/1732.5	20M QPSK(50,49)	0.470	0.228	-4.92	22.40	22.50	0.481	2025/8/20	
Back Side	20175/1732.5	20M QPSK(50,49)	0.107	0.056	1.37	22.40	22.50	0.109	2025/8/20	

NOTE: Body-Worn SAR test results of LTE Band 4

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	20175/1732.5	20M QPSK(1,49)	0.838	0.414	2.52	23.69	24.00	0.900	2025/8/20	10#
Back Side	20175/1732.5	20M QPSK(1,49)	0.210	0.099	0.59	23.69	24.00	0.226	2025/8/20	
Left Side	20175/1732.5	20M QPSK(1,49)	0.085	0.040	-2.96	23.69	24.00	0.091	2025/8/20	
Right Side	20175/1732.5	20M QPSK(1,49)	0.042	0.021	-2.26	23.69	24.00	0.045	2025/8/20	
Bottom Side	20175/1732.5	20M QPSK(1,49)	0.595	0.288	-1.76	23.69	24.00	0.639	2025/8/20	
Back Side	20050/1720	20M QPSK(1,49)	0.782	0.362	1.35	23.46	24.00	0.886	2025/8/20	
Back Side	20300/1745	20M QPSK(50,49)	0.798	0.394	-2.84	23.57	24.00	0.881	2025/8/20	
BackSide Repeated	20175/1732.5	20M QPSK(50,49)	0.837	0.413	3.99	23.69	24.00	0.899	2025/8/20	
50%RB										
Front Side	20175/1732.5	20M QPSK(50,49)	0.470	0.228	-4.92	22.40	22.50	0.481	2025/8/20	
Back Side	20175/1732.5	20M QPSK(50,49)	0.107	0.056	1.37	22.40	22.50	0.109	2025/8/20	
Left Side	20175/1732.5	20M QPSK(50,49)	0.045	0.021	0.56	22.40	22.50	0.046	2025/8/20	

Right Side	20175/1732.5	20M QPSK(50,49)	0.023	0.011	3.66	22.40	22.50	0.024	2025/8/20	
Bottom Side	20175/1732.5	20M QPSK(50,49)	0.341	0.151	-2.37	22.40	22.50	0.349	2025/8/20	
100%RB										
Back Side	20175/1732.5	20M QPSK(100,0)	0.425	0.227	-1.77	22.35	22.50	0.440	2025/8/20	

NOTE: 1.Hotspot SAR test results of LTE Band 4

2.Tested by : Max Zhou

10.1.6. SAR measurement Result of LTE Band 7

Test Position of Body-Worn with 0mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	21100/2535	20M QPSK(1,49)	0.632	0.240	3.47	23.83	24.00	0.657	2025/8/18	11#
Back Side	21100/2535	20M QPSK(1,49)	0.170	0.061	-0.29	23.83	24.00	0.177	2025/8/18	
50%RB										
Front Side	21100/2535	20M QPSK(50,0)	0.337	0.141	0.34	22.12	23.00	0.413	2025/8/18	
Back Side	21100/2535	20M QPSK(50,0)	0.092	0.036	-1.46	22.12	23.00	0.113	2025/8/18	

NOTE: 1.Body-Worn SAR test results of LTE Band 7

2.Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	21100/2535	20M QPSK(1,49)	0.632	0.240	3.47	23.83	24.00	0.657	2025/8/18	11#
Back Side	21100/2535	20M QPSK(1,49)	0.170	0.061	-0.29	23.83	24.00	0.177	2025/8/18	
Left	21100/2535	20M	0.067	0.025	-1.50	23.83	24.00	0.070	2025/8/18	

Side		QPSK(1,49)								
Right Side	21100/2535	20M QPSK(1,49)	0.034	0.012	-2.68	23.83	24.00	0.035	2025/8/18	
Top Side	21100/2535	20M QPSK(1,49)	0.455	0.169	-3.44	23.83	24.00	0.473	2025/8/18	
50%RB										
Front Side	21100/2535	20M QPSK(50,0)	0.337	0.141	0.34	22.12	23.00	0.413	2025/8/18	
Back Side	21100/2535	20M QPSK(50,0)	0.092	0.036	-1.46	22.12	23.00	0.113	2025/8/18	
Left Side	21100/2535	20M QPSK(50,0)	0.037	0.014	2.55	22.12	23.00	0.045	2025/8/18	
Right Side	21100/2535	20M QPSK(50,0)	0.019	0.007	-3.85	22.12	23.00	0.023	2025/8/18	
Bottom Side	21100/2535	20M QPSK(50,0)	0.233	0.088	-2.06	22.12	23.00	0.285	2025/8/18	

NOTE: 1.Hotspot SAR test results of LTE Band 7
2.Tested by : Max Zhou

10.1.7. SAR measurement Result of WLAN 2.4G

Test Position of Body-Worn with 0mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	6/2437	802.11b	0.138	0.059	-1.26	13.87	14.00	0.142	2025/8/25	
Back Side	6/2437	802.11b	0.139	0.060	-3.69	13.87	14.00	0.143	2025/8/25	9#

NOTE: 1.Body-Worn SAR test results of WLAN 2.4G
2. Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	6/2437	802.11b	0.138	0.059	-1.26	13.87	14.00	0.142	2025/8/25	
Back Side	6/2437	802.11b	0.139	0.060	-3.69	13.87	14.00	0.143	2025/8/25	9#
Right Side	6/2437	802.11b	0.070	0.029	1.98	13.87	14.00	0.072	2025/8/25	
Top Side	6/2437	802.11b	0.129	0.055	-1.79	13.87	14.00	0.133	2025/8/25	

NOTE:1. Hotspot SAR test results of WLAN 2.4G
2.Tested by : Max Zhou

10.1.8. SAR measurement Result of WLAN 5.2G

Test Position of Body-Worn with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	42/5210	802.11ac VHT80	0.154	0.068	3.65	12.59	13.00	0.169	2025/8/21	5#
Back Side	42/5210	802.11ac VHT80	0.100	0.044	2.75	12.59	13.00	0.110	2025/8/21	

NOTE: 1.Body-Worn SAR test results of WLAN 5.2G

2. Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	42/5210	802.11ac VHT80	0.154	0.068	3.65	12.59	13.00	0.169	2025/8/21	5#
Back Side	42/5210	802.11ac VHT80	0.100	0.044	2.75	12.59	13.00	0.110	2025/8/21	
Right Side	42/5210	802.11ac VHT80	0.068	0.029	-1.70	12.59	13.00	0.075	2025/8/21	
Top Side	42/5210	802.11ac VHT80	0.136	0.059	-1.13	12.59	13.00	0.149	2025/8/21	

NOTE: 1.Hotspot SAR test results of WLAN 5.2G

2. Tested by : Max Zhou

10.1.9. SAR measurement Result of WLAN 5.3G

Test Position of Body-Worn with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	54/5270	802.11ac VHT40	0.169	0.073	-0.15	13.61	14.00	0.185	2025/8/22	6#
Back Side	54/5270	802.11ac VHT40	0.100	0.041	2.39	13.61	14.00	0.109	2025/8/22	

NOTE: 1.Body-Worn SAR test results of WLAN 5.3G

2. Tested by : Max Zhou

Test Position of Hotspot	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						

with 0mm										
Front Side	54/5270	802.11ac VHT40	0.169	0.073	-0.15	13.61	14.00	0.185	2025/8/22	6#
Back Side	54/5270	802.11ac VHT40	0.100	0.041	2.39	13.61	14.00	0.109	2025/8/22	
Right Side	54/5270	802.11ac VHT40	0.076	0.032	3.86	13.61	14.00	0.083	2025/8/22	
Top Side	54/5270	802.11ac VHT40	0.136	0.059	2.29	13.61	14.00	0.149	2025/8/22	

NOTE: 1.Hotspot SAR test results of WLAN 5.3G
2.Tested by : Max Zhou

10.1.10. SAR measurement Result of WLAN 5.6G

Test Position of Body-Worn with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	120/5600	802.11a	0.291	0.109	2.35	13.68	14.00	0.313	2025/8/23	7#
Back Side	120/5600	802.11a	0.155	0.057	0.33	13.68	14.00	0.167	2025/8/23	

NOTE: 1.Body-Worn SAR test results of WLAN 5.6G
2.Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	120/5600	802.11a	0.291	0.109	2.35	13.68	14.00	0.313	2025/8/23	7#
Back Side	120/5600	802.11a	0.155	0.057	0.33	13.68	14.00	0.167	2025/8/23	
Right Side	120/5600	802.11a	0.120	0.043	-3.38	13.68	14.00	0.129	2025/8/23	
Top Side	120/5600	802.11a	0.248	0.089	-0.92	13.68	14.00	0.267	2025/8/23	

NOTE: 1.Hotspot SAR test results of WLAN 5.6G
2.Tested by : Max Zhou

10.1.11. SAR measurement Result of WLAN 5.8G

Test Position of Body-Worn with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	159/5795	802.11n HT40	0.439	0.139	4.98	13.46	13.50	0.443	2025/8/24	8#
Back Side	159/5795	802.11n HT40	0.230	0.071	1.26	13.46	13.50	0.232	2025/8/24	

NOTE:1. Body-Worn SAR test results of WLAN 5.8G

2. Tested by : Max Zhou

Test Position of Hotspot with 0mm	Test channel /Freq	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Front Side	159/5795	802.11n HT40	0.439	0.139	4.98	13.46	13.50	0.443	2025/8/24	8#
Back Side	159/5795	802.11n HT40	0.230	0.071	1.26	13.46	13.50	0.232	2025/8/24	
Right Side	159/5795	802.11n HT40	0.192	0.061	-1.93	13.46	13.50	0.194	2025/8/24	
Top Side	159/5795	802.11n HT40	0.384	0.122	1.18	13.46	13.50	0.388	2025/8/24	

NOTE: 1. Hotspot SAR test results of WLAN 5.8G

2. Tested by : Max Zhou

10.2. SAR Summation Scenario

Per KDB 447498 D01, simultaneous transmission SAR is compliant if,

- Scalar SAR summation < 1.6W/kg.
- $SPLSR = (SAR_1 + SAR_2)^{1.5} / (\text{min. separation distance, mm})$, and the peak separation distance is determined from the square root of $[(x_1 - x_2)^2 + (y_1 - y_2)^2 + (z_1 - z_2)^2]$, where (x_1, y_1, z_1) and (x_2, y_2, z_2) are the coordinates of the extrapolated peak SAR locations in the zoom scan. If $SPLSR \leq 0.04$, simultaneously transmission SAR measurement is not necessary.

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	DTS			
Hotspot	Front Side	0.90	0.142	1.042	N/A	N/A
	Back Side	0.886	0.143	1.029	N/A	N/A

Body	Front Side	0.90	0.142	1.042	N/A	N/A
	Back Side	0.886	0.143	1.029	N/A	N/A
	Left Side	0.091	N/A	0.091	N/A	N/A
	Right Side	0.045	0.072	0.117	N/A	N/A
	Top Side	0.639	0.133	0.772	N/A	N/A
	Bottom Side	N/A	N/A	N/A	N/A	N/A

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	NII			
Hotspot	Front Side	0.90	0.443	1.343	N/A	N/A
	Back Side	0.886	0.232	1.118	N/A	N/A
Body	Front Side	0.90	0.443	1.343	N/A	N/A
	Back Side	0.886	0.232	1.118	N/A	N/A
	Left Side	0.091	0.000	0.091	N/A	N/A
	Right Side	0.045	0.194	0.239	N/A	N/A
	Top Side	0.639	0.388	1.027	N/A	N/A
	Bottom Side	N/A	N/A	N/A	N/A	N/A

Test Position		Scaled SAR _{MAX}		Σ 1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	DSS			
Hotspot	Front Side	0.90	0.133	1.033	N/A	N/A
	Back Side	0.886	0.133	1.019	N/A	N/A
Body	Front Side	0.90	0.133	1.033	N/A	N/A
	Back Side	0.886	0.133	1.019	N/A	N/A
	Left Side	0.091	0.133	0.224	N/A	N/A
	Right Side	0.045	0.133	0.178	N/A	N/A
	Top Side	0.639	0.133	0.772	N/A	N/A
	Bottom Side	N/A	N/A	N/A	N/A	N/A

11. Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

12. Appendix B. System Check Plots

Table of contents
MEASUREMENT 1 System Performance Check - 835MHz
MEASUREMENT 2 System Performance Check - 1800MHz
MEASUREMENT 3 System Performance Check - 1900MHz
MEASUREMENT 4 System Performance Check - 2450MHz
MEASUREMENT 5 System Performance Check - 2600MHz
MEASUREMENT 6 System Performance Check - 5200MHz
MEASUREMENT 7 System Performance Check - 5400MHz
MEASUREMENT 8 System Performance Check - 5600MHz
MEASUREMENT 9 System Performance Check - 5800MHz

1# System check at 835 MHz
Date of measurement: 16/8/2025

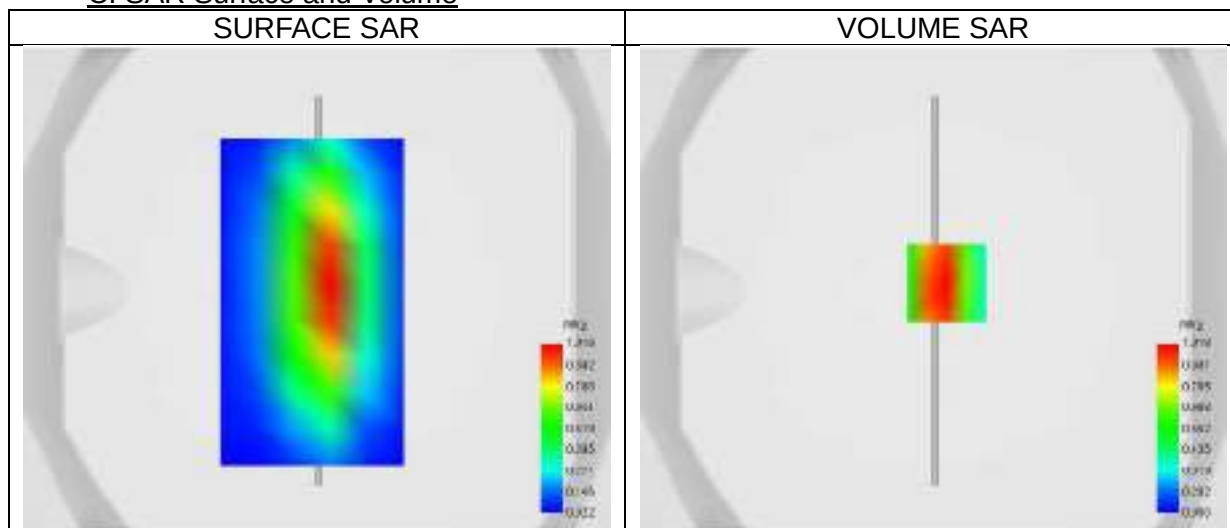
A. Experimental conditions.

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	Dipole
Band	CW835
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	835.00
Relative permittivity (real part)	41.92
Relative permittivity (imaginary part)	19.73
Conductivity (S/m)	0.92

C. SAR Surface and Volume



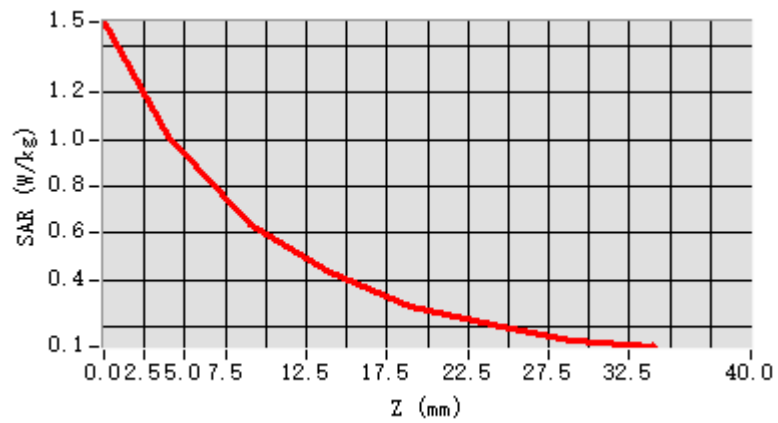
Maximum location: X=5.00, Y=3.00 ; SAR Peak: 1.54 W/kg

D. SAR 1g & 10g

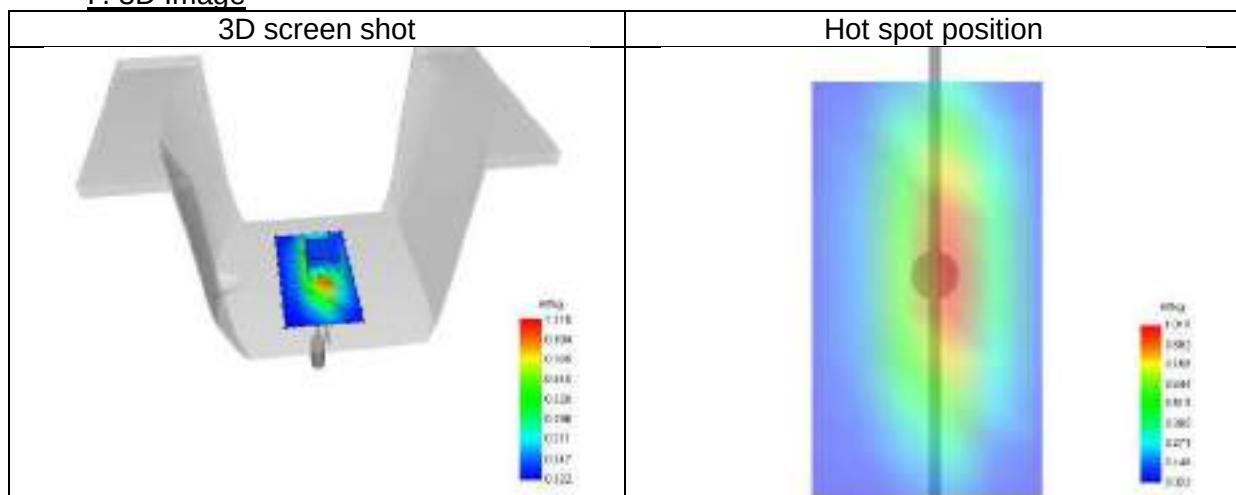
SAR 10g (W/Kg)	0.587
SAR 1g (W/Kg)	0.993
Variation (%)	-0.55
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	62.31

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.502	1.018	0.634	0.429	0.285	0.211	0.146



F. 3D Image



2# System check at 1800 MHz
Date of measurement: 20/8/2025

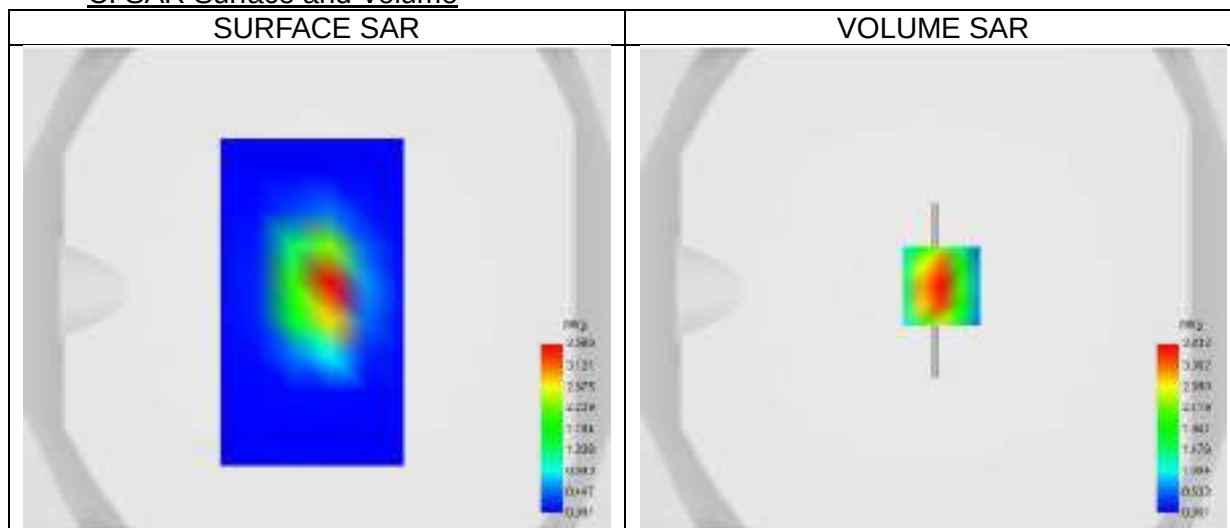
A. Experimental conditions.

