FCC SAR EVALUATION REPORT

In accordance with the requirements of
FCC 47 CFR Part 2(2.1093) and
IEEE Std 1528-2013

Product Name： Smart Phone

Brand Name： CUBOT

Model Name： KINGKONG POWER 5

Family Model： N/A

Report No.： S25031906403001

FCC ID： 2AHZ5KP5

Prepared for

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TEST RESULT CERTIFICATION

Applicant's name	Shenzhen Huafurui Technology Co., Ltd.
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Manufacturer's Name .	Shenzhen Huafurui Technology Co., Ltd.
Address	Unit 601-03, 6/F, Block A, Building 1,Ganfeng Technology Building, No. 993 Jiaxian Road,Shenzhen,China
Product description	
Product name	Smart Phone
Brand Name	CUBOT
Model and/or type reference	KINGKONG POWER 5
Family Model	N/A
	FCC 47 CFR Part 2(2.1093)
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). The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Test Sample Number S250319064003

Date of Test

Date (s) of performance of tests.. Mar. 28, 2025~ Apr. 18, 2025

Date of Issue..... May. 12, 2025

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

Prepared By :	Reviewed By :	Approved By :
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(Project Engineer)	(Supervisor)	(Manager)

Shenzhen NTEK Testing Technology Co., Ltd. NTEK Report Seal

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	May. 12, 2025	Owen Xiao

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1. General Information

1.1. RF exposure limits

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	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
HEAD AND 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 KINGKONG POWER 5 are as follows.

RF Exposure Conditions		Equipment Class -Highest Reported SAR (W/kg)				Max. Reported SAR (W/kg)
		PCE	DTS	NII	DSS	
1-g Head		0.197	0.335	0.682	0.236	0.682
1-g Body-Worn (Separation distance of 10mm)		0.671	0.143	0.240	0.118	0.671
1-g Hotspot (Separation distance of 10mm)		0.671	0.156	0.430	0.118	
Max Simultaneous Tx	Head	0.879	0.532	0.879	0.433	0.879
	Body-Worn	0.911	0.814	0.911	0.789	0.911
	Hotspot	0.911	0.814	0.911	0.789	

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 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	Smart Phone
Brand Name	CUBOT
Model Name	KINGKONG POWER 5
Family Model	N/A
Model Difference	All models are the same circuit and RF module, except for model names.
FCC ID	2AHZ5KP5
Device Phase	Identical Prototype
Exposure Category	General population / Uncontrolled environment
Antenna Type	PIFA Antenna
Battery Information	DC 3.87V, 15300mAh, 59.211Wh
HW Version	E233-C1

SW Version	CUBOT_KINGKONG_POWER_5_F011C_V08		
Device Operating Configurations			
Supporting Mode(s)	GSM850/1900,WCDMABand2/4/5,LTEBand2/4/5/7/12/17/41 ,WLAN 2.4G/5G, Bluetooth, NFC		
Test Modulation	GSM(GMSK), WCDMA(QPSK), LTE(QPSK/16QAM),WLAN(DSSS/OFDM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK), NFC(ASK)		
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 4	1710-1755	2110-2155
	WCDMA Band 5	824-849	869-894
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690
	LTE Band 12	699-716	729-746
	LTE Band 17	704-716	734-746
	LTE Band 41	2593-2650	
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
	NFC	13.56	
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 4)		
	3, tested with power control “all 1”(WCDMA Band 5)		
	3, tested with power control all Max.(LTE Band 2)		
	3, tested with power control all Max.(LTE Band 4)		
	3, tested with power control all Max.(LTE Band 5)		
	3, tested with power control all Max.(LTE Band 7)		
	3, tested with power control all Max.(LTE Band 12)		
	3, tested with power control all Max.(LTE Band 17)		
	3, tested with power control all Max.(LTE Band 41)		

1.4. Test specification(s)

FCC 47 CFR Part 2(2.1093)

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 v03r01
KDB 941225 D05 SAR for LTE Devices v01r02;
KDB 941225 D06 Hotspot SAR v02r01;
KDB 648474 D04 Handset SAR v01r03;

1.5. Ambient Condition

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

1.6. Facilities And Accreditations

1.6.1. Facilities

All measurement facilities used to collect the measurement data are located at
Building 1, No. 24 Xinfa East Road, Xiangshan Community, Xinqiao Street, Bao'an District, Shenzhen, Guangdong, China

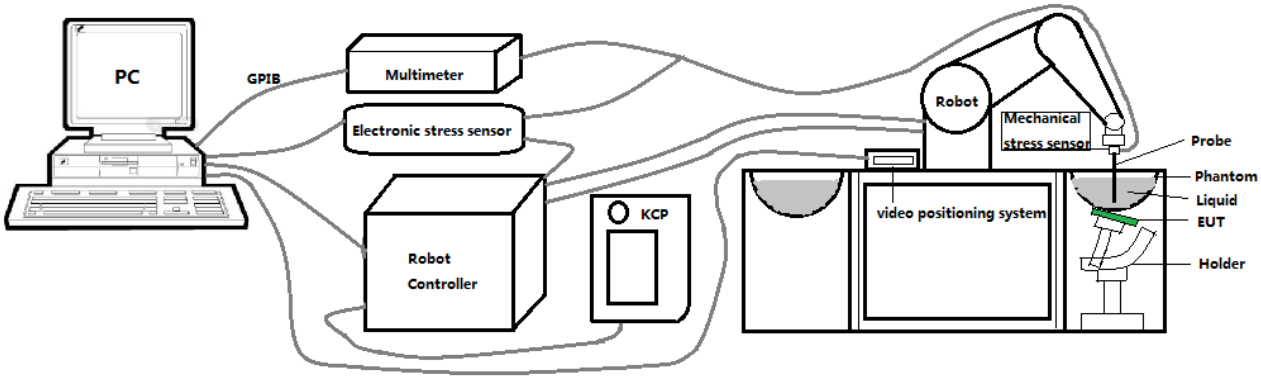
The sites are constructed in conformance with the requirements of IEC/IEEE 1528:2013

1.6.2. Laboratory Accreditations And Listings

Site Description
CNAS Lab. : The Certificate Registration Number is L5516
A2LA Lab. : The Certificate Registration Number is 4298.01
FCC Accredited : Test Firm Registration Number: 463705
Designation Number: CN1184
ISED Registration : Company Number: 9270A
CAB identifier: CN0074

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 4024-EPGO-442 with following specifications is used



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

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

2.3.1. E-Field Probe Calibration

Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. 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

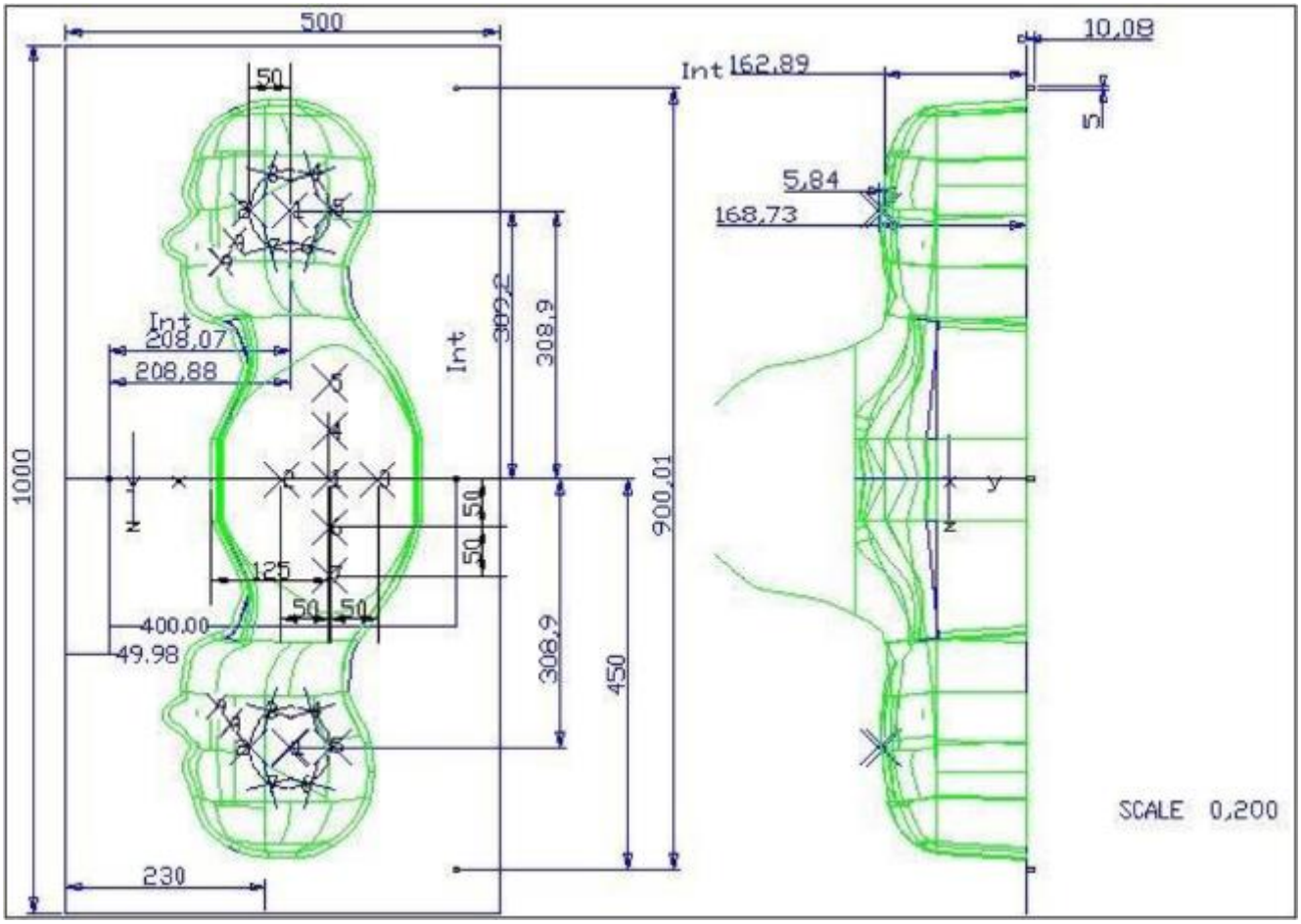
Photo of SAM phantom SN 16/15 SAM119



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 ±0.2 mm	27 liters	Length:1000 mm Width:500 mm Height:200 mm	Gelcoat with fiberglass	3.4	0.02

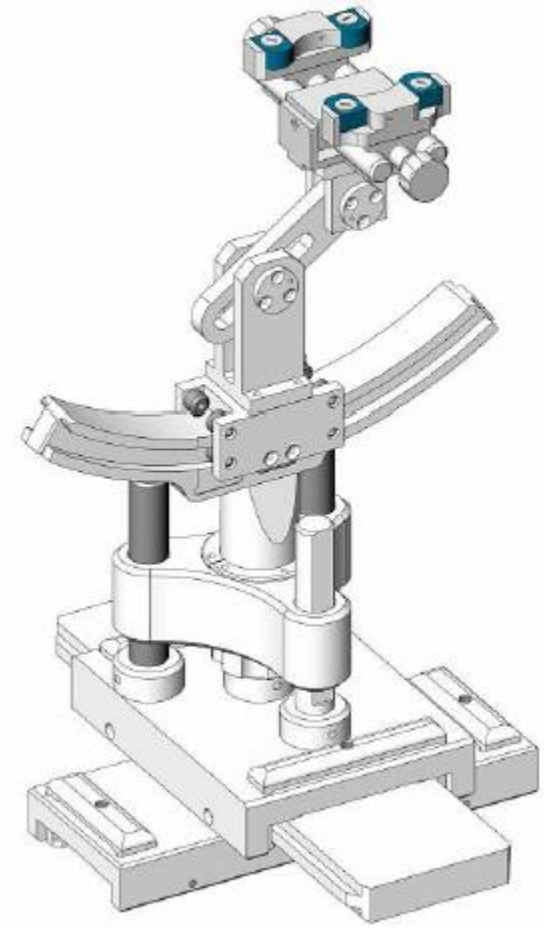


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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

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	4024-EPGO-442	Oct.4.2024	Oct.3.2025
☒	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	Nov. 29, 2024	Nov. 28, 2025
☒	R&S	Universal radio communication tester	CMU200	105747	Apr. 26, 2024	Apr. 25, 2025
☒	R&S	Wideband radio communication tester	CMW500	103917	Apr. 26, 2024	Apr. 25, 2025

☒	HP	Network Analyzer	E5071C	LPS-461	Oct. 15, 2024	Oct. 14, 2025
☒	Agilent	Calibration Kit	85033E	N/A	May. 31, 2024	May. 30, 2025
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power meter	E4419B	MY45102538	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	LES-413-C	May. 30, 2024	May. 29, 2025
☒	Agilent	Power sensor	E9301A	US39212148	Apr. 25, 2024	Apr. 24, 2025
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Apr. 26, 2024	Apr. 25, 2027
☒	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	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 Wi-Fi/BT power measurement, use engineering software to configure EUT Wi-Fi/BT 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 Wi-Fi/BT output power.

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT Wi-Fi/BT 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.

<table>
<tr><td colspan="3"></td><td>≤ 3 GHz</td><td>> 3 GHz</td></tr>
<tr><td colspan="3">Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface</td><td>5 ± 1 mm</td><td>½·δ·ln(2) ± 0.5 mm</td></tr>
<tr><td colspan="3">Maximum probe angle from probe axis to phantom surface normal at the measurement location</td><td>30° ± 1°</td><td>20° ± 1°</td></tr>
<tr><td colspan="3" rowspan="2">Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}</td><td>≤ 2 GHz: ≤ 15 mm
2 – 3 GHz: ≤ 12 mm</td><td>3 – 4 GHz: ≤ 12 mm
4 – 6 GHz: ≤ 10 mm</td></tr>
<tr><td colspan="2">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.</td></tr>
<tr><td colspan="3">Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}</td><td>≤ 2 GHz: ≤ 8 mm
2 – 3 GHz: ≤ 5 mm*</td><td>3 – 4 GHz: ≤ 5 mm*
4 – 6 GHz: ≤ 4 mm*</td></tr>
<tr><td rowspan="3">Maximum zoom scan spatial resolution, normal to phantom surface</td><td colspan="2">uniform grid: $\Delta z_{Zoom}(n)$</td><td>≤ 5 mm</td><td>3 – 4 GHz: ≤ 4 mm
4 – 5 GHz: ≤ 3 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td rowspan="2">graded grid</td><td>$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface</td><td>≤ 4 mm</td><td>3 – 4 GHz: ≤ 3 mm
4 – 5 GHz: ≤ 2.5 mm
5 – 6 GHz: ≤ 2 mm</td></tr>
<tr><td>$\Delta z_{Zoom}(n>1)$: between subsequent points</td><td colspan="2">≤ 1.5·$\Delta z_{Zoom}(n-1)$</td></tr>
<tr><td>Minimum zoom scan volume</td><td colspan="2">x, y, z</td><td>≥ 30 mm</td><td>3 – 4 GHz: ≥ 28 mm
4 – 5 GHz: ≥ 25 mm
5 – 6 GHz: ≥ 22 mm</td></tr>
<tr><td colspan="5">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 reported SAR from the area scan based 1-g SAR estimation 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.</td></tr>
</table>

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 ±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	5200	5800
Water	34.40	34.40	34.40	55.36	55.36	57.87	57.87	57.87	65.53	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	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	24.24	24.24
DGBE	0.00	0.00	0.00	13.84	13.84	22.00	22.00	22.00	10.23	10.23

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

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

4.1.1. Tissue Dielectric Parameter Check Results

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

Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		εr (±5%)	σ (S/m) (±5%)	εr	σ (S/m)		
Head 750	750	41.96 (39.86~44.06)	0.89 (0.85~0.93)	40.57	0.89	21.1 °C	Apr. 11, 2025
Head 850	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.90	0.88	21.7 °C	Apr. 09, 2025
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	38.86	1.38	21.7 °C	Apr. 14, 2025
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	38.67	1.45	21.1 °C	Apr. 18, 2025
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.73	1.77	21.1 °C	Mar. 28, 2025
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	39.84	1.95	21.3 °C	Apr. 12, 2025
Head 5200	5200	36.00 (34.20~37.80)	4.66 (4.43~4.89)	36.19	4.81	21.4 °C	Mar. 30, 2025
Head 5800	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	35.39	5.18	21.7 °C	Apr. 02, 2025

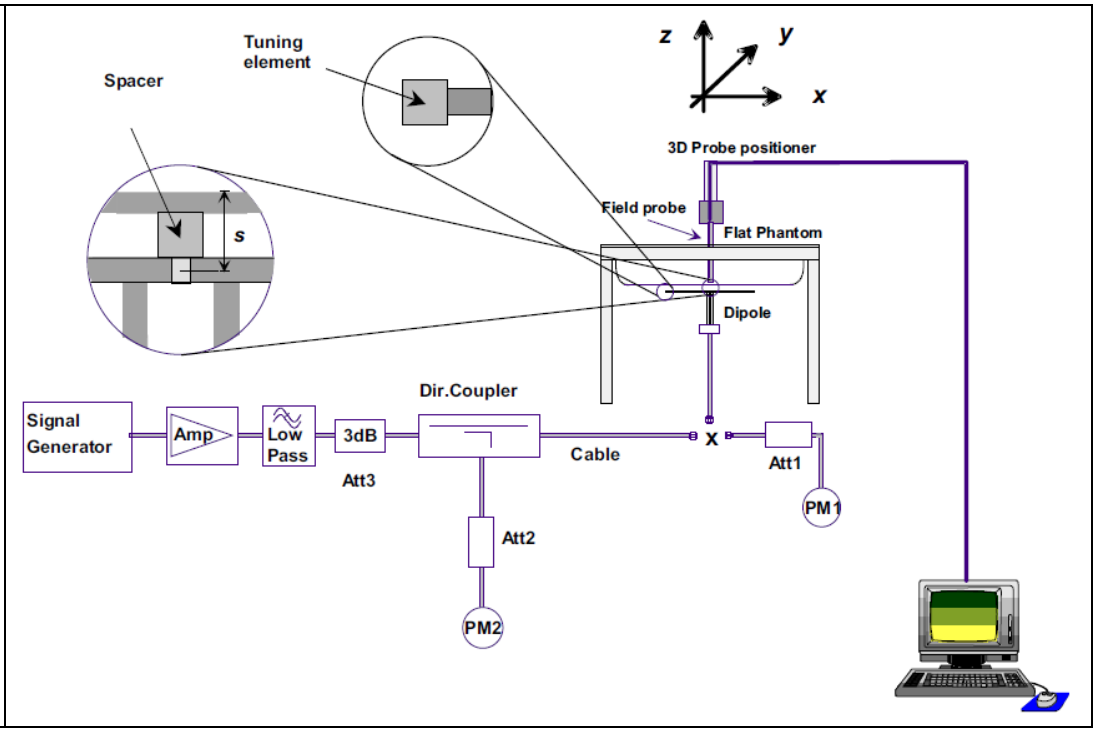
NOTE: The dielectric parameters of the tissue-equivalent liquid should be measured under similar ambient conditions and within 2 °C of the conditions expected during the SAR evaluation to satisfy protocol requirements.

4.2. System Verification Procedure

The system verification is performed for verifying the accuracy of the complete measurement system and performance of the software. The dipole is connected to the signal source consisting of signal generator and amplifier via a directional coupler, N-connector cable and adaption to SMA. 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 ±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) (±10%)		Measured SAR		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
750MHz	8.60 (7.74~9.46)	5.78 (5.20~6.36)	0.910	0.630	9.10	6.30	21.1 °C	Apr. 11, 2025
835MHz	9.40 (8.46~10.34)	6.28 (5.65~6.91)	0.916	0.602	9.16	6.02	21.7 °C	Apr. 09, 2025
1800MHz	37.06 (33.35~40.77)	20.01 (18.01~22.01)	3.948	1.941	39.48	19.41	21.7 °C	Apr. 14, 2025
1900MHz	39.69 (35.72~43.66)	20.92 (18.83~23.01)	4.154	1.959	41.54	19.59	21.1 °C	Apr. 18, 2025
2450MHz	50.05 (45.05~55.06)	23.80 (21.42~26.18)	5.246	2.245	52.46	22.45	21.1 °C	Mar. 28, 2025
2600MHz	54.16 (48.74~59.58)	24.85 (22.37~27.34)	5.723	2.363	57.23	23.63	21.3 °C	Apr. 12, 2025
5200MHz	162.59 (146.33~178.85)	56.21 (50.59~61.83)	1.612	0.548	161.20	54.78	21.4 °C	Mar. 30, 2025
5800MHz	182.20 (163.98~200.42)	61.32 (55.19~67.45)	1.698	0.567	169.80	56.70	21.7 °C	Apr. 02, 2025

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 (~ 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. Ear and handset reference point

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



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

6.2. Definition of the cheek position

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

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

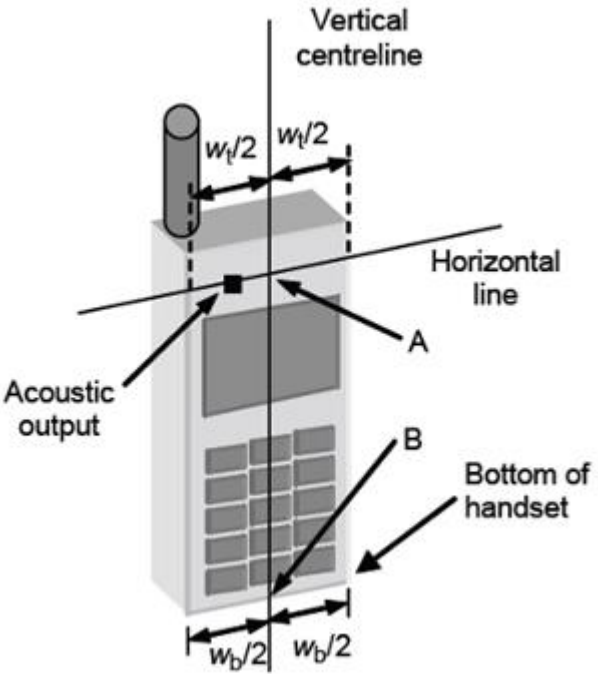


Fig 6.2.1 Handset vertical and horizontal reference lines—"fixed case

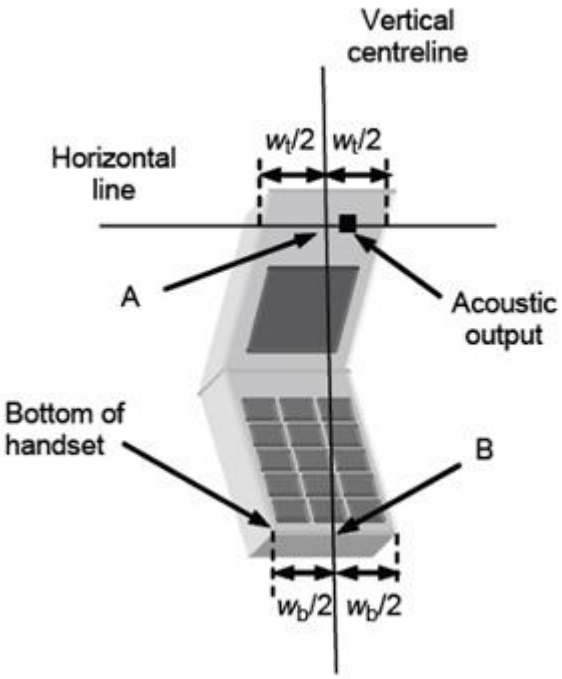


Fig 6.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

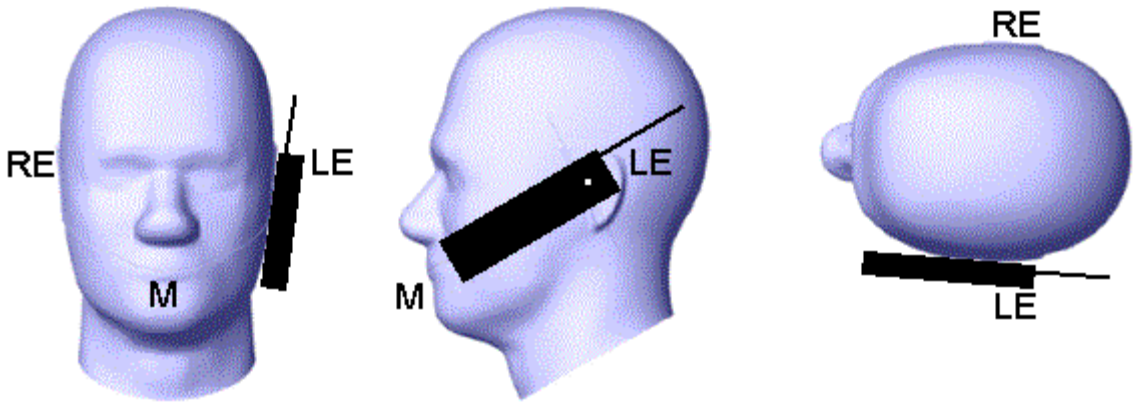


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

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

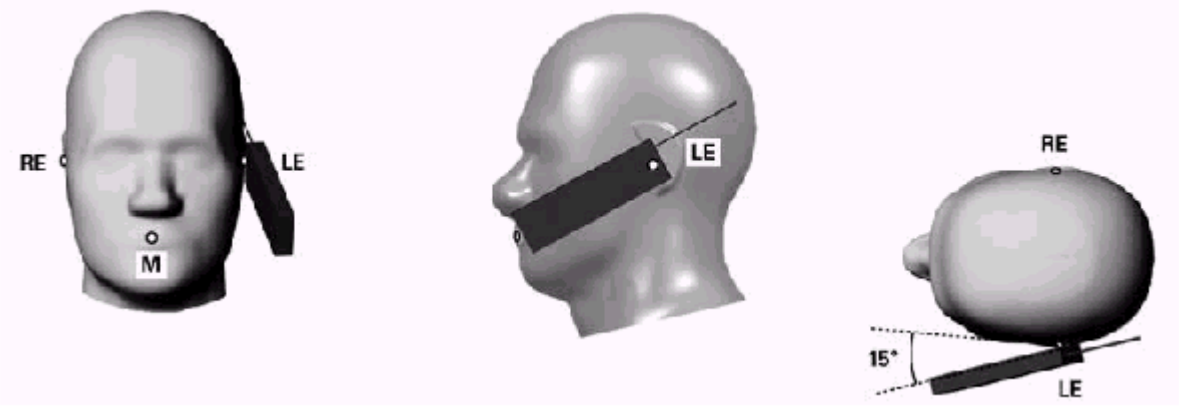


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Body Worn Accessory

1. Body-worn operating configurations are tested with the belt-clips and holsters attached to the device and positioned against a flat phantom in a normal use configuration (see Figure 6.4.1). Per KDB 648474 D04, body-worn accessory exposure is typically related to voice mode operations when handsets are carried in body-worn accessories. The body-worn accessory procedures in FCC KDB 447498 D01 should be used to test for body-worn accessory SAR compliance, without a headset connected to it. This enables the test results for such configuration to be compatible with that required for hotspot mode when the body-worn accessory test separation distance is greater than or equal to that required for hotspot mode, when applicable. When the reported SAR for body-worn accessory, measured without a headset connected to the handset is < 1.2 W/kg, the highest reported SAR configuration for that wireless mode and frequency band should be repeated for that body-worn accessory with a handset attached to the handset.
2. Accessories for body-worn operation configurations are divided into two categories: those that do not contain metallic components and those that do contain metallic components and those that do contain metallic components. When multiple accessories that do not contain metallic components are supplied with the device, the device is tested with only the accessory that dictates the closest

spacing to the body. Then multiple accessories that contain metallic components are test with the device with each accessory. If multiple accessories share an identical metallic component (i.e. the same metallic belt-chip used with different holsters with no other metallic components) only the accessory that dictates the closest spacing to the body is tested.

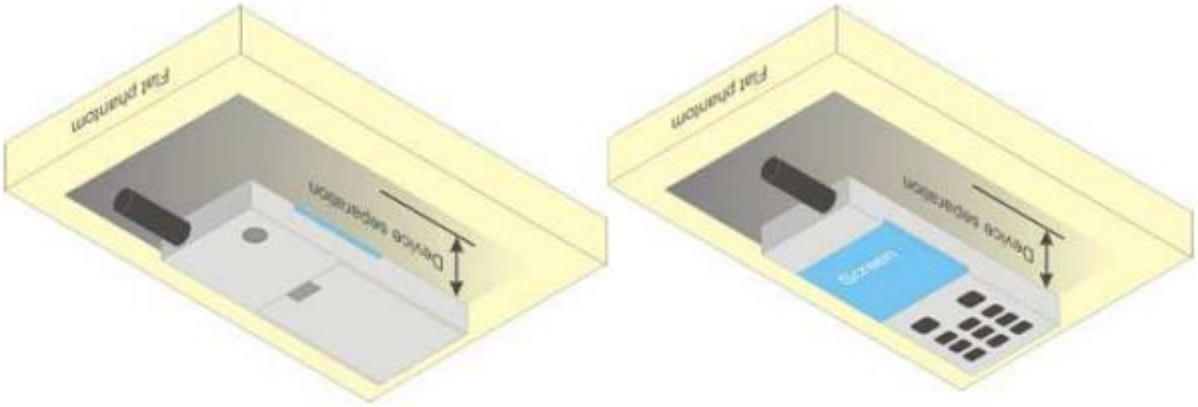


Figure 6.4.1 – Test positions for body-worn devices

6.5. Wireless Router Devices

Some battery-operated handsets have the capability to transmit and receive user through simultaneous transmission of WLAN simultaneously with a separate licensed transmitter. The FCC has provided guidance in FCC KDB Publication 941225 D06 where SAR test considerations for handsets (L x W ≥ 9 cm x 5 cm) are based on a composite test separation distance of 10mm from the front, back and edges of the device containing transmitting antennas within 2.5cm of their edges, determined form general mixed use conditions for this type of devices. Since the hotspot SAR results may overlap with the body-worn accessory SAR requirements, the more conservative configurations can be considered, thus excluding some body-worn accessory SAR tests.

When the user enables the personal wireless router functions for the handset, actual operations include simultaneous transmission of both the WLAN transmitter and another licensed transmitter. Both transmitters often do not transmit at the same transmitting frequency and thus cannot be evaluated for SAR under actual use conditions due to the limitations of the SAR assessment probes. Therefore, SAR must be evaluated for each frequency transmission and mode separately and spatially summed with the WLAN transmitter according to FCC KDB Publication 447498 D01 publication procedures. The “Portable Hotspot” feature on the handset was NOT activated during SAR assessments, to ensure the SAR measurements were evaluated for a single transmission frequency RF signal at a time.

7. RF Output Power

7.1. GSM Conducted Power

Band GSM850	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	128	189	251	Tune-up	128	189	251
Frequency (MHz)	(dBm)	824.2	836.4	848.8		824.2	836.4	848.8
GSM (GMSK)	33.50	32.92	32.95	33.03	24.47	23.89	23.92	24.00
GPRS(GMSK,1 Tx slot)	33.00	32.89	32.90	32.99	23.97	23.86	23.87	23.96
GPRS(GMSK,2 Tx slot)	32.50	31.91	31.94	32.03	26.48	25.89	25.92	26.01
GPRS(GMSK,3 Tx slot)	30.00	29.79	29.80	29.96	25.74	25.53	25.54	25.70
GPRS(GMSK,4 Tx slot)	29.00	28.64	28.66	28.77	25.99	25.63	25.65	25.76
EGPRS(8PSK,1 Tx slot)	27.50	27.22	27.36	27.12	18.47	18.19	18.33	18.09
EGPRS(8PSK,2 Tx slot)	27.00	26.39	26.21	26.75	20.98	20.37	20.19	20.73
EGPRS(8PSK,3 Tx slot)	25.00	24.45	24.48	24.52	20.74	20.19	20.22	20.26
EGPRS(8PSK,4 Tx slot)	23.50	23.21	23.25	23.46	20.49	20.20	20.24	20.45

Band GSM1900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	512	661	810	Tune-up	512	661	810
Frequency (MHz)	(dBm)	1850.2	1880	1909.8		1850.2	1880	1909.8
GSM (GMSK)	30.00	29.73	29.69	29.29	20.97	20.70	20.66	20.26
GPRS(GMSK,1 Tx slot)	30.00	29.75	29.72	29.33	20.97	20.72	20.69	20.30
GPRS(GMSK,2 Tx slot)	29.00	28.75	28.76	28.41	22.98	22.73	22.74	22.39
GPRS(GMSK,3 Tx slot)	27.00	26.52	26.61	26.42	22.74	22.26	22.35	22.16
GPRS(GMSK,4 Tx slot)	26.00	25.46	25.56	25.41	22.99	22.45	22.55	22.40
EGPRS(8PSK,1 Tx slot)	27.00	26.20	26.70	25.27	17.97	17.17	17.67	16.24
EGPRS(8PSK,2 Tx slot)	26.00	25.72	25.37	25.14	19.98	19.70	19.35	19.12
EGPRS(8PSK,3 Tx slot)	25.00	24.68	24.43	23.87	20.74	20.42	20.17	19.61
EGPRS(8PSK,4 Tx slot)	23.50	22.68	23.13	22.69	20.49	19.67	20.12	19.68

7.2. WCDMA Conducted Power

WCDMA Band 2	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up	9262	9400	9538
Frequency (MHz)	(dBm)	1852.4	1880	1907.6
RMC12.2K	23.00	22.90	22.92	22.78
HSDPA Sub 1	22.50	22.26	22.26	22.06
HSDPA Sub 2	22.50	21.93	22.01	21.65

HSDPA Sub 3	21.50	20.44	20.39	21.42
HSDPA Sub 4	22.00	21.21	20.81	21.75
HSUPA Sub 1	22.00	21.93	21.90	21.84
HSUPA Sub 2	22.50	22.14	22.16	21.88
HSUPA Sub 3	21.50	21.12	20.71	21.02
HSUPA Sub 4	22.50	22.15	22.21	22.07
HSUPA Sub 5	22.00	21.34	21.37	21.55
WCDMA Band 4	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up	1312	1413	1513
Frequency (MHz)	(dBm)	1712.4	1732.6	1752.6
RMC12.2K	23.00	22.90	22.80	22.92
HSDPA Sub 1	22.50	22.23	22.08	22.23
HSDPA Sub 2	22.00	21.76	21.84	21.88
HSDPA Sub 3	21.00	20.75	20.49	20.68
HSDPA Sub 4	21.50	20.77	21.02	20.67
HSUPA Sub 1	22.50	21.49	22.03	22.14
HSUPA Sub 2	22.50	22.16	22.02	22.14
HSUPA Sub 3	21.00	19.74	20.92	20.77
HSUPA Sub 4	22.50	22.26	22.11	22.24
HSUPA Sub 5	22.50	21.22	21.45	22.47
WCDMA Band 5	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up	4132	4182	4233
Frequency (MHz)	(dBm)	826.4	836.4	846.6
RMC12.2K	23.00	22.86	22.73	22.71
HSDPA Sub 1	22.50	22.14	22.12	22.00
HSDPA Sub 2	23.00	21.80	22.59	21.91
HSDPA Sub 3	21.00	20.45	20.54	20.16
HSDPA Sub 4	21.00	20.03	20.61	19.99
HSUPA Sub 1	22.00	21.79	21.88	21.95
HSUPA Sub 2	22.50	22.13	21.96	21.99
HSUPA Sub 3	22.00	20.26	21.99	21.67
HSUPA Sub 4	22.50	22.12	22.09	22.05
HSUPA Sub 5	21.00	19.71	20.77	21.00

7.3. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18607/1850.7	18900/1880	19193/1909.3
LTE Band 2	1.4MHz	QPSK	1	0	23.50	23.08	22.94	22.52
			1	2	23.50	23.11	22.84	22.50
			1	5	23.50	23.03	22.96	22.52
			3	0	23.50	23.11	22.90	22.57
			3	1	23.50	23.10	22.86	22.55
			3	2	23.50	23.11	22.78	22.57
			6	0	22.50	22.42	21.95	21.92
		16QAM	1	0	23.00	22.55	22.20	22.03
			1	2	23.00	22.50	22.06	22.06
			1	5	23.00	22.55	22.08	22.00
			3	0	22.50	22.30	21.88	21.77
			3	1	22.50	22.32	21.81	21.72
			3	2	22.50	22.22	21.92	21.84
			6	0	22.00	21.77	21.38	21.27
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band 2	3MHz	QPSK	1	0	23.00	22.50	22.46	22.44
			1	7	23.00	22.50	22.46	22.48
			1	14	23.00	22.49	22.47	22.47
			8	0	22.00	21.91	21.91	21.88
			8	4	22.00	21.93	21.94	21.90
			8	7	22.00	21.92	21.91	21.89
			15	0	22.00	21.92	21.90	21.90
		16QAM	1	0	22.50	22.05	22.04	22.01
			1	7	22.50	21.99	22.11	21.94
			1	14	22.50	22.03	22.11	21.96
			8	0	21.50	21.30	21.30	21.20
			8	4	21.50	21.30	21.29	21.24
			8	7	21.50	21.28	21.28	21.24
			15	0	21.50	21.21	21.23	21.16
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
LTE	5MHz	QPSK	1	0	23.00	22.71	22.70	22.62

Band 2			1	12	23.00	22.73	22.73	22.69
			1	24	23.00	22.67	22.70	22.70
			12	0	22.50	21.99	22.01	21.98
			12	6	22.50	22.01	22.03	21.99
			12	11	22.50	22.01	22.01	21.97
			25	0	22.50	22.02	22.03	22.01
		16QAM	1	0	22.50	22.35	22.20	22.18
			1	12	22.50	22.21	22.28	22.13
			1	24	22.50	22.20	22.33	22.18
			12	0	21.50	21.29	21.34	21.25
			12	6	21.50	21.30	21.32	21.25
			12	11	21.50	21.32	21.35	21.23
			25	0	21.50	21.35	21.38	21.31
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18650/1855	18900/1880	19150/1905
LTE Band 2	10MHz	QPSK	1	0	23.00	22.79	22.77	22.66
			1	24	23.00	22.68	22.72	22.64
			1	49	23.00	22.66	22.75	22.79
			25	0	22.50	21.93	22.00	21.93
			25	12	22.50	21.98	22.02	21.96
			25	24	22.50	21.95	22.00	21.92
			50	0	22.50	22.00	22.03	21.96
		16QAM	1	0	22.50	22.39	22.37	22.11
			1	24	22.50	22.24	22.34	22.14
			1	49	22.50	22.10	22.24	22.26
			25	0	21.50	21.26	21.33	21.24
			25	12	21.50	21.28	21.34	21.24
			25	24	21.50	21.28	21.32	21.22
			50	0	21.50	21.28	21.33	21.24
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5
LTE Band 2	15MHz	QPSK	1	0	23.00	22.77	22.67	22.62
			1	37	23.00	22.65	22.73	22.63
			1	74	23.00	22.62	22.72	22.75
			36	0	22.50	21.92	21.98	21.92
			36	18	22.50	21.90	22.00	21.91
			36	37	22.50	21.91	22.01	21.92
			75	0	22.50	21.92	22.01	21.91

			1	0	22.50	22.35	22.25	22.12
			1	37	22.50	22.10	22.23	22.13
			1	74	22.50	22.14	22.26	22.17
		16QAM	36	0	21.50	21.22	21.31	21.19
			36	18	21.50	21.21	21.28	21.18
			36	37	21.50	21.22	21.31	21.19
			75	0	21.50	21.20	21.31	21.18
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
LTE Band 2	20MHz	QPSK	1	0	23.50	23.08	22.99	23.03
			1	49	23.50	22.60	22.75	22.60
			1	99	23.50	22.61	22.63	22.74
			50	0	22.50	21.86	21.98	21.90
			50	24	22.50	21.90	22.04	21.95
			50	49	22.50	21.91	22.00	21.85
			100	0	22.00	21.88	21.98	21.89
		16QAM	1	0	23.00	22.57	22.53	22.50
			1	49	23.00	22.18	22.33	22.09
			1	99	23.00	22.11	22.16	22.25
			50	0	21.50	21.14	21.27	21.17
			50	24	21.50	21.18	21.32	21.21
			50	49	21.50	21.21	21.30	21.12
			100	0	21.50	21.17	21.27	21.14

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	23.00	22.92	22.91	22.86
			1	2	23.00	22.96	22.94	22.90
			1	5	23.00	22.94	22.94	22.85
			3	0	23.00	22.99	22.98	22.91
			3	1	23.00	22.95	22.96	22.88
			3	2	23.00	22.98	22.98	22.92
			6	0	22.50	22.32	22.33	22.27
		16QAM	1	0	22.50	22.44	22.33	22.38
			1	2	22.50	22.38	22.48	22.40
			1	5	22.50	22.40	22.36	22.40
			3	0	22.50	22.20	22.23	22.14

			3	1	22.50	22.23	22.13	22.19
			3	2	22.50	22.19	22.17	22.20
			6	0	22.00	21.69	21.71	21.66
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	23.00	22.91	22.88	22.82
			1	7	23.00	22.88	22.91	22.86
			1	14	23.00	22.91	22.90	22.86
			8	0	22.50	22.34	22.31	22.29
			8	4	22.50	22.33	22.35	22.33
			8	7	22.50	22.34	22.35	22.30
			15	0	22.50	22.36	22.32	22.28
		16QAM	1	0	22.50	22.36	22.30	22.27
			1	7	22.50	22.41	22.46	22.28
			1	14	22.50	22.40	22.35	22.37
			8	0	22.00	21.70	21.64	21.62
			8	4	22.00	21.65	21.70	21.66
			8	7	22.00	21.70	21.71	21.65
			15	0	22.00	21.63	21.61	21.58
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	23.50	23.11	23.08	23.04
			1	12	23.50	23.11	23.15	23.09
			1	24	23.50	23.09	23.13	23.08
			12	0	22.50	22.42	22.42	22.36
			12	6	22.50	22.42	22.44	22.40
			12	11	22.50	22.41	22.46	22.39
			25	0	22.50	22.44	22.48	22.41
		16QAM	1	0	23.00	22.53	22.59	22.66
			1	12	23.00	22.64	22.61	22.54
			1	24	23.00	22.64	22.62	22.66
			12	0	22.00	21.68	21.72	21.68
			12	6	22.00	21.72	21.72	21.70
			12	11	22.00	21.71	21.77	21.69
			25	0	22.00	21.73	21.79	21.74
Band	Band	Modulation	RB		Tune-up	Channel/Frequency(MHz)		

	Width		Configuration		(dBm)			
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
LTE Band 4	10MHz	QPSK	1	0	23.50	23.18	23.13	23.14
			1	24	23.50	23.07	23.15	23.06
			1	49	23.50	23.12	23.22	23.17
			25	0	22.50	22.42	22.39	22.37
			25	12	22.50	22.42	22.47	22.40
			25	24	22.50	22.41	22.48	22.37
			50	0	22.50	22.44	22.45	22.40
		16QAM	1	0	23.00	22.65	22.72	22.66
			1	24	23.00	22.54	22.64	22.63
			1	49	23.00	22.70	22.67	22.71
			25	0	22.00	21.71	21.70	21.68
			25	12	22.00	21.72	21.75	21.70
			25	24	22.00	21.73	21.76	21.68
			50	0	22.00	21.69	21.74	21.67
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	23.50	23.15	23.08	23.11
			1	37	23.50	23.07	23.15	23.06
			1	74	23.50	23.15	23.23	23.19
			36	0	23.00	22.44	22.39	22.42
			36	18	23.00	22.38	22.45	22.37
			36	37	23.00	22.42	22.52	22.38
			75	0	22.50	22.41	22.45	22.41
		16QAM	1	0	23.00	22.63	22.64	22.63
			1	37	23.00	22.60	22.64	22.48
			1	74	23.00	22.68	22.60	22.59
			36	0	22.00	21.72	21.66	21.71
			36	18	22.00	21.66	21.72	21.65
			36	37	22.00	21.71	21.79	21.68
			75	0	22.00	21.69	21.72	21.70
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
LTE	20MHz	QPSK	1	0	23.50	23.45	23.37	23.45

Band 4			1	49	23.50	23.04	23.17	23.07
			1	99	23.50	23.16	23.17	23.15
			50	0	23.00	22.39	22.36	22.43
			50	24	23.00	22.40	22.50	22.44
			50	49	23.00	22.43	22.52	22.38
			100	0	22.50	22.41	22.44	22.40
		16QAM	1	0	23.00	22.87	22.89	22.91
			1	49	23.00	22.64	22.62	22.45
			1	99	23.00	22.66	22.66	22.66
			50	0	22.00	21.66	21.63	21.71
			50	24	22.00	21.67	21.76	21.70
			50	49	22.00	21.69	21.78	21.66
			100	0	22.00	21.68	21.71	21.67

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20407/824.7	20525/836.5	20643/848.3
LTE Band 5	1.4MHz	QPSK	1	0	23.50	22.01	22.17	23.03
			1	2	23.50	21.90	22.27	23.06
			1	5	23.50	21.82	22.28	23.06
			3	0	23.50	22.01	22.22	23.10
			3	1	23.50	21.92	22.23	23.07
			3	2	23.50	21.89	22.29	23.10
			6	0	22.50	21.30	21.57	22.47
		16QAM	1	0	23.00	21.53	21.65	22.47
			1	2	23.00	21.40	21.90	22.53
			1	5	23.00	21.40	21.86	22.51
			3	0	22.50	21.25	21.48	22.27
			3	1	22.50	21.23	21.58	22.33
			3	2	22.50	21.21	21.57	22.32
			6	0	22.00	19.12	20.95	21.78
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20415/825.5	20525/836.5	20635/847.5
LTE Band 5	3MHz	QPSK	1	0	23.50	22.00	22.08	23.01
			1	7	23.50	21.68	22.23	23.03
			1	14	23.50	21.75	22.37	23.04
			8	0	22.50	21.30	21.61	22.45
			8	4	22.50	21.19	21.65	22.49
			8	7	22.50	21.18	21.72	22.46

			15	0	22.50	21.18	21.62	22.46
		16QAM	1	0	23.00	21.56	21.67	22.51
			1	7	23.00	21.31	21.78	22.57
			1	14	23.00	21.30	21.86	22.50
			8	0	22.00	19.04	20.98	21.76
			8	4	22.00	18.94	21.04	21.82
			8	7	22.00	18.89	21.06	21.79
			15	0	22.00	18.87	20.91	21.74

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20425/826.5	20525/836.5	20625/846.5
LTE Band 5	5MHz	QPSK	1	0	23.50	22.22	22.20	23.06
			1	12	23.50	21.98	22.47	23.26
			1	24	23.50	21.97	22.64	23.25
			12	0	23.00	21.29	21.66	22.49
			12	6	23.00	21.29	21.78	22.55
			12	11	23.00	21.36	21.81	22.59
			25	0	23.00	21.33	21.72	22.57
		16QAM	1	0	23.00	21.85	21.84	22.60
			1	12	23.00	21.62	22.09	22.70
			1	24	23.00	21.58	22.19	22.70
			12	0	22.00	18.94	20.98	21.74
			12	6	22.00	18.98	21.10	21.85
			12	11	22.00	19.01	21.14	21.86
			25	0	22.00	19.01	21.06	21.85

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20450/829	20525/836.5	20600/844
LTE Band 5	10MHz	QPSK	1	0	23.50	22.26	22.13	22.78
			1	24	23.50	21.96	22.49	22.95
			1	49	23.50	22.22	22.82	23.30
			25	0	23.00	21.22	21.57	22.17
			25	12	23.00	21.25	21.71	22.34
			25	24	23.00	21.31	21.79	22.56
			50	0	22.50	21.28	21.70	22.40
		16QAM	1	0	23.00	21.95	21.77	22.31
			1	24	23.00	21.60	22.04	22.49
			1	49	23.00	21.73	22.42	22.83
			25	0	22.00	18.89	20.89	21.50
			25	12	22.00	18.99	21.04	21.63

			25	24	22.00	19.00	21.12	21.85
			50	0	22.00	18.96	21.00	21.67

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	24.50	21.88	24.14	23.83
			1	12	24.50	21.90	23.47	23.86
			1	24	24.50	21.76	23.19	22.80
			12	0	22.00	21.18	21.92	21.52
			12	6	22.00	21.15	21.90	21.58
			12	11	22.00	21.07	21.86	21.59
			25	0	22.00	21.15	21.91	21.60
		16QAM	1	0	22.50	21.35	21.97	21.52
			1	12	22.50	21.32	22.17	21.68
			1	24	22.50	21.25	22.12	21.80
			12	0	21.50	20.45	21.16	20.73
			12	6	21.50	20.41	21.18	20.80
			12	11	21.50	20.35	21.09	20.82
			25	0	21.50	20.44	21.19	20.83

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	24.50	22.00	24.17	22.07
			1	24	24.50	21.78	23.29	23.70
			1	49	24.50	21.65	22.63	22.94
			25	0	22.00	21.12	21.92	21.35
			25	12	22.00	21.03	21.90	21.45
			25	24	22.00	20.99	21.86	21.50
			50	0	22.00	21.08	21.92	21.46
		16QAM	1	0	22.50	21.51	21.97	21.53
			1	24	22.50	21.22	22.10	21.46
			1	49	22.50	21.22	22.13	21.83
			25	0	21.50	20.41	21.16	20.57
			25	12	21.50	20.32	21.15	20.70
			25	24	21.50	20.28	21.11	20.78
			50	0	21.50	20.32	21.15	20.67

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	24.50	21.94	24.07	22.04
			1	37	24.50	21.67	23.30	23.65
			1	74	24.50	21.56	22.55	23.13
			36	0	22.00	21.06	21.86	21.24
			36	18	22.00	20.92	21.90	21.35
			36	37	22.00	20.87	21.86	21.45
			75	0	22.00	20.97	21.87	21.34
		16QAM	1	0	22.50	21.40	21.95	21.54
			1	37	22.50	21.08	22.18	21.48
			1	74	22.50	21.08	22.08	21.78
			36	0	21.50	20.35	21.12	20.50
			36	18	21.50	20.18	21.14	20.58
			36	37	21.50	20.13	21.11	20.69
			75	0	21.50	20.23	21.10	20.58

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	21.88	23.95	23.66
			1	49	24.00	21.57	23.34	21.98
			1	99	24.00	21.67	22.28	23.45
			50	0	22.00	20.94	21.90	21.25
			50	24	22.00	20.87	21.91	21.34
			50	49	22.00	20.92	21.76	21.41
			100	0	22.00	20.94	21.84	21.30
		16QAM	1	0	22.50	21.32	21.74	21.69
			1	49	22.50	21.05	22.20	21.48
			1	99	22.50	21.11	21.92	21.68
			50	0	21.50	20.22	21.12	20.47
			50	24	21.50	20.11	21.14	20.55
			50	49	21.50	20.18	21.00	20.65
			100	0	21.50	20.21	21.07	20.54

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		23017/699.7	23095/707.5	23173/715.3
LTE Band 12	1.4MHz	QPSK	1	0	20.50	19.79	19.75	20.04
			1	2	20.50	19.97	19.79	20.09
			1	5	20.50	19.99	19.80	20.14
			3	0	20.50	19.92	19.80	20.08
			3	1	20.50	19.98	19.79	20.10