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)	38.65
Relative permittivity (imaginary part)	13.69
Conductivity (S/m)	1.37

C. SAR Surface and Volume



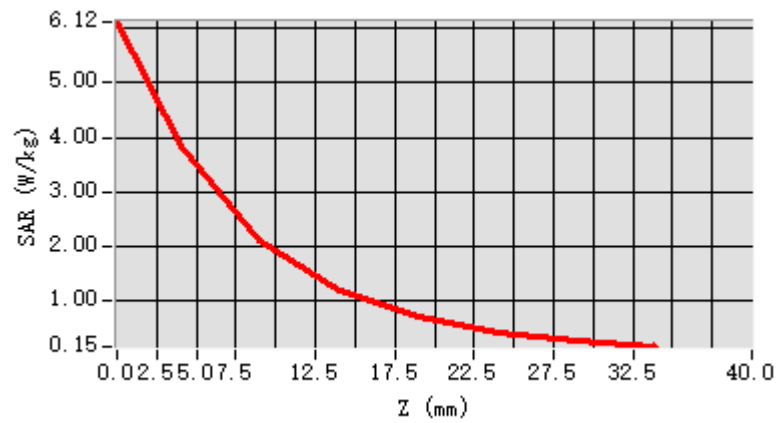
Maximum location: X=3.00, Y=2.00 ; SAR Peak: 6.20 W/kg

D. SAR 1g & 10g

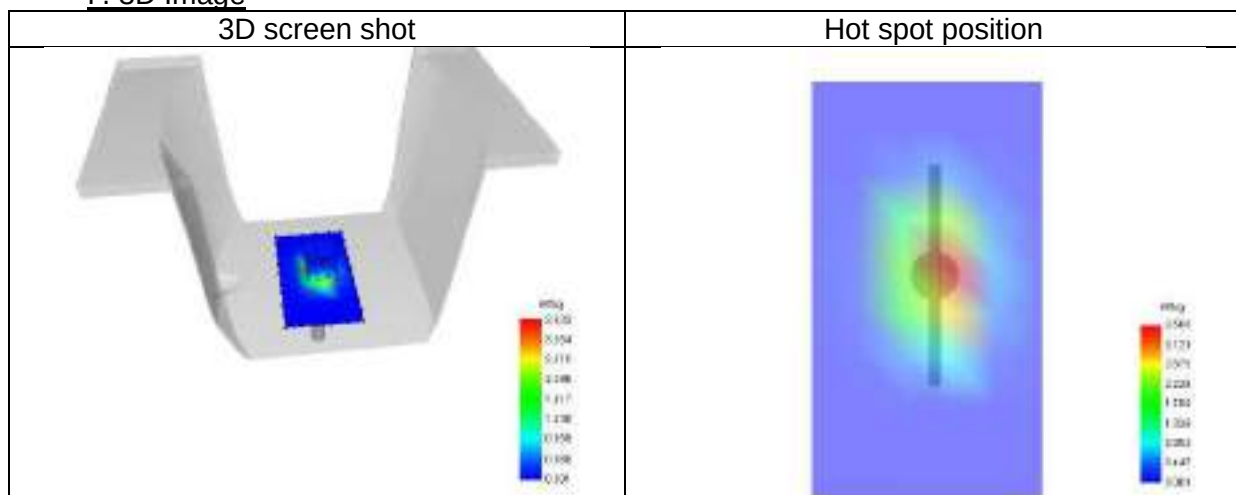
SAR 10g (W/Kg)	1.838
SAR 1g (W/Kg)	3.643
Variation (%)	-0.16
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	54.51

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.123	3.833	2.090	1.200	0.701	0.419	0.251



F. 3D Image



3# System check at 1900 MHz
 Date of measurement: 17/8/2025

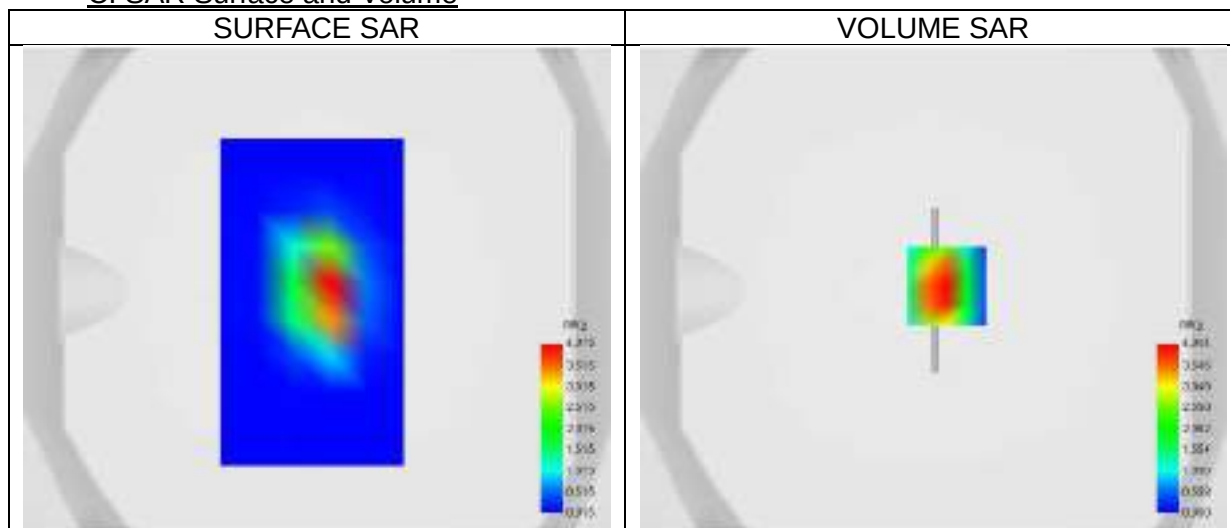
A. Experimental conditions.

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	Dipole
Band	CW1900
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	1900.00
Relative permittivity (real part)	38.23
Relative permittivity (imaginary part)	13.46
Conductivity (S/m)	1.42

C. SAR Surface and Volume



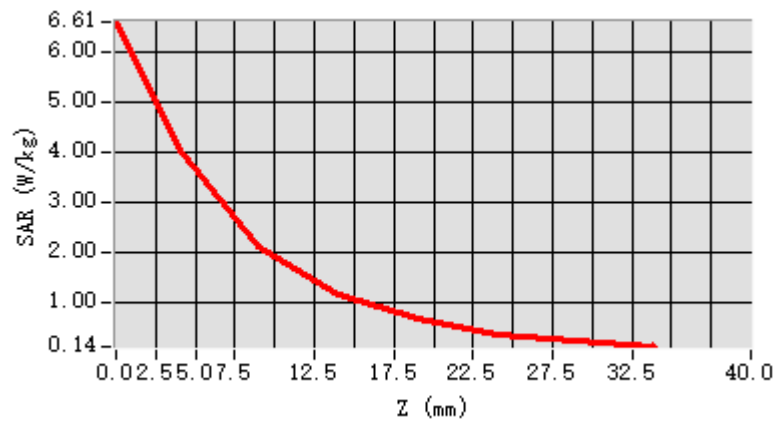
Maximum location: X=5.00, Y=2.00 ; SAR Peak: 6.96 W/kg

D. SAR 1g & 10g

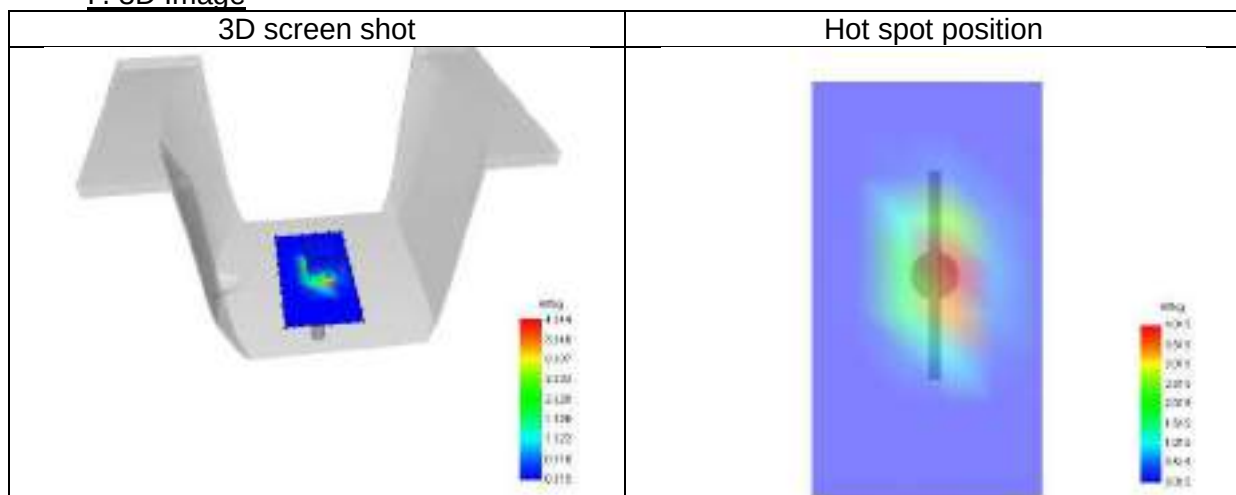
SAR 10g (W/Kg)	1.945
SAR 1g (W/Kg)	4.075
Variation (%)	0.10
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	52.36

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.609	4.044	2.118	1.181	0.688	0.388	0.259



F. 3D Image



4# System check at 2450 MHz

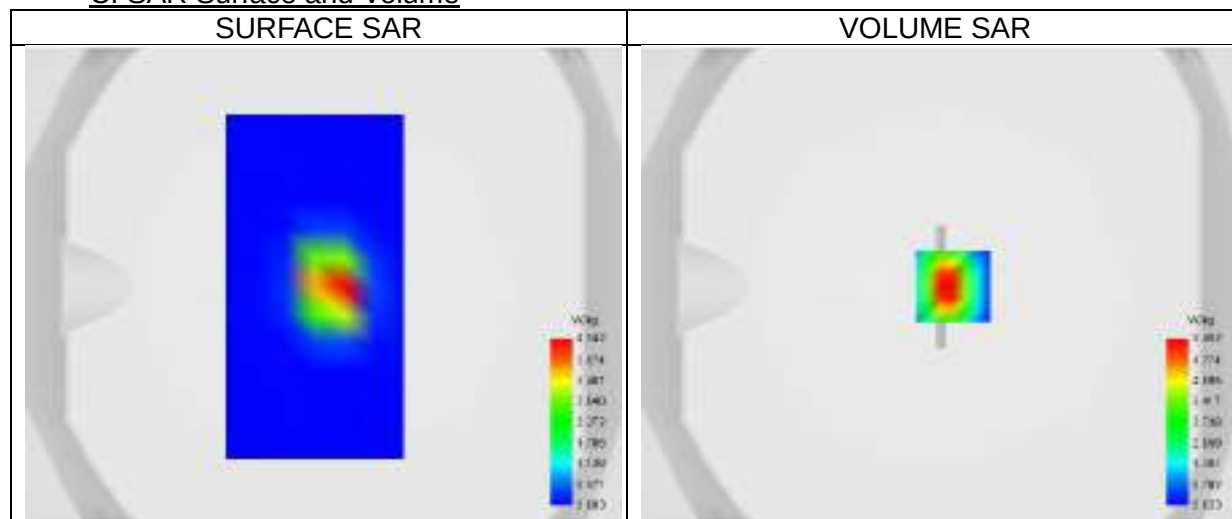
Date of measurement: 25/8/2025

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)	38.04
Relative permittivity (imaginary part)	13.21
Conductivity (S/m)	1.80

C. SAR Surface and Volume

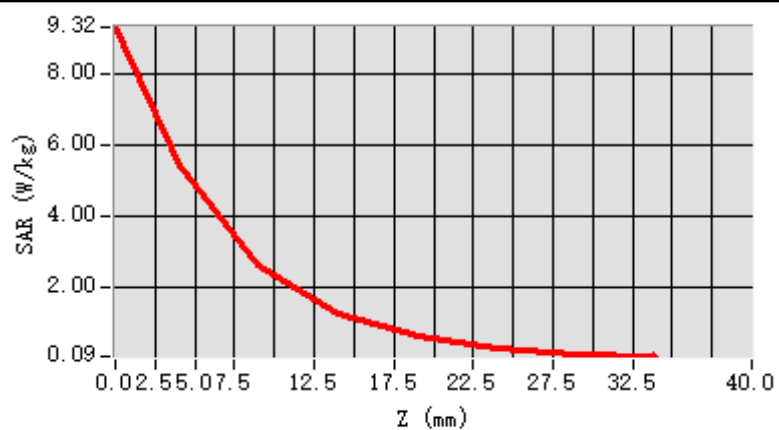
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 9.74 W/kg

D. SAR 1g & 10g

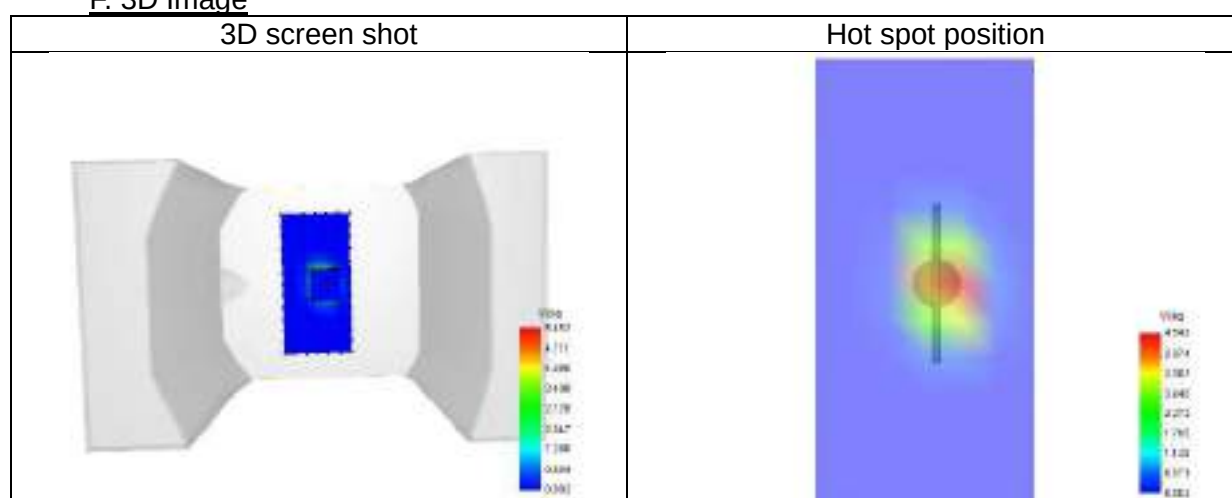
SAR 10g (W/Kg)	2.241
SAR 1g (W/Kg)	5.175
Variation (%)	0.03
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	48.44

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.318	5.452	2.641	1.311	0.675	0.340	0.171



F. 3D Image



5# System check at 2600 MHz
 Date of measurement: 18/8/2025

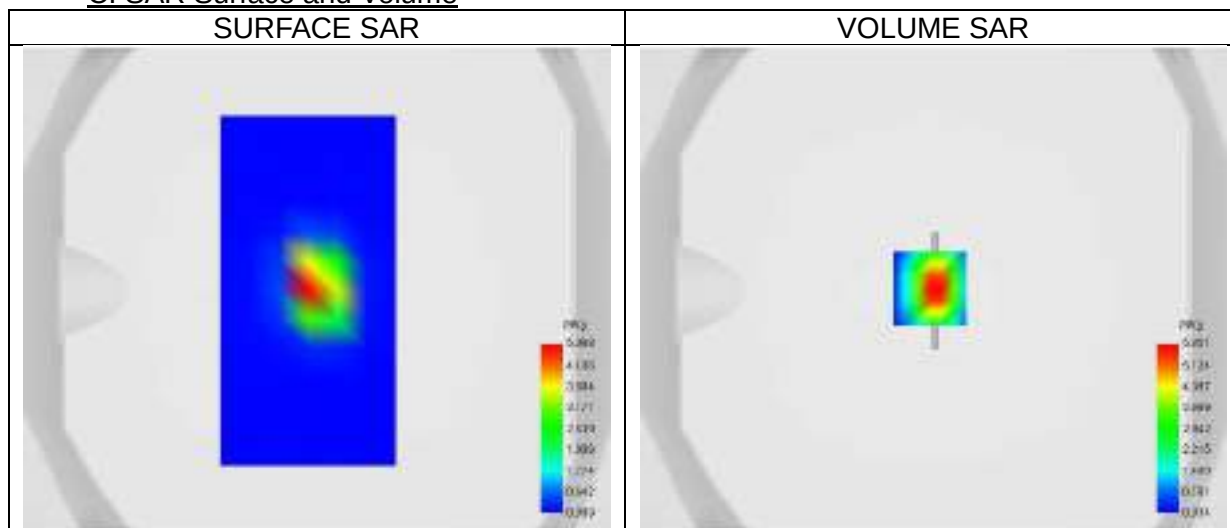
A. Experimental conditions.

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)	39.47
Relative permittivity (imaginary part)	13.32
Conductivity (S/m)	1.92

C. SAR Surface and Volume



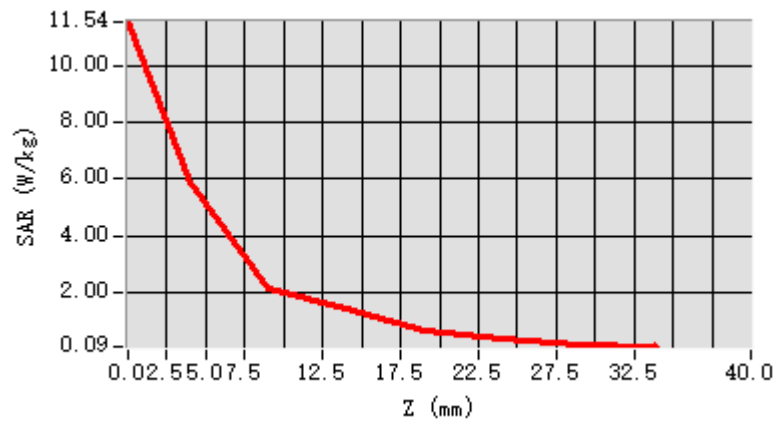
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 10.41 W/kg

D. SAR 1g & 10g

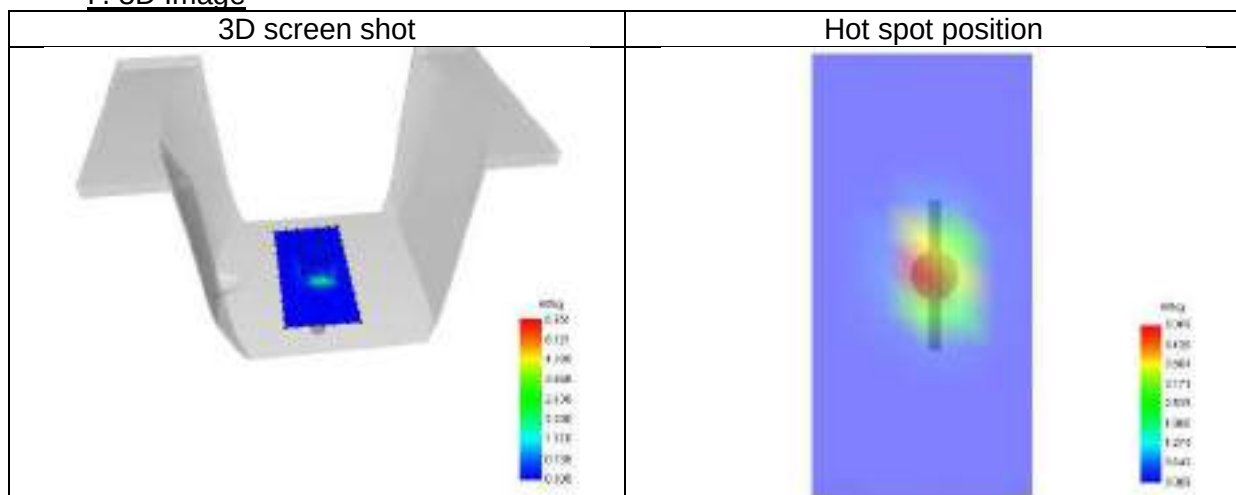
SAR 10g (W/Kg)	2.322
SAR 1g (W/Kg)	5.430
Variation (%)	1.88
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	48.95

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	11.538	5.851	2.171	1.398	0.619	0.383	0.173



F. 3D Image



6# System check at 5200 MHz
Date of measurement: 21/8/2025

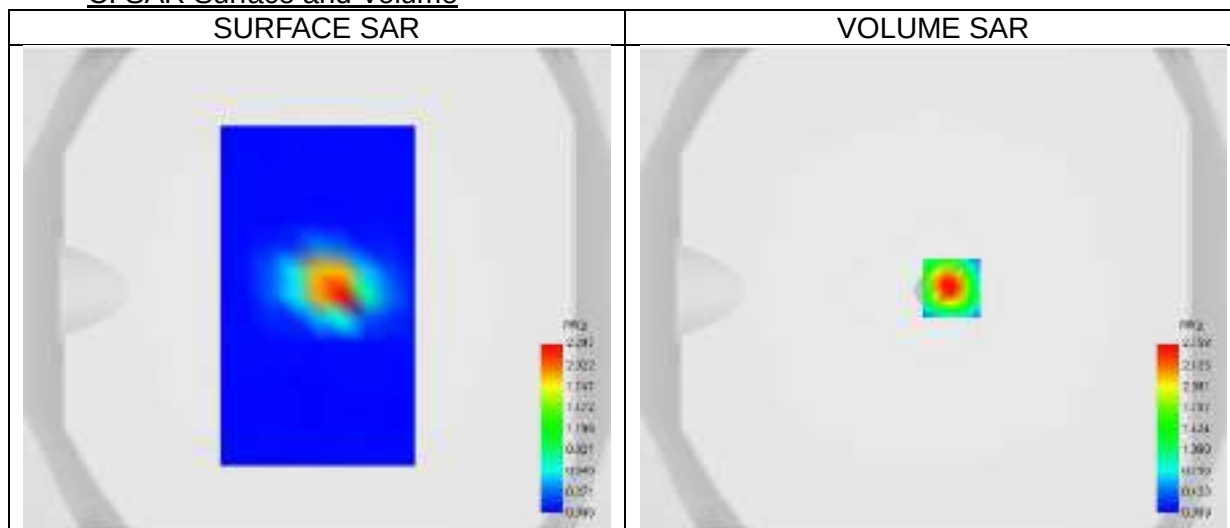
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.37
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Body
Band	CW5200
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	5200.000
Relative permittivity (real part)	36.87
Relative permittivity (imaginary part)	15.60
Conductivity (S/m)	4.51

C. SAR Surface and Volume



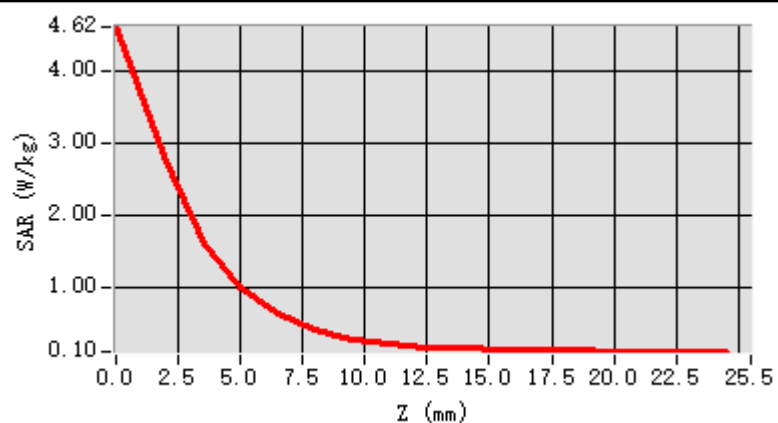
Maximum location: X=7.00, Y=1.00 ; SAR Peak: 4.96 W/kg

D. SAR 1g & 10g

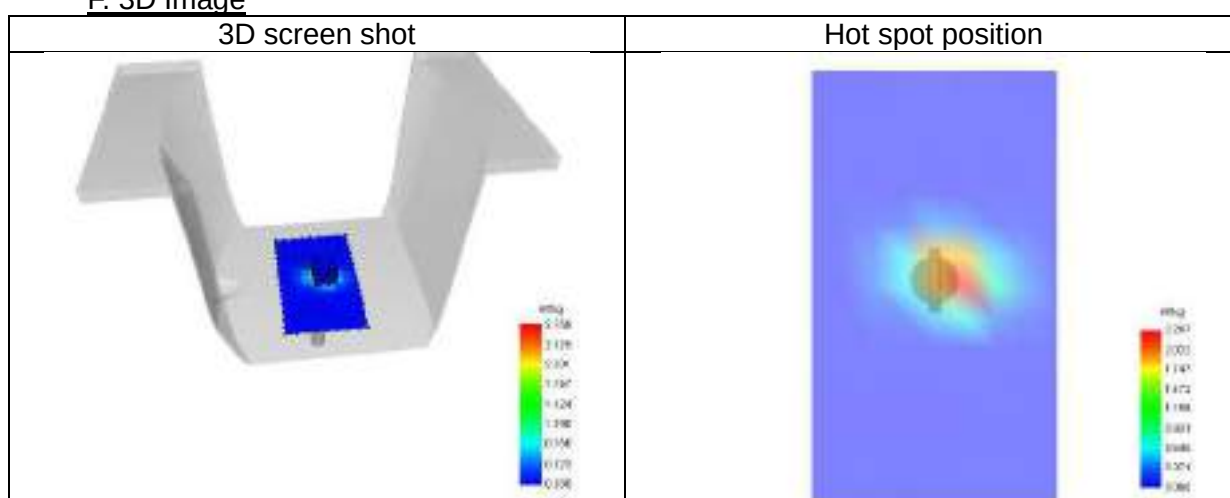
SAR 10g (W/Kg)	0.594
SAR 1g (W/Kg)	1.610
Variation (%)	2.55
Horizontal validation criteria: minimum distance (mm)	9.00
Vertical validation criteria: SAR ratio M2/M1 (%)	58.69

E. Z Axis Scan

Z (mm)	0.0	2.0	3.5	5.0	6.5	8.0	9.5	11.	12.	14.	15.	17.	18.	20.	21.	23.
	0	0	0	0	0	0	0	00	50	00	50	00	50	00	50	00
SAR (W/Kg)	4.6	2.7	1.6	0.9	0.6	0.4	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.1
	22	58	19	92	23	04	77	18	61	46	31	24	17	99	99	08



F. 3D Image



7# System check at 5400 MHz

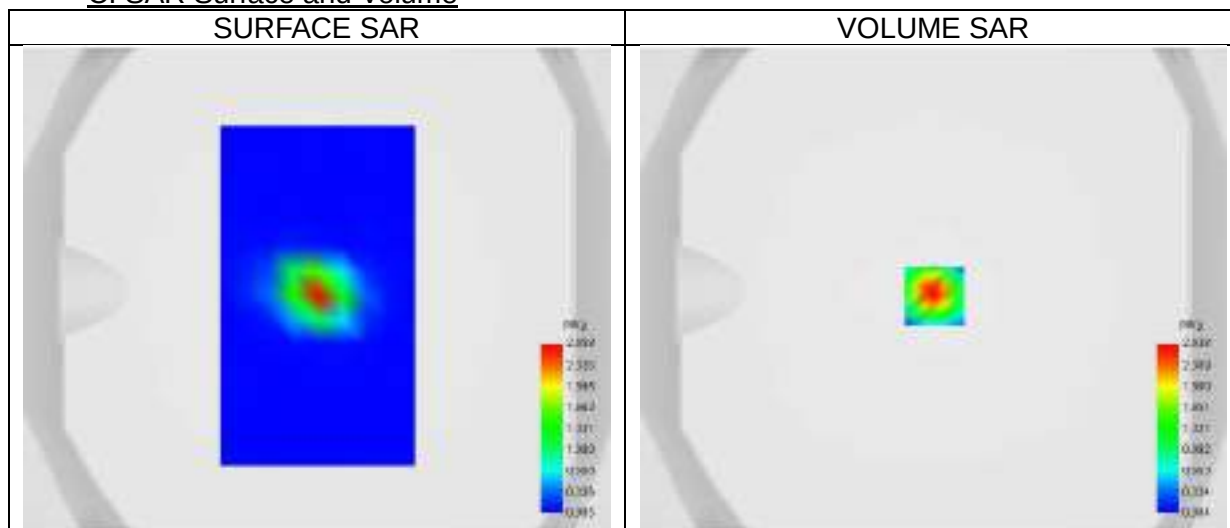
Date of measurement: 22/8/2025

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	CW5400
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	5400.00
Relative permittivity (real part)	34.90
Relative permittivity (imaginary part)	16.54
Conductivity (S/m)	4.96

C. SAR Surface and Volume

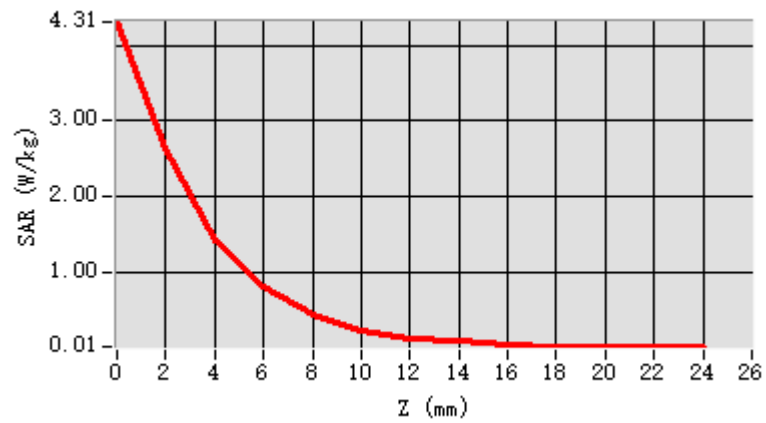
Maximum location: X=0.00, Y=-2.00 ; SAR Peak: 4.58 W/kg

D. SAR 1g & 10g

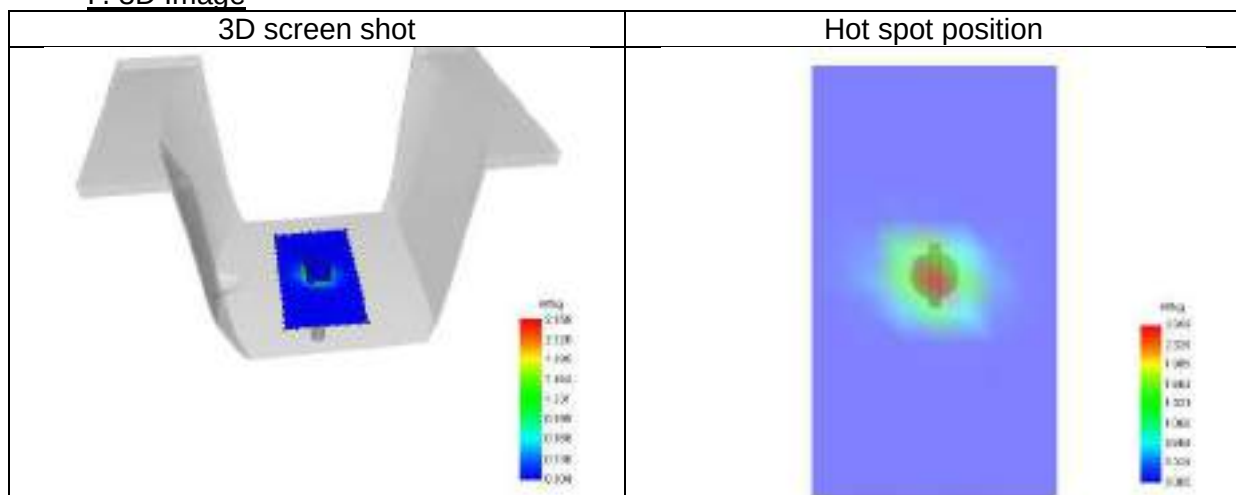
SAR 10g (W/Kg)	0.517
SAR 1g (W/Kg)	1.526
Variation (%)	0.51
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	54.05

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)	4.31	2.63	1.42	0.79	0.43	0.21	0.12	0.07	0.04	0.01	0.01	0.00
	0	8	6	8	5	9	0	5	1	7	2	7



F. 3D Image



8# System check at 5600 MHz
 Date of measurement: 23/8/2025

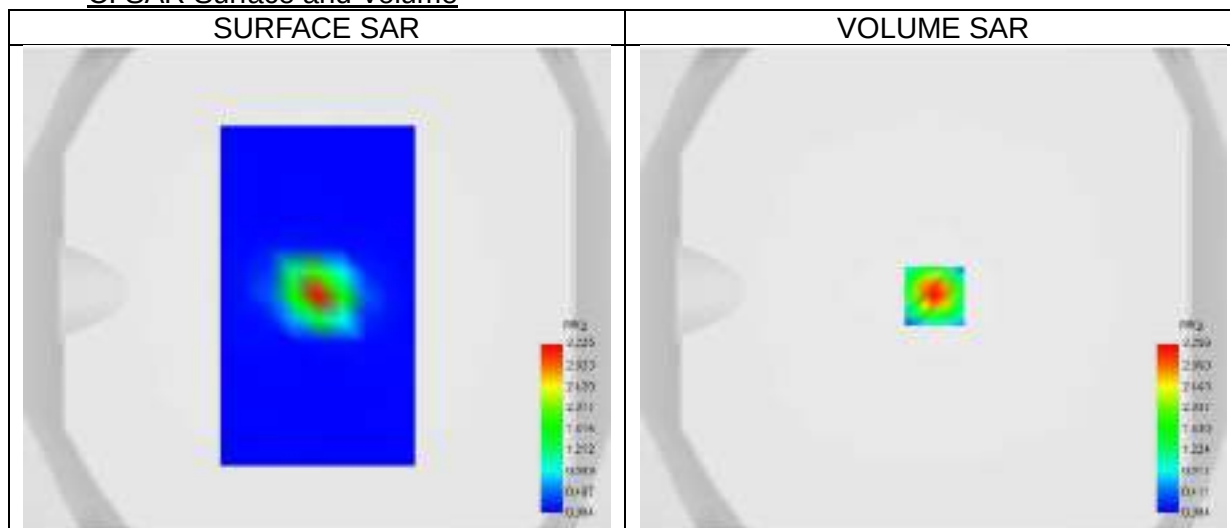
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.36
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	CW5600
Signal	CW
Channels/Frequency	Middle

B. Permittivity

Middle TX Frequency (MHz)	5600.00
Relative permittivity (real part)	35.33
Relative permittivity (imaginary part)	16.15
Conductivity (S/m)	5.02

C. SAR Surface and Volume



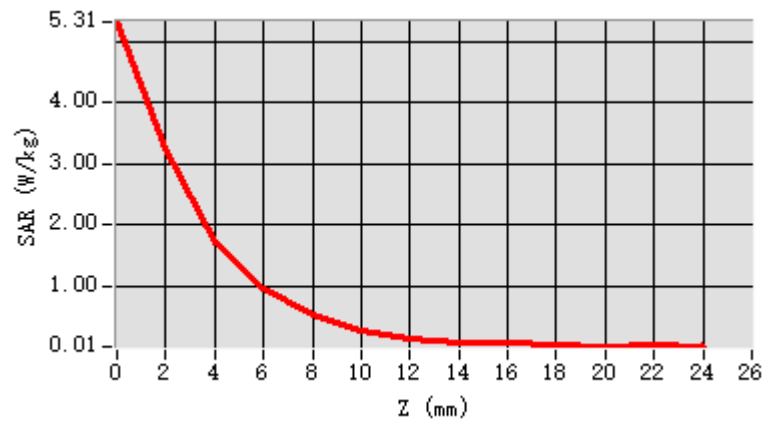
Maximum location: X=0.00, Y=-2.00 ; SAR Peak: 5.81 W/kg

D. SAR 1g & 10g

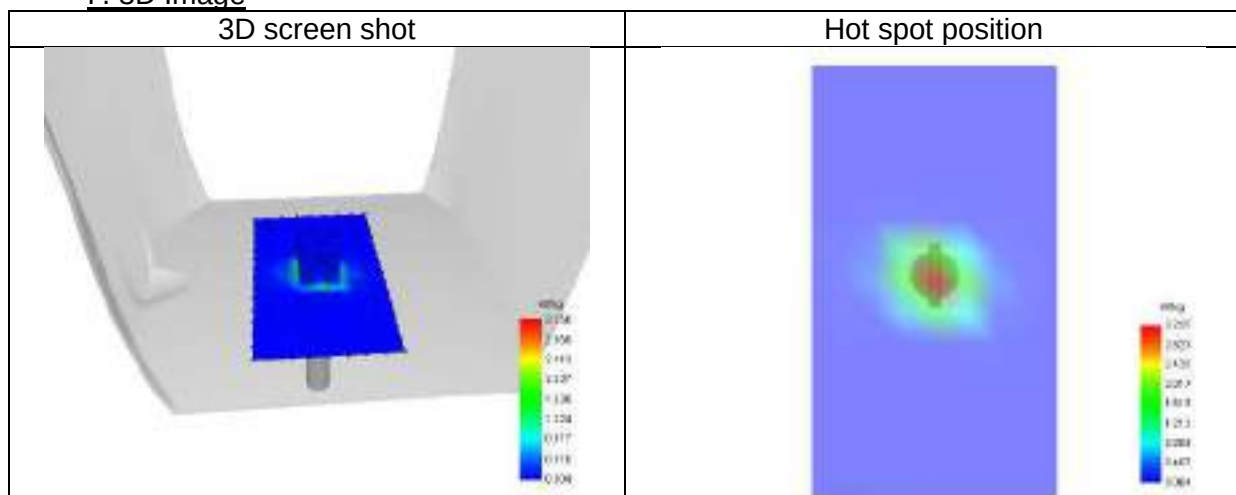
SAR 10g (W/Kg)	0.645
SAR 1g (W/Kg)	1.362
Variation (%)	2.43
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	52.22

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)	5.31	3.25	1.70	0.97	0.54	0.29	0.15	0.08	0.06	0.05	0.03	0.04
	4	6	0	0	3	2	9	1	6	3	0	4



F. 3D Image



9# System check at 5800 MHz2
Date of measurement: 24/8/2025

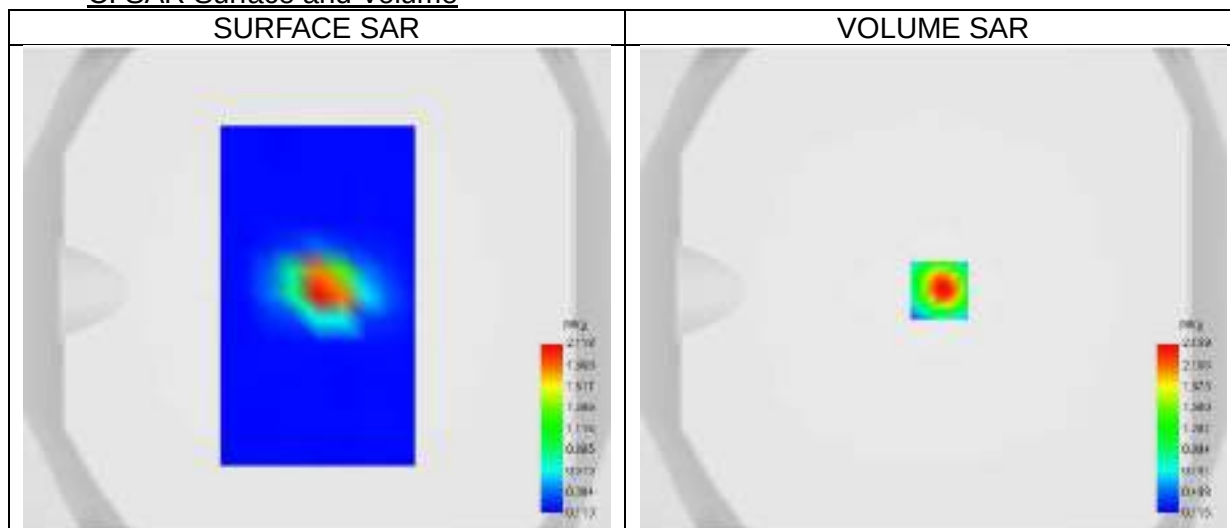
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.35
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	9x9x16,dx=3mm dy=3mm dz=1.5mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Channels/Frequency	Middle
Signal	CW

B. Permittivity

Middle TX Frequency (MHz)	5800.000
Relative permittivity (real part)	35.47
Relative permittivity (imaginary part)	15.97
Conductivity (S/m)	5.14

C. SAR Surface and Volume



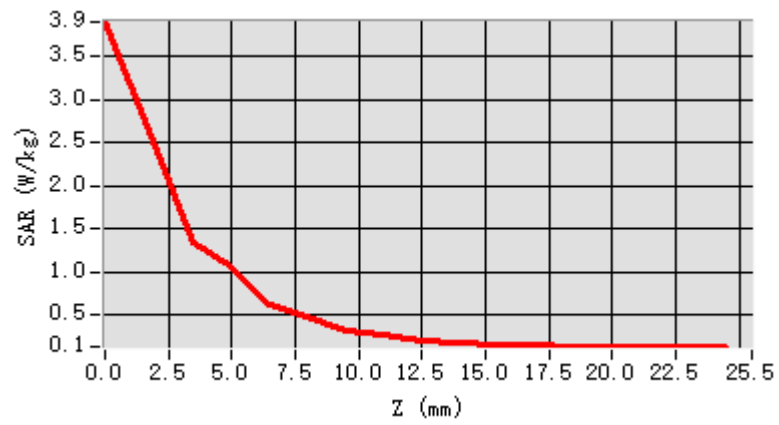
Maximum location: X=2.00, Y=0.00 ; SAR Peak: 4.23 W/kg

D. SAR 1g & 10g

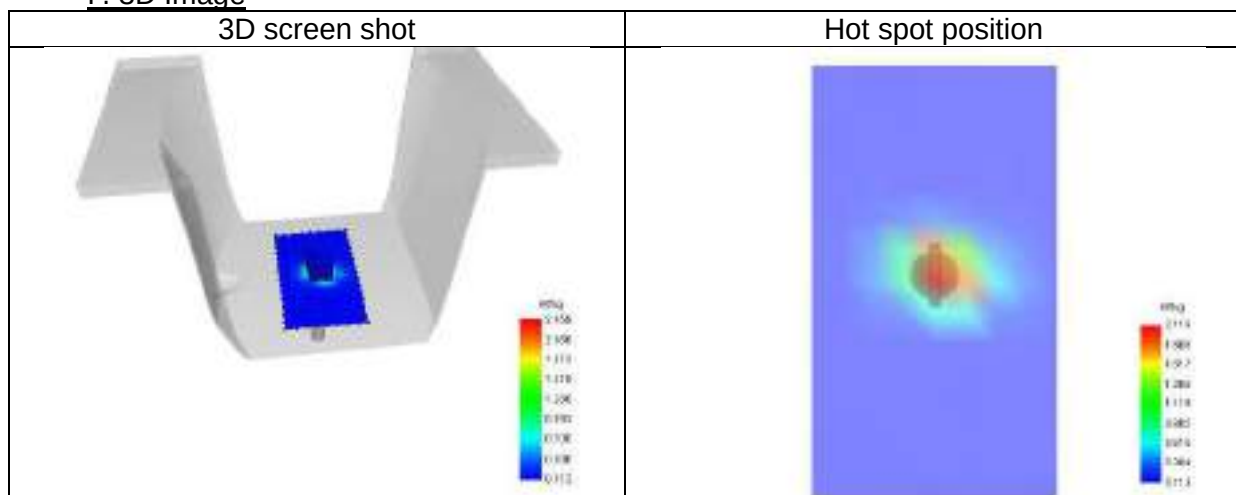
SAR 10g (W/Kg)	0.580
SAR 1g (W/Kg)	1.499
Variation (%)	1.18
Horizontal validation criteria: minimum distance (mm)	9.49
Vertical validation criteria: SAR ratio M2/M1 (%)	63.37

E. Z Axis Scan

Z (mm)	0.0	2.0	3.5	5.0	6.5	8.0	9.5	11.	12.	14.	15.	17.	18.	20.	21.	23.
	0	0	0	0	0	0	0	00	50	00	50	00	50	00	50	00
SAR (W/Kg)	3.9	2.4	1.3	1.0	0.6	0.4	0.3	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
	06	59	37	63	25	95	28	84	15	93	71	52	44	46	47	38



F. 3D Image



13. Appendix C. Plots of High SAR Measurement

Table of contents
1# SAR Measurement at GPRS850 (Body, Validation Plane)
2# SAR Measurement at GPRS1900 (Body, Validation Plane)
3# SAR Measurement at Band 2 (1900) (Body, Validation Plane)
4# SAR Measurement at Band 5 (850) (Body, Validation Plane)
5# SAR Measurement at U-NII-1 (Body, Validation Plane)
6# SAR Measurement at U-NII-2a (Body, Validation Plane)
7# SAR Measurement at U-NII-2c (Body, Validation Plane)
8# SAR Measurement at U-NII-3 (Body, Validation Plane)
9# SAR Measurement at ISM (Body, Validation Plane)
10# SAR Measurement at LTE band 4 (Body, Validation Plane)
11# SAR Measurement at LTE band 7 (Body, Validation Plane)

1# SAR Measurement at GPRS850 (Body, Validation Plane)

Date of measurement: 16/8/2025

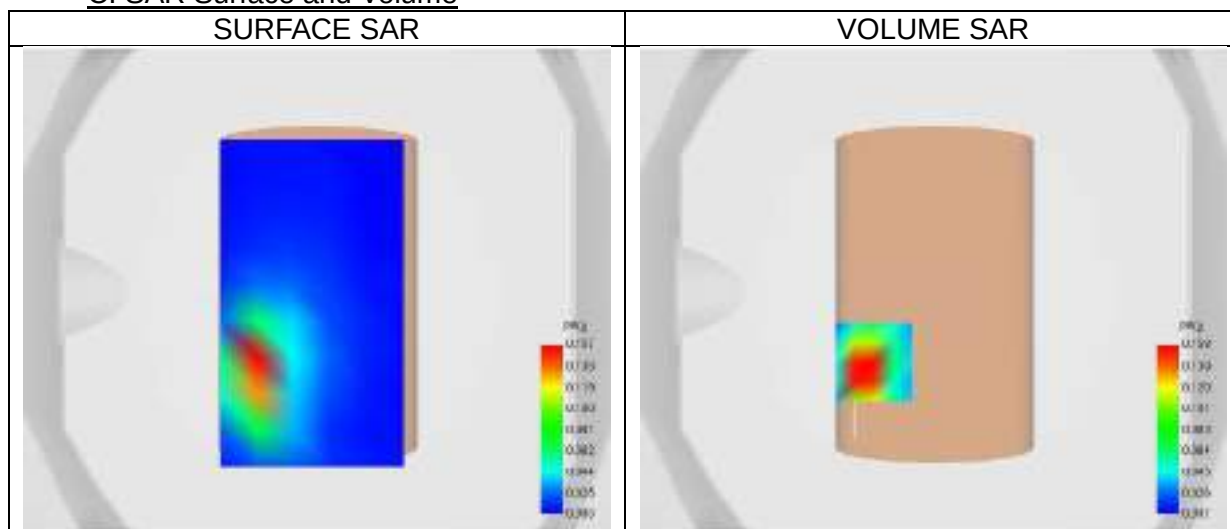
A. Experimental conditions.