			3	2	20.50	20.04	19.82	20.15
			6	0	19.50	19.26	19.10	19.41
		16QAM	1	0	20.00	19.43	19.27	19.46
			1	2	20.00	19.49	19.35	19.53
			1	5	20.00	19.51	19.26	19.54
			3	0	19.50	19.16	18.99	19.27
			3	1	19.50	19.26	18.97	19.37
			3	2	19.50	19.29	19.07	19.41
			6	0	19.00	18.63	18.45	18.74
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		23025/700.5	23095/707.5	23165/714.5
LTE Band 12	3MHz	QPSK	1	0	20.50	19.85	19.75	20.21
			1	7	20.50	20.10	19.76	20.02
			1	14	20.50	20.16	19.84	20.13
			8	0	20.00	19.36	19.12	19.45
			8	4	20.00	19.48	19.18	19.40
			8	7	20.00	19.51	19.17	19.44
			15	0	19.50	19.41	19.10	19.42
		16QAM	1	0	20.00	19.27	19.23	19.64
			1	7	20.00	19.59	19.37	19.63
			1	14	20.00	19.58	19.43	19.70
			8	0	19.00	18.63	18.42	18.79
			8	4	19.00	18.77	18.48	18.76
			8	7	19.00	18.83	18.49	18.73
			15	0	19.00	18.65	18.35	18.64
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		23035/701.5	23095/707.5	23155/713.5
LTE Band 12	5MHz	QPSK	1	0	20.50	20.09	20.01	20.21
			1	12	20.50	20.47	20.06	20.41
			1	24	20.50	20.09	20.11	20.37
			12	0	20.00	19.53	19.22	19.50
			12	6	20.00	19.61	19.26	19.56
			12	11	20.00	19.47	19.28	19.49
			25	0	20.00	19.51	19.25	19.51
		16QAM	1	0	20.00	19.68	19.57	19.71
			1	12	20.00	19.81	19.53	19.98
			1	24	20.00	19.52	19.63	19.77
			12	0	19.00	18.76	18.48	18.75

			12	6	19.00	18.87	18.53	18.82
			12	11	19.00	18.70	18.53	18.74
			25	0	19.00	18.78	18.51	18.78
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		23060/704	23095/707.5	23130/711
LTE Band 12	10MHz	QPSK	1	0	20.50	20.25	20.23	20.09
			1	24	20.50	20.05	20.07	20.26
			1	49	20.50	20.13	20.34	20.37
			25	0	19.50	19.41	19.20	19.26
			25	12	19.50	19.33	19.24	19.44
			25	24	19.50	19.17	19.28	19.47
			50	0	19.50	19.34	19.27	19.42
		16QAM	1	0	20.00	19.74	19.75	19.63
			1	24	20.00	19.64	19.48	19.79
			1	49	20.00	19.52	19.82	19.86
			25	0	19.00	18.68	18.46	18.54
			25	12	19.00	18.59	18.49	18.70
			25	24	19.00	18.44	18.54	18.73
			50	0	19.00	18.57	18.51	18.64

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		23755/706.5	23790/710	23825/713.5
LTE Band 17	5MHz	QPSK	1	0	23.50	23.07	23.07	23.09
			1	12	23.50	23.13	22.99	23.05
			1	24	23.50	23.10	23.15	23.06
			12	0	22.50	22.42	22.41	22.44
			12	6	22.50	22.41	22.36	22.37
			12	11	22.50	22.39	22.37	22.39
			25	0	22.50	22.47	22.45	22.45
		16QAM	1	0	23.00	22.46	22.53	22.50
			1	12	23.00	22.43	22.48	22.54
			1	24	23.00	22.62	22.63	22.54
			12	0	20.50	20.03	20.01	20.06
			12	6	20.50	20.06	20.00	20.05
			12	11	20.50	19.99	19.99	20.02
			25	0	20.50	20.08	20.07	20.07
Band	Band	Modulation	RB Configuration		Tune-up	Channel/Frequency(MHz)		

	Width		RB Size	RB Offset	(dBm)	23780/709	23790/710	23800/711
LTE Band 17	10MHz	QPSK	1	0	23.50	23.11	23.23	23.21
			1	24	23.50	22.99	22.96	23.01
			1	49	23.50	23.11	23.12	23.10
			25	0	22.50	22.42	22.42	22.40
			25	12	22.50	22.36	22.42	22.40
			25	24	22.50	22.37	22.40	22.40
			50	0	22.50	22.40	22.45	22.43
		16QAM	1	0	23.00	22.46	22.72	22.64
			1	24	23.00	22.49	22.46	22.39
			1	49	23.00	22.53	22.56	22.54
			25	0	20.50	20.04	20.02	20.00
			25	12	20.50	20.03	20.08	20.06
			25	24	20.50	19.98	20.01	20.02
			50	0	20.50	20.00	20.04	20.04

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		40645/2595.5	40905/2621.5	41165/2647.5
LTE Band 41	5MHz	QPSK	1	0	23.00	22.85	22.81	22.76
			1	12	23.00	22.96	22.89	22.82
			1	24	23.00	22.85	22.79	22.68
			12	0	22.00	21.87	21.86	21.83
			12	6	22.00	21.92	21.91	21.84
			12	11	22.00	21.92	21.84	21.76
			25	0	22.00	21.90	21.87	21.81
		16QAM	1	0	22.50	22.01	21.98	21.97
			1	12	22.50	22.16	22.08	22.03
			1	24	22.50	22.05	21.98	21.89
			12	0	21.00	20.95	20.89	20.86
			12	6	21.00	20.99	20.93	20.87
			12	11	21.00	20.95	20.88	20.79
			25	0	21.50	21.02	20.95	20.90
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		40670/2598	40905/2621.5	41140/2645
LTE Band	10MHz	QPSK	1	0	23.00	22.90	22.92	22.96
			1	24	23.00	22.94	22.88	22.85

41			1	49	23.00	22.96	22.87	22.74
			25	0	22.00	21.86	21.90	21.95
			25	12	22.00	21.96	21.92	21.90
			25	24	22.00	21.94	21.87	21.78
			50	0	22.00	21.92	21.90	21.89
		16QAM	1	0	22.50	22.10	22.11	22.16
			1	24	22.50	22.15	22.09	22.08
			1	49	22.50	22.14	22.08	21.97
			25	0	21.50	20.97	20.94	21.01
			25	12	21.50	21.03	20.97	20.98
			25	24	21.50	21.00	20.92	20.85
			50	0	21.00	21.00	20.96	20.94
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		40695/2600.5	40905/2621.5	41115/2642.5
LTE Band 41	15MHz	QPSK	1	0	23.00	22.84	22.89	22.96
			1	37	23.00	22.97	22.89	22.92
			1	74	23.00	22.92	22.84	22.74
			36	0	22.50	21.88	21.88	22.01
			36	18	22.50	22.01	21.90	21.92
			36	37	22.50	21.99	21.85	21.77
			75	0	22.00	21.96	21.89	21.94
		16QAM	1	0	22.50	22.04	22.08	22.16
			1	37	22.50	22.17	22.09	22.13
			1	74	22.50	22.09	22.04	21.92
			36	0	21.50	20.92	20.88	21.02
			36	18	21.50	21.01	20.89	20.93
			36	37	21.50	21.00	20.86	20.80
			75	0	21.00	21.00	20.93	20.96
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		40720/2603	40905/2621.5	41090/2640
LTE Band 41	20MHz	QPSK	1	0	23.00	21.83	21.92	21.95
			1	49	23.00	22.98	22.89	22.97
			1	99	23.00	22.77	22.80	22.61
			50	0	22.50	21.87	21.90	22.13
			50	24	22.50	22.06	21.95	22.04
			50	49	22.50	22.01	21.85	21.80
			100	0	22.00	21.94	21.87	21.96

		16QAM	1	0	22.50	21.05	21.12	21.15
			1	49	22.50	22.18	22.09	22.19
			1	99	22.50	21.95	22.00	21.83
			50	0	21.50	20.95	20.94	21.17
			50	24	21.50	21.10	21.00	21.09
			50	49	21.50	21.04	20.90	20.85
			100	0	21.00	20.97	20.89	20.99

7.4. WLAN & Bluetooth Output Power

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11b	1	2412	16.00	15.13
	6	2437	16.00	15.52
	11	2462	16.00	15.17
802.11g	1	2412	13.50	13.41
	6	2437	13.50	13.40
	11	2462	13.50	12.85
802.11n HT20	1	2412	12.50	12.36
	6	2437	12.50	12.32
	11	2462	12.50	11.64
802.11n HT40	3	2422	13.00	12.63
	6	2437	13.00	12.36
	9	2452	13.00	12.27

NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	36	5180	12.00	10.88
	40	5200	12.00	11.38
	48	5240	12.00	11.76
802.11n HT20	36	5180	12.00	10.69
	40	5200	12.00	11.27
	48	5240	12.00	11.86
802.11n HT40	38	5190	11.50	10.53
	46	5230	11.50	11.44
802.11ac VHT20	36	5180	12.50	11.40

	40	5200	12.50	11.29
	48	5240	12.50	12.13
802.11ac VHT40	38	5190	12.00	10.78
	46	5230	12.00	11.63
802.11ac VHT80	42	5210	11.00	10.91

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	11.50	11.32
	157	5785	11.50	11.27
	165	5825	11.50	10.94
802.11n HT20	149	5745	12.00	11.59
	157	5785	12.00	11.25
	165	5825	12.00	10.70
802.11n HT40	151	5755	11.00	10.89
	159	5795	11.00	10.49
802.11ac VHT20	149	5745	12.00	11.71
	157	5785	12.00	10.95
	165	5825	12.00	10.50
802.11ac VHT40	151	5755	11.50	11.49
	159	5795	11.50	10.74
802.11ac VHT80	155	5775	11.00	10.98

NOTE: Power measurement results of WLAN 5.8G.

BR+EDR	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channel		
			0CH	39CH	78CH
	1M	7.50	6.07	7.13	7.49
	2M	7.50	6.70	7.12	6.76
	3M	7.50	7.09	7.13	6.76

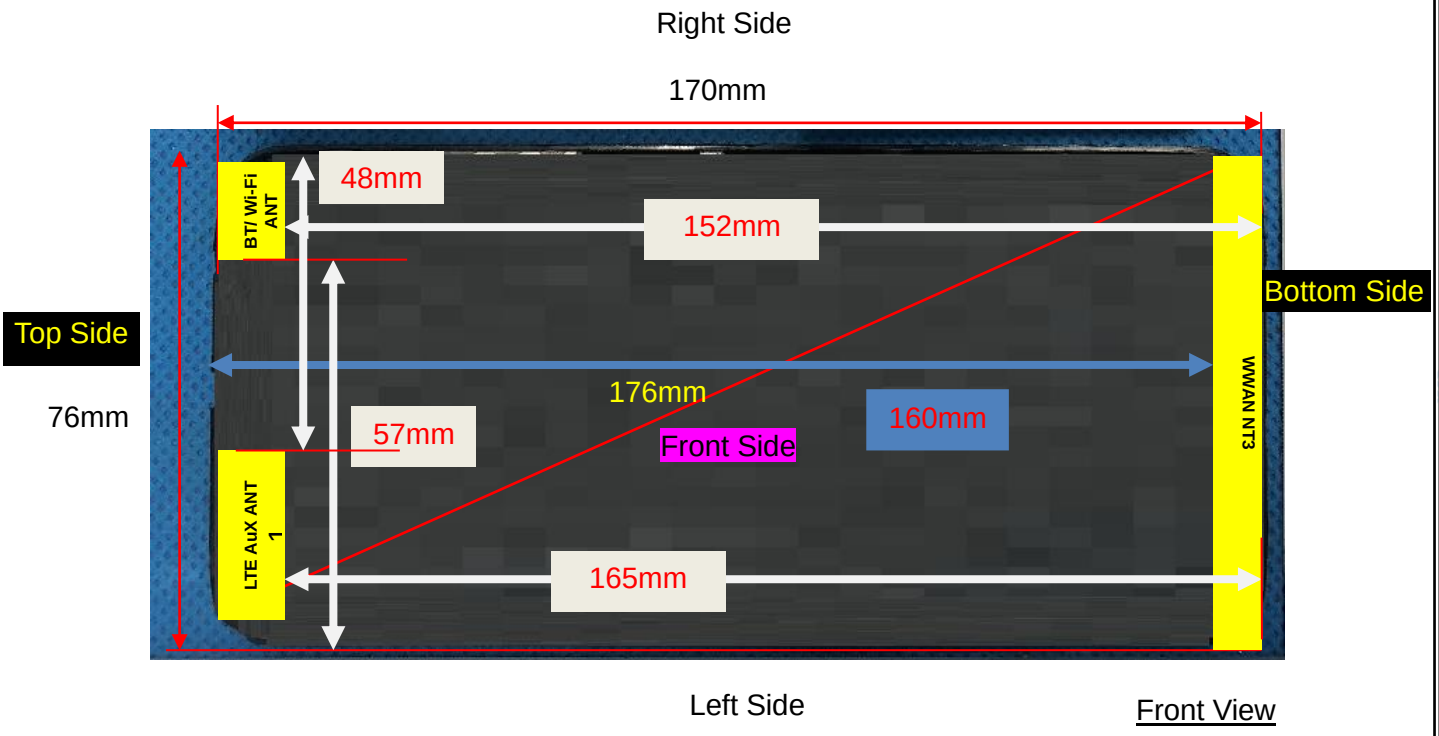
BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	-5.50	-5.84	-5.73	-6.38
	2M	-5.50	-5.65	-5.79	-6.25

NOTE: Power measurement results of Bluetooth.

7.5. NFC

Channel Freq（MHz）	Min Distance (mm)	Max power (dBm)	tune-up power (dBm)	Max power（mW）	Limits（mW）	SAR Test Exclusion
13.56	10	-35.54	-35.54±1	0.00035	443	Yes

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
WWAN ANT	≤ 25mm	≤ 25mm	≤25mm	≤ 25mm	> 25mm	≤ 25mm
WWAN AUX ANT	≤25mm	≤25mm	≤25mm	> 25mm	≤ 25mm	> 25mm
WLAN & Bluetooth	≤ 25mm	≤ 25mm	> 25mm	≤ 25mm	≤ 25mm	>25mm
Positions for SAR tests						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
WWAN ANT	Yes	Yes	NO	Yes	Yes	Yes
WWAN AUX ANT	Yes	Yes	Yes	NO	Yes	NO
WLAN & Bluetooth	Yes	Yes	Yes	Yes	Yes	NO

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:

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

- $f_{(GHZ)}$ 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	SAR test exclusion
Bluetooth	7.50	5.623	5	2.480	1.771	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:

[(max. power of channel, including tune-up tolerance, mW)/(min. test separation distance, mm)] * [$\sqrt{f_{(GHZ)}}$/x] W/kg for test separation distances ≤ 50mm, 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	Head	7.50	5.623	5	2.48	7.5	0.236
Bluetooth	Body	7.50	5.623	10	2.48	7.5	0.118
Bluetooth	Hotspot	7.50	5.623	10	2.48	7.5	0.118

NOTE: Estimated SAR calculation for Bluetooth

10. SAR Results

10.1. SAR measurement Result

10.1.1. SAR measurement Result of GSM850

Test Position of Head	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(±5%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
Left Cheek	189/836.4	GPRS(GMSK 2TS)	0.173	0.120	-1.88	31.94	32.50	0.197	2025/4/09	1#
Left Tilt 15 Degree	189/836.4	GPRS(GMSK 2TS)	0.097	0.065	-2.98	31.94	32.50	0.110	2025/4/09	
Right Cheek	189/836.4	GPRS(GMSK 2TS)	0.150	0.103	-0.85	31.94	32.50	0.171	2025/4/09	
Right Tilt 15 Degree	189/836.4	GPRS(GMSK 2TS)	0.068	0.045	-2.31	31.94	32.50	0.077	2025/4/09	

NOTE: Head SAR test results of GSM850.

Test Position of Body-Worn with 10mm	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	189/836.4	GPRS(GMSK 2TS)	0.270	0.138	-1.38	31.94	32.50	0.307	2025/4/09	
Back Side	189/836.4	GPRS(GMSK 2TS)	0.471	0.254	-0.36	31.94	32.50	0.536	2025/4/09	2#

NOTE: Body-Worn SAR test results of GSM850

Test Position of Hotspot with 10mm	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	189/836.4	GPRS(GMSK 2TS)	0.270	0.138	-1.38	31.94	32.50	0.307	2025/4/09	
Back Side	189/836.4	GPRS(GMSK 2TS)	0.471	0.254	-0.36	31.94	32.50	0.536	2025/4/09	2#
Left Side	189/836.4	GPRS(GMSK 2TS)	0.153	0.078	-1.76	31.94	32.50	0.174	2025/4/09	
Right Side	189/836.4	GPRS(GMSK 2TS)	0.128	0.068	-1.41	31.94	32.50	0.146	2025/4/09	
Bottom Side	189/836.4	GPRS(GMSK 2TS)	0.240	0.128	-1.62	31.94	32.50	0.273	2025/4/09	

NOTE: Hotspot SAR test results of GSM850

10.1.2. SAR measurement Result of GSM1900

Test Position of Head	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						
Left Cheek	661/1880	GPRS(GMSK 2TS)	0.035	0.019	2.36	25.56	26.00	0.039	2025/4/18	3#
Left Tilt 15 Degree	661/1880	GPRS(GMSK 2TS)	0.021	0.011	1.65	25.56	26.00	0.023	2025/4/18	

Right Cheek	661/1880	GPRS(GMSK 2TS)	0.033	0.017	-2.33	25.56	26.00	0.037	2025/4/18	
Right Tilt 15 Degree	661/1880	GPRS(GMSK 2TS)	0.016	0.014	-1.02	25.56	26.00	0.018	2025/4/18	

NOTE: Head SAR test results of GSM1900

Test Position of Body-Worn with 10mm	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	661/1880	GPRS(GMSK 2TS)	0.203	0.099	1.07	25.56	26.00	0.225	2025/4/18	
Back Side	661/1880	GPRS(GMSK 2TS)	0.252	0.127	3.30	25.56	26.00	0.279	2025/4/18	4#

NOTE: Body-Worn SAR test results of GSM1900

Test Position of Hotspot with 10mm	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	661/1880	GPRS(GMSK 2TS)	0.203	0.099	1.07	25.56	26.00	0.225	2025/4/18	
Back Side	661/1880	GPRS(GMSK 2TS)	0.252	0.127	3.30	25.56	26.00	0.279	2025/4/18	4#
Left Side	661/1880	GPRS(GMSK 2TS)	0.189	0.091	1.17	25.56	26.00	0.209	2025/4/18	
Right Side	661/1880	GPRS(GMSK 2TS)	0.030	0.015	-2.76	25.56	26.00	0.033	2025/4/18	
Bottom Side	661/1880	GPRS(GMSK 2TS)	0.126	0.062	-3.80	25.56	26.00	0.139	2025/4/18	

NOTE: Hotspot SAR test results of GSM1900

10.1.3. SAR measurement Result of WCDMA Band 2

Test Position of Head	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						
Left Cheek	9400/1880	RMC12.2K	0.159	0.088	-2.70	22.92	23.00	0.162	2025/4/18	5#

Left Tilt 15 Degree	9400/1880	RMC12.2K	0.090	0.048	-0.38	22.92	23.00	0.092	2025/4/18	
Right Cheek	9400/1880	RMC12.2K	0.138	0.076	-3.55	22.92	23.00	0.141	2025/4/18	
Right Tilt 15 Degree	9400/1880	RMC12.2K	0.069	0.038	-1.61	22.92	23.00	0.070	2025/4/18	

NOTE: Head SAR test results of WCDMA Band 2

Test Position of Body-Worn with 10mm	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	0.413	0.213	-3.53	22.92	23.00	0.421	2025/4/18	
Back Side	9400/1880	RMC12.2K	0.549	0.283	2.76	22.92	23.00	0.559	2025/4/18	6#

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

Test Position of Hotspot with 10mm	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	9400/1880	RMC12.2K	0.413	0.213	-3.53	22.92	23.00	0.421	2025/4/18	
Back Side	9400/1880	RMC12.2K	0.549	0.283	2.76	22.92	23.00	0.559	2025/4/18	6#
Left Side	9400/1880	RMC12.2K	0.413	0.207	3.16	22.92	23.00	0.421	2025/4/18	
Right Side	9400/1880	RMC12.2K	0.058	0.029	2.44	22.92	23.00	0.059	2025/4/18	
Bottom Side	9400/1880	RMC12.2K	0.266	0.130	-3.14	22.92	23.00	0.271	2025/4/18	

NOTE: Hotspot SAR test results of WCDMA Band 2

10.1.4. SAR measurement Result of WCDMA Band 4

Test Position of Head	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						
Left Cheek	1413/1732.6	RMC12.2K	0.031	0.018	4.54	22.80	23.00	0.032	2025/4/14	7#
Left Tilt 15 Degree	1413/1732.6	RMC12.2K	0.018	0.016	1.82	22.80	23.00	0.019	2025/4/14	
Right Cheek	1413/1732.6	RMC12.2K	0.029	0.016	-2.08	22.80	23.00	0.030	2025/4/14	
Right Tilt 15 Degree	1413/1732.6	RMC12.2K	0.016	0.014	3.29	22.80	23.00	0.017	2025/4/14	

NOTE: Head SAR test results of WCDMA Band 4

Test Position of Body-Worn with 10mm	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	1413/1732.6	RMC12.2K	0.266	0.136	-2.81	22.80	23.00	0.279	2025/4/14	
Back Side	1413/1732.6	RMC12.2K	0.338	0.178	0.92	22.80	23.00	0.354	2025/4/14	8#

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

Test Position of Hotspot with 10mm	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	1413/1732.6	RMC12.2K	0.266	0.136	-2.81	22.80	23.00	0.279	2025/4/14	
Back Side	1413/1732.6	RMC12.2K	0.338	0.178	0.92	22.80	23.00	0.354	2025/4/14	8#
Left Side	1413/1732.6	RMC12.2K	0.259	0.130	0.52	22.80	23.00	0.271	2025/4/14	
Right Side	1413/1732.6	RMC12.2K	0.035	0.018	-3.44	22.80	23.00	0.037	2025/4/14	
Bottom Side	1413/1732.6	RMC12.2K	0.158	0.079	-0.22	22.80	23.00	0.165	2025/4/14	

NOTE: Hotspot SAR test results of WCDMA Band 4

10.1.5. SAR measurement Result of WCDMA Band 5

Test Position of Head	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						
Left Cheek	4182/836.4	RMC12.2K	0.107	0.075	-1.42	22.73	23.00	0.114	2025/4/09	9#
Left Tilt 15 Degree	4182/836.4	RMC12.2K	0.056	0.038	3.67	22.73	23.00	0.060	2025/4/09	
Right Cheek	4182/836.4	RMC12.2K	0.096	0.067	3.29	22.73	23.00	0.102	2025/4/09	
Right Tilt 15 Degree	4182/836.4	RMC12.2K	0.044	0.030	-1.18	22.73	23.00	0.047	2025/4/09	

NOTE: Head SAR test results of WCDMA Band 5

Test Position of Body-Worn with 10mm	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	4182/836.4	RMC12.2K	0.140	0.094	3.32	22.73	23.00	0.149	2025/4/09	
Back Side	4182/836.4	RMC12.2K	0.262	0.186	-1.59	22.73	23.00	0.279	2025/4/09	10#

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

Test Position of Hotspot with 10mm	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	4182/836.4	RMC12.2K	0.140	0.094	3.32	22.73	23.00	0.149	2025/4/09	
Back Side	4182/836.4	RMC12.2K	0.262	0.186	-1.59	22.73	23.00	0.279	2025/4/09	10#
Left Side	4182/836.4	RMC12.2K	0.093	0.063	-1.65	22.73	23.00	0.099	2025/4/09	
Right Side	4182/836.4	RMC12.2K	0.068	0.046	-1.88	22.73	23.00	0.072	2025/4/09	
Bottom Side	4182/836.4	RMC12.2K	0.150	0.102	0.98	22.73	23.00	0.160	2025/4/09	

NOTE: Hotspot SAR test results of WCDMA Band 5

10.1.6. SAR measurement Result of LTE Band 2

Test Position of Head	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										
Left Cheek	18900/1880	20M QPSK(1,0)	0.141	0.078	4.41	22.99	23.50	0.159	2025/4/18	#17
Left Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.082	0.044	-2.76	22.99	23.50	0.092	2025/4/18	
Right	18900/1880	20M	0.120	0.064	-2.80	22.99	23.50	0.135	2025/4/18	

Cheek		QPSK(1,0)								
Right Tilt 15 Degree	18900/1880	20M QPSK(1,0)	0.062	0.034	-3.12	22.99	23.50	0.070	2025/4/18	
50%RB										
Left Cheek	18900/1880	20M QPSK(50,0)	0.084	0.040	0.43	22.04	22.50	0.093	2025/4/18	
Left Tilt 15 Degree	18900/1880	20M QPSK(50,0)	0.045	0.026	1.75	22.04	22.50	0.050	2025/4/18	
Right Cheek	18900/1880	20M QPSK(50,0)	0.063	0.036	4.41	22.04	22.50	0.070	2025/4/18	
Right Tilt 15 Degree	18900/1880	20M QPSK(50,0)	0.034	0.019	1.88	22.04	22.50	0.038	2025/4/18	