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	GPRS850
Signal	TDMA (GPRS)
Channels/Frequency	Middle (189)/ frequency 836.40 Mhz
Modulation	GMSK (CS-4)
TX-slots	4

B. Permittivity

Middle TX Frequency (MHz)	836.40
Relative permittivity (real part)	41.83
Relative permittivity (imaginary part)	19.76
Conductivity (S/m)	0.92

C. SAR Surface and Volume



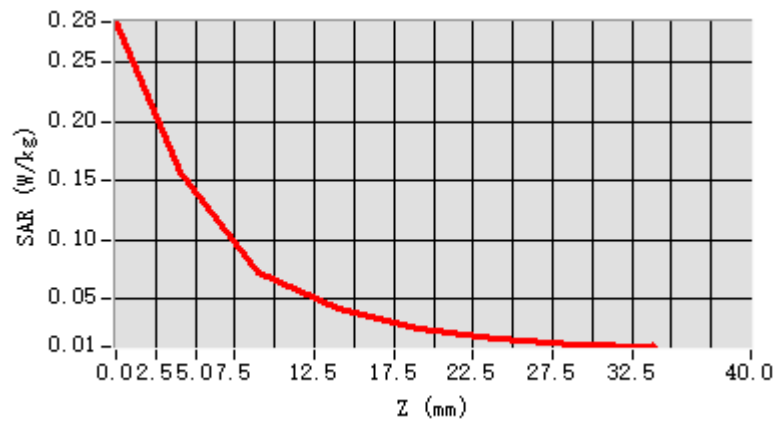
Maximum location: X=-25.00, Y=-29.00 ; SAR Peak: 0.32 W/kg

D. SAR 1g & 10g

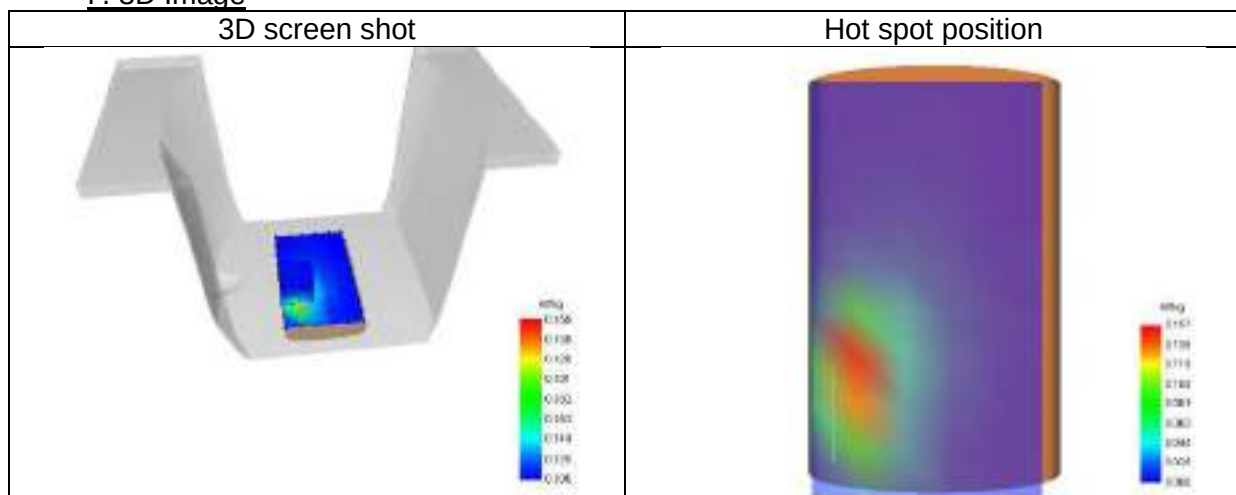
SAR 10g (W/Kg)	0.074
SAR 1g (W/Kg)	0.171
Variation (%)	2.37
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	50.53

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.284	0.158	0.073	0.043	0.026	0.017	0.011



F. 3D Image



2# SAR Measurement at GPRS1900 (Body, Validation Plane)

Date of measurement: 17/8/2025

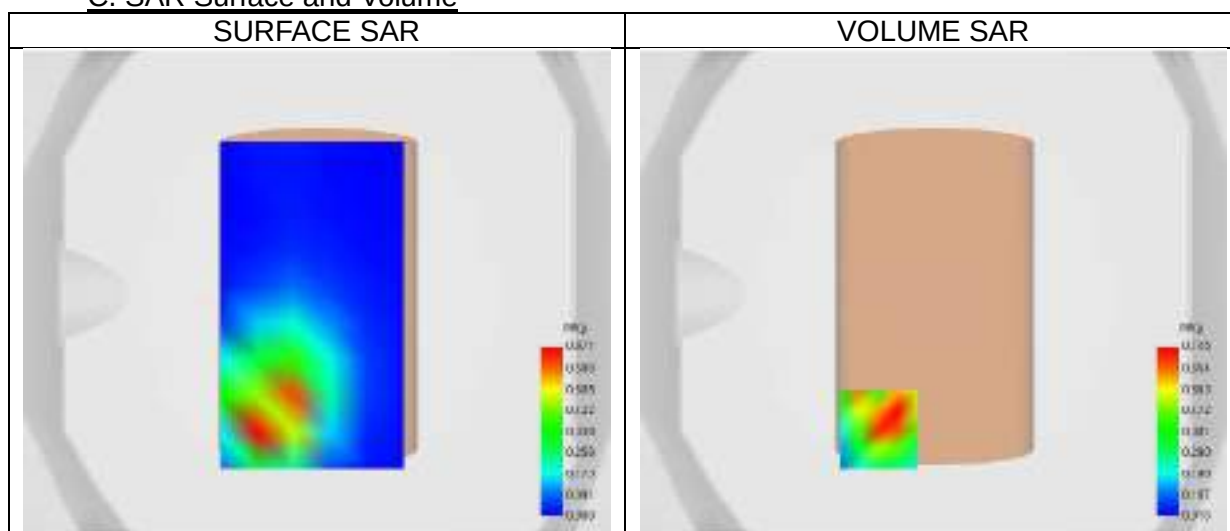
A. Experimental conditions.

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	GPRS1900
Signal	TDMA (GPRS)
Channels/Frequency	Middle (661)/ frequency 1880.00 Mhz
Modulation	GMSK (CS-4)
TX-slots	4

B. Permittivity

Middle TX Frequency (MHz)	1880.00
Relative permittivity (real part)	38.32
Relative permittivity (imaginary part)	13.48
Conductivity (S/m)	1.41

C. SAR Surface and Volume



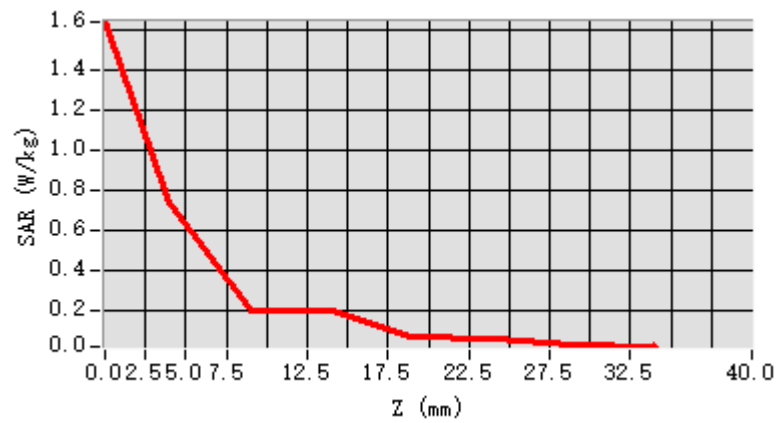
Maximum location: X=-23.00, Y=-56.00 ; SAR Peak: 1.27 W/kg

D. SAR 1g & 10g

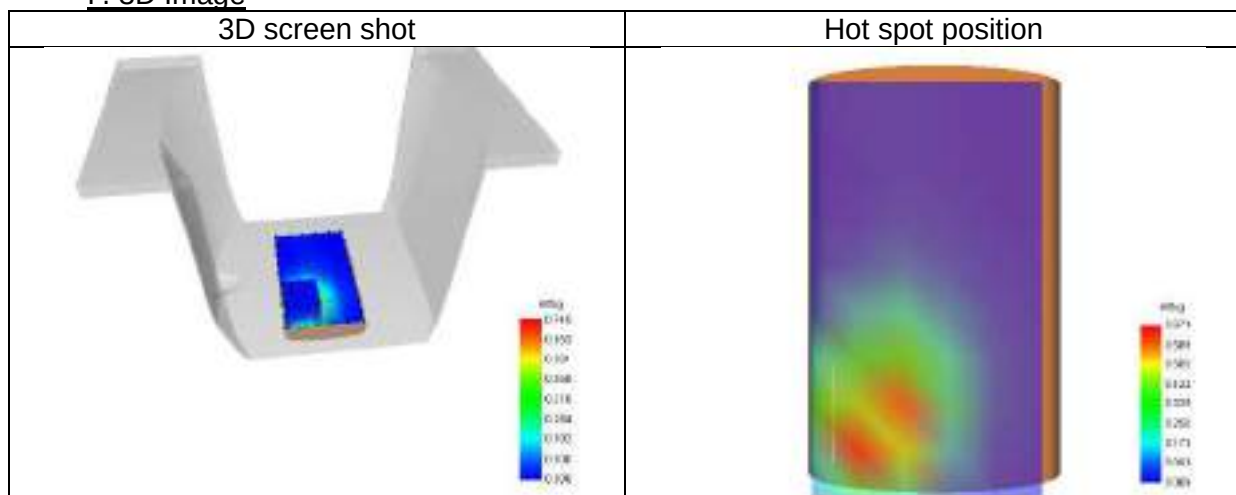
SAR 10g (W/Kg)	0.331
SAR 1g (W/Kg)	0.710
Variation (%)	0.97
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	52.96

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.643	0.745	0.199	0.207	0.073	0.064	0.029



F. 3D Image



3# SAR Measurement at Band 2 (1900) (Body, Validation Plane)

Date of measurement: 17/8/2025

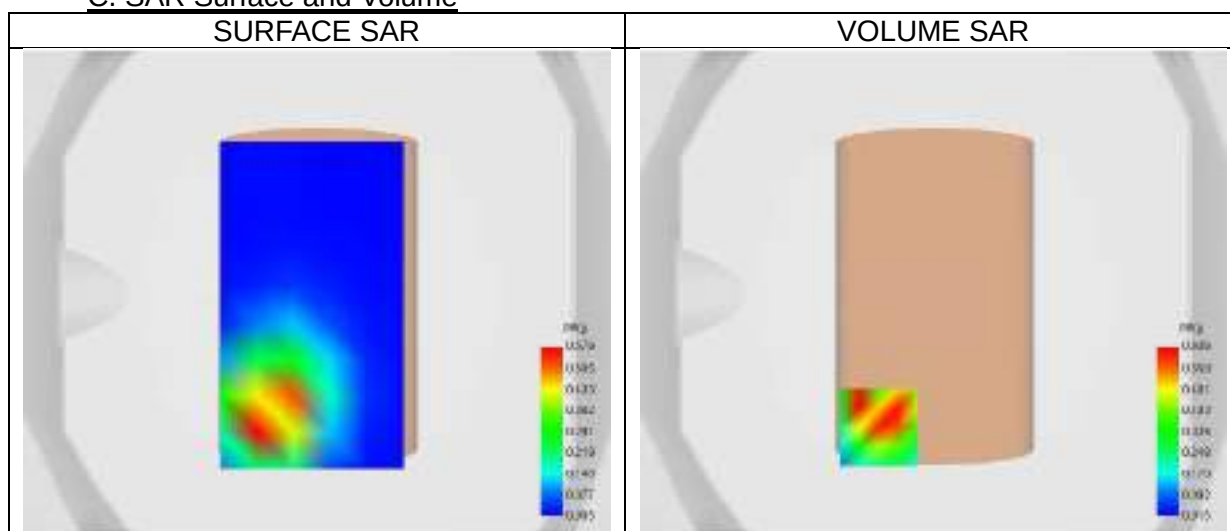
A. Experimental conditions.

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 2 (1900)
Signal	WCDMA
Channels/Frequency	Middle (9400)/ frequency 1880.00 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Middle TX Frequency (MHz)	1880.00
Relative permittivity (real part)	38.32
Relative permittivity (imaginary part)	13.48
Conductivity (S/m)	1.41

C. SAR Surface and Volume



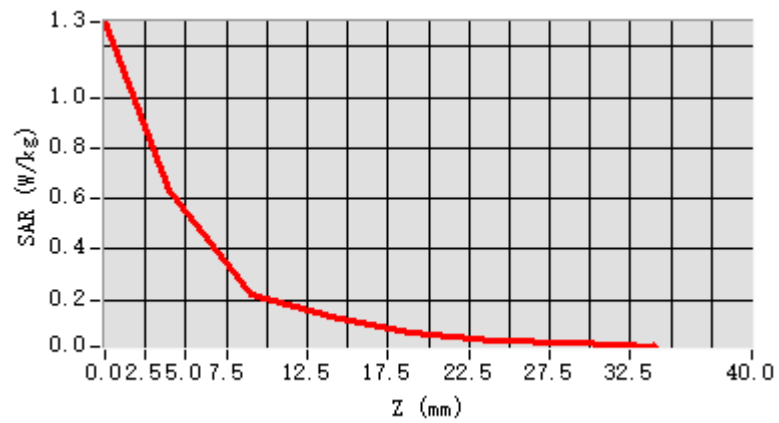
Maximum location: X=-23.00, Y=-55.00 ; SAR Peak: 1.18 W/kg

D. SAR 1g & 10g

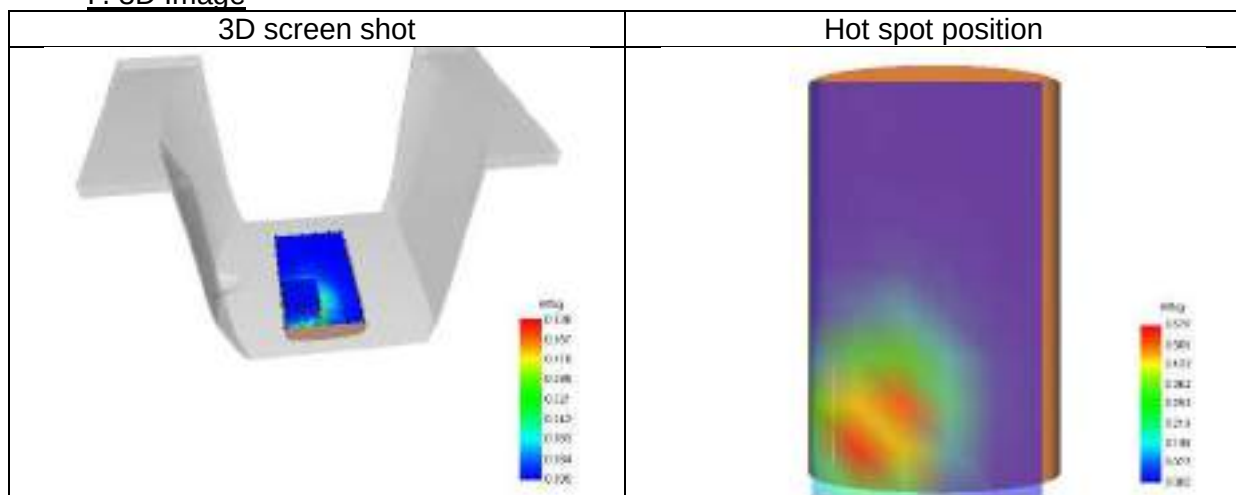
SAR 10g (W/Kg)	0.246
SAR 1g (W/Kg)	0.600
Variation (%)	-1.06
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	52.50

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.297	0.636	0.219	0.133	0.071	0.041	0.031



F. 3D Image



4# SAR Measurement at Band 5 (850) (Body, Validation Plane)

Date of measurement: 16/8/2025

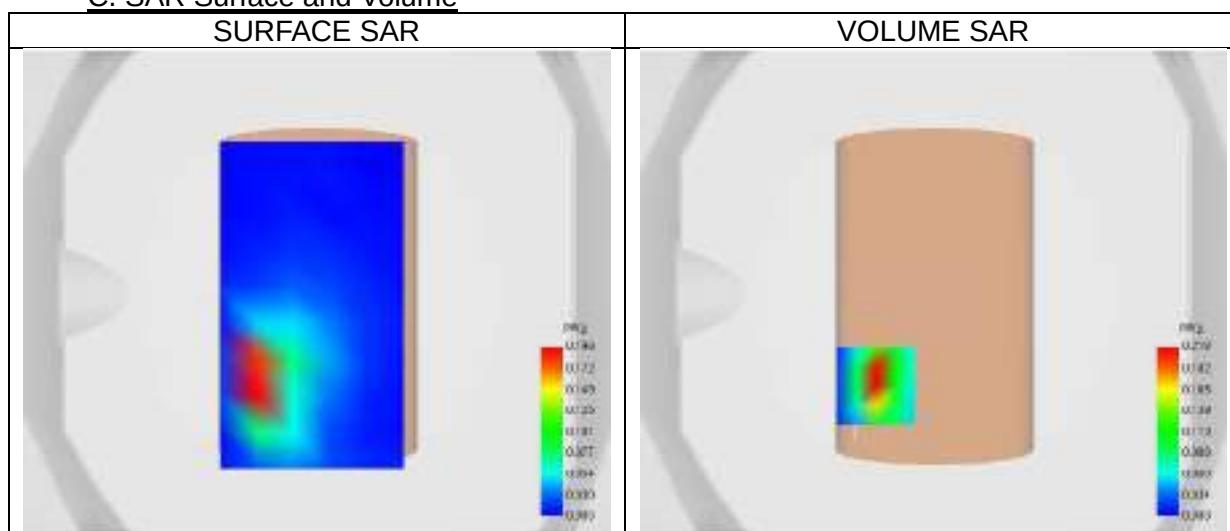
A. Experimental conditions.

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	Band 5 (850)
Signal	WCDMA
Channels/Frequency	Middle (4182)/ frequency 836.40 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permittivity

Middle TX Frequency (MHz)	836.40
Relative permittivity (real part)	41.83
Relative permittivity (imaginary part)	19.76
Conductivity (S/m)	0.92

C. SAR Surface and Volume



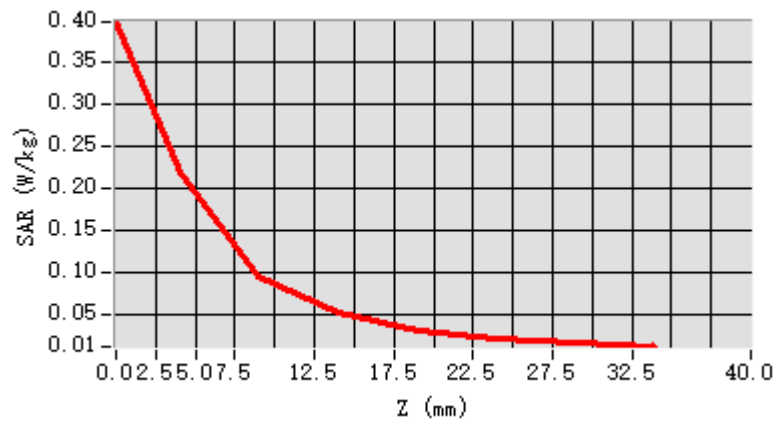
Maximum location: X=-24.00, Y=-38.00 ; SAR Peak: 0.41 W/kg

D. SAR 1g & 10g

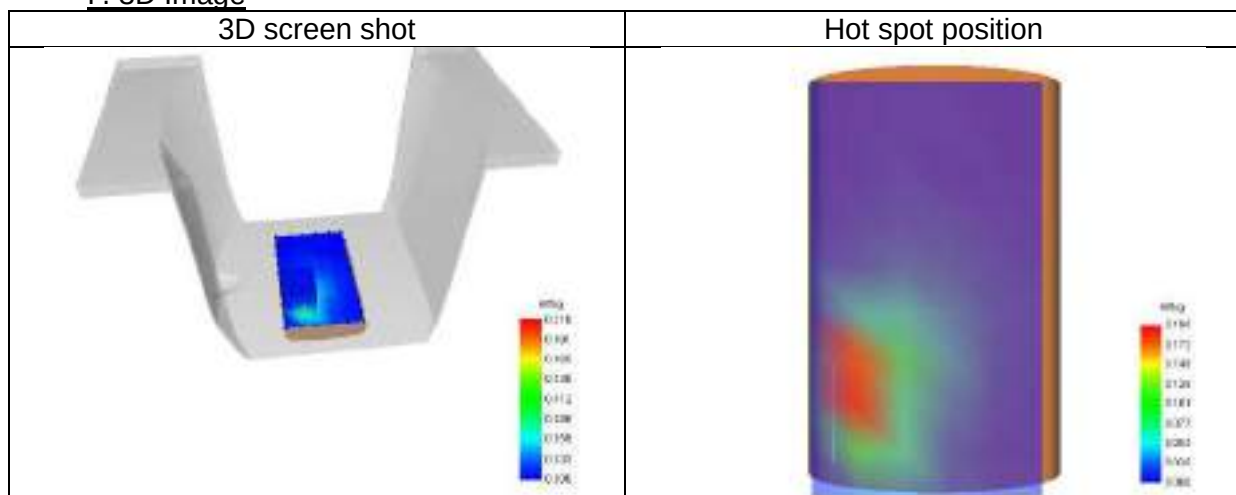
SAR 10g (W/Kg)	0.082
SAR 1g (W/Kg)	0.201
Variation (%)	-3.10
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	43.93

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.398	0.218	0.096	0.053	0.030	0.021	0.015



F. 3D Image



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

Date of measurement: 21/8/2025

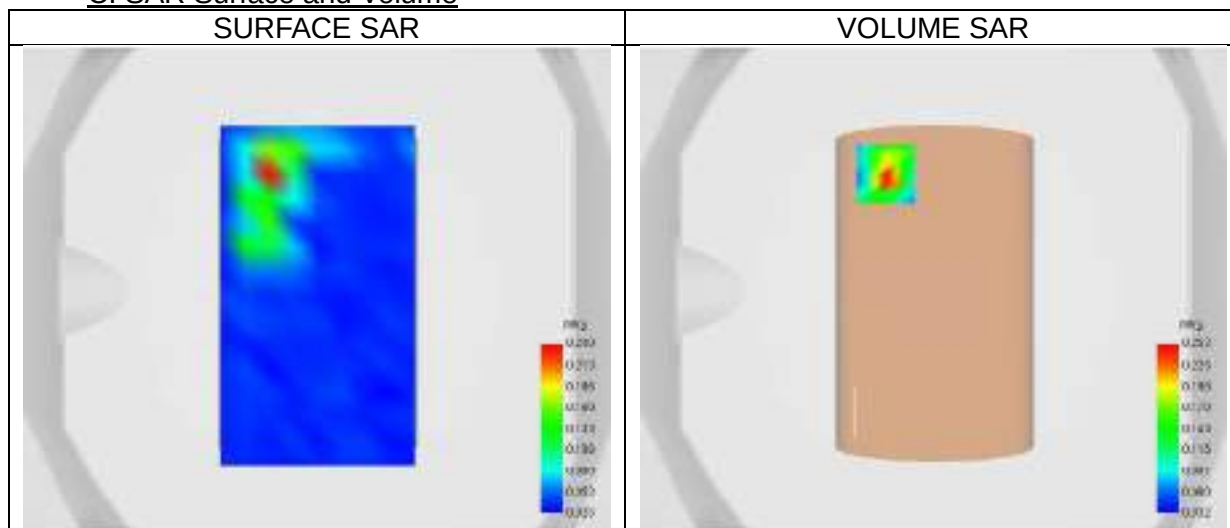
A. Experimental conditions.

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 (42)/ frequency 5210.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5210.00
Relative permittivity (real part)	36.80
Relative permittivity (imaginary part)	15.59
Conductivity (S/m)	4.51

C. SAR Surface and Volume



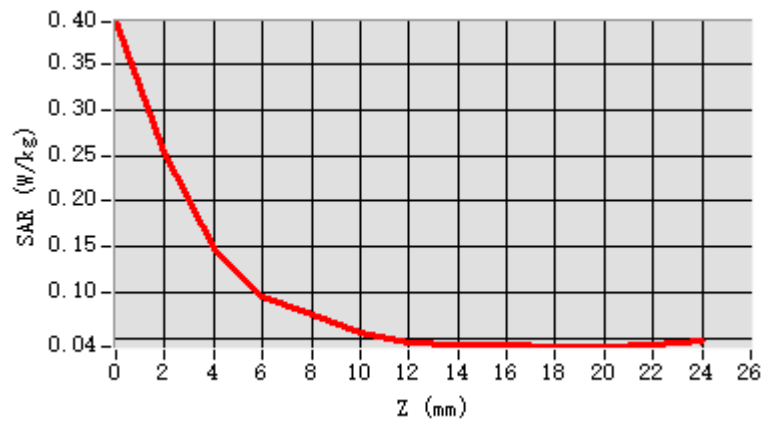
Maximum location: X=-20.00, Y=48.00 ; SAR Peak: 0.44 W/kg

D. SAR 1g & 10g

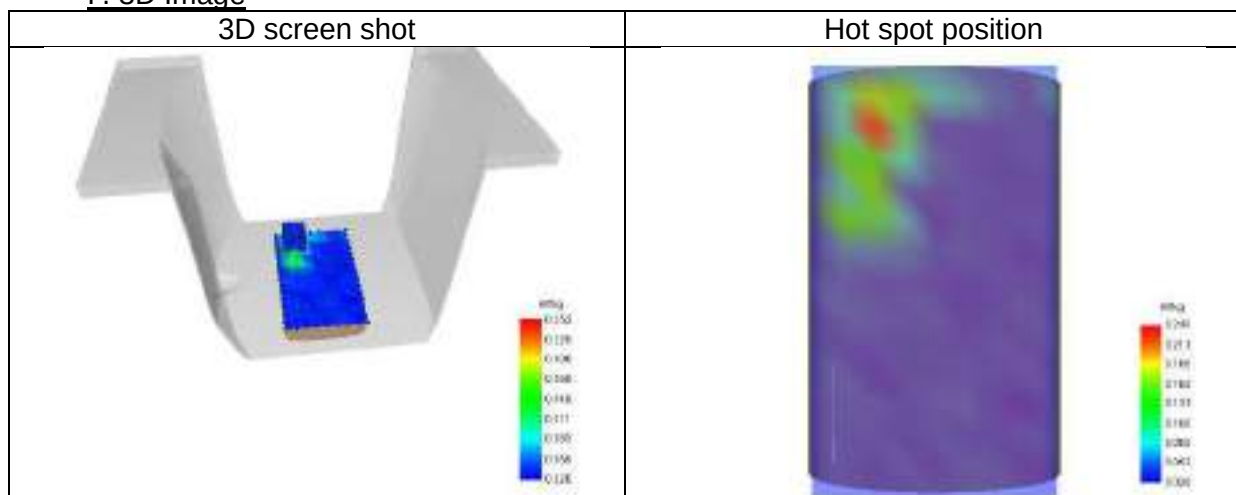
SAR 10g (W/Kg)	0.068
SAR 1g (W/Kg)	0.154
Variation (%)	3.65
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	60.79

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)	0.39	0.25	0.14	0.09	0.07	0.05	0.04	0.04	0.04	0.04	0.04	0.04
	6	3	8	5	5	5	5	3	4	1	1	2



F. 3D Image



6# SAR Measurement at U-NII-2a (Body, Validation Plane)

Date of measurement: 22/8/2025

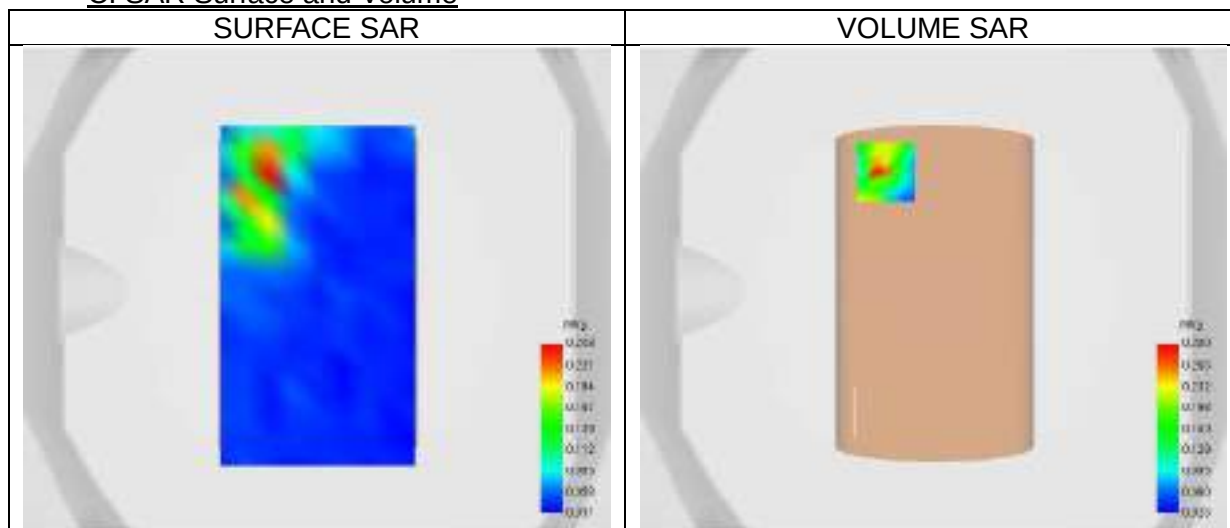
A. Experimental conditions.

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-2a
Signal	IEEE 802.11 ac
Channels/Frequency	Middle (54)/ frequency 5270.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5270.00
Relative permittivity (real part)	35.27
Relative permittivity (imaginary part)	16.46
Conductivity (S/m)	4.82

C. SAR Surface and Volume



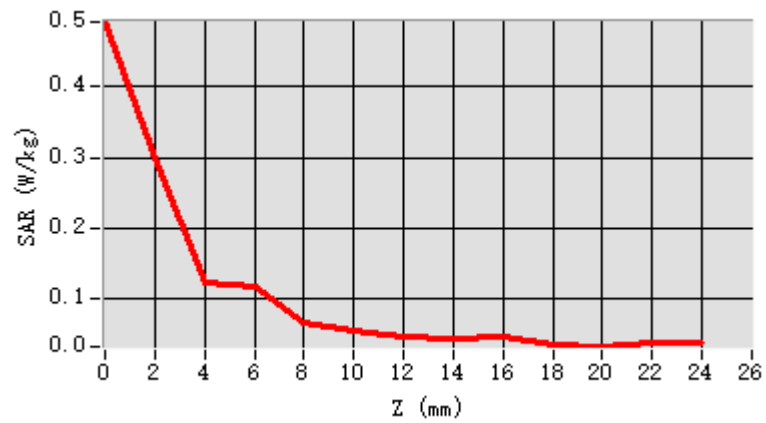
Maximum location: X=-20.00, Y=49.00 ; SAR Peak: 0.50 W/kg

D. SAR 1g & 10g

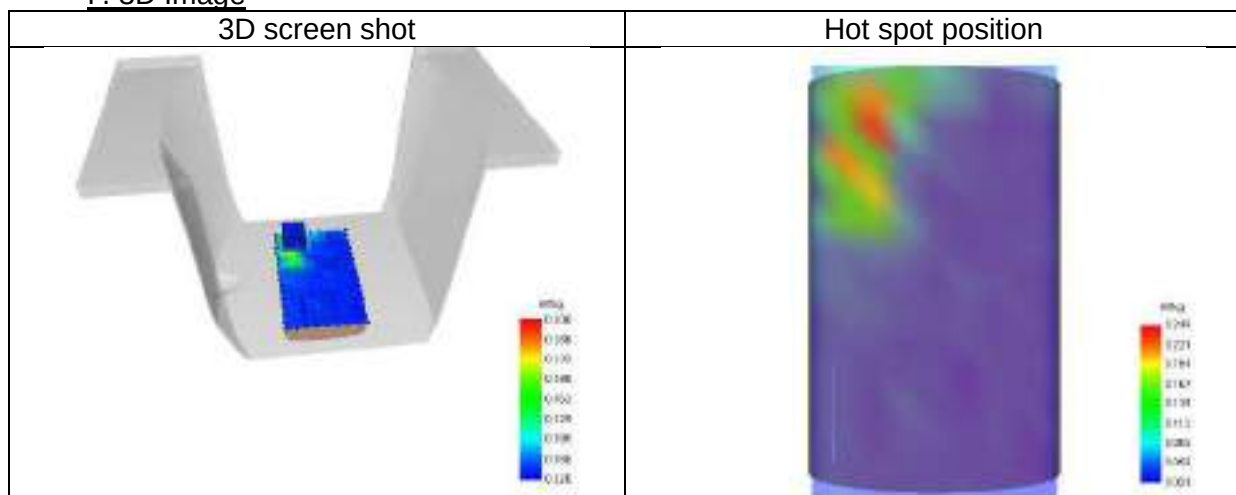
SAR 10g (W/Kg)	0.073
SAR 1g (W/Kg)	0.169
Variation (%)	-0.15
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	58.04

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)	0.49	0.30	0.12	0.11	0.06	0.05	0.04	0.04	0.04	0.03	0.03	0.03
	2	0	4	7	6	6	8	3	6	7	3	8



F. 3D Image



7# SAR Measurement at U-NII-2c (Body, Validation Plane)

Date of measurement: 23/8/2025

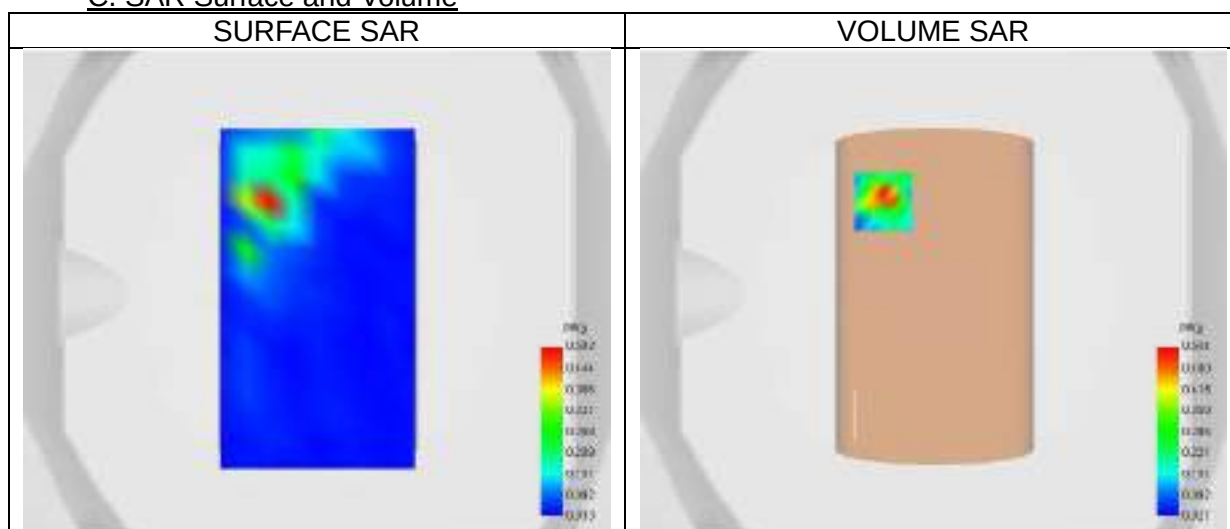
A. Experimental conditions.

Probe	0725-EPGO-448
ConvF	1.36
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-2c
Signal	IEEE 802.11 a
Channels/Frequency	Middle (120)/ frequency 5600.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5600.00
Relative permittivity (real part)	35.33
Relative permittivity (imaginary part)	16.15
Conductivity (S/m)	5.02

C. SAR Surface and Volume



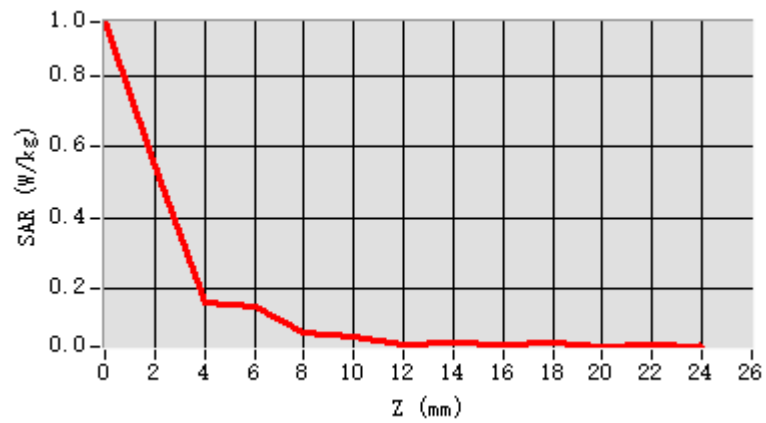
Maximum location: X=-21.00, Y=38.00 ; SAR Peak: 1.02 W/kg

D. SAR 1g & 10g

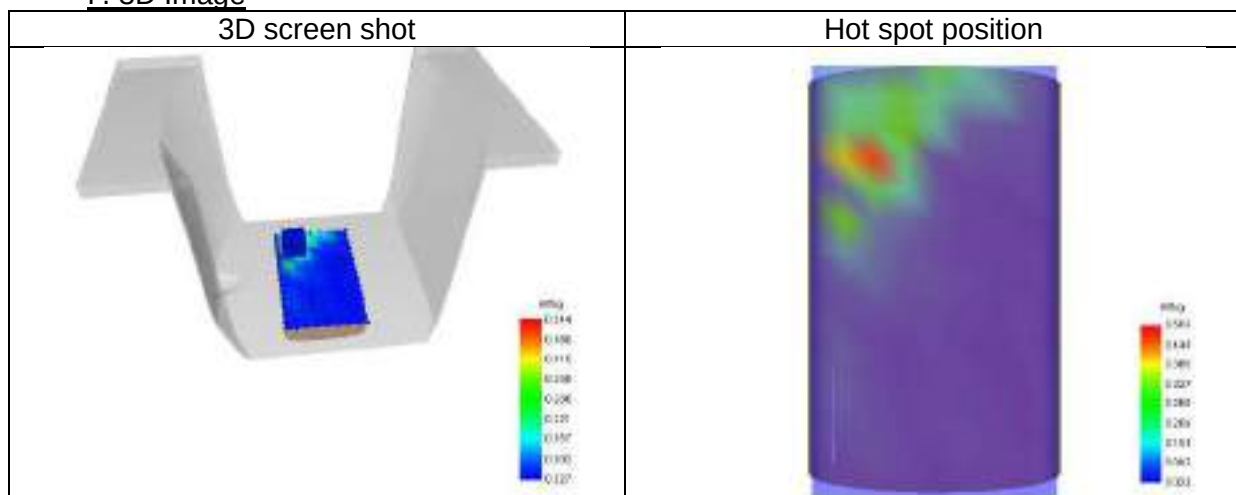
SAR 10g (W/Kg)	0.109
SAR 1g (W/Kg)	0.291
Variation (%)	2.35
Horizontal validation criteria: minimum distance (mm)	5.66
Vertical validation criteria: SAR ratio M2/M1 (%)	50.91

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)	0.95	0.54	0.16	0.14	0.07	0.06	0.04	0.04	0.03	0.04	0.03	0.04
	2	4	1	8	3	5	4	4	8	7	5	1



F. 3D Image



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

Date of measurement: 24/8/2025

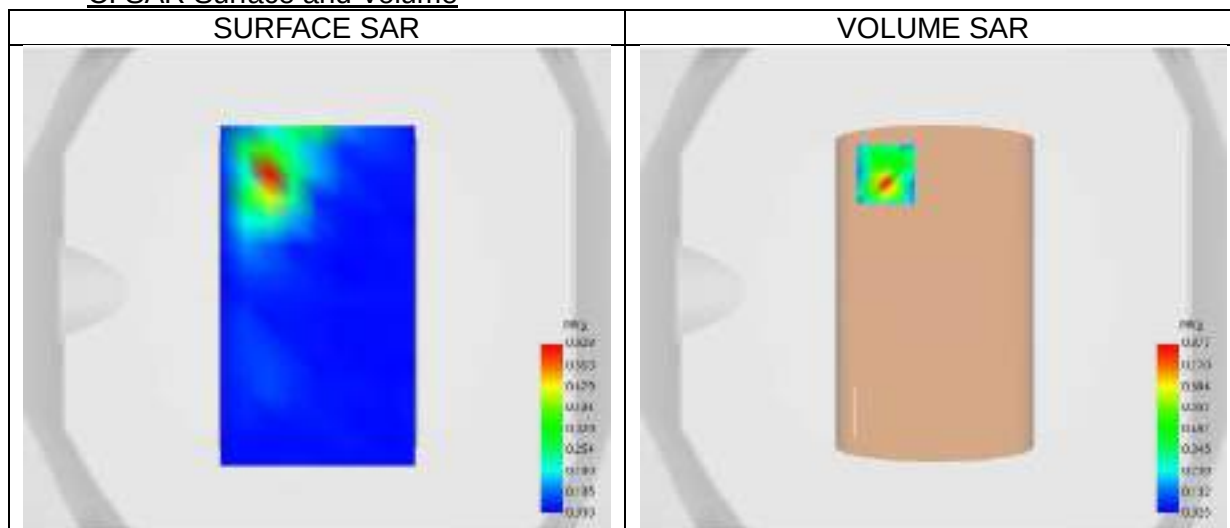
A. Experimental conditions.