NOTE: Head SAR test results of LTE Band 2

Test Position of Body-Worn with 10mm	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						
1RB										
Front Side	18900/1880	20M QPSK(1,0)	0.434	0.219	-2.55	22.99	23.50	0.488	2025/4/18	
Back Side	18900/1880	20M QPSK(1,0)	0.597	0.310	4.93	22.99	23.50	0.671	2025/4/18	18#
50%RB										
Front Side	18900/1880	20M QPSK(50,0)	0.224	0.120	-4.04	22.04	22.50	0.249	2025/4/18	
Back Side	18900/1880	20M QPSK(50,0)	0.342	0.175	-0.90	22.04	22.50	0.380	2025/4/18	

NOTE: Body-Worn SAR test results of LTE Band 2

Test Position of Hotspot	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						

with 10mm										
1RB										
Front Side	18900/1880	20M QPSK(1,0)	0.434	0.219	-2.55	22.99	23.50	0.488	2025/4/18	
Back Side	18900/1880	20M QPSK(1,0)	0.597	0.310	4.93	22.99	23.50	0.671	2025/4/18	18#
Left Side	18900/1880	20M QPSK(1,0)	0.434	0.214	-1.41	22.99	23.50	0.488	2025/4/18	
Right Side	18900/1880	20M QPSK(1,0)	0.060	0.031	-2.04	22.99	23.50	0.067	2025/4/18	
Bottom Side	18900/1880	20M QPSK(1,0)	0.279	0.138	0.33	22.99	23.50	0.314	2025/4/18	
50%RB										
Front Side	18900/1880	20M QPSK(50,0)	0.224	0.120	-4.04	22.04	22.50	0.249	2025/4/18	
Back Side	18900/1880	20M QPSK(50,0)	0.342	0.175	-0.90	22.04	22.50	0.380	2025/4/18	
Left Side	18900/1880	20M QPSK(50,0)	0.221	0.118	4.09	22.04	22.50	0.246	2025/4/18	
Right Side	18900/1880	20M QPSK(50,0)	0.031	0.017	-1.60	22.04	22.50	0.034	2025/4/18	
Bottom Side	18900/1880	20M QPSK(50,0)	0.151	0.070	1.72	22.04	22.50	0.168	2025/4/18	

NOTE: Hotspot SAR test results of LTE Band 2

10.1.7. SAR measurement Result of LTE Band 4

Test Position of Head	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										
Left Cheek	20175/1732.5	20M QPSK(1,0)	0.035	0.019	0.26	23.37	23.50	0.036	2025/4/14	19#
Left Tilt 15 Degree	20175/1732.5	20M QPSK(1,0)	0.019	0.017	3.52	23.37	23.50	0.020	2025/4/14	
Right Cheek	20175/1732.5	20M QPSK(1,0)	0.032	0.017	-2.94	23.37	23.50	0.033	2025/4/14	
Right	20175/1732.5	20M	0.016	0.014	-3.55	23.37	23.50	0.016	2025/4/14	

Tilt 15 Degree		QPSK(1,0)								
50%RB										
Left Cheek	20175/1732.5	20M QPSK(50,49)	0.019	0.011	-3.14	22.52	23.00	0.021	2025/4/14	
Left Tilt 15 Degree	20175/1732.5	20M QPSK(50,49)	0.010	0.009	-4.08	22.52	23.00	0.011	2025/4/14	
Right Cheek	20175/1732.5	20M QPSK(50,49)	0.017	0.010	3.49	22.52	23.00	0.019	2025/4/14	
Right Tilt 15 Degree	20175/1732.5	20M QPSK(50,49)	0.009	0.007	2.09	22.52	23.00	0.010	2025/4/14	

NOTE: Head SAR test results of LTE Band 4

Test Position of Body-Worn with 10mm	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						
1RB										
Front Side	20175/1732.5	20M QPSK(1,0)	0.140	0.256	-3.62	23.37	23.50	0.144	2025/4/14	
Back Side	20175/1732.5	20M QPSK(1,0)	0.156	0.297	3.28	23.37	23.50	0.161	2025/4/14	20#
50%RB										
Front Side	20175/1732.5	20M QPSK(50,49)	0.076	0.137	-4.19	22.52	23.00	0.085	2025/4/14	
Back Side	20175/1732.5	20M QPSK(50,49)	0.082	0.155	-3.45	22.52	23.00	0.092	2025/4/14	

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

Test Position of Hotspot with 10mm	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	0.140	0.256	-3.62	23.37	23.50	0.144	2025/4/14	

		QPSK(1,0)								
Back Side	20175/1732.5	20M QPSK(1,0)	0.156	0.297	3.28	23.37	23.50	0.161	2025/4/14	20#
Left Side	20175/1732.5	20M QPSK(1,0)	0.133	0.246	1.50	23.37	23.50	0.137	2025/4/14	
Right Side	20175/1732.5	20M QPSK(1,0)	0.018	0.016	-2.91	23.37	23.50	0.019	2025/4/14	
Bottom Side	20175/1732.5	20M QPSK(1,0)	0.081	0.154	1.82	23.37	23.50	0.083	2025/4/14	
50%RB										
Front Side	20175/1732.5	20M QPSK(50,49)	0.076	0.137	-4.19	22.52	23.00	0.085	2025/4/14	
Back Side	20175/1732.5	20M QPSK(50,49)	0.082	0.155	-3.45	22.52	23.00	0.092	2025/4/14	
Left Side	20175/1732.5	20M QPSK(50,49)	0.068	0.124	-2.36	22.52	23.00	0.076	2025/4/14	
Right Side	20175/1732.5	20M QPSK(50,49)	0.009	0.009	2.99	22.52	23.00	0.010	2025/4/14	
Bottom Side	20175/1732.5	20M QPSK(50,49)	0.048	0.077	-1.96	22.52	23.00	0.054	2025/4/14	

NOTE: Hotspot SAR test results of LTE Band 4

10.1.8. SAR measurement Result of LTE Band 5

Test Position of Head	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										
Left Cheek	20525/836.5	10M QPSK(1,49)	0.105	0.077	0.75	22.82	23.50	0.123	2025/4/09	21#
Left Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.056	0.041	3.59	22.82	23.50	0.065	2025/4/09	
Right Cheek	20525/836.5	10M QPSK(1,49)	0.100	0.071	-2.75	22.82	23.50	0.117	2025/4/09	
Right Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.049	0.035	-0.35	22.82	23.50	0.057	2025/4/09	
50%RB										

Left Cheek	20525/836.5	10M QPSK(25,24)	0.056	0.045	0.75	21.79	23.00	0.074	2025/4/09	
Left Tilt 15 Degree	20525/836.5	10M QPSK(25,24)	0.029	0.022	4.49	21.79	23.00	0.038	2025/4/09	
Right Cheek	20525/836.5	10M QPSK(25,24)	0.052	0.038	-3.23	21.79	23.00	0.069	2025/4/09	
Right Tilt 15 Degree	20525/836.5	10M QPSK(25,24)	0.025	0.019	-0.42	21.79	23.00	0.033	2025/4/09	

NOTE: Head SAR test results of LTE Band 5

Test Position of Body-Worn with 10mm	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						
1RB										
Front Side	20525/836.5	10M QPSK(1,49)	0.130	0.074	1.27	22.82	23.50	0.152	2025/4/09	
Back Side	20525/836.5	10M QPSK(1,49)	0.240	0.140	0.40	22.82	23.50	0.281	2025/4/09	22#
50%RB										
Front Side	20525/836.5	10M QPSK(25,24)	0.066	0.037	-3.26	21.79	23.00	0.087	2025/4/09	
Back Side	20525/836.5	10M QPSK(25,24)	0.125	0.071	-1.04	21.79	23.00	0.165	2025/4/09	

NOTE: Body-Worn SAR test results of LTE Band 5

Test Position of Hotspot with 10mm	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	20525/836.5	10M QPSK(1,49)	0.130	0.074	1.27	22.82	23.50	0.152	2025/4/09	

Back Side	20525/836.5	10M QPSK(1,49)	0.240	0.140	0.40	22.82	23.50	0.281	2025/4/09	22#
Left Side	20525/836.5	10M QPSK(1,49)	0.072	0.042	0.47	22.82	23.50	0.084	2025/4/09	
Right Side	20525/836.5	10M QPSK(1,49)	0.068	0.038	1.94	22.82	23.50	0.080	2025/4/09	
Bottom Side	20525/836.5	10M QPSK(1,49)	0.135	0.079	-0.26	22.82	23.50	0.158	2025/4/09	
50%RB										
Front Side	20525/836.5	10M QPSK(25,24)	0.066	0.037	-3.26	21.79	23.00	0.087	2025/4/09	
Back Side	20525/836.5	10M QPSK(25,24)	0.125	0.071	-1.04	21.79	23.00	0.165	2025/4/09	
Left Side	20525/836.5	10M QPSK(25,24)	0.041	0.024	-3.24	21.79	23.00	0.054	2025/4/09	
Right Side	20525/836.5	10M QPSK(25,24)	0.037	0.022	-3.31	21.79	23.00	0.049	2025/4/09	
Bottom Side	20525/836.5	10M QPSK(25,24)	0.071	0.043	-4.57	21.79	23.00	0.094	2025/4/09	

NOTE: Hotspot SAR test results of LTE Band 5

10.1.9. SAR measurement Result of LTE Band 7

Test Position of Head	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										
Left Cheek	21100/2535	20M QPSK(1,0)	0.037	0.020	1.19	23.95	24.00	0.037	2025/4/12	23#
Left Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0.020	0.018	-2.25	23.95	24.00	0.020	2025/4/12	
Right Cheek	21100/2535	20M QPSK(1,0)	0.033	0.017	-3.13	23.95	24.00	0.033	2025/4/12	
Right Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0.017	0.015	-0.85	23.95	24.00	0.017	2025/4/12	
50%RB										
Left	21100/2535	20M	0.020	0.011	-4.47	21.91	22.00	0.020	2025/4/12	

Cheek		QPSK(50,24)								
Left Tilt 15 Degree	21100/2535	20M QPSK(50,24)	0.011	0.010	1.71	21.91	22.00	0.011	2025/4/12	
Right Cheek	21100/2535	20M QPSK(50,24)	0.019	0.010	-2.67	21.91	22.00	0.019	2025/4/12	
Right Tilt 15 Degree	21100/2535	20M QPSK(50,24)	0.009	0.008	4.89	21.91	22.00	0.009	2025/4/12	

NOTE: Head SAR test results of LTE Band 7

Test Position of Body-Worn with 10mm	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						
1RB										
Front Side	21100/2535	20M QPSK(1,0)	0.055	0.028	3.65	23.95	24.00	0.056	2025/4/12	
Back Side	21100/2535	20M QPSK(1,0)	0.411	0.221	2.66	23.95	24.00	0.416	2025/4/12	24#
50%RB										
Front Side	21100/2535	20M QPSK(50,24)	0.028	0.015	-3.74	21.91	22.00	0.029	2025/4/12	
Back Side	21100/2535	20M QPSK(50,24)	0.232	0.115	-1.80	21.91	22.00	0.237	2025/4/12	

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

Test Position of Hotspot with 10mm	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(1,0)	0.055	0.028	3.65	23.95	24.00	0.056	2025/4/12	
Back	21100/2535	20M	0.411	0.221	2.66	23.95	24.00	0.416	2025/4/12	24#

Side		QPSK(1,0)								
Left Side	21100/2535	20M QPSK(1,0)	0.050	0.026	-2.24	23.95	24.00	0.051	2025/4/12	
Right Side	21100/2535	20M QPSK(1,0)	0.022	0.011	0.78	23.95	24.00	0.022	2025/4/12	
Bottom Side	21100/2535	20M QPSK(1,0)	0.264	0.137	-1.67	23.95	24.00	0.267	2025/4/12	
50%RB										
Front Side	21100/2535	20M QPSK(50,24)	0.028	0.015	-3.74	21.91	22.00	0.029	2025/4/12	
Back Side	21100/2535	20M QPSK(50,24)	0.232	0.115	-1.80	21.91	22.00	0.237	2025/4/12	
Left Side	21100/2535	20M QPSK(50,24)	0.027	0.014	-4.13	21.91	22.00	0.028	2025/4/12	
Right Side	21100/2535	20M QPSK(50,24)	0.012	0.006	-3.22	21.91	22.00	0.012	2025/4/12	
Bottom Side	21100/2535	20M QPSK(50,24)	0.152	0.075	0.84	21.91	22.00	0.155	2025/4/12	

NOTE: Hotspot SAR test results of LTE Band 7

10.1.10. SAR measurement Result of LTE Band 12

Test Position of Head	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										
Left Cheek	23095/707.5	10M QPSK(1,49)	0.094	0.078	-4.48	20.34	20.50	0.098	2025/4/11	25#
Left Tilt 15 Degree	23095/707.5	10M QPSK(1,49)	0.051	0.041	-0.78	20.34	20.50	0.053	2025/4/11	
Right Cheek	23095/707.5	10M QPSK(1,49)	0.085	0.069	2.36	20.34	20.50	0.088	2025/4/11	
Right Tilt 15 Degree	23095/707.5	10M QPSK(1,49)	0.042	0.034	-1.59	20.34	20.50	0.044	2025/4/11	
50%RB										
Left Cheek	23095/707.5	10M QPSK(25,0)	0.054	0.043	-4.75	19.28	19.50	0.057	2025/4/11	
Left Tilt	23095/707.5	10M	0.028	0.021	0.22	19.28	19.50	0.029	2025/4/11	

15 Degree		QPSK(25,0)								
Right Cheek	23095/707.5	10M QPSK(25,0)	0.048	0.036	-2.64	19.28	19.50	0.050	2025/4/11	
Right Tilt 15 Degree	23095/707.5	10M QPSK(25,0)	0.025	0.018	4.62	19.28	19.50	0.026	2025/4/11	

NOTE: Head SAR test results of LTE Band 12

Test Position of Body-Worn with 10mm	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	23095/707.5	10M QPSK(1,49)	0.072	0.053	-1.60	20.34	20.50	0.075	2025/4/11	
Back Side	23095/707.5	10M QPSK(1,49)	0.122	0.092	1.51	20.34	20.50	0.127	2025/4/11	26#
50%RB										
Front Side	23095/707.5	10M QPSK(25,0)	0.043	0.029	1.47	19.28	19.50	0.045	2025/4/11	
Back Side	23095/707.5	10M QPSK(25,0)	0.072	0.054	-2.73	19.28	19.50	0.076	2025/4/11	

NOTE: Body-Worn SAR test results of LTE Band 12

Test Position of Hotspot with 10mm	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	23095/707.5	10M QPSK(1,49)	0.072	0.053	-1.60	20.34	20.50	0.075	2025/4/11	
Back Side	23095/707.5	10M QPSK(1,49)	0.122	0.092	1.51	20.34	20.50	0.127	2025/4/11	26#
Left Side	23095/707.5	10M QPSK(1,49)	0.077	0.058	-3.69	20.34	20.50	0.080	2025/4/11	
Right Side	23095/707.5	10M QPSK(1,49)	0.043	0.031	2.42	20.34	20.50	0.045	2025/4/11	

Bottom Side	23095/707.5	10M QPSK(1,49)	0.102	0.077	-0.34	20.34	20.50	0.106	2025/4/11	
50%RB										
Front Side	23095/707.5	10M QPSK(25,0)	0.043	0.029	1.47	19.28	19.50	0.045	2025/4/11	
Back Side	23095/707.5	10M QPSK(25,0)	0.072	0.054	-2.73	19.28	19.50	0.076	2025/4/11	
Left Side	23095/707.5	10M QPSK(25,0)	0.040	0.033	-4.00	19.28	19.50	0.042	2025/4/11	
Right Side	23095/707.5	10M QPSK(25,0)	0.022	0.016	-4.00	19.28	19.50	0.023	2025/4/11	
Bottom Side	23095/707.5	10M QPSK(25,0)	0.059	0.041	0.16	19.28	19.50	0.062	2025/4/11	

NOTE: Hotspot SAR test results of LTE Band 12

10.1.11. SAR measurement Result of LTE Band 17

Test Position of Head	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										
Left Cheek	23790/710	10M QPSK(1,0)	0.132	0.107	-3.91	23.23	23.50	0.140	2025/4/11	27#
Left Tilt 15 Degree	23790/710	10M QPSK(1,0)	0.076	0.060	1.62	23.23	23.50	0.081	2025/4/11	
Right Cheek	23790/710	10M QPSK(1,0)	0.122	0.097	-3.86	23.23	23.50	0.130	2025/4/11	
Right Tilt 15 Degree	23790/710	10M QPSK(1,0)	0.062	0.048	1.00	23.23	23.50	0.066	2025/4/11	
50%RB										
Left Cheek	23790/710	10M QPSK(25,0)	0.070	0.059	2.99	22.42	22.50	0.071	2025/4/11	
Left Tilt 15 Degree	23790/710	10M QPSK(25,0)	0.043	0.030	0.12	22.42	22.50	0.044	2025/4/11	
Right Cheek	23790/710	10M QPSK(25,0)	0.067	0.057	-4.49	22.42	22.50	0.068	2025/4/11	

Right Tilt 15 Degree	23790/710	10M QPSK(25,0)	0.035	0.028	2.09	22.42	22.50	0.036	2025/4/11	

NOTE: Head SAR test results of LTE Band 17

Test Position of Body-Worn with 10mm	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	23790/710	10M QPSK(1,0)	0.121	0.091	1.09	23.23	23.50	0.129	2025/4/11	
Back Side	23790/710	10M QPSK(1,0)	0.187	0.145	0.39	23.23	23.50	0.199	2025/4/11	28#
50%RB										
Front Side	23790/710	10M QPSK(25,0)	0.066	0.052	3.79	22.42	22.50	0.067	2025/4/11	
Back Side	23790/710	10M QPSK(25,0)	0.110	0.079	-1.84	22.42	22.50	0.112	2025/4/11	

NOTE: Body-Worn SAR test results of LTE Band 17

Test Position of Hotspot with 10mm	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	23790/710	10M QPSK(1,0)	0.121	0.091	1.09	23.23	23.50	0.129	2025/4/11	
Back Side	23790/710	10M QPSK(1,0)	0.187	0.145	0.39	23.23	23.50	0.199	2025/4/11	28#
Left Side	23790/710	10M QPSK(1,0)	0.086	0.063	-1.00	23.23	23.50	0.092	2025/4/11	
Right Side	23790/710	10M QPSK(1,0)	0.048	0.037	1.91	23.23	23.50	0.051	2025/4/11	
Bottom Side	23790/710	10M QPSK(1,0)	0.114	0.085	2.53	23.23	23.50	0.121	2025/4/11	
50%RB										
Front	23790/710	10M	0.066	0.052	3.79	22.42	22.50	0.067	2025/4/11	

Side		QPSK(25,0)								
Back Side	23790/710	10M QPSK(25,0)	0.110	0.079	-1.84	22.42	22.50	0.112	2025/4/11	
Left Side	23790/710	10M QPSK(25,0)	0.051	0.032	-1.77	22.42	22.50	0.052	2025/4/11	
Right Side	23790/710	10M QPSK(25,0)	0.026	0.021	-2.53	22.42	22.50	0.026	2025/4/11	
Bottom Side	23790/710	10M QPSK(25,0)	0.061	0.043	-2.25	22.42	22.50	0.062	2025/4/11	

NOTE: Hotspot SAR test results of LTE Band 17

10.1.12. SAR measurement Result of LTE Band 41

Test Position of Head	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										
Left Cheek	40620/2593	20M QPSK(1,49)	0.054	0.027	3.28	22.89	23.00	0.055	2025/4/12	29#
Left Tilt 15 Degree	40620/2593	20M QPSK(1,49)	0.027	0.012	-2.62	22.89	23.00	0.028	2025/4/12	
Right Cheek	40620/2593	20M QPSK(1,49)	0.046	0.022	-0.26	22.89	23.00	0.047	2025/4/12	
Right Tilt 15 Degree	40620/2593	20M QPSK(1,49)	0.025	0.012	2.39	22.89	23.00	0.026	2025/4/12	
50%RB										
Left Cheek	40620/2593	20M QPSK(50,24)	0.032	0.014	3.09	21.95	22.50	0.036	2025/4/12	
Left Tilt 15 Degree	40620/2593	20M QPSK(50,24)	0.015	0.007	2.58	21.95	22.50	0.017	2025/4/12	
Right Cheek	40620/2593	20M QPSK(50,24)	0.024	0.013	4.42	21.95	22.50	0.027	2025/4/12	
Right Tilt 15 Degree	40620/2593	20M QPSK(50,24)	0.015	0.006	-2.13	21.95	22.50	0.017	2025/4/12	

NOTE: Head SAR test results of LTE Band 41

Test Position of Body-Worn with 10mm	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	40620/2593	20M QPSK(1,49)	0.055	0.027	0.97	22.89	23.00	0.056	2025/4/12	
Back Side	40620/2593	20M QPSK(1,49)	0.377	0.183	1.42	22.89	23.00	0.387	2025/4/12	30#
50%RB										
Front Side	40620/2593	20M QPSK(50,24)	0.028	0.014	1.55	21.95	22.50	0.032	2025/4/12	
Back Side	40620/2593	20M QPSK(50,24)	0.217	0.110	1.05	21.95	22.50	0.246	2025/4/12	

NOTE: Body-Worn SAR test results of LTE Band 41

Test Position of Hotspot with 10mm	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	40620/2593	20M QPSK(1,49)	0.055	0.027	0.97	22.89	23.00	0.056	2025/4/12	
Back Side	40620/2593	20M QPSK(1,49)	0.377	0.183	1.42	22.89	23.00	0.387	2025/4/12	30#
Left Side	40620/2593	20M QPSK(1,49)	0.047	0.022	0.48	22.89	23.00	0.048	2025/4/12	
Right Side	40620/2593	20M QPSK(1,49)	0.021	0.010	-1.72	22.89	23.00	0.022	2025/4/12	
Bottom Side	40620/2593	20M QPSK(1,49)	0.228	0.111	0.92	22.89	23.00	0.234	2025/4/12	
50%RB										
Front Side	40620/2593	20M QPSK(50,24)	0.028	0.014	1.55	21.95	22.50	0.032	2025/4/12	
Back Side	40620/2593	20M QPSK(50,24)	0.217	0.110	1.05	21.95	22.50	0.246	2025/4/12	
Left	40620/2593	20M	0.028	0.013	-0.71	21.95	22.50	0.032	2025/4/12	

Side		QPSK(50,24)								
Right Side	40620/2593	20M QPSK(50,24)	0.011	0.006	-2.02	21.95	22.50	0.012	2025/4/12	
Bottom Side	40620/2593	20M QPSK(50,24)	0.137	0.063	-2.87	21.95	22.50	0.155	2025/4/12	

NOTE: Hotspot SAR test results of LTE Band 41

10.1.13. SAR measurement Result of WLAN2.4G

Test Position of Head	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						
Left Cheek	6/2437	802.11b	0.300	0.136	-1.98	15.52	16.00	0.335	2025/3/28	15#
Left Tilt 15 Degree	6/2437	802.11b	0.172	0.078	2.25	15.52	16.00	0.192	2025/3/28	
Right Cheek	6/2437	802.11b	0.264	0.114	0.07	15.52	16.00	0.295	2025/3/28	
Right Tilt 15 Degree	6/2437	802.11b	0.135	0.058	3.19	15.52	16.00	0.151	2025/3/28	

NOTE: Head SAR test results of WLAN 2.4G

Test Position of Body-Worn with 10mm	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	0.104	0.051	1.78	15.52	16.00	0.116	2025/3/28	
Back Side	6/2437	802.11b	0.128	0.063	-2.72	15.52	16.00	0.143	2025/3/28	

NOTE: Body-worn SAR test results of WLAN 2.4G

Test Position of Hotspot with 10mm	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	0.104	0.051	1.78	15.52	16.00	0.116	2025/3/28	
Back Side	6/2437	802.11b	0.128	0.063	-2.72	15.52	16.00	0.143	2025/3/28	
Right Side	6/2437	802.11b	0.036	0.018	0.47	15.52	16.00	0.040	2025/3/28	
Top Side	6/2437	802.11b	0.140	0.072	-3.52	15.52	16.00	0.156	2025/3/28	16#

NOTE: Hotspot SAR test results of WLAN2.4G

10.1.14. SAR measurement Result of WLAN5.2G

Test Position of Head	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						
Left Cheek	48/5240	802.11ac VHT20	0.626	0.205	-1.70	12.13	12.50	0.682	2025/3/30	11#
Left Tilt 15 Degree	48/5240	802.11ac VHT20	0.340	0.109	-3.88	12.13	12.50	0.370	2025/3/30	
Right Cheek	48/5240	802.11ac VHT20	0.553	0.179	-3.45	12.13	12.50	0.602	2025/3/30	
Right Tilt 15 Degree	48/5240	802.11ac VHT20	0.260	0.081	0.69	12.13	12.50	0.283	2025/3/30	

NOTE: Head SAR test results of WLAN5.2G

Test Position of Body-Worn with 10mm	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	48/5240	802.11a	0.211	0.075	-1.89	0.00	0.00	0.211	2025/3/30	
Back Side	48/5240	802.11ac VHT20	0.220	0.079	1.39	12.13	12.50	0.240	2025/3/30	

NOTE: Body-worn SAR test results of WLAN5.2G

Test Position of Hotspot with 10mm	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	48/5240	802.11a	0.211	0.075	-1.89	0.00	0.00	0.211	2025/3/30	
Back Side	48/5240	802.11ac VHT20	0.220	0.079	1.39	12.13	12.50	0.240	2025/3/30	
Right Side	48/5240	802.11ac VHT20	0.395	0.148	1.58	12.13	12.50	0.430	2025/3/30	12#
Top	48/5240	802.11ac	0.273	0.099	-0.23	12.13	12.50	0.297	2025/3/30	

Side		VHT20								

NOTE: Hotspot SAR test results of WLAN5.2G

10.1.15. SAR measurement Result of WLAN5.8G

Test Position of Head	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						
Left Cheek	157/5785	802.11n HT20	0.527	0.182	0.12	11.25	12.00	0.626	2025/4/02	13#
Left Tilt 15 Degree	157/5785	802.11n HT20	0.291	0.096	0.48	11.25	12.00	0.346	2025/4/02	
Right Cheek	157/5785	802.11n HT20	0.480	0.164	2.87	11.25	12.00	0.570	2025/4/02	
Right Tilt 15 Degree	157/5785	802.11n HT20	0.225	0.076	1.55	11.25	12.00	0.267	2025/4/02	

NOTE: Head SAR test results of WLAN5.8G

Test Position of Body-Worn with 10mm	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	157/5785	802.11n HT20	0.154	0.050	3.37	11.25	12.00	0.183	2025/4/02	
Back Side	157/5785	802.11n HT20	0.155	0.050	-3.37	11.25	12.00	0.184	2025/4/02	

NOTE: Body-worn SAR test results of WLAN5.8G

Test Position of Hotspot with 10mm	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	157/5785	802.11n HT20	0.154	0.050	3.37	11.25	12.00	0.183	2025/4/02	
Back	157/5785	802.11n	0.155	0.050	-3.37	11.25	12.00	0.184	2025/4/02	

Side		HT20								
Right Side	157/5785	802.11n HT20	0.307	0.103	2.78	11.25	12.00	0.365	2025/4/02	14#
Top Side	157/5785	802.11n HT20	0.215	0.069	-1.31	11.25	12.00	0.256	2025/4/02	

NOTE: Hotspot SAR test results of WLAN5.8G

10.2. Simultaneous Transmission Analysis

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

1) Scalar SAR summation < 1.6W/kg.

2) SPLSR = $(SAR_1 + SAR_2)^{1.5}$ / (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 ≤ 0.04, simultaneously transmission SAR measurement is not necessary.

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	DTS			
Head	Left Cheek	0.197	0.335	0.532	N/A	N/A
	Left Tilt 15 Degree	0.110	0.192	0.302	N/A	N/A
	Right Cheek	0.171	0.295	0.466	N/A	N/A
	Right Tilt 15 Degree	0.077	0.151	0.228	N/A	N/A
Body-Worn	Front Side	0.488	0.116	0.604	N/A	N/A
	Back Side	0.671	0.143	0.814	N/A	N/A
Hotspot	Front Side	0.488	0.116	0.604	N/A	N/A
	Back Side	0.671	0.143	0.814	N/A	N/A
	Left Side	0.488	N/A	0.488	N/A	N/A
	Right Side	0.146	0.040	0.186	N/A	N/A
	Top Side	N/A	0.156	0.156	N/A	N/A
	Bottom Side	0.314	N/A	0.314	N/A	N/A

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	NII			
Head	Left Cheek	0.197	0.682	0.879	N/A	N/A
	Left Tilt 15 Degree	0.110	0.370	0.480	N/A	N/A
	Right Cheek	0.171	0.602	0.773	N/A	N/A
	Right Tilt 15 Degree	0.077	0.283	0.360	N/A	N/A
Body-Worn	Front Side	0.488	0.211	0.699	N/A	N/A
	Back Side	0.671	0.240	0.911	N/A	N/A
Hotspot	Front Side	0.488	0.211	0.699	N/A	N/A
	Back Side	0.671	0.240	0.911	N/A	N/A
	Left Side	0.488	N/A	0.488	N/A	N/A
	Right Side	0.146	0.430	0.576	N/A	N/A
	Top Side	N/A	0.297	0.297	N/A	N/A
	Bottom Side	0.314	N/A	0.314	N/A	N/A

Test Position		Scaled SAR_{MAX}		∑1-g SAR (W/Kg)	SPLSR	Remark
		WWAN	DSS			
Head	Left Cheek	0.197	0.236	0.433	N/A	N/A
	Left Tilt 15 Degree	0.110	0.236	0.346	N/A	N/A
	Right Cheek	0.171	0.236	0.407	N/A	N/A
	Right Tilt 15 Degree	0.077	0.236	0.313	N/A	N/A
Body-Worn	Front Side	0.488	0.118	0.606	N/A	N/A
	Back Side	0.671	0.118	0.789	N/A	N/A
Hotspot	Front Side	0.488	0.118	0.606	N/A	N/A
	Back Side	0.671	0.118	0.789	N/A	N/A
	Left Side	0.488	N/A	0.488	N/A	N/A
	Right Side	0.146	0.118	0.264	N/A	N/A
	Top Side	N/A	0.118	0.118	N/A	N/A
	Bottom Side	0.314	N/A	0.314	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 - 750MHz
MEASUREMENT 2 System Performance Check - 835MHz
MEASUREMENT 3 System Performance Check - 1800MHz
MEASUREMENT 4 System Performance Check - 1900MHz
MEASUREMENT 5 System Performance Check - 2450MHz
MEASUREMENT 6 System Performance Check - 2600MHz
MEASUREMENT 7 System Performance Check - 5200MHz
MEASUREMENT 8 System Performance Check - 5800MHz

1# System check at 750 MHz
Date of measurement: 11/4/2025

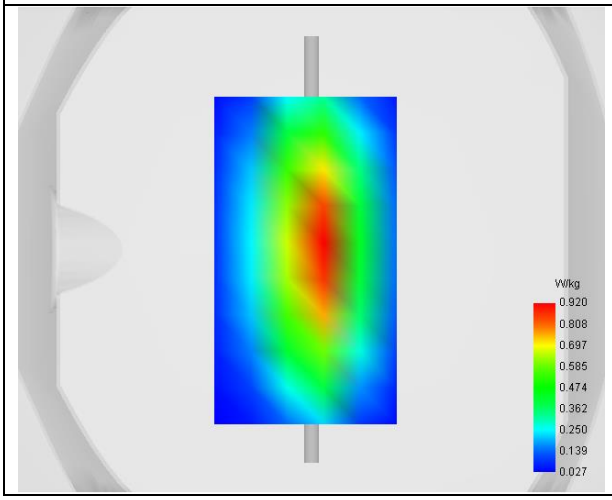
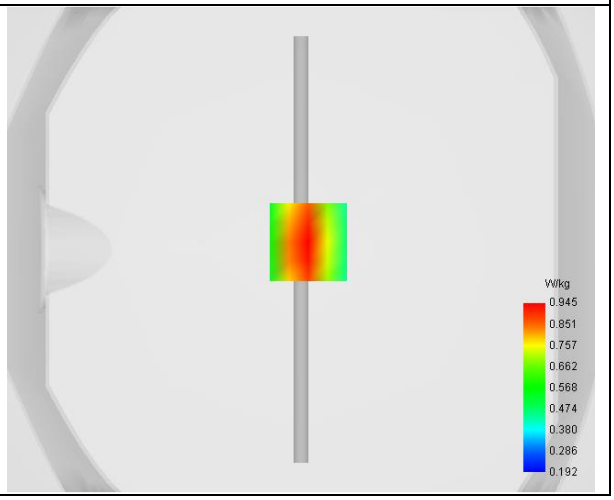
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW750
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	750.000
Relative permitivity (real part)	40.57
Relative permitivity (imaginary part)	21.44
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

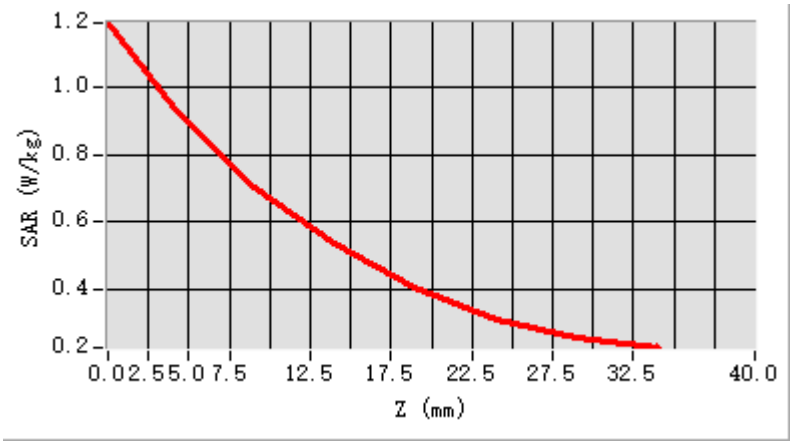
Maximum location: X=3.00, Y=3.00 ; SAR Peak: 1.20 W/kg

D. SAR 1g & 10g

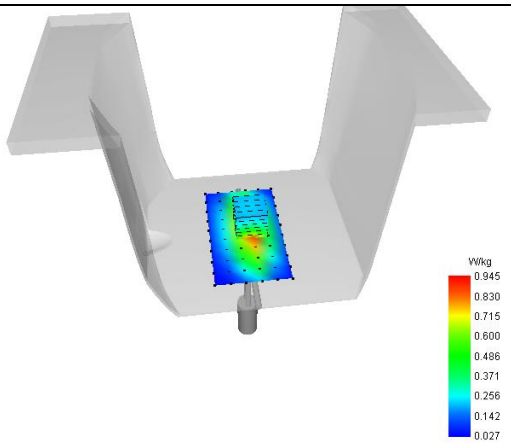
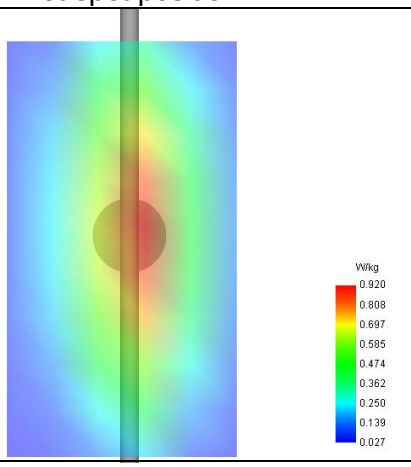
SAR 10g (W/Kg)	0.633
SAR 1g (W/Kg)	0.913
Variation (%)	-0.43
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	74.63

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.191	0.945	0.705	0.533	0.402	0.308	0.254



F. 3D Image

3D screen shot	Hot spot position
	

2# System check at 835 MHz
Date of measurement: 9/4/2025

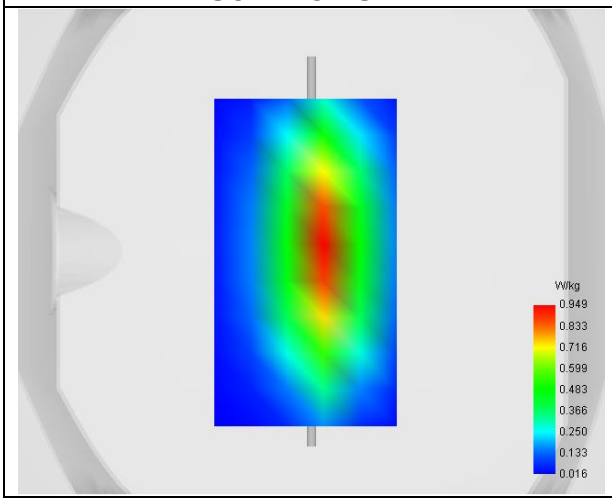
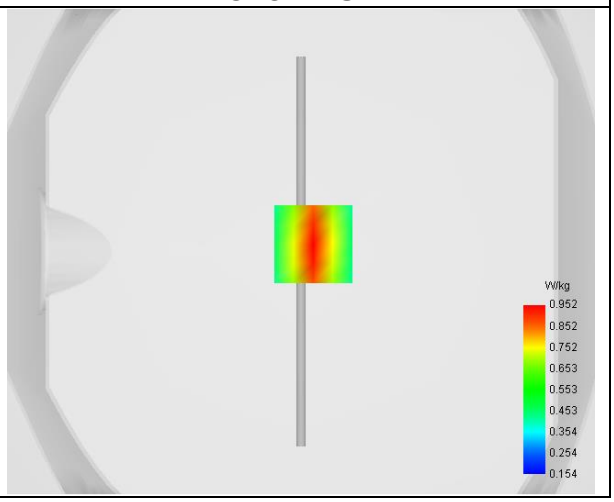
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
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
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	835.000
Relative permitivity (real part)	40.90
Relative permitivity (imaginary part)	19.04
Conductivity (S/m)	0.88

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

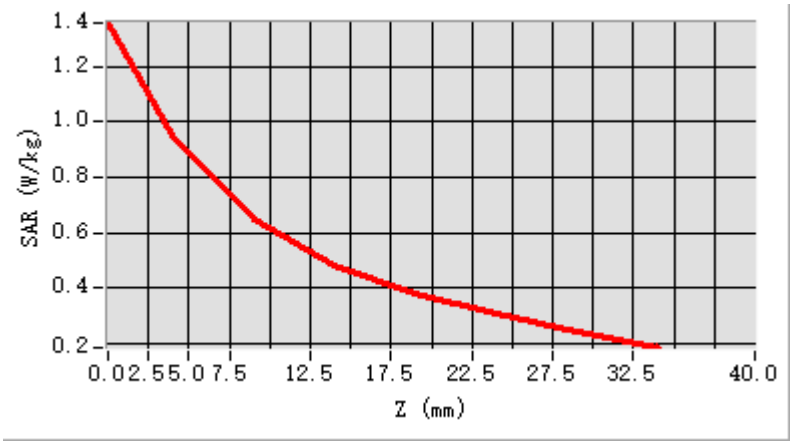
Maximum location: X=5.00, Y=3.00 ; SAR Peak: 1.35 W/kg

D. SAR 1g & 10g

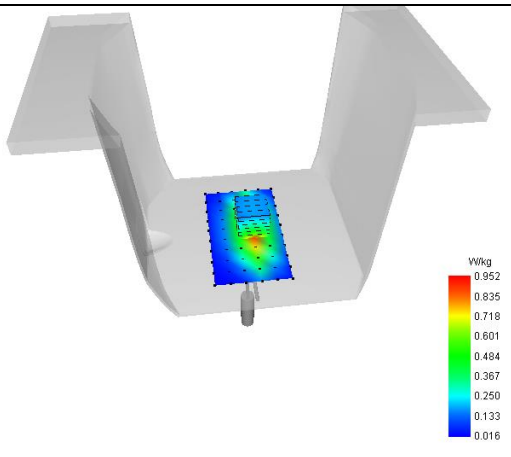
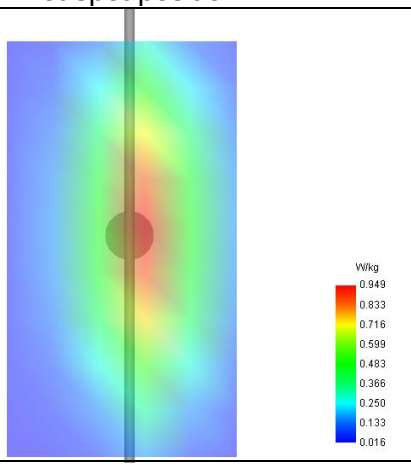
SAR 10g (W/Kg)	0.602
SAR 1g (W/Kg)	0.916
Variation (%)	-0.22
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	67.98

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.357	0.952	0.647	0.482	0.383	0.309	0.242



F. 3D Image

3D screen shot	Hot spot position
	

3# System check at 1800 MHz
Date of measurement: 14/4/2025

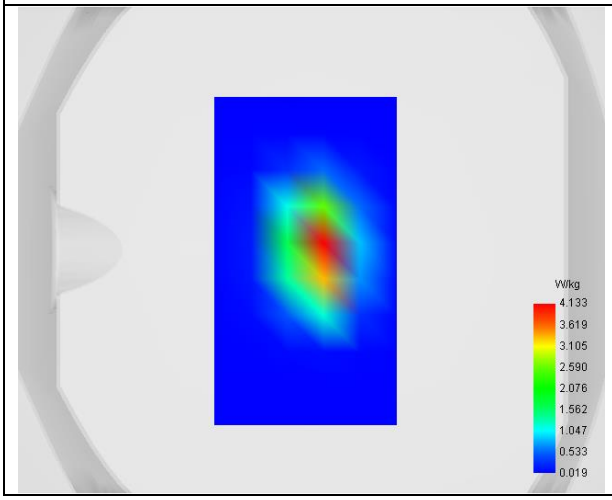
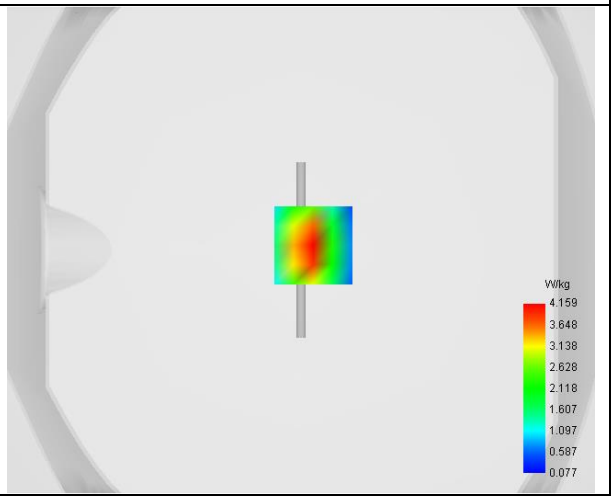
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	1800.000
Relative permitivity (real part)	38.86
Relative permitivity (imaginary part)	13.77
Conductivity (S/m)	1.38

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

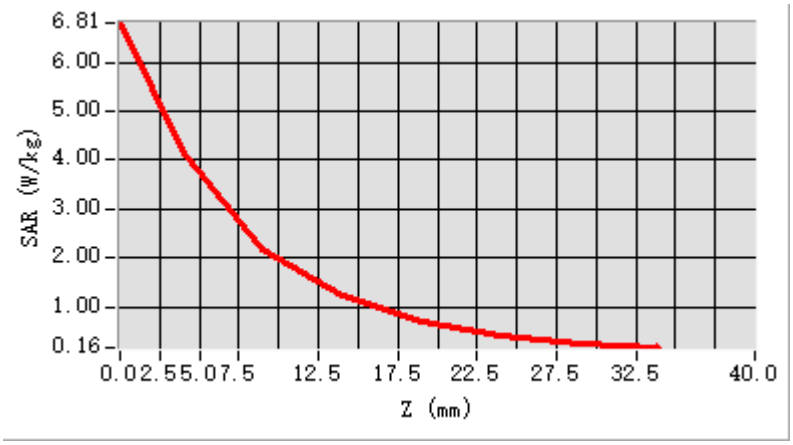
Maximum location: X=5.00, Y=2.00 ; SAR Peak: 6.90 W/kg

D. SAR 1g & 10g

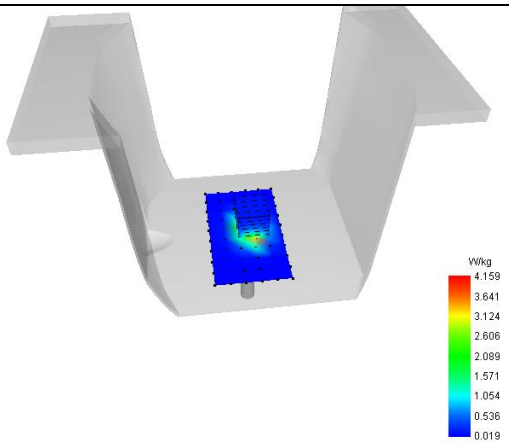
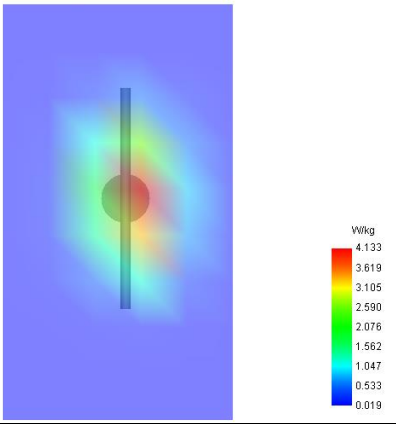
SAR 10g (W/Kg)	1.941
SAR 1g (W/Kg)	3.948
Variation (%)	-0.18
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	52.63

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.806	4.159	2.189	1.219	0.706	0.423	0.257



F. 3D Image

3D screen shot	Hot spot position
	

3# System check at 1900 MHz
Date of measurement: 18/4/2025

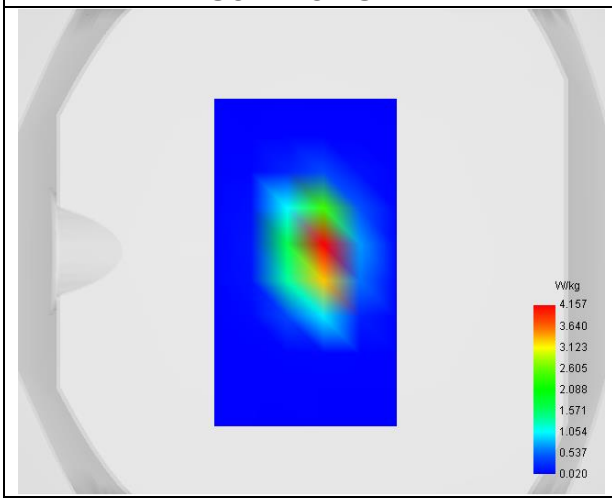
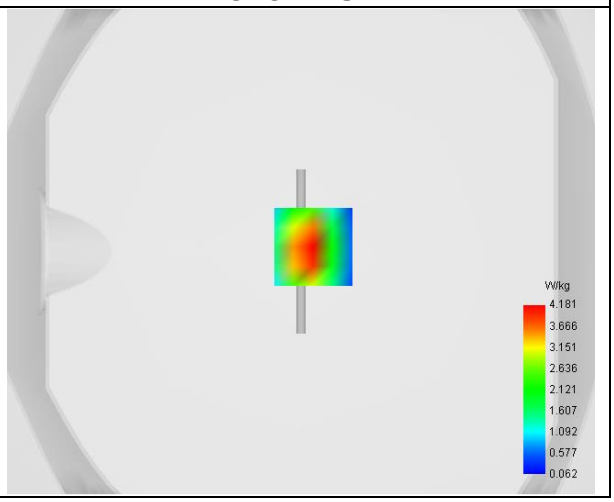
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
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
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	1900.000
Relative permitivity (real part)	38.67
Relative permitivity (imaginary part)	13.78
Conductivity (S/m)	1.45

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

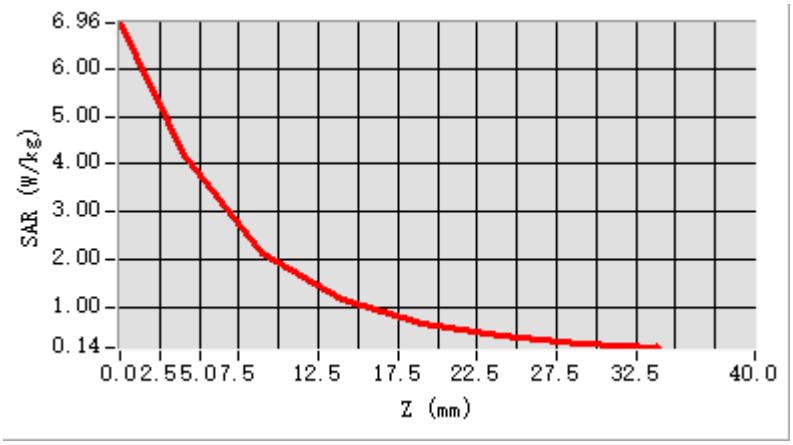
Maximum location: X=5.00, Y=2.00 ; SAR Peak: 7.16 W/kg

D. SAR 1g & 10g

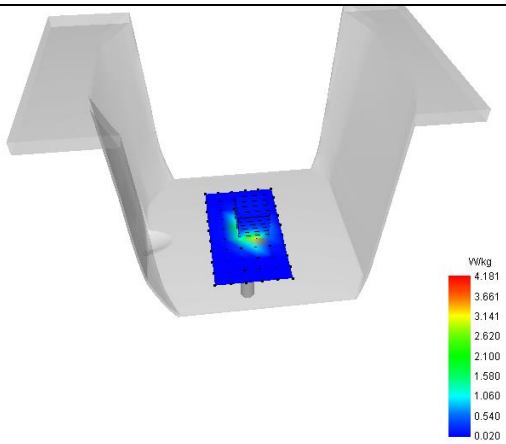
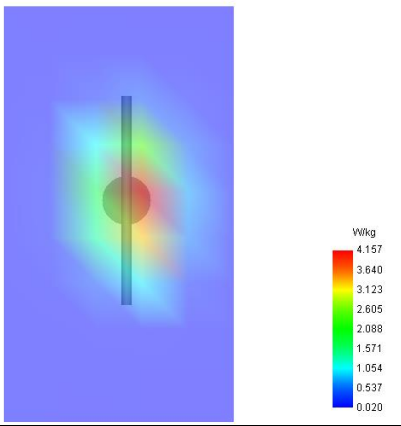
SAR 10g (W/Kg)	1.959
SAR 1g (W/Kg)	4.154
Variation (%)	-0.25
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	51.12

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.961	4.181	2.137	1.163	0.657	0.381	0.226