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 n
Channels/Frequency	Middle (159)/ frequency 5795.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	5795.00
Relative permittivity (real part)	35.46
Relative permittivity (imaginary part)	16.01
Conductivity (S/m)	5.15

C. SAR Surface and Volume



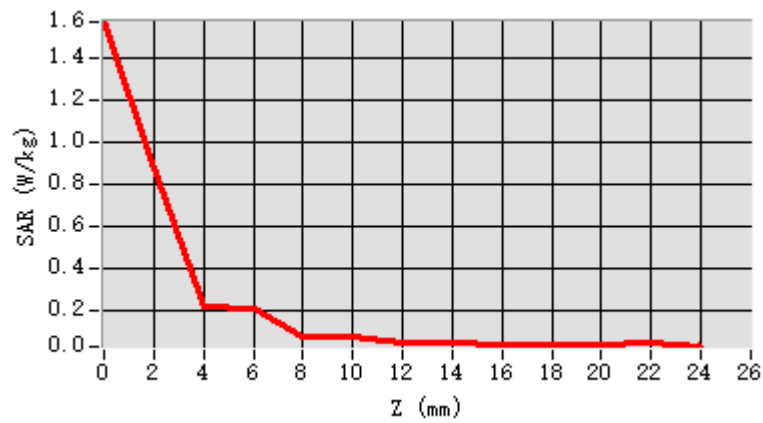
Maximum location: X=-20.00, Y=48.00 ; SAR Peak: 1.66 W/kg

D. SAR 1g & 10g

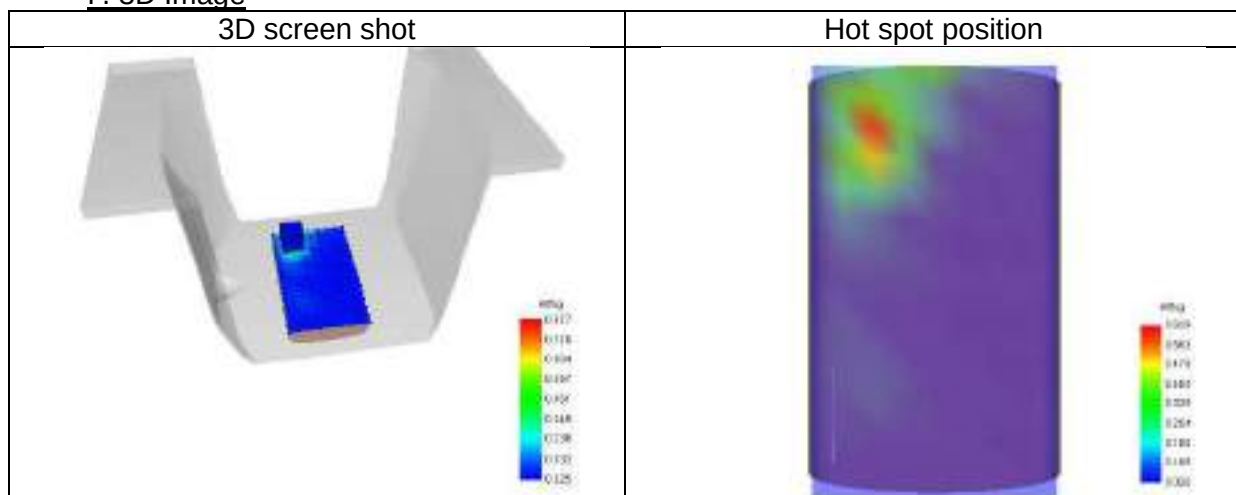
SAR 10g (W/Kg)	0.139
SAR 1g (W/Kg)	0.439
Variation (%)	4.98
Horizontal validation criteria: minimum distance (mm)	5.66
Vertical validation criteria: SAR ratio M2/M1 (%)	46.28

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)	1.57	0.87	0.22	0.21	0.07	0.07	0.04	0.05	0.04	0.03	0.04	0.04
	5	7	4	0	4	2	6	0	3	8	2	4



F. 3D Image



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

Date of measurement: 25/8/2025

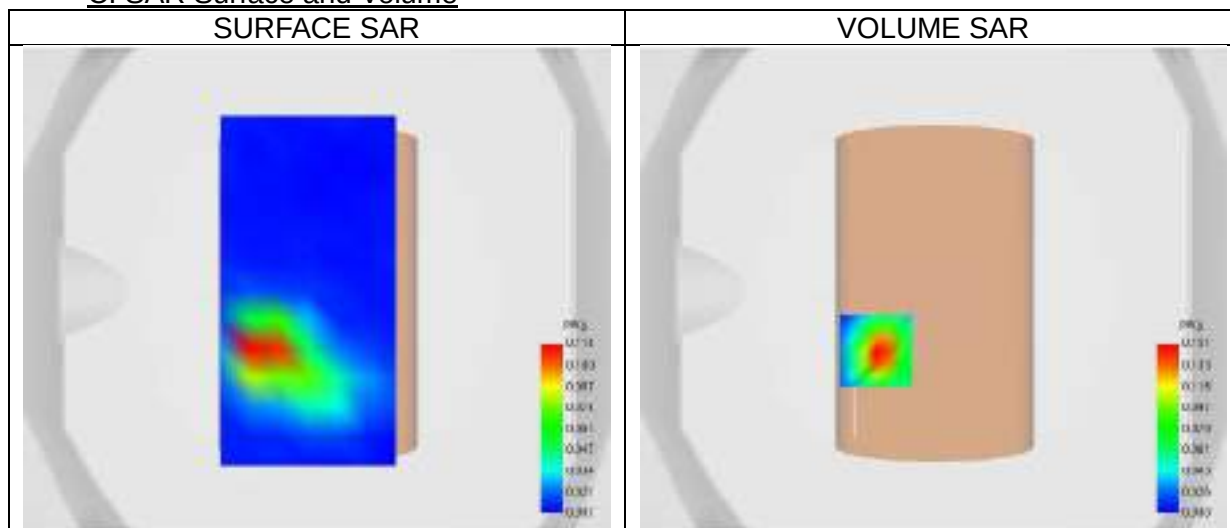
A. Experimental conditions.

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 (6)/ frequency 2437.00 Mhz

B. Permittivity

Middle TX Frequency (MHz)	2437.00
Relative permittivity (real part)	38.10
Relative permittivity (imaginary part)	13.13
Conductivity (S/m)	1.78

C. SAR Surface and Volume



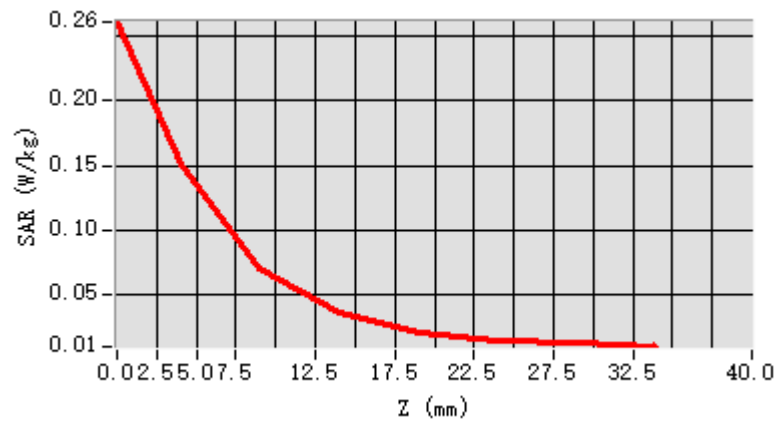
Maximum location: X=-24.00, Y=-25.00 ; SAR Peak: 0.27 W/kg

D. SAR 1g & 10g

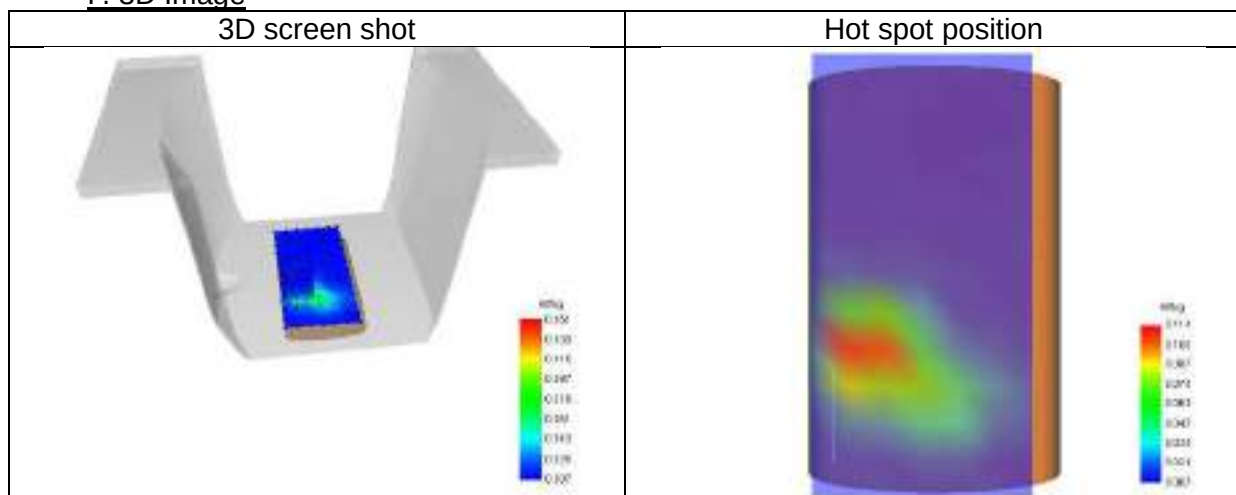
SAR 10g (W/Kg)	0.060
SAR 1g (W/Kg)	0.139
Variation (%)	-3.69
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	46.76

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.261	0.151	0.070	0.036	0.021	0.014	0.013



F. 3D Image



10# SAR Measurement at LTE band 4 (Body, Validation Plane)

Date of measurement: 20/8/2025

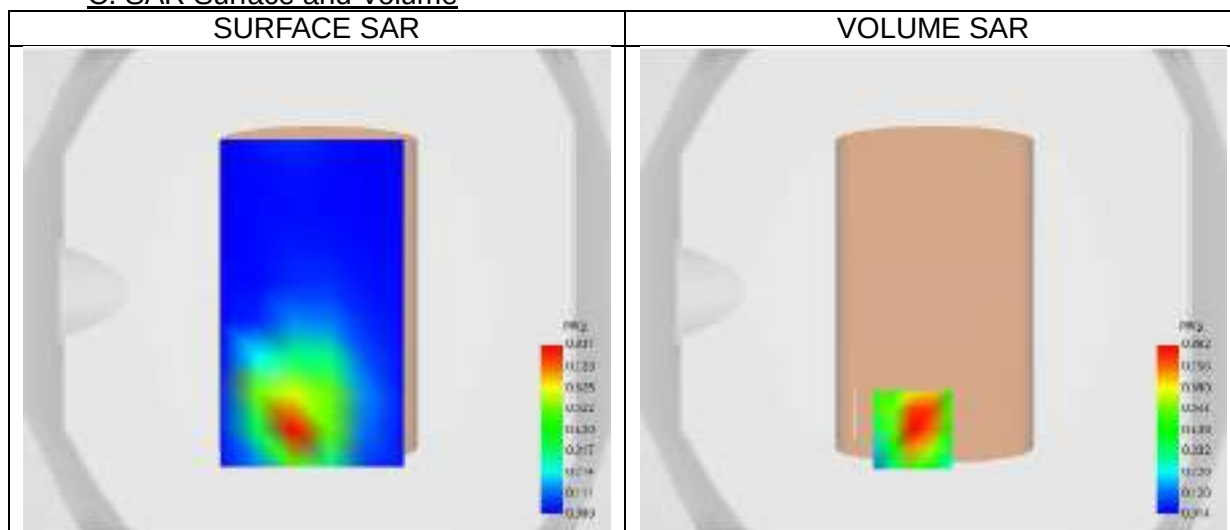
A. Experimental conditions.

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 4
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20175)/ frequency 1732.50 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1732.50

B. Permittivity

Middle TX Frequency (MHz)	1732.50
Relative permittivity (real part)	39.11
Relative permittivity (imaginary part)	13.63
Conductivity (S/m)	1.31

C. SAR Surface and Volume



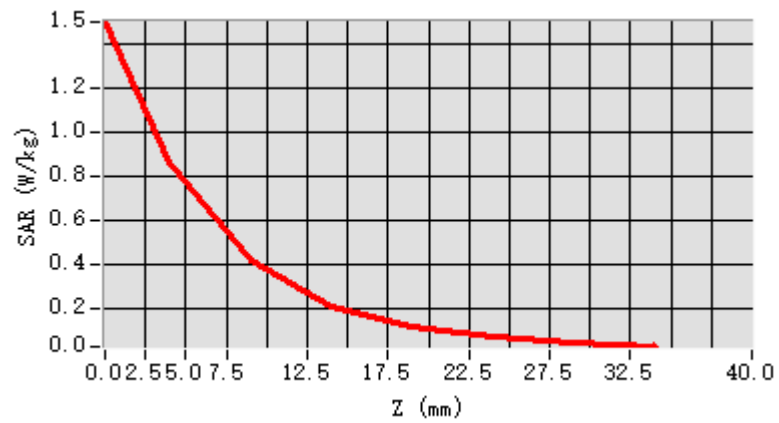
Maximum location: X=-9.00, Y=-57.00 ; SAR Peak: 1.49 W/kg

D. SAR 1g & 10g

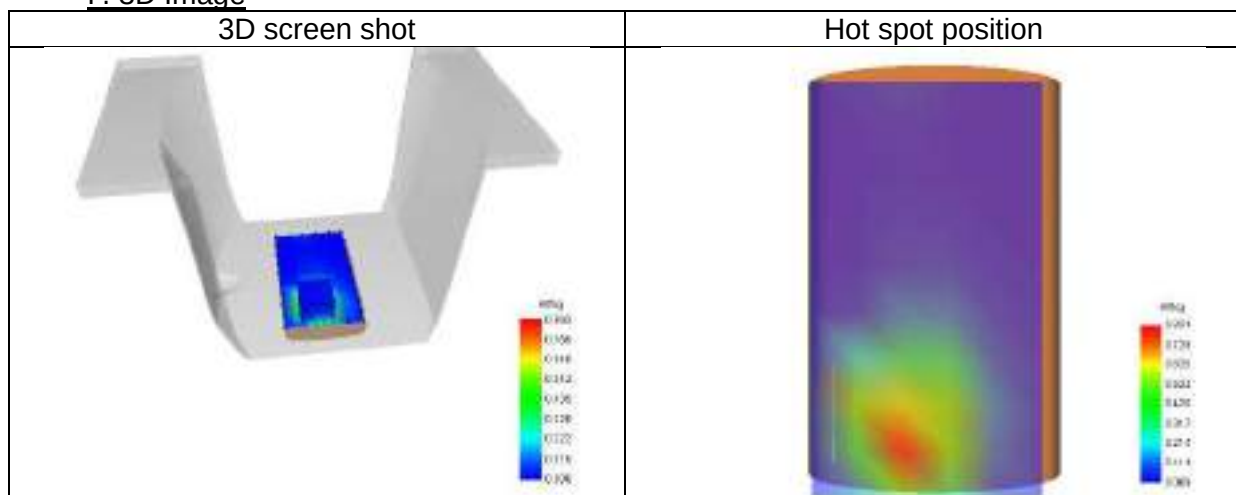
SAR 10g (W/Kg)	0.414
SAR 1g (W/Kg)	0.838
Variation (%)	2.52
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	56.68

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.496	0.862	0.413	0.212	0.119	0.069	0.042



F. 3D Image



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

Date of measurement: 18/8/2025

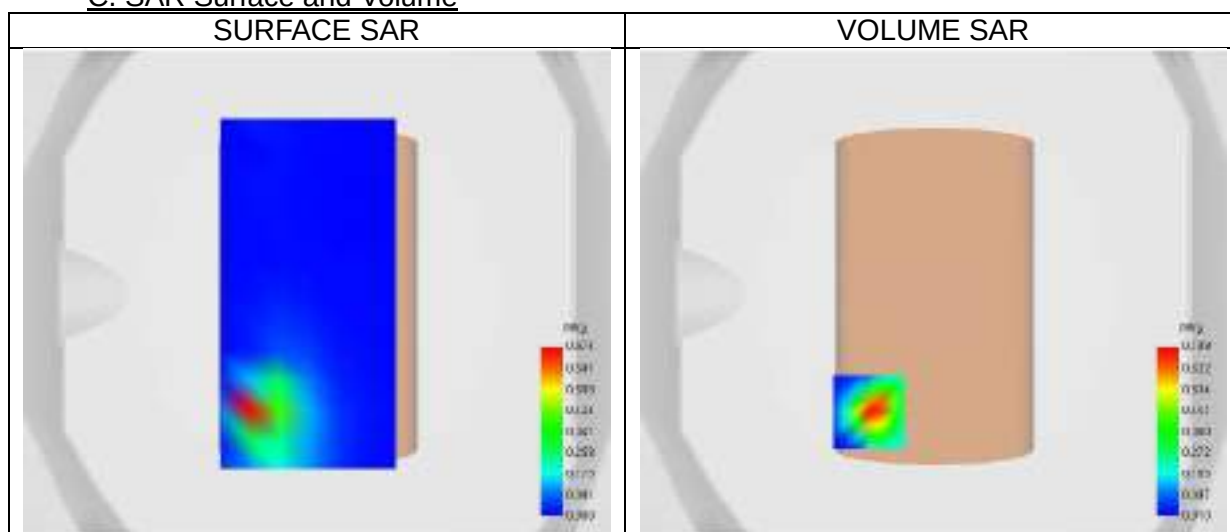
A. Experimental conditions.

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)	39.81
Relative permittivity (imaginary part)	13.19
Conductivity (S/m)	1.86

C. SAR Surface and Volume



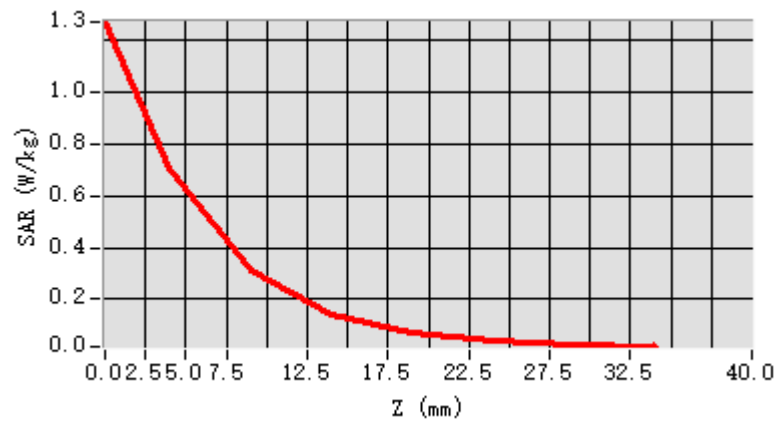
Maximum location: X=-27.00, Y=-49.00 ; SAR Peak: 1.30 W/kg

D. SAR 1g & 10g

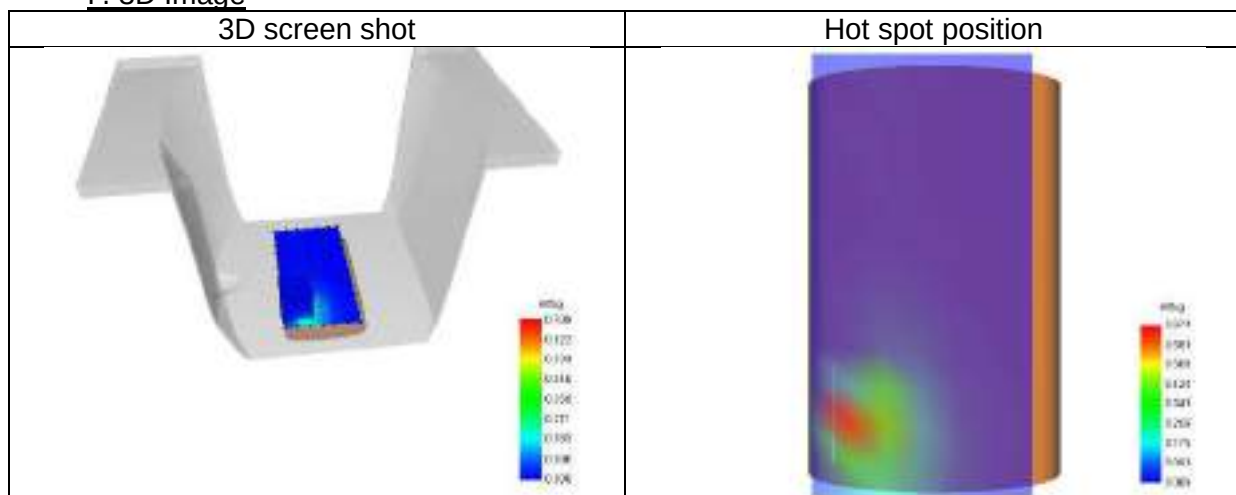
SAR 10g (W/Kg)	0.240
SAR 1g (W/Kg)	0.632
Variation (%)	3.47
Horizontal validation criteria: minimum distance (mm)	7.07
Vertical validation criteria: SAR ratio M2/M1 (%)	43.96

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.273	0.709	0.312	0.145	0.070	0.039	0.026



F. 3D Image



14. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 4024-EPGO-448
835 MHz Dipole - SN 03/15 DIP 0G835-347
1800 MHz Dipole - SN 03/15 DIP 1G800-349
1900 MHz Dipole - SN 03/15 DIP 1G900-350
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

Design Envelope ID: 8D8C9547C2B44414A559C663F745B7A3



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



Accreditation #2-6789
Scope available on www.cofrac.fr

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

Summary:

This document presents the method and results from an accredited COMOSAR Dosimetric E-Field Probe calibration performed at MVG, using the CALIPRUBS 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).