F. 3D Image

3D screen shot	Hot spot position
	

5# System check at 2450 MHz
Date of measurement: 28/3/2025

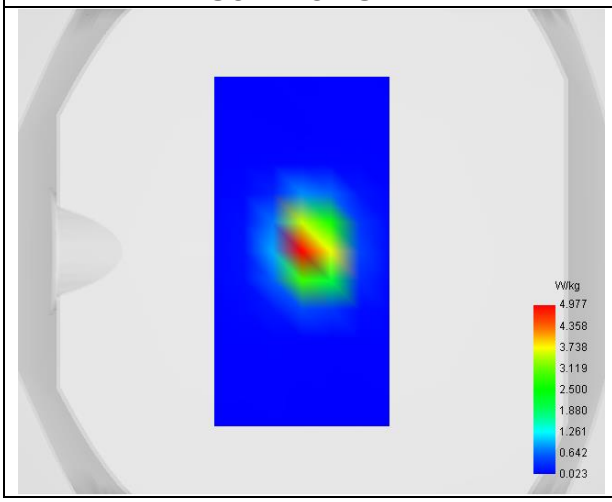
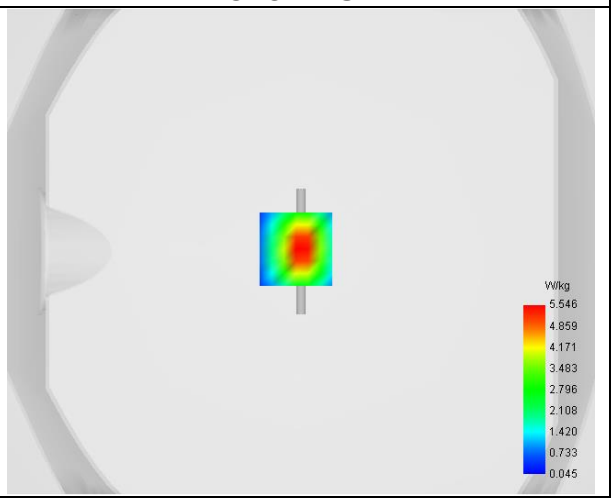
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
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
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	2450.000
Relative permitivity (real part)	40.73
Relative permitivity (imaginary part)	12.97
Conductivity (S/m)	1.76

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

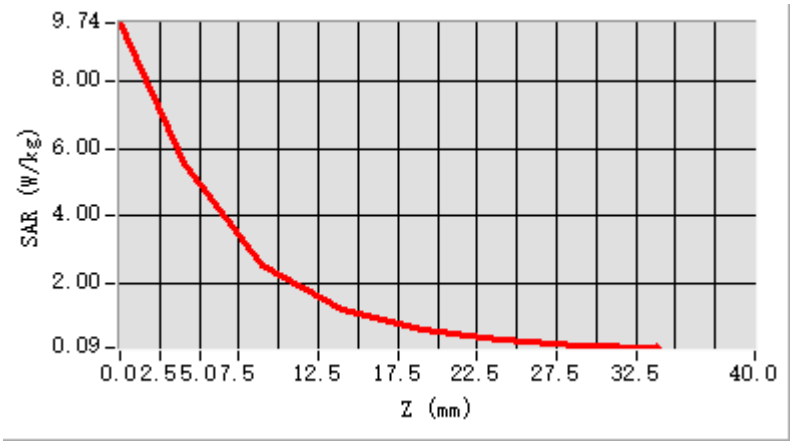
Maximum location: X=-2.00, Y=1.00 ; SAR Peak: 10.01 W/kg

D. SAR 1g & 10g

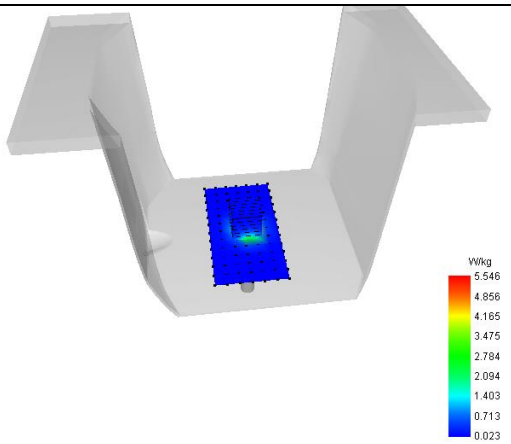
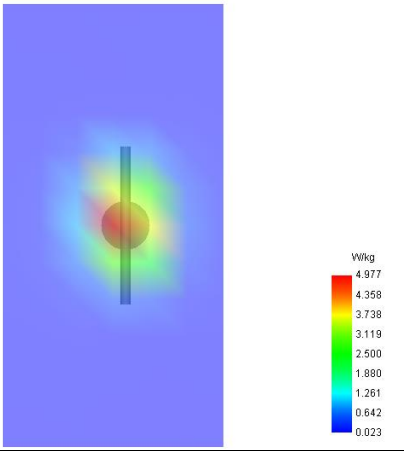
SAR 10g (W/Kg)	2.245
SAR 1g (W/Kg)	5.246
Variation (%)	0.92
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	46.08

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.737	5.546	2.556	1.230	0.607	0.306	0.164



F. 3D Image

3D screen shot	Hot spot position
	

6# System check at 2600 MHz
Date of measurement: 12/4/2025

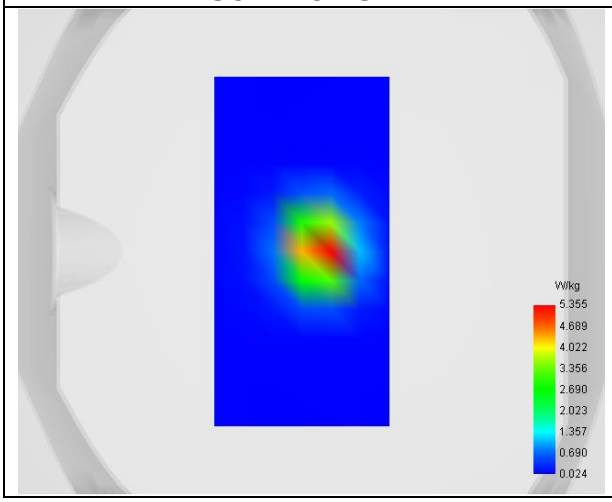
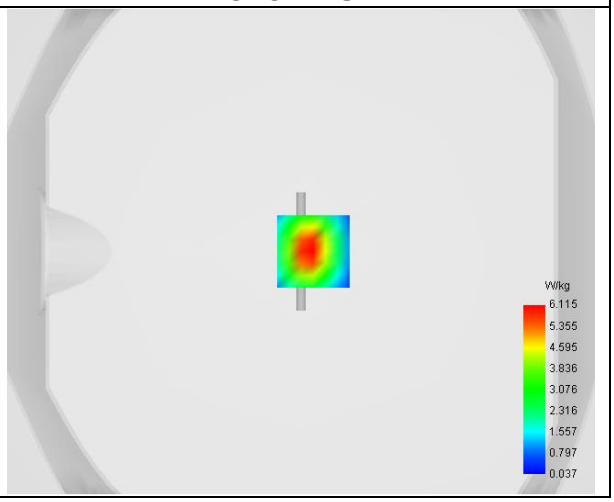
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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
Channels/Frequency	Middle
Signal	CW

B. Permitivity

Middle TX Frequency (MHz)	2600.000
Relative permitivity (real part)	39.84
Relative permitivity (imaginary part)	13.48
Conductivity (S/m)	1.95

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

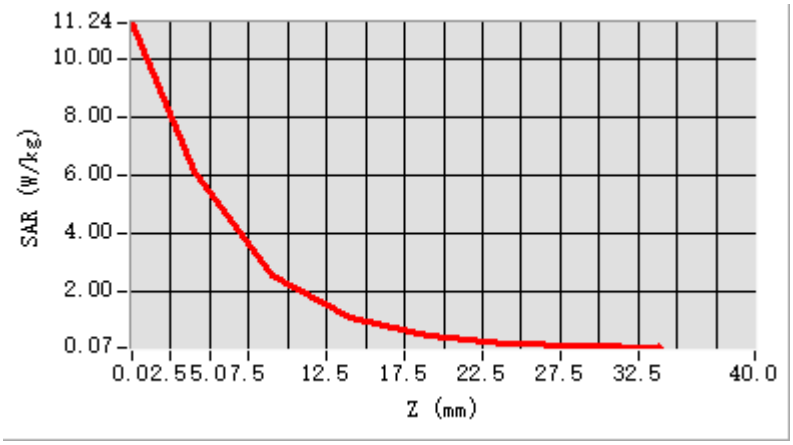
Maximum location: X=5.00, Y=0.00 ; SAR Peak: 11.28 W/kg

D. SAR 1g & 10g

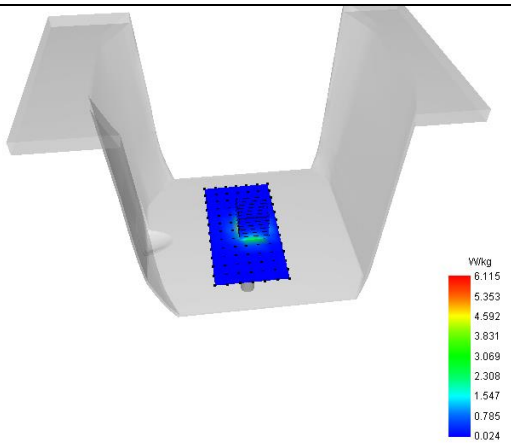
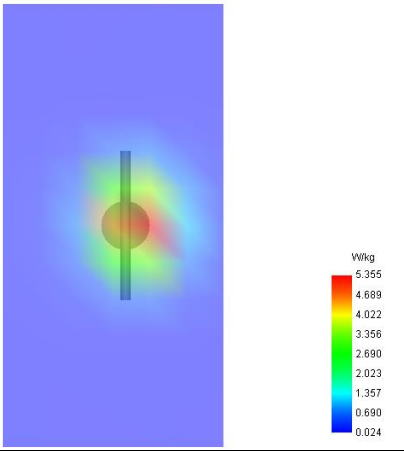
SAR 10g (W/Kg)	2.363
SAR 1g (W/Kg)	5.723
Variation (%)	-0.33
Horizontal validation criteria: minimum distance (mm)	10.00
Vertical validation criteria: SAR ratio M2/M1 (%)	42.05

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	11.241	6.115	2.571	1.113	0.496	0.231	0.114



F. 3D Image

3D screen shot	Hot spot position
	

7# System check at 5200 MHz
Date of measurement: 30/3/2025

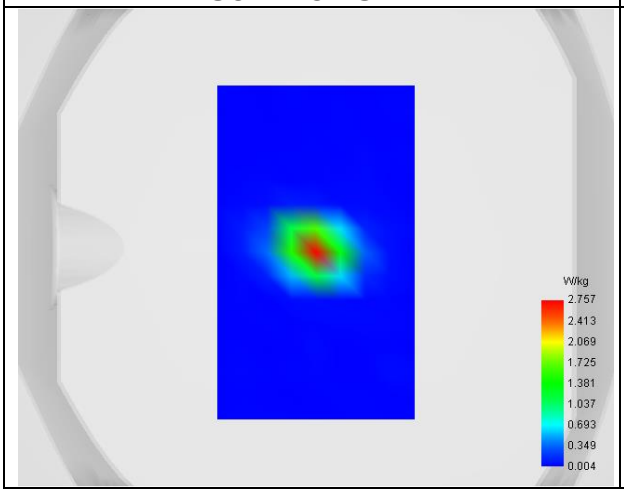
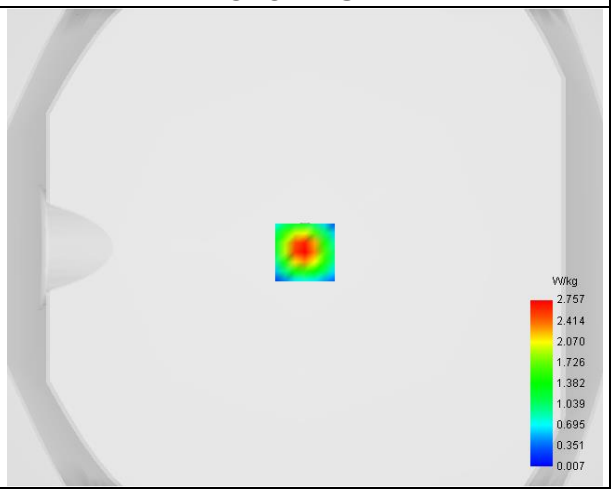
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5200
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5200.00
Relative permitivity (real part)	36.19
Relative permitivity (imaginary part)	16.66
Conductivity (S/m)	4.81

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

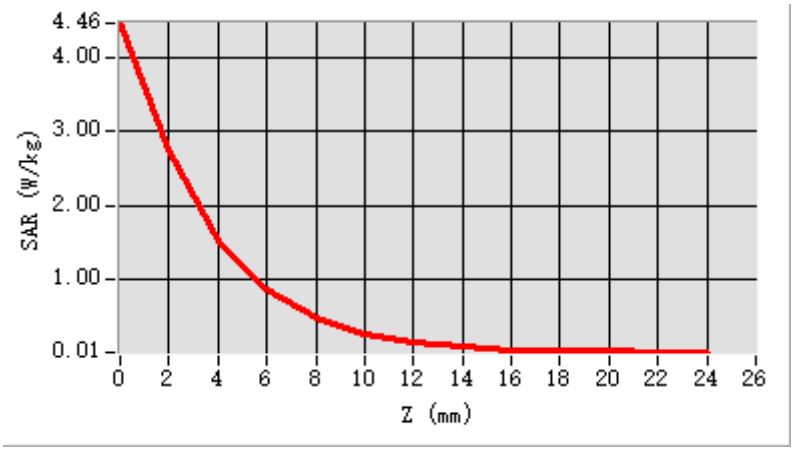
Maximum location: X=0.00, Y=-2.00 ; SAR Peak: 4.77 W/kg

D. SAR 1g & 10g

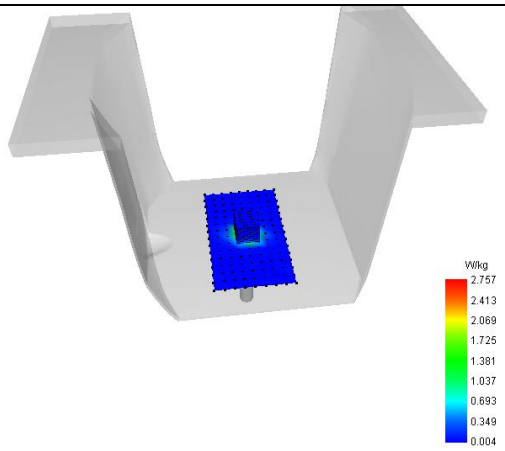
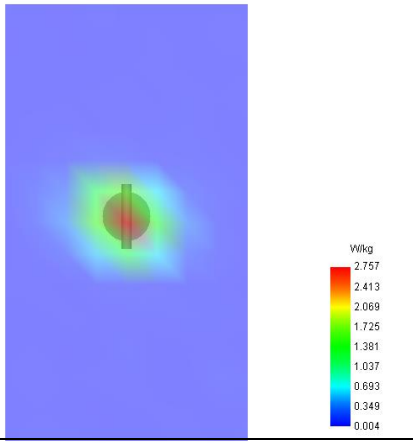
SAR 10g (W/Kg)	0.547
SAR 1g (W/Kg)	1.612
Variation (%)	1.55
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	54.84

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	4.458	2.757	1.512	0.860	0.487	0.249	0.148	0.089	0.049	0.038	0.029	0.011



F. 3D Image

3D screen shot	Hot spot position
	

8# System check at 5800 MHz
Date of measurement: 2/4/2025

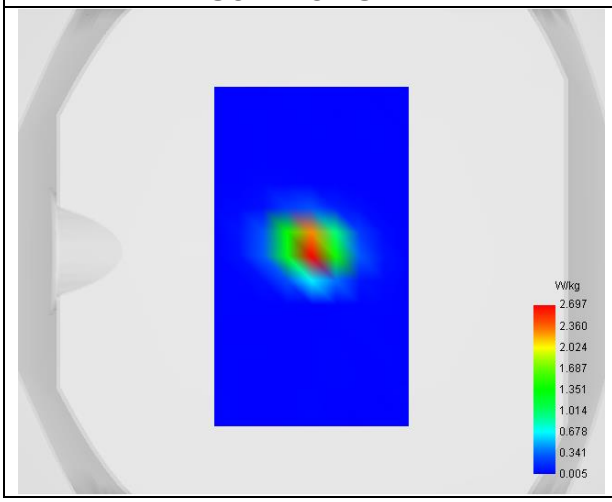
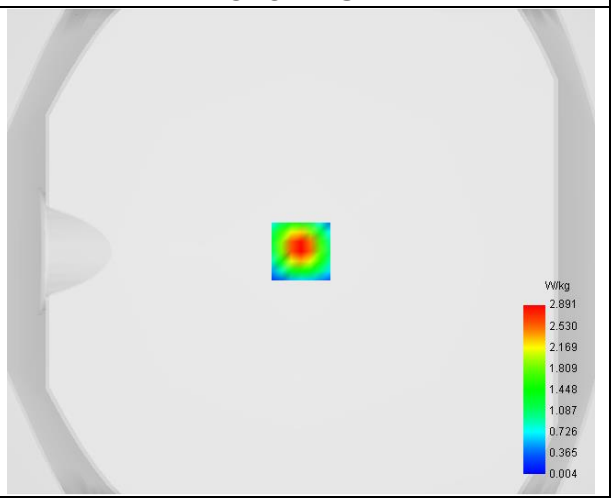
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.90
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW5800
Signal	CW
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5800.00
Relative permitivity (real part)	35.39
Relative permitivity (imaginary part)	16.09
Conductivity (S/m)	5.18

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

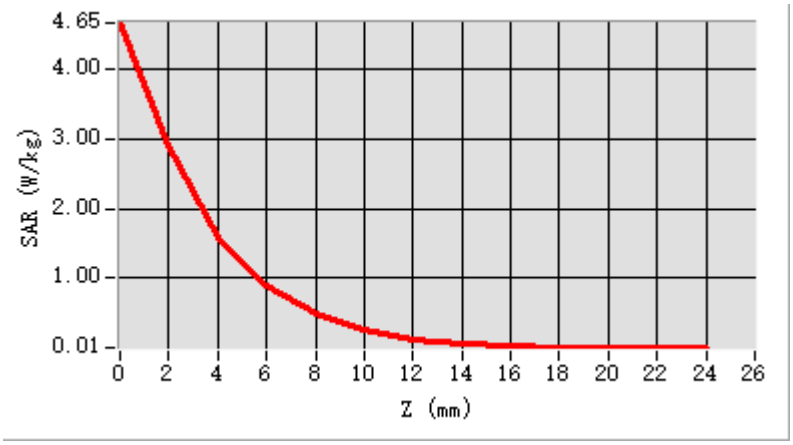
Maximum location: X=0.00, Y=0.00 ; SAR Peak: 5.08 W/kg

D. SAR 1g & 10g

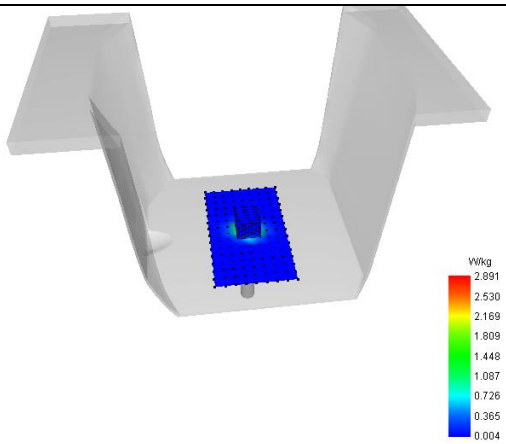
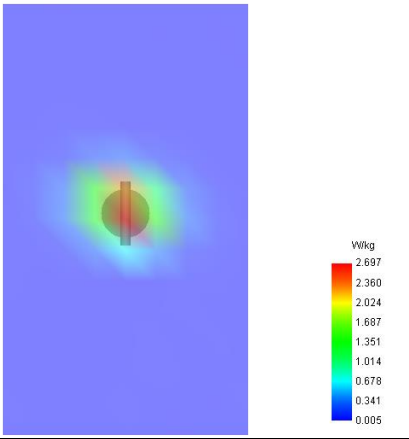
SAR 10g (W/Kg)	0.567
SAR 1g (W/Kg)	1.698
Variation (%)	0.67
Horizontal validation criteria: minimum distance (mm)	8.94
Vertical validation criteria: SAR ratio M2/M1 (%)	54.89

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	4.651	2.891	1.587	0.906	0.509	0.271	0.131	0.068	0.040	0.019	0.018	0.012



F. 3D Image

3D screen shot	Hot spot position
	

13. Appendix C. Plots of High SAR Measurement

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MEASUREMENT 30 LTE Band 41 Body

1# SAR Measurement at GSM850 (Cheek, Left)
Date of measurement: 9/4/2025

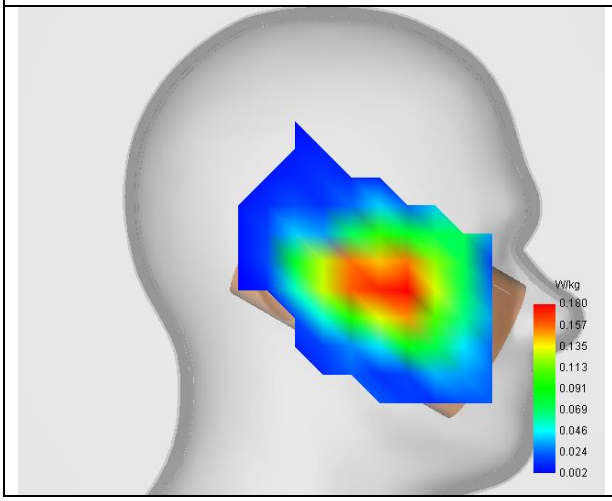
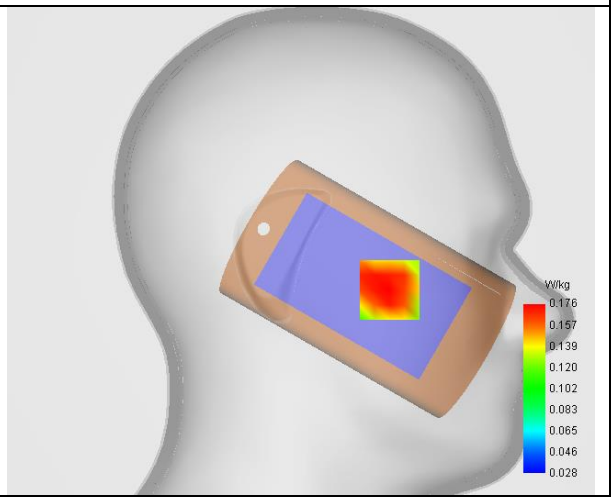
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	GSM850
Signal	TDMA (GSM)
Channels/Frequency	Middle (189)/ frequency 836.40 Mhz
Modulation	GMSK

B. Permitivity

Middle TX Frequency (MHz)	836.40
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

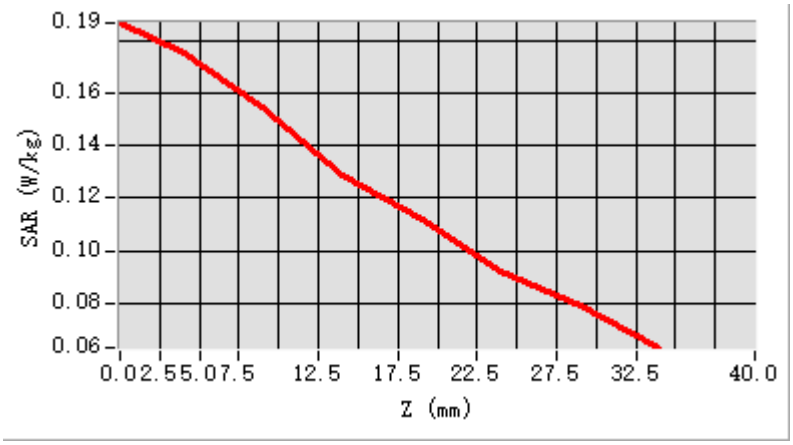
Maximum location: X=-47.00, Y=-21.00 ; SAR Peak: 0.22 W/kg

D. SAR 1g & 10g

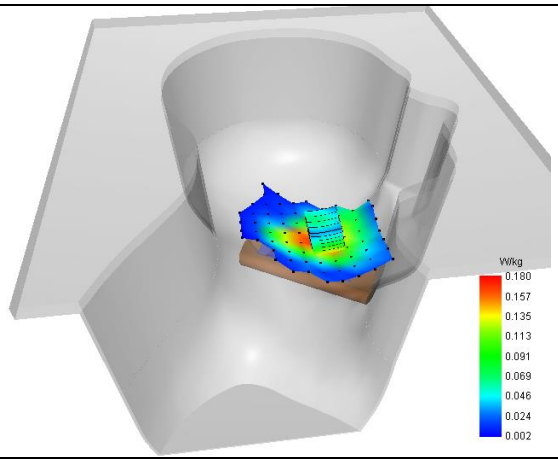
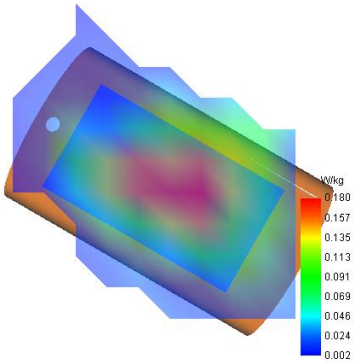
SAR 10g (W/Kg)	0.120
SAR 1g (W/Kg)	0.173
Variation (%)	-1.88
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.187	0.176	0.155	0.129	0.112	0.092	0.079



F. 3D Image

3D screen shot	Hot spot position
	

2# SAR Measurement at GSM850 (Body, Validation Plane)
Date of measurement: 9/4/2025

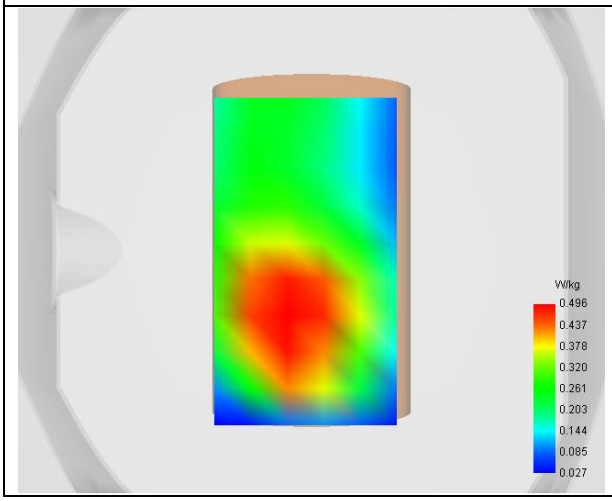
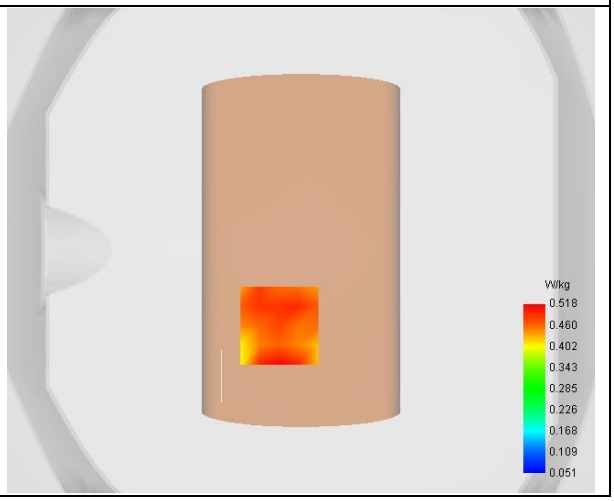
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
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	GSM850
Signal	TDMA (GSM)
Channels/Frequency	Middle (189)/ frequency 836.40 Mhz
Modulation	GMSK

B. Permitivity

Middle TX Frequency (MHz)	836.40
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

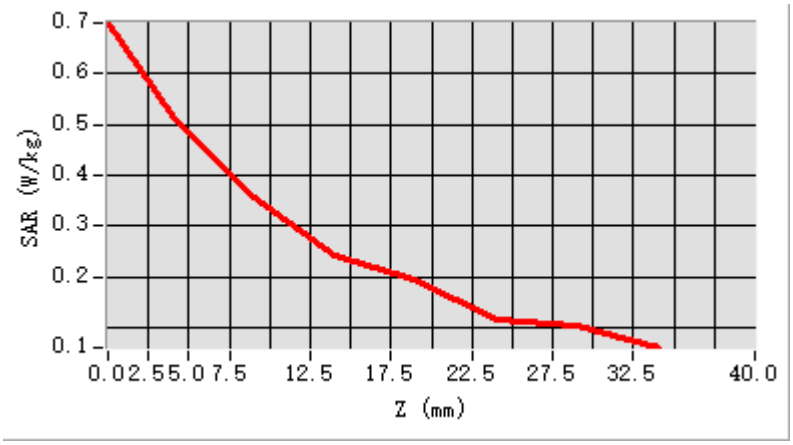
Maximum location: X=-9.00, Y=-31.00 ; SAR Peak: 0.74 W/kg

D. SAR 1g & 10g

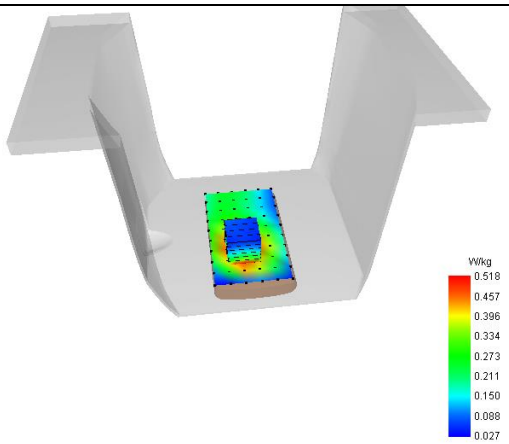
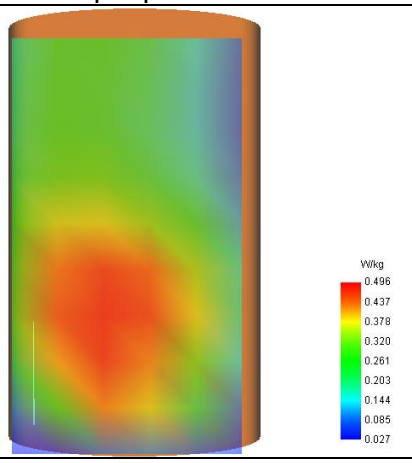
SAR 10g (W/Kg)	0.254
SAR 1g (W/Kg)	0.471
Variation (%)	-0.36
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.700	0.518	0.358	0.244	0.197	0.118	0.107



F. 3D Image

3D screen shot	Hot spot position
	

3# SAR Measurement at GSM1900 (Cheek, Left)
Date of measurement: 18/4/2025

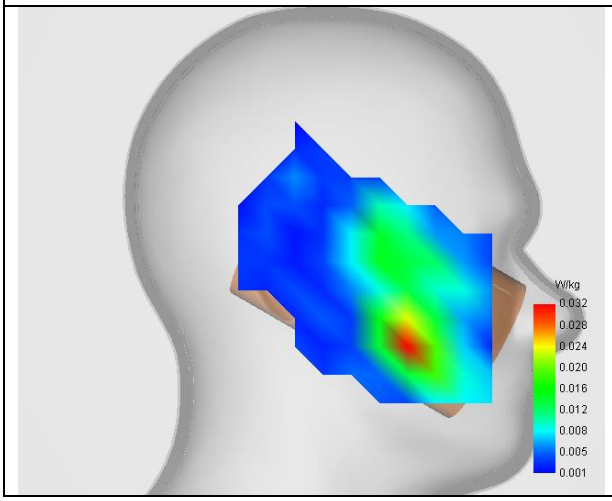
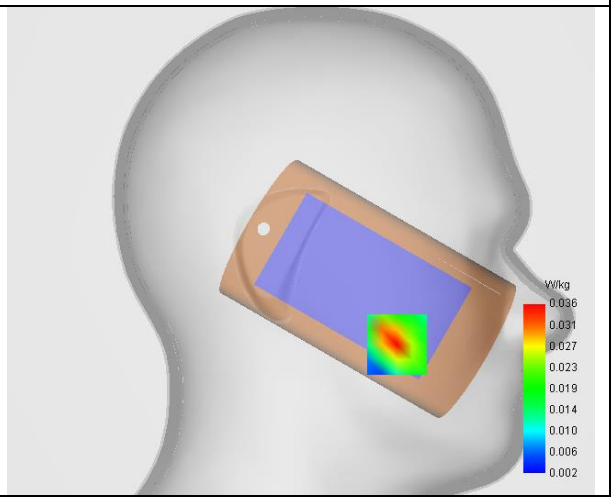
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	GSM1900
Signal	TDMA (GSM)
Channels/Frequency	Middle (661)/ frequency 1880.00 Mhz
Modulation	GMSK

B. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

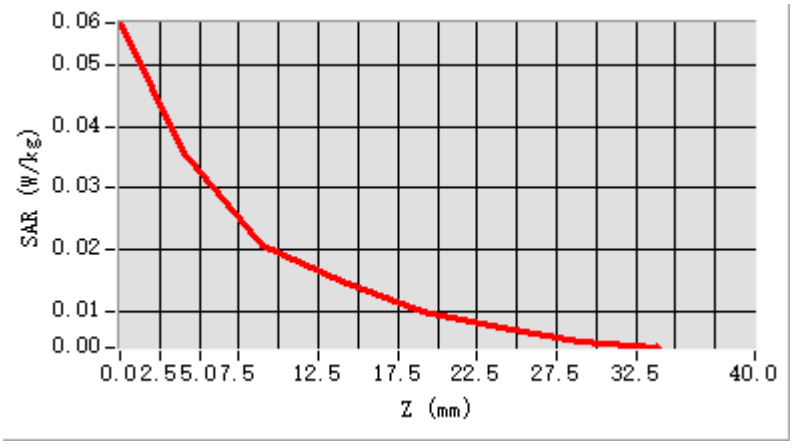
Maximum location: X=-51.00, Y=-50.00 ; SAR Peak: 0.06 W/kg

D. SAR 1g & 10g

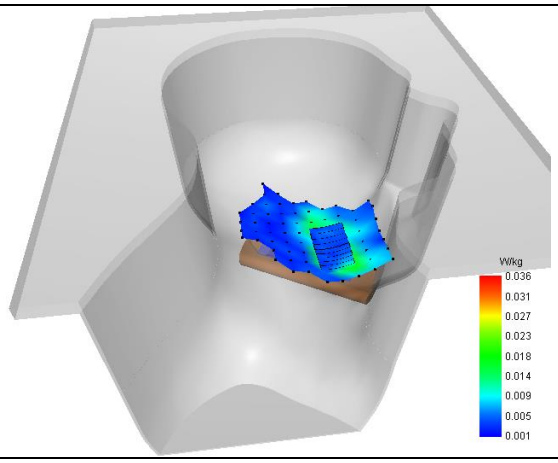
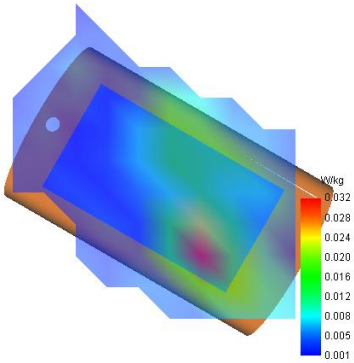
SAR 10g (W/Kg)	0.019
SAR 1g (W/Kg)	0.035
Variation (%)	2.36
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	58.18

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.057	0.036	0.021	0.015	0.010	0.008	0.005



F. 3D Image

3D screen shot	Hot spot position
	

4# SAR Measurement at GSM1900 (Body, Validation Plane)
Date of measurement: 18/4/2025

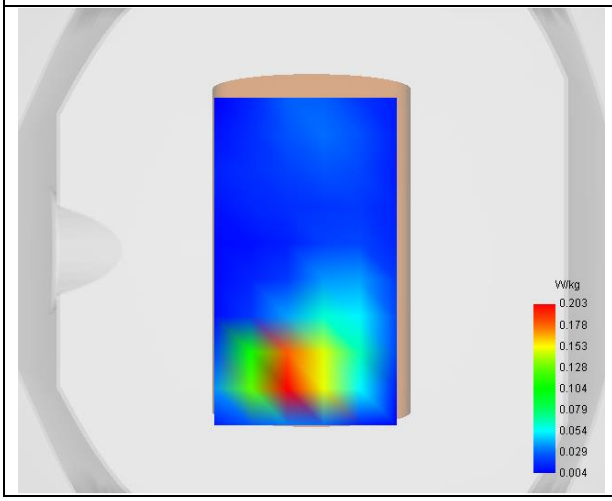
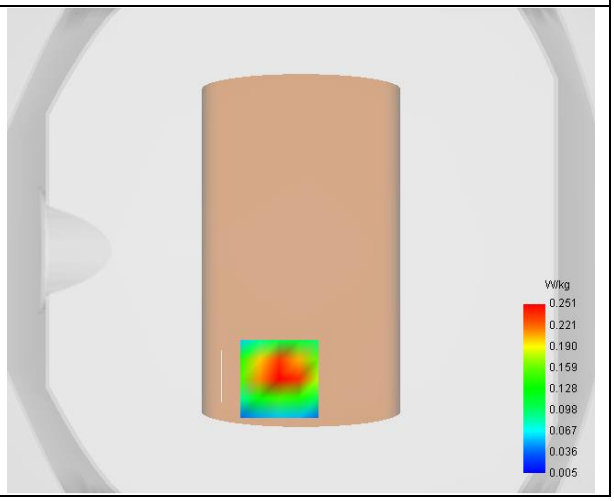
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
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	GSM1900
Signal	TDMA (GSM)
Channels/Frequency	Middle (661)/ frequency 1880.00 Mhz
Modulation	GMSK

B. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

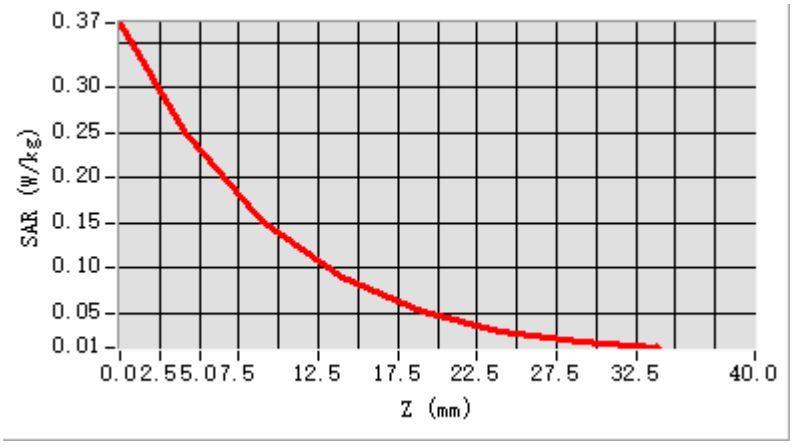
Maximum location: X=-9.00, Y=-53.00 ; SAR Peak: 0.41 W/kg

D. SAR 1g & 10g

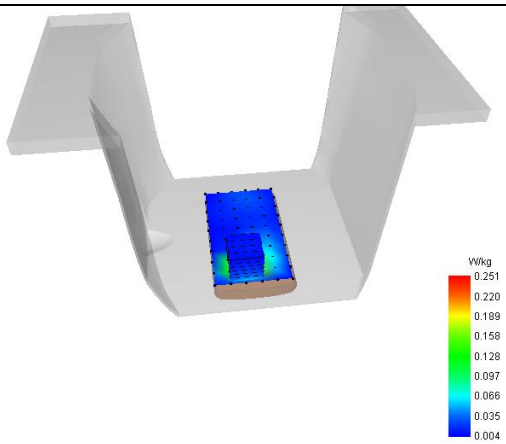
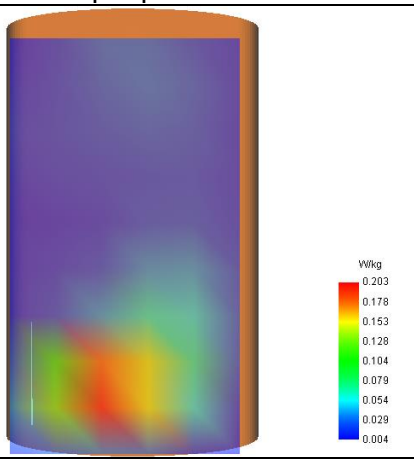
SAR 10g (W/Kg)	0.127
SAR 1g (W/Kg)	0.252
Variation (%)	3.30
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	60.01

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.371	0.251	0.151	0.089	0.053	0.030	0.018



F. 3D Image

3D screen shot	Hot spot position
	

5# SAR Measurement at Band 2 (1900) (Cheek, Left)
Date of measurement: 18/4/2025

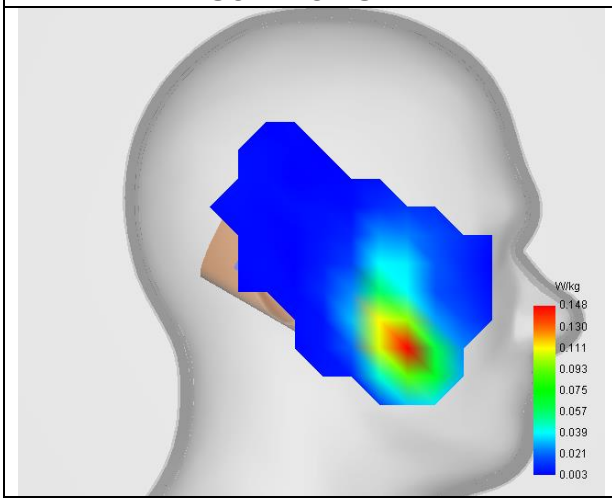
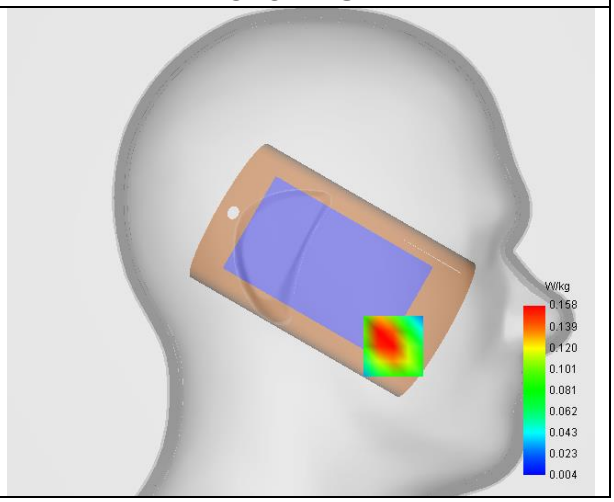
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	Band 2 (1900)
Signal	WCDMA
Channels/Frequency	Middle (9400)/ frequency 1880.00 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

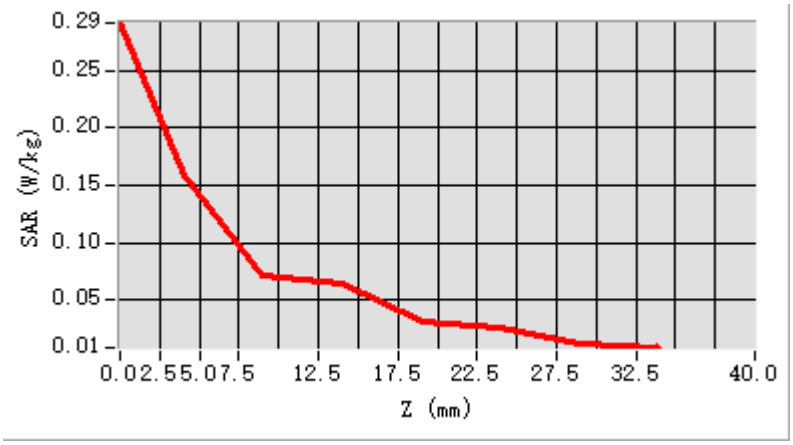
Maximum location: X=-49.00, Y=-50.00 ; SAR Peak: 0.24 W/kg

D. SAR 1g & 10g

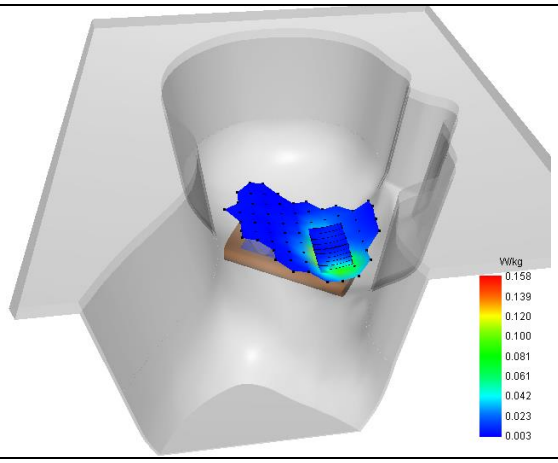
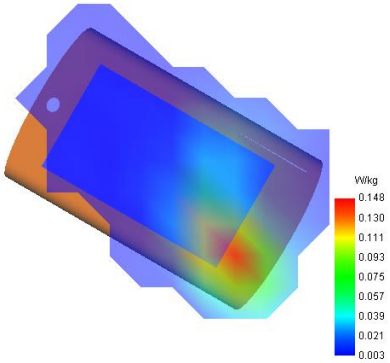
SAR 10g (W/Kg)	0.088
SAR 1g (W/Kg)	0.159
Variation (%)	-2.70
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	65.29

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.292	0.158	0.071	0.064	0.031	0.027	0.012



F. 3D Image

3D screen shot	Hot spot position
	

6# SAR Measurement at Band 2 (1900) (Body, Validation Plane)
Date of measurement: 18/4/2025

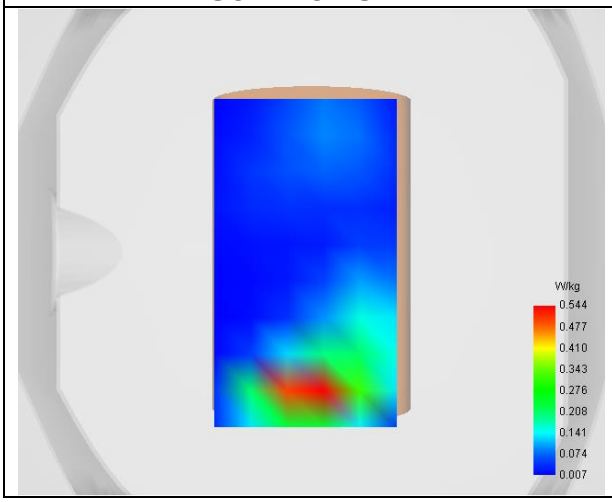
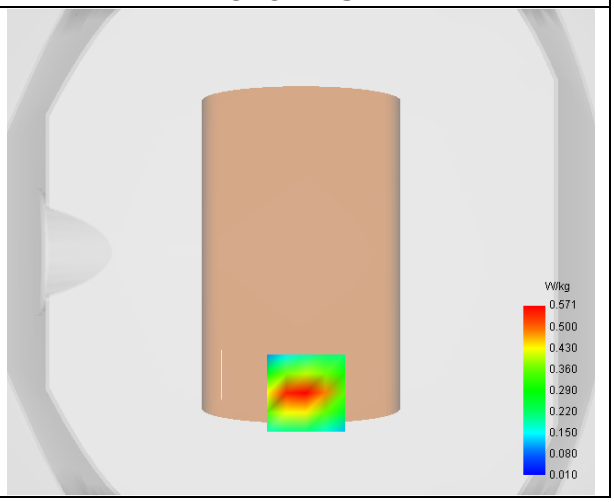
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
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. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

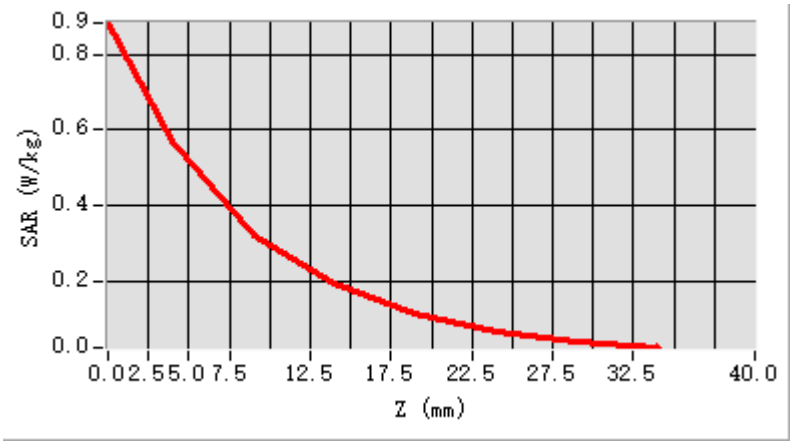
Maximum location: X=2.00, Y=-58.00 ; SAR Peak: 0.89 W/kg

D. SAR 1g & 10g

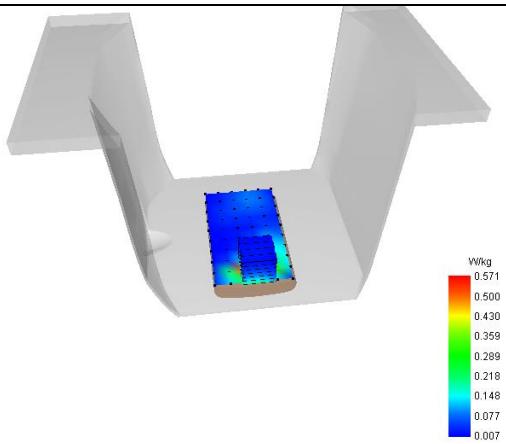
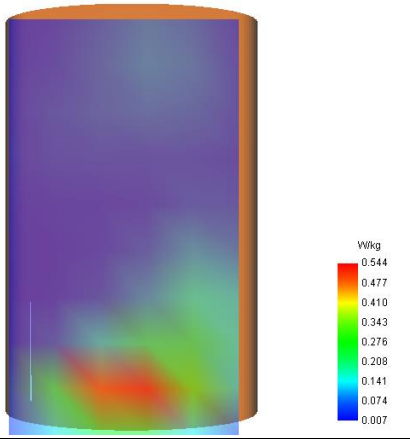
SAR 10g (W/Kg)	0.283
SAR 1g (W/Kg)	0.549
Variation (%)	2.76
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	56.60

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.884	0.571	0.323	0.190	0.111	0.065	0.039



F. 3D Image

3D screen shot	Hot spot position
	

7# SAR Measurement at Band 4 (1700) (Cheek, Left)
Date of measurement: 14/4/2025

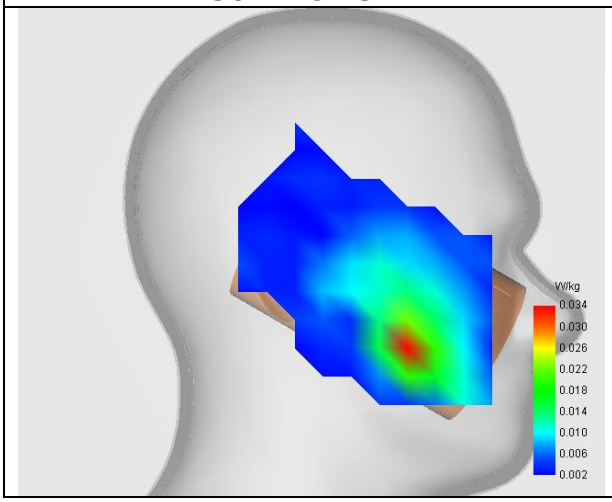
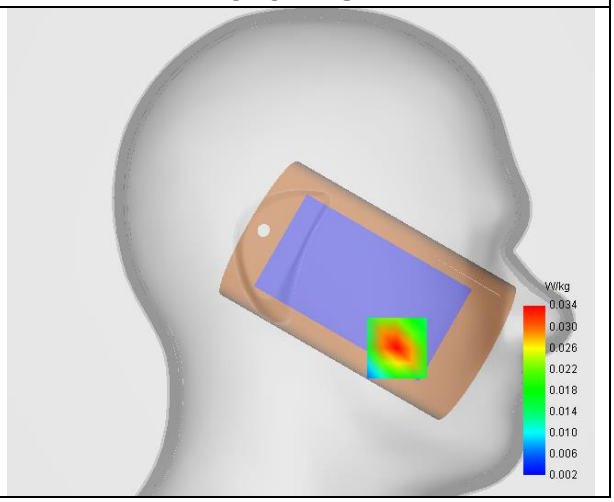
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	Band 4 (1700)
Signal	WCDMA
Channels/Frequency	Middle (1413)/ frequency 1732.60 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Middle TX Frequency (MHz)	1732.60
Relative permitivity (real part)	39.33
Relative permitivity (imaginary part)	13.71
Conductivity (S/m)	1.32

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

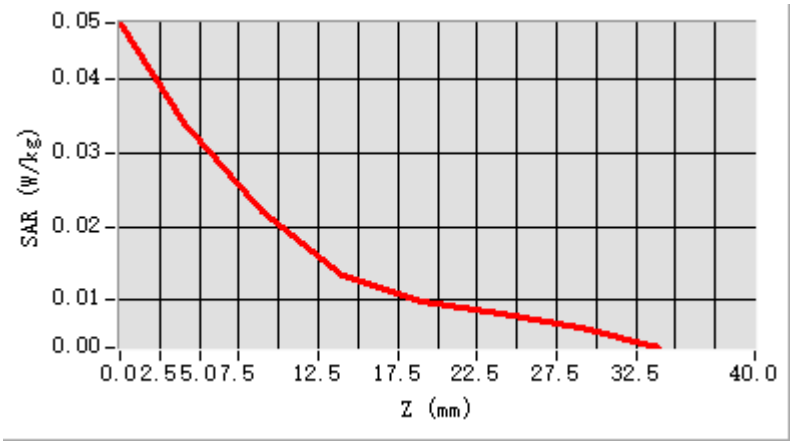
Maximum location: X=-51.00, Y=-51.00 ; SAR Peak: 0.05 W/kg

D. SAR 1g & 10g

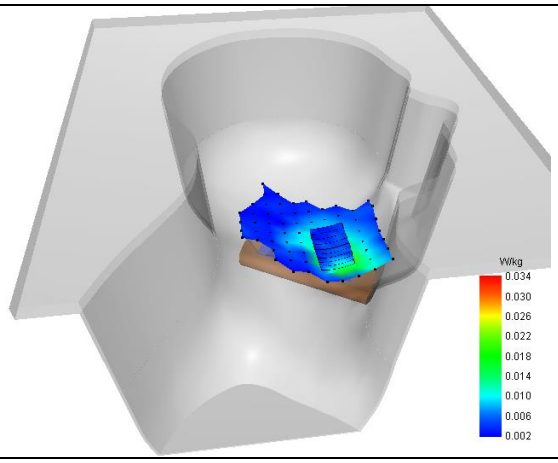
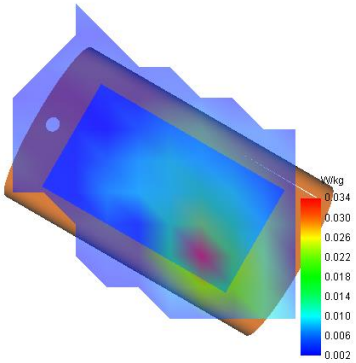
SAR 10g (W/Kg)	0.018
SAR 1g (W/Kg)	0.031
Variation (%)	4.54
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	64.39

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.048	0.034	0.022	0.013	0.010	0.008	0.006



F. 3D Image

3D screen shot	Hot spot position
	

8# SAR Measurement at Band 4 (1700) (Body, Validation Plane)
Date of measurement: 14/4/2025

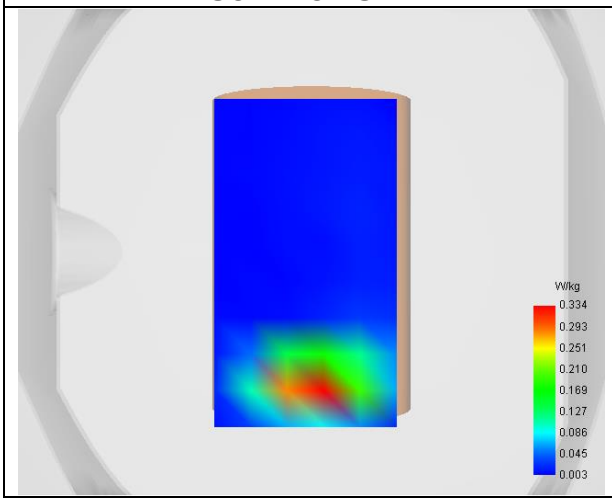
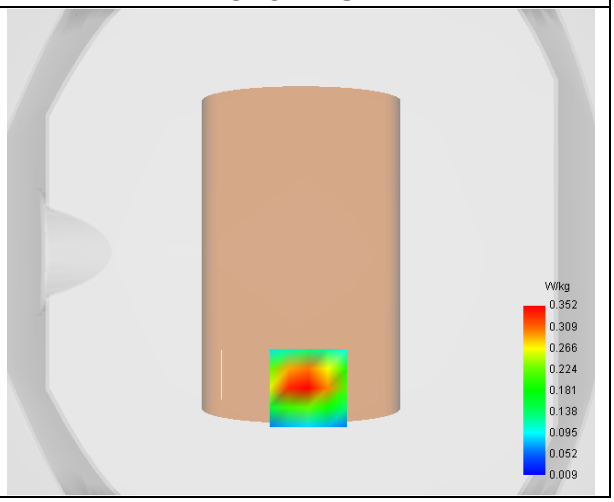
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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 4 (1700)
Signal	WCDMA
Channels/Frequency	Middle (1413)/ frequency 1732.60 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Middle TX Frequency (MHz)	1732.60
Relative permitivity (real part)	39.33
Relative permitivity (imaginary part)	13.71
Conductivity (S/m)	1.32

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

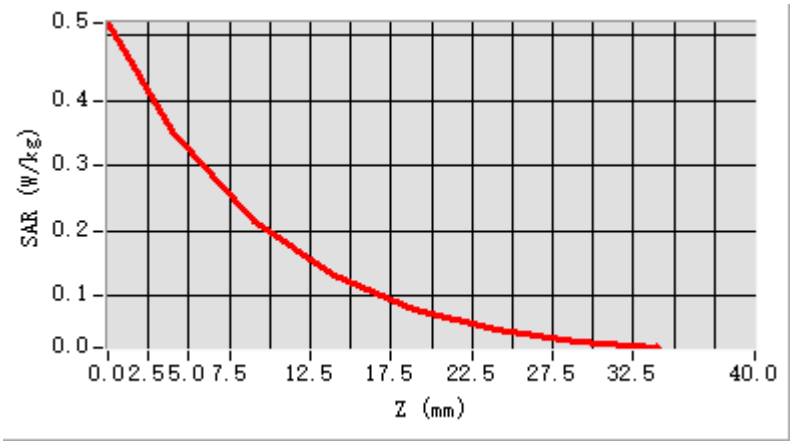
Maximum location: X=3.00, Y=-56.00 ; SAR Peak: 0.55 W/kg

D. SAR 1g & 10g

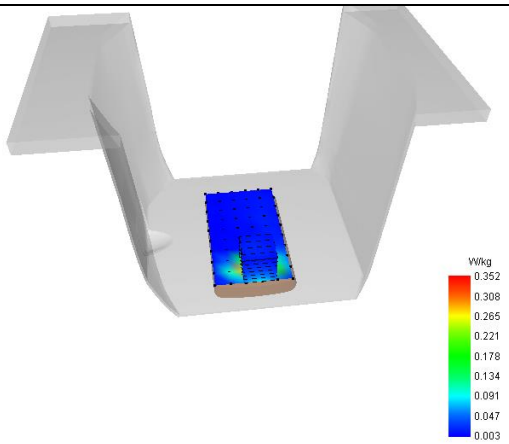
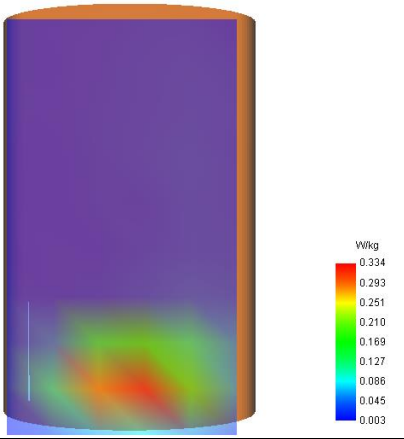
SAR 10g (W/Kg)	0.178
SAR 1g (W/Kg)	0.338
Variation (%)	0.92
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	60.59

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.518	0.352	0.213	0.130	0.080	0.047	0.030



F. 3D Image

3D screen shot	Hot spot position
	

9# SAR Measurement at Band 5 (850) (Cheek, Left)
Date of measurement: 9/4/2025

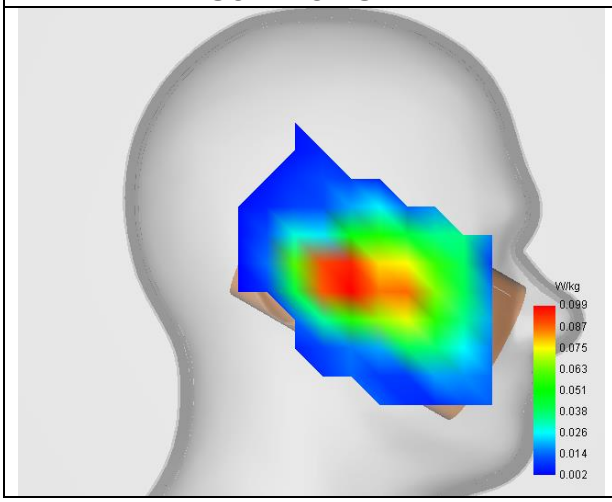
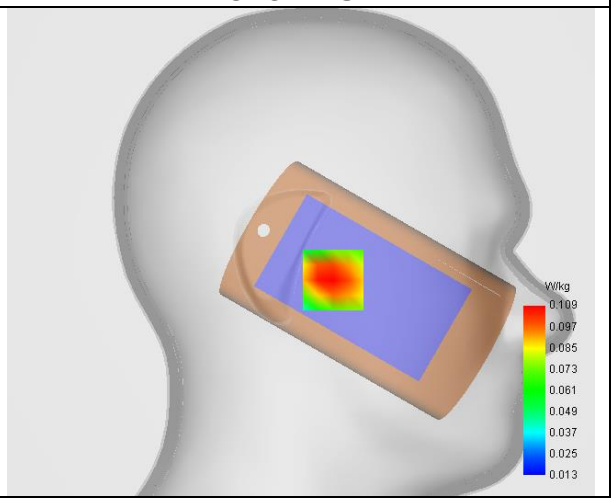
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	Band 5 (850)
Signal	WCDMA
Channels/Frequency	Middle (4182)/ frequency 836.40 Mhz
Mode	Release 99
Connection Type	RMC, 12.2 kbps

B. Permitivity

Middle TX Frequency (MHz)	836.40
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

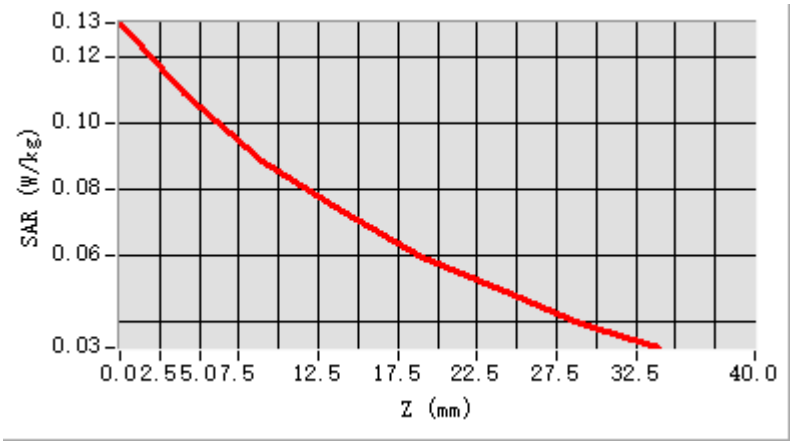
Maximum location: X=-17.00, Y=-15.00 ; SAR Peak: 0.14 W/kg

D. SAR 1g & 10g

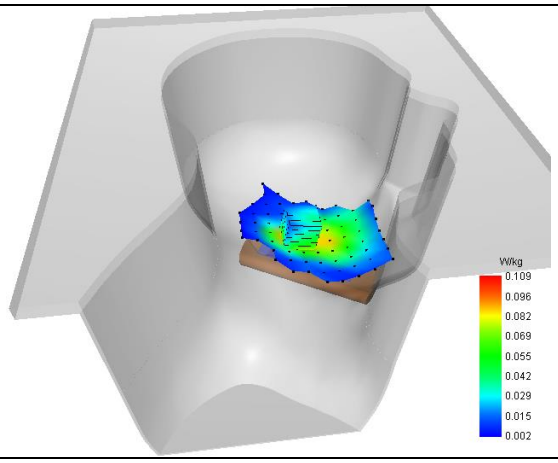
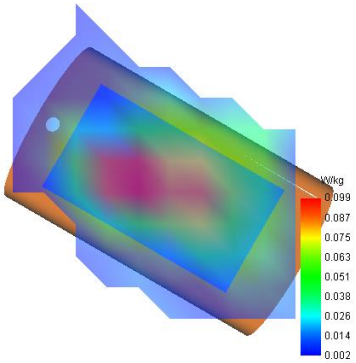
SAR 10g (W/Kg)	0.075
SAR 1g (W/Kg)	0.107
Variation (%)	-1.42
Horizontal validation criteria: minimum distance (mm)	22.63
Vertical validation criteria: SAR ratio M2/M1 (%)	81.38

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.130	0.109	0.089	0.073	0.060	0.050	0.039



F. 3D Image

3D screen shot	Hot spot position
	

10# SAR Measurement at Band 5 (850) (Body, Validation Plane)
Date of measurement: 9/4/2025

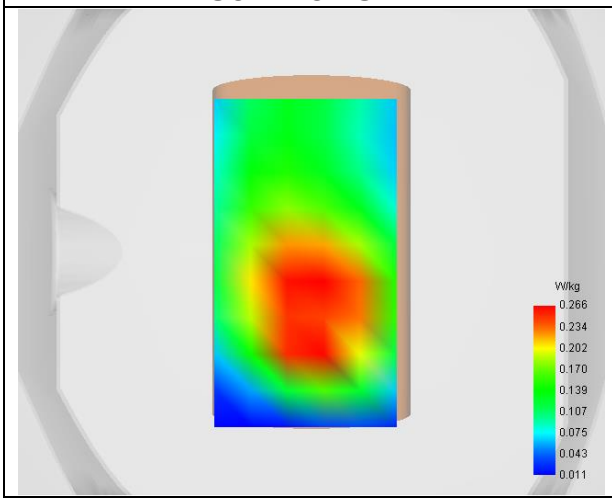
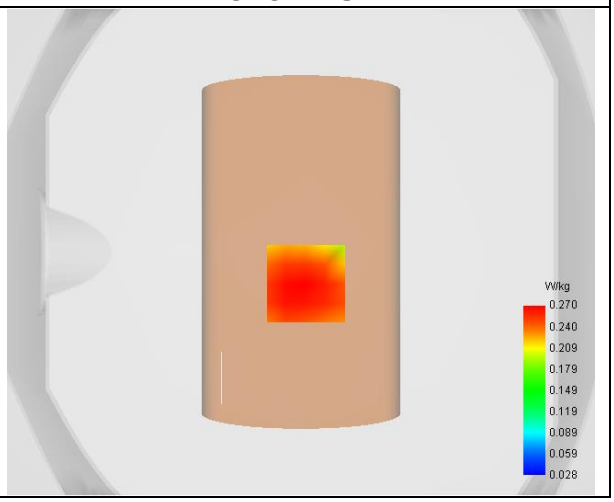
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
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. Permitivity

Middle TX Frequency (MHz)	836.40
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

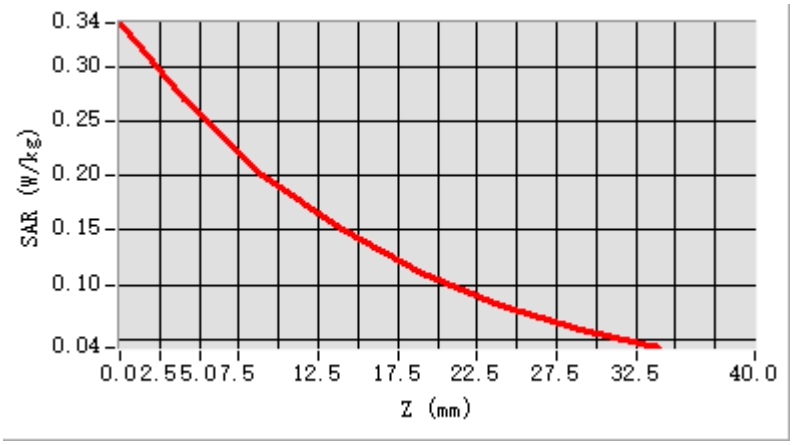
Maximum location: X=2.00, Y=-13.00 ; SAR Peak: 0.34 W/kg

D. SAR 1g & 10g

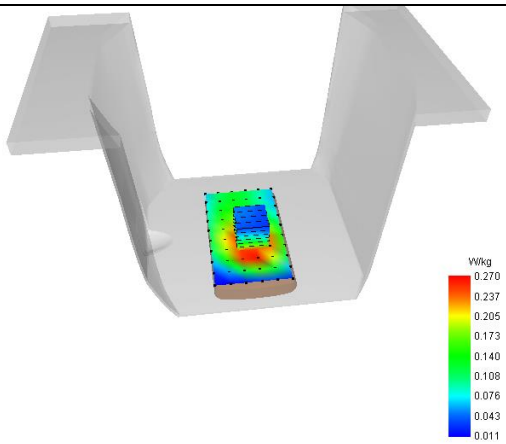
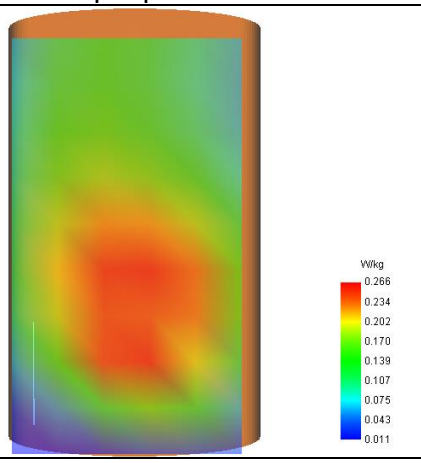
SAR 10g (W/Kg)	0.186
SAR 1g (W/Kg)	0.262
Variation (%)	-1.59
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.340	0.270	0.201	0.150	0.111	0.080	0.058



F. 3D Image

3D screen shot	Hot spot position
	

11# SAR Measurement at Bluetooth (Cheek, Left)
Date of measurement: 28/3/2025

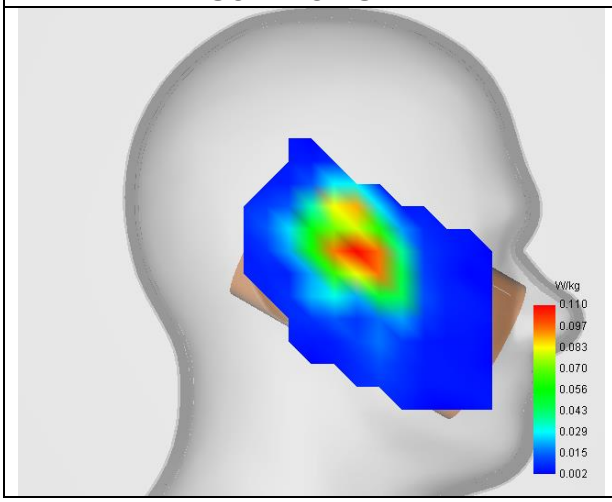
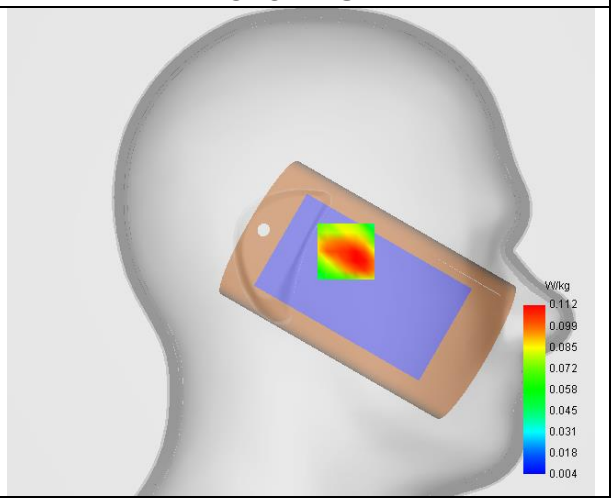
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	Bluetooth
Signal	Bluetooth
Channels/Frequency	Middle (39)/ frequency 2441.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2441.00
Relative permitivity (real part)	40.76
Relative permitivity (imaginary part)	12.90
Conductivity (S/m)	1.75

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

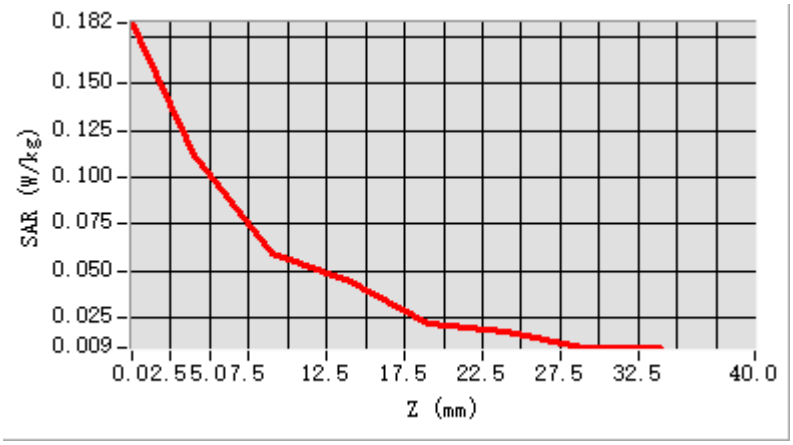
Maximum location: X=-24.00, Y=0.00 ; SAR Peak: 0.17 W/kg

D. SAR 1g & 10g

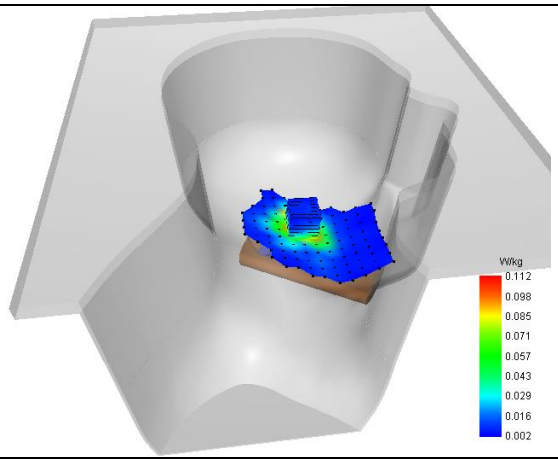
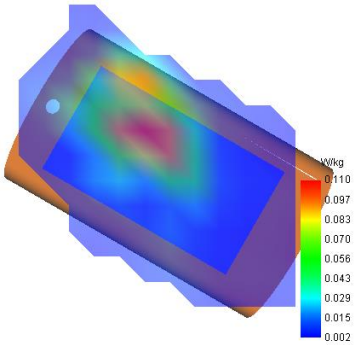
SAR 10g (W/Kg)	0.058
SAR 1g (W/Kg)	0.107
Variation (%)	2.81
Horizontal validation criteria: minimum distance (mm)	18.03
Vertical validation criteria: SAR ratio M2/M1 (%)	62.18

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.182	0.112	0.060	0.044	0.021	0.018	0.009



F. 3D Image

3D screen shot	Hot spot position
	

12# SAR Measurement at Bluetooth (Body, Validation Plane)
Date of measurement: 28/3/2025

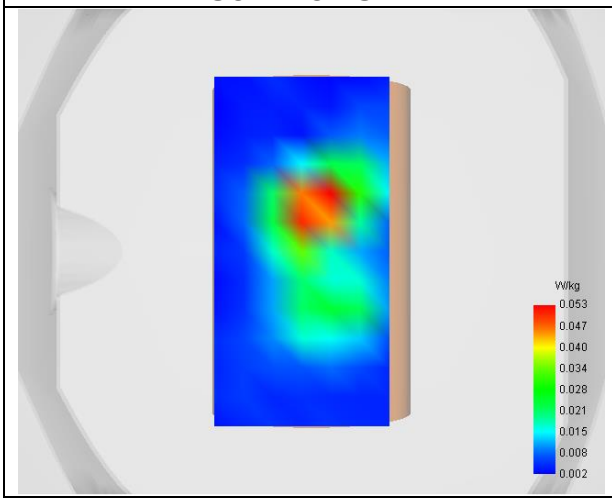