Google Drive ID: 3D5C8H4X-C2B4-4414-A350-C5E8F742B7A3



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACE100125D0A

	Name	Function	Date	Signature
Prepared by:	Pedro Ruiz	Technical Manager	4/18/2025	
Checked & approved by:	Pedro Ruiz	Technical Manager	4/18/2025	
Authorized by:	Kim Rutkowski	Quality Manager	4/23/2025	Signed for:  Kimberly RUTKOWSKI (20081403002E)

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

Issue	Name	Date	Modifications
A	Pedro Ruiz	4/18/2025	Initial release

Page: 2/11

Exception: ACBLOP&N.FT.MF100,ISSUE: COMOSAR Probe v02

This document shall not be reproduced, copied in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of NTEK.

DocId: 30502841; 0254-4414; A350-05EP742B7AD



COMOSAR E-FIELD PROBE CALIBRATION REPORT

E&E ACC-109 125D0A

TABLE OF CONTENTS

1	Device Under Test	4
2	Product Description	4
2.1	General Information	4
3	Measurement Method	4
3.1	Sensitivity	4
3.2	Linearity	5
3.3	Isotropy	5
3.4	Boundary Effect	5
3.5	Probe Modulation Response	6
4	Measurement Uncertainty	6
5	Calibration Results	6
5.1	Calibration in air	6
5.2	Calibration in liquid	7
6	Verification Results	8
7	List of Equipment	10

Page: 3/11

Exception: ACB, DRAN, EFM, F10B, J00UE, COMOSAR Probe v02

This document shall not be reproduced, copied in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is submitted and it not to be released in whole or part without written approval of NTEK.

Download Envelope ID: 8D5C884E-C2B4-4814-A350-C5E8F742B7A5



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACT-108-123828-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 coil method (transfer method) as outlined in the standards for frequency 150-450 MHz.

Page: 4/11

Exception: ACT-108-123828-AE_COMOSAR Probe v02

This document shall not be reproduced, copied in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of NTEK.



3.2 LINEARITY

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

3.3 ISOTROPY

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

3.4 BOUNDARY EFFECT

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

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

$$\text{SAR}_{\text{corrected}} [\%] = \text{SAR}_{\text{th}} \frac{(d_{\text{th}} + d_{\text{avg}})^2}{2d_{\text{avg}}} \frac{(e^{-d_{\text{th}}/\delta})}{\delta/\lambda} \quad \text{for } (d_{\text{th}} + d_{\text{avg}}) < 10 \text{ mm}$$

where

SAR_{uncertainty} is the uncertainty in percent of the probe boundary effect

d_{be} is the distance between the surface and the closest zone-centre 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.

$\Delta \text{SAR}_{\text{bg}}$ in percent of SAR is the deviation between the measured SAR value, at the distance d_{bg} 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%).



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 $\pm 11\%$ for the frequency range 150–450 MHz.

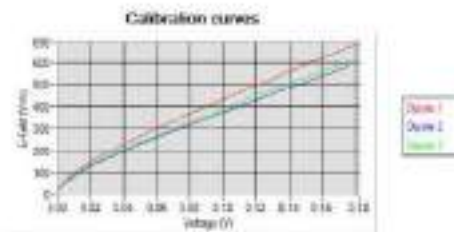
The estimated expanded uncertainty ($k=2$) in calibration for SAR (W/kg) is $\pm 1.4\%$ for the frequency range 600–7500 MHz.

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

$$m_{ij} = \sum_{k=1}^3 \frac{V_i (1 + V_i / DCF_i)}{Norm_i}$$

Pure: 611

Regular: AUBURN, FRANKLIN, COLUMBIA Press 40¢

This document shall not be reproduced, except in full or in part, without the written approval of AICTE. The information contained herein is to be used only for the purposes for which it is submitted and is not to be released in whole or part without written approval of AICTE.

Download Envelope ID: 3D5C2B4E-C2B4-4414-A310-C5E9F742B7A5



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACC-100-125820-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

Normi dipole 1 ($\mu V/(V/m)^2$)	Normi dipole 2 ($\mu V/(V/m)^2$)	Normi dipole 3 ($\mu V/(V/m)^2$)
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,

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

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:

$$SAR = \frac{4P_{avg}}{ab\delta} e^{-\frac{2\pi z}{\delta}}$$

Page: 7/11

Exception: ACC-100-125820-A-01, COMOSAR Probe v02

This document shall not be reproduced, copied in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of NTEK.

Google eBook ID: 30902843-0284-4434-A353-05E8F74CB7AD



COMOSAR E-FIELD PROBE CALIBRATION REPORT 1

Ref: ACTH 100 125 DED A

where

a = the larger cross-sectional of the waveguide

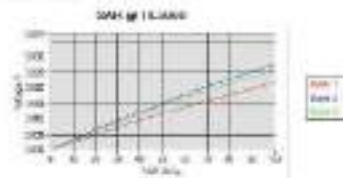
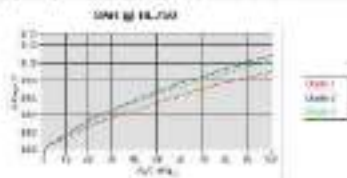
b—the smaller cross-sectional of the waveguide

 δ —the skin depth for the liquid in the waveguide

P_{we} —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	1.30
HL850	850	1.32
HL900	900	1.33
HL1000	1000	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	1.59
HL4800	4800	1.61
HL4900	4900	1.58
HL5200	5200	1.37
HL5400	5400	1.37
HL5600	5600	1.36
HL5800	5800	1.35

[illegible]

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.

Page: 811

Freeform: A B, D, E, N, F, H, J, K, L, M, O, P, Q, R, S, T, U, V, W, X, Y, Z, [], { }, ~, ^, _

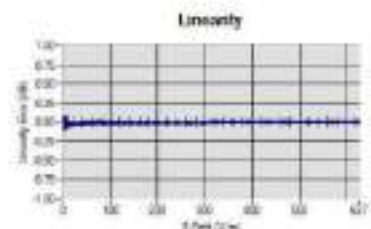
The document shall not be reproduced, except in full or in part, without the written approval of AETC. The information contained herein is to be used only for the purposes for which it is submitted and is not to be released in whole or in part without written approval of AETC.

Qualisign Envelope ID: 8D9C884E-02B4-4814-A350-05E8F742B7A5

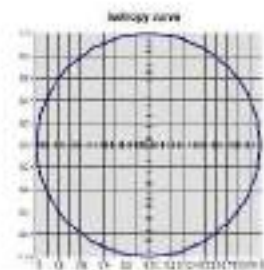


COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACC-108 12582DA



Linearity: $\pm 1.56\%$ ($\pm 0.071\text{dB}$)



Saturation: $\pm 0.05\%$ ($\pm 0.002\text{dB}$)

Page: 9/11

Exception: ACC-108 12582DA ISSUE: COMOSAR Probe v02

This document should not be reproduced, copied in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or part without written approval of NTEK.

Google



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACTU00125BDA

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	09/2021	09/2026
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2027
Multimeter	Keithley 2000	4013962	03/2023	03/2028
Signal Generator	Rohde & Schwarz SMB	183277	09/2022	09/2026
Amplifier	MMG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	09/2021	09/2026
USB Sensor	Keysight U2000A	SN: MY623-0002	10/2024	10/2027
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LunaSense Luxtron 812	94664	09/2022	09/2025
Coaxial cell	MMG	SN 32/16 COAXCELL_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MMG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MMG	SN 32/16 WGLIQ_0G600_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MMG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MMG	SN 32/16 WGLIQ_0G900_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MMG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MMG	SN 32/16 WGLIQ_1G600_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MMG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MMG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MMG	SN 32/16 WGLIQ_1G800H_1	Validated. No cal required.	Validated. No cal required.

Page: 10/11

Regular ACADEMIC JOURNAL ISSUE CONTAINS PAGE 101

This document shall not be reproduced, except in full or in part, without the written approval of AETC. The information contained herein is to be used only for the purposes for which it is submitted and is not to be released in whole or part without written approval of AETC.

Digitized by Google



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACTU00129DIDA

Waveguide	MVG	SN 32/16 WG10_1	Validated, No cal required.	Validated, No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G000_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 164 H1	44235403	02/2024	02/2027

Page: 11/11

Freeform: 400, 500, 600, 700, 800, 900, 1000, 1100, 1200, 1300, 1400, 1500, 1600, 1700, 1800, 1900, 2000, 2100, 2200, 2300, 2400, 2500, 2600, 2700, 2800, 2900, 3000, 3100, 3200, 3300, 3400, 3500, 3600, 3700, 3800, 3900, 4000, 4100, 4200, 4300, 4400, 4500, 4600, 4700, 4800, 4900, 5000, 5100, 5200, 5300, 5400, 5500, 5600, 5700, 5800, 5900, 6000, 6100, 6200, 6300, 6400, 6500, 6600, 6700, 6800, 6900, 7000, 7100, 7200, 7300, 7400, 7500, 7600, 7700, 7800, 7900, 8000, 8100, 8200, 8300, 8400, 8500, 8600, 8700, 8800, 8900, 9000, 9100, 9200, 9300, 9400, 9500, 9600, 9700, 9800, 9900, 10000, 10100, 10200, 10300, 10400, 10500, 10600, 10700, 10800, 10900, 11000, 11100, 11200, 11300, 11400, 11500, 11600, 11700, 11800, 11900, 12000, 12100, 12200, 12300, 12400, 12500, 12600, 12700, 12800, 12900, 13000, 13100, 13200, 13300, 13400, 13500, 13600, 13700, 13800, 13900, 14000, 14100, 14200, 14300, 14400, 14500, 14600, 14700, 14800, 14900, 15000, 15100, 15200, 15300, 15400, 15500, 15600, 15700, 15800, 15900, 16000, 16100, 16200, 16300, 16400, 16500, 16600, 16700, 16800, 16900, 17000, 17100, 17200, 17300, 17400, 17500, 17600, 17700, 17800, 17900, 18000, 18100, 18200, 18300, 18400, 18500, 18600, 18700, 18800, 18900, 19000, 19100, 19200, 19300, 19400, 19500, 19600, 19700, 19800, 19900, 20000, 20100, 20200, 20300, 20400, 20500, 20600, 20700, 20800, 20900, 21000, 21100, 21200, 21300, 21400, 21500, 21600, 21700, 21800, 21900, 22000, 22100, 22200, 22300, 22400, 22500, 22600, 22700, 22800, 22900, 23000, 23100, 23200, 23300, 23400, 23500, 23600, 23700, 23800, 23900, 24000, 24100, 24200, 24300, 24400, 24500, 24600, 24700, 24800, 24900, 25000, 25100, 25200, 25300, 25400, 25500, 25600, 25700, 25800, 25900, 26000, 26100, 26200, 26300, 26400, 26500, 26600, 26700, 26800, 26900, 27000, 27100, 27200, 27300, 27400, 27500, 27600, 27700, 27800, 27900, 28000, 28100, 28200, 28300, 28400, 28500, 28600, 28700, 28800, 28900, 29000, 29100, 29200, 29300, 29400, 29500, 29600, 29700, 29800, 29900, 30000, 30100, 30200, 30300, 30400, 30500, 30600, 30700, 30800, 30900, 31000, 31100, 31200, 31300, 31400, 31500, 31600, 31700, 31800, 31900, 32000, 32100, 32200, 32300, 32400, 32500, 32600, 32700, 32800, 32900, 33000, 33100, 33200, 33300, 33400, 33500, 33600, 33700, 33800, 33900, 34000, 34100, 34200, 34300, 34400, 34500, 34600, 34700, 34800, 34900, 35000, 35100, 35200, 35300, 35400, 35500, 35600, 35700, 35800, 35900, 36000, 36100, 36200, 36300, 36400, 36500, 36600, 36700, 36800, 36900, 37000, 37100, 37200, 37300, 37400, 37500, 37600, 37700, 37800, 37900, 38000, 38100, 38200, 38300, 38400, 38500, 38600, 38700, 38800, 38900, 39000, 39100, 39200, 39300, 39400, 39500, 39600, 39700, 39800, 39900, 40000, 40100, 40200, 40300, 40400, 40500, 40600, 40700, 40800, 40900, 41000, 41100, 41200, 41300, 41400, 41500, 41600, 41700, 41800, 41900, 42000, 42100, 42200, 42300, 42400, 42500, 42600, 42700, 42800, 42900, 43000, 43100, 43200, 43300, 43400, 43500, 43600, 43700, 43800, 43900, 44000, 44100, 44200, 44300, 44400, 44500, 44600, 44700, 44800, 44900, 45000, 45100, 45200, 45300, 45400, 45500, 45600, 45700, 45800, 45900, 46000, 46100, 46200, 46300, 46400, 46500, 46600, 46700, 46800, 46900, 47000, 47100, 47200, 47300, 47400, 47500, 47600, 47700, 47800, 47900, 48000, 48100, 48200, 48300, 48400, 48500, 48600, 48700, 48800, 48900, 49000, 49100, 49200, 49300, 49400, 49500, 49600, 49700, 49800, 49900, 50000, 50100, 50200, 50300, 50400, 50500, 50600, 50700, 50800, 50900, 51000, 51100, 51200, 51300, 51400, 51500, 51600, 51700, 51800, 51900, 52000, 52100, 52200, 52300, 52400, 52500, 52600, 52700, 52800, 52900, 53000, 53100, 53200, 53300, 53400, 53500, 53600, 53700, 53800, 53900, 54000, 54100, 54200, 54300, 54400, 54500, 54600, 54700, 54800, 54900, 55000, 55100, 55200, 55300, 55400, 55500, 55600, 55700, 55800, 55900, 56000, 56100, 56200, 56300, 56400, 56500, 56600, 56700, 56800, 56900, 57000, 57100, 57200, 57300, 57400, 57500, 57600, 57700, 57800, 57900, 58000, 58100, 58200, 58300, 58400, 58500, 58600, 58700, 58800, 58900, 59000, 59100, 59200, 59300, 59400, 59500, 59600, 59700, 59800, 59900, 60000, 60100, 60200,

The document shall not be reproduced, except in full or in part, without the written approval of AICTE. The information contained herein is to be used only for the purpose for which it is submitted and is not to be released in whole or in part without written approval of AICTE.



SAR Reference Dipole Calibration Report

Ref : ACR.53.24.24.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: 835 MHZ

SERIAL NO.: SN 03/15DIP0G835-347

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 02-6789 and 02-6814
Scope available on www.cofrac.fr

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

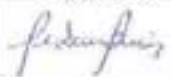
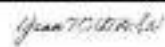
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.532424.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
00:55:11 +0100

	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.532424.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test.....	4
3	Product Description	4
3.1	General Information	4
4	Measurement Method	5
4.1	Mechanical Requirements	5
4.2	S11 parameter Requirements	5
4.3	SAR Requirements	5
5	Measurement Uncertainty	5
5.1	Mechanical dimensions	5
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.532424.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 835 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID835
Serial Number	SN 03/13DIP0G835-347
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

Ref: ACR.532424.BES.A

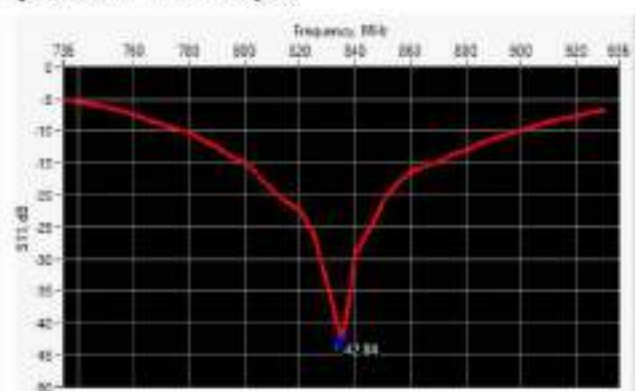
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	161.00 +/- 2%	-	89.80 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
835	-42.84	-20	50.5Ω + 0.5jΩ

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.

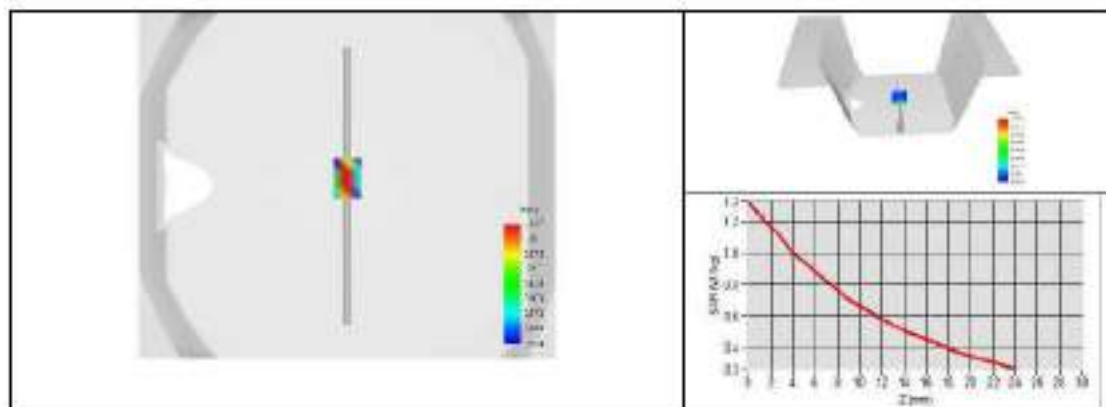


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.532424.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EP00-429
Liquid	Head Liquid Values: $\epsilon_r' : 44.8$ $\sigma : 0.90$
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	835 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
835 MHz	0.94	9.40	9.56	0.63	6.28	6.22





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.532424.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 13/08 SAM08	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	Kethley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106569	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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184-H1	44225320	08/2021	08/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.26.24.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: 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 02-6789 and 02-6814
Scope available on www.cofrac.fr

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

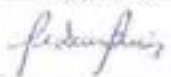
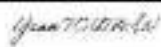
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.532624.BES.A

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

Yann
Toutain IDSignature
numérique de
Yann Toutain ID
Date: 2024/02/27
08:56:12 -01'00'

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

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.5326.04.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test.....	4
3	Product Description.....	4
3.1	General Information.....	4
4	Measurement Method.....	5
4.1	Mechanical Requirements.....	5
4.2	S11 parameter Requirements.....	5
4.3	SAR Requirements.....	5
5	Measurement Uncertainty.....	5
5.1	Mechanical dimensions.....	5
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.5326.04.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 03/13DIP1G800-349
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



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

Ref: ACR.532624.BES.A

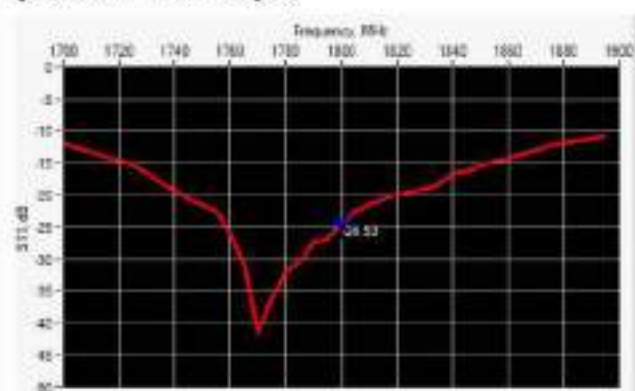
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



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

6.3 SAR

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

6.3.1 SAR with Head Liquid

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

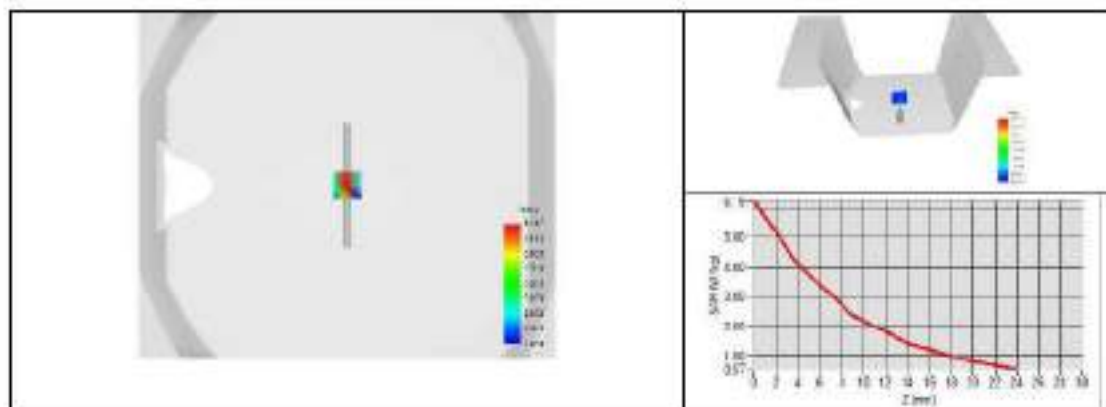


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.5326.04.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EP00-429
Liquid	Head Liquid Values: $\epsilon_r' : 42.7$ $\sigma : 1.36$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	1800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70%

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





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR-532634-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 13/08 SAM08	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	Kethley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106569	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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184-H1	44225320	08/2021	08/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.27.24.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: 1900 MHZ

SERIAL NO.: SN 03/15DIP1G900-350

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 02-6789 and 02-6814
Scope available on www.cofrac.fr

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

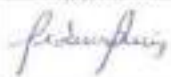
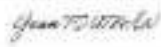
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

REF-ACR.5327.04.BES.A

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

Yann
Toutain IDSignature
numérique de
Yann Toutain ID
Date : 2024.02.27
08:56:45 +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 DIPOLE CALIBRATION REPORT

REF-ACR.5327.04.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test.....	4
3	Product Description	4
3.1	General Information	4
4	Measurement Method	5
4.1	Mechanical Requirements	5
4.2	S11 parameter Requirements	5
4.3	SAR Requirements	5
5	Measurement Uncertainty	5
5.1	Mechanical dimensions	5
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.532724.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 1900 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID1900
Serial Number	SN 03/13DIP1G900-350
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

REF-ACR.532724.BES.A

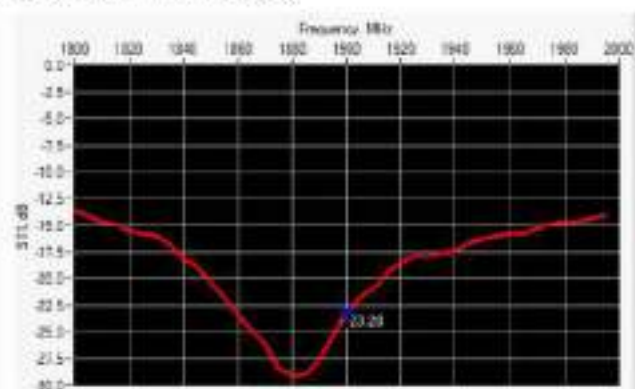
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

L mm		h mm		d mm	
Measured	Required	Measured	Required	Measured	Required
-	68.00 +/- 2%	-	39.50 +/- 2%	-	3.60 +/- 2%

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
1900	-23.28	-20	$46.2\Omega + 5.4j\Omega$

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.

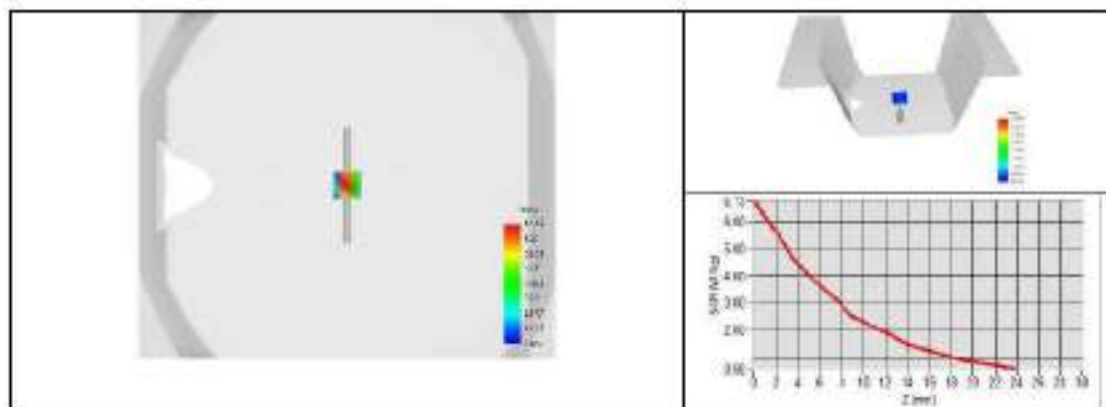


SAR REFERENCE DIPOLE CALIBRATION REPORT

REF-ACR.5327.04.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EP00-429
Liquid	Head Liquid Values: $\epsilon_r' : 42.5$ $\sigma : 1.39$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoom Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	1900 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
1900 MHz	3.97	39.69	39.70	2.09	20.92	20.50





SAR REFERENCE DIPOLE CALIBRATION REPORT

REF-ACR.5337.04.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 SAM08	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	Kethley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106569	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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184-H1	44225320	08/2021	08/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.29.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 03/15DIP2G450-352

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 02/21/2024



Accreditations 02-6789 and 02-6814
Scope available on www.cofrac.fr

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

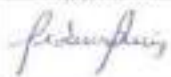
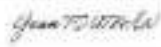
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.5329.24.BES.A

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

Yann
Toutain IDSignature
numérique de
Yann Toutain ID
Date: 2024/02/27
08:57:39 +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.5329.04.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test.....	4
3	Product Description.....	4
3.1	General Information.....	4
4	Measurement Method.....	5
4.1	Mechanical Requirements.....	5
4.2	S11 parameter Requirements.....	5
4.3	SAR Requirements.....	5
5	Measurement Uncertainty.....	5
5.1	Mechanical dimensions.....	5
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.5529.04.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 03/13DIP2G450-352
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



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

Ref: ACR.5329.04.BES.A

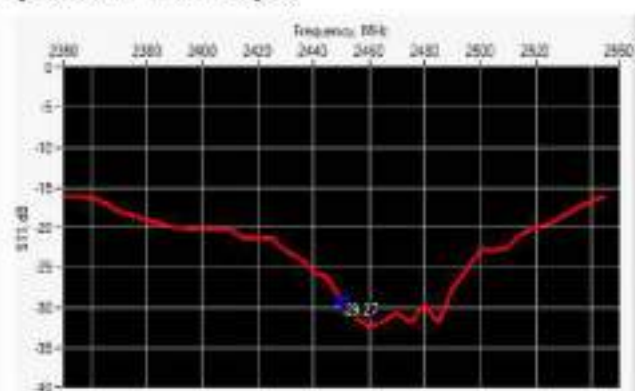
6 CALIBRATION RESULTS

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	53.6Ω + 0.1jΩ

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.

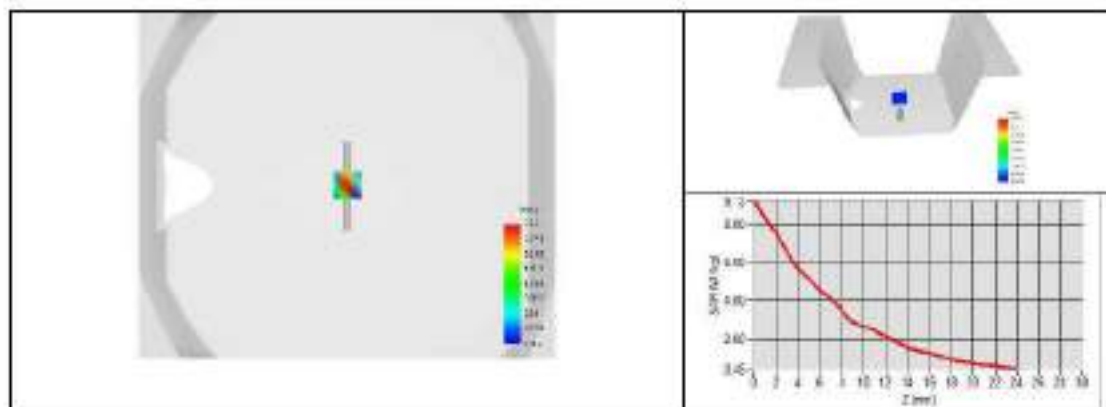


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.5329.04.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EP00-429
Liquid	Head Liquid Values: ϵ_r' : 42.1 σ : 1.83
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoom 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.5329.04.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 SAM08	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	Kethley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106569	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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184-H1	44225320	08/2021	08/2024



SAR Reference Dipole Calibration Report

Ref : ACR.53.30.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 2600 MHZ

SERIAL NO.: SN 03/15DIP2G600-356

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 02/21/2024



Accreditations 02-6789 and 02-6814
Scope available on www.cofrac.fr

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

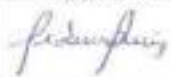
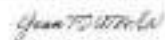
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.3330.24.BES.A

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

Yann
Toutain
IDSignature
numérique de
Yann Toutain ID
Date: 2024.02.27
0858:12 +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.0330.04.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test.....	4
3	Product Description.....	4
3.1	General Information.....	4
4	Measurement Method.....	5
4.1	Mechanical Requirements.....	5
4.2	S11 parameter Requirements.....	5
4.3	SAR Requirements.....	5
5	Measurement Uncertainty.....	5
5.1	Mechanical dimensions.....	5
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.3330.04.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 03/13DIP2G-600-356
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



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

Ref: ACR.DDD.N.YY.MVGLISSUE

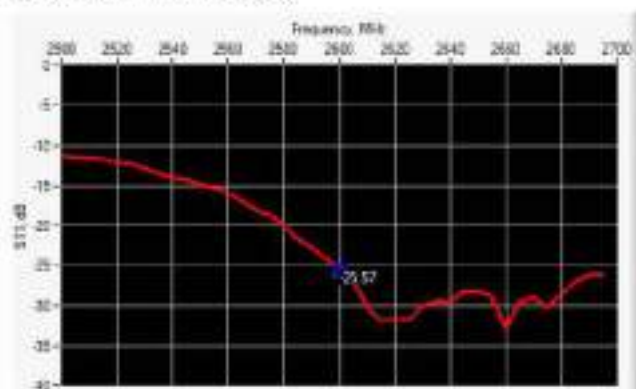
6 CALIBRATION RESULTS

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	54.5Ω + 3.2jΩ

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.

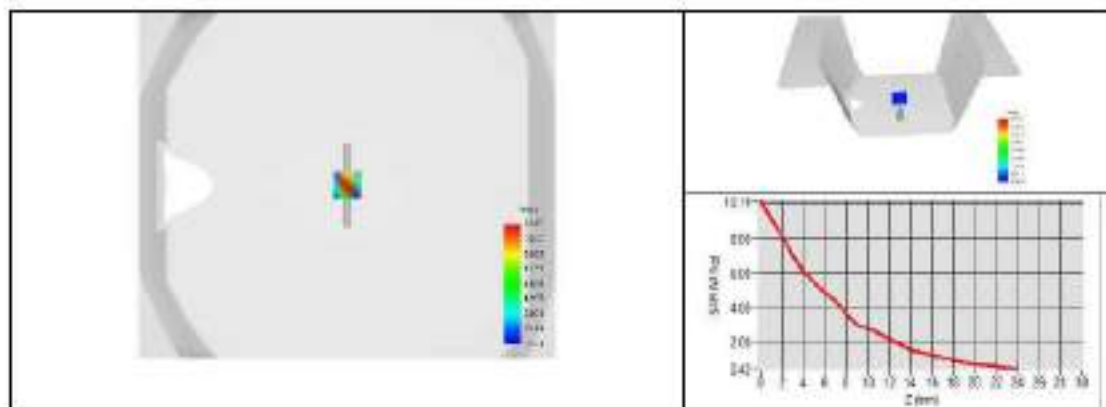


SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.DDD.N.YY.MV.GE.ISSUE SAR Reference Dipole v1

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EP00-429
Liquid	Head Liquid Values: $\epsilon_r' : 41.3$ $\sigma : 1.95$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoom Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2600 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70%

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





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.000004.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 SAM08	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	Kethley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106569	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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 159020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184-H1	44225320	08/2021	08/2024



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
Scope available on www.cofrac.fr

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

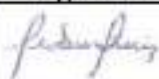
Summary:

This document presents the method and results from an accredited SAR reference 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.53.3124.BES.A

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

Yann
Toutain IDSignature
numérique de Yann
Toutain ID
Date : 2024.02.27
08:58:45 +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.53.3124.BES.A

TABLE OF CONTENTS

1	Introduction.....	4
2	Device Under Test	4
3	Product Description	4
3.1	General Information	4
4	Measurement Method	4
4.1	Mechanical Requirements	4
4.2	S11 parameter Requirements	4
4.3	SAR Requirements	5
5	Measurement Uncertainty	5
5.1	Mechanical dimensions	5
5.2	S11 Parameter	5
5.3	SAR	5
6	Calibration Results	5
6.1	Mechanical Dimensions	5
6.2	S11 parameter	6
6.3	SAR	6
7	List of Equipment	9



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.53.3124.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 $\pm 19\%$ with respect to measurement conditions.

6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

Frequency (MHz)	L (mm)		W (mm)		Lr (mm)		Wr (mm)	
	Required	Measured	Required	Measured	Required	Measured	Required	Measured
5800	40.39 $\pm$ 0.13	-	20.19 $\pm$ 0.13	-	61.03 $\pm$ 0.13	-	61.06 $\pm$ 0.13	-

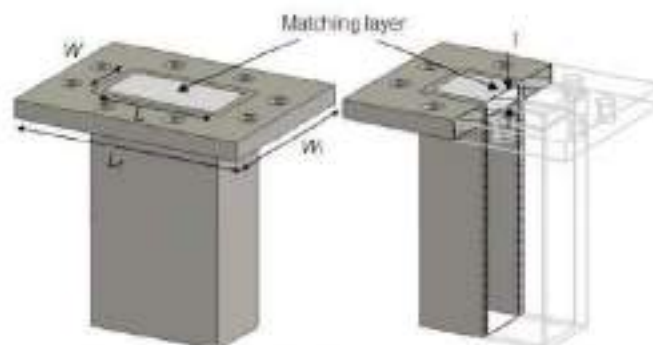


Figure 1: Validation Waveguide Dimensions

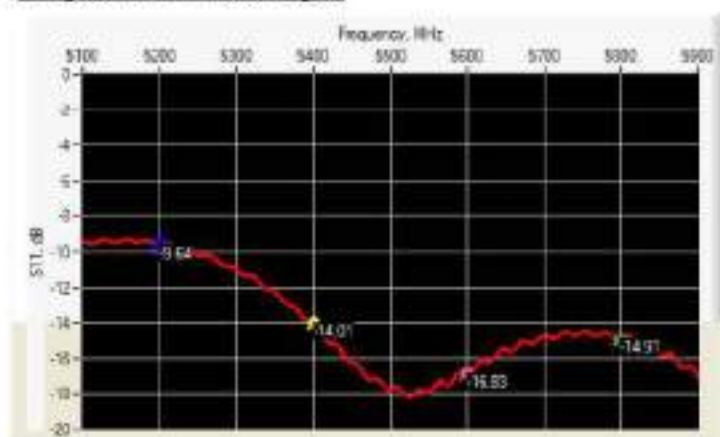


SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.3124.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.



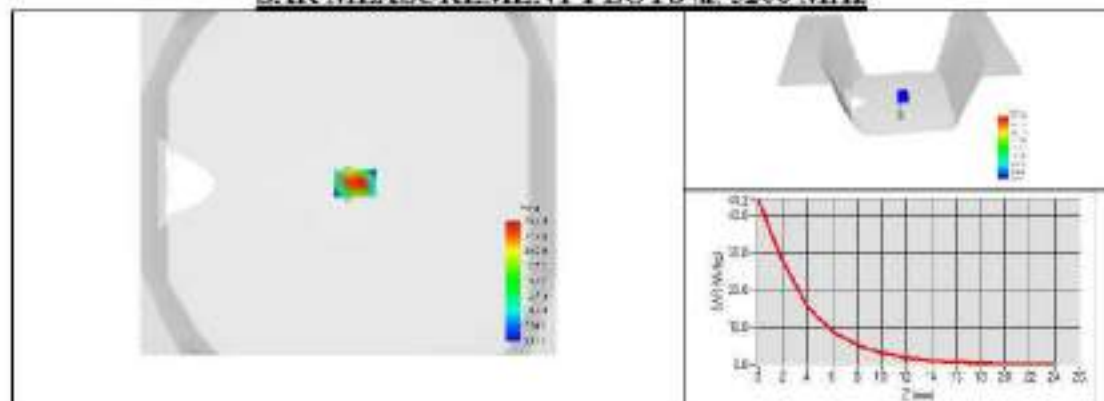
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

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	$\Delta x=8\text{mm}/\Delta y=8\text{mm}$
Zoom Scan Resolution	$\Delta x=4\text{mm}/\Delta y=4\text{mm}/\Delta z=2\text{mm}$
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

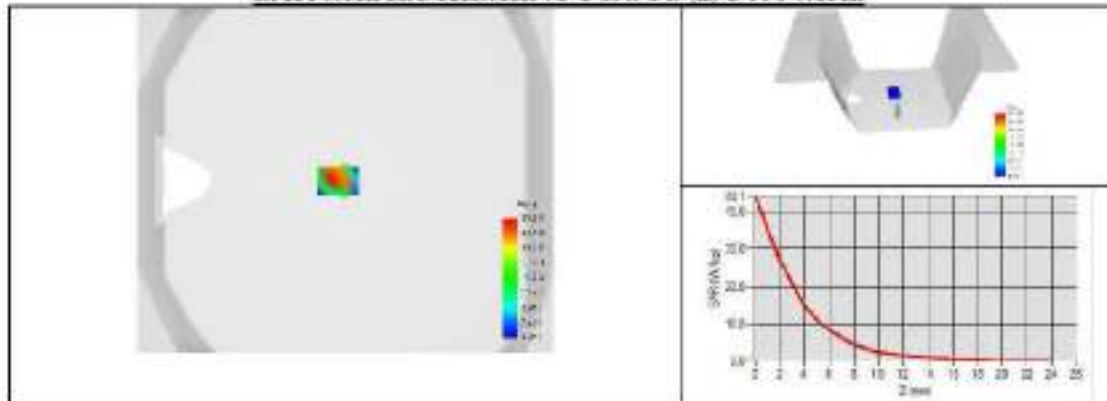




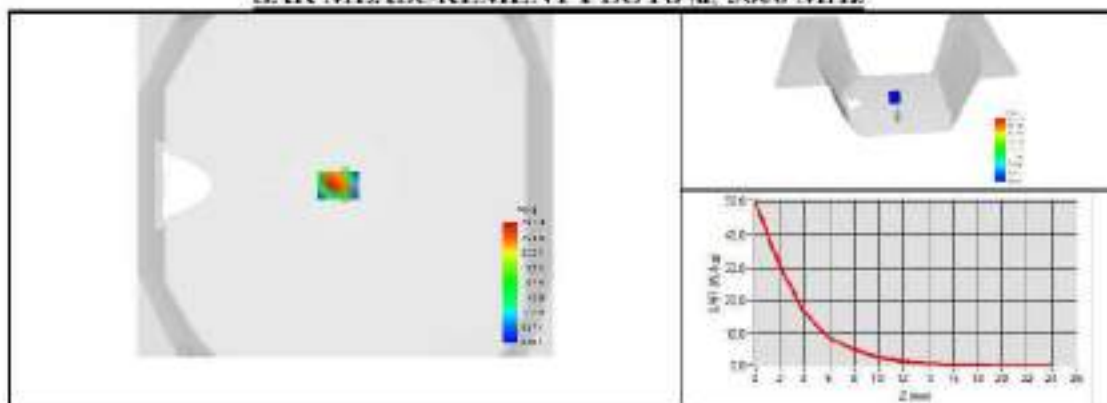
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.3124.BES.A

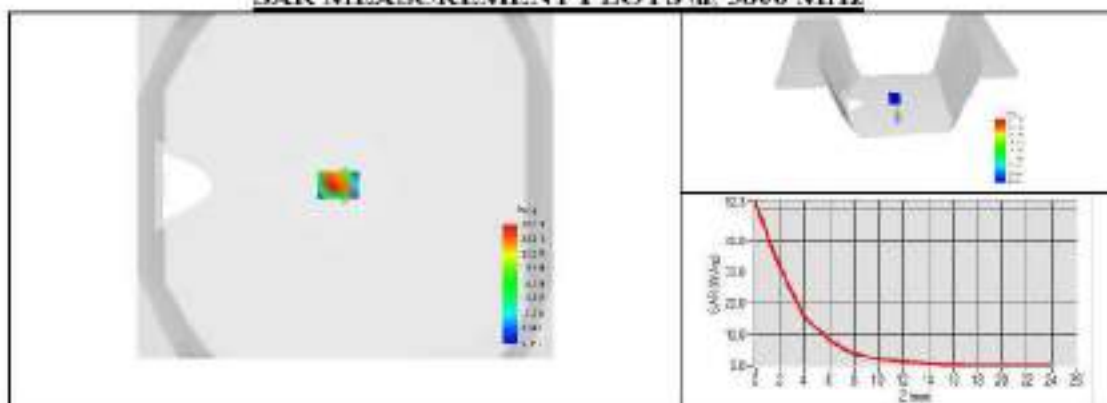
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz





SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.53.1124.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAR 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	07/2026
Calipers	Mitutoyo	SN 0009732	11/2022	11/2026
Reference Probe	MVG	3623-EPGO-431	11/2023	11/2024
Multimeter	Kethley 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	17C100013	09/2021	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

Page: 9/9

Template: ACR.DDDN.YYMVG/ISSUE SAR Reference Waveguide v1.

This document shall not be reproduced, except in full or in part, without the written approval of NTEK. The information contained herein is to be used only for the purpose for which it is intended and is not to be released in whole or part without written approval of NTEK.

END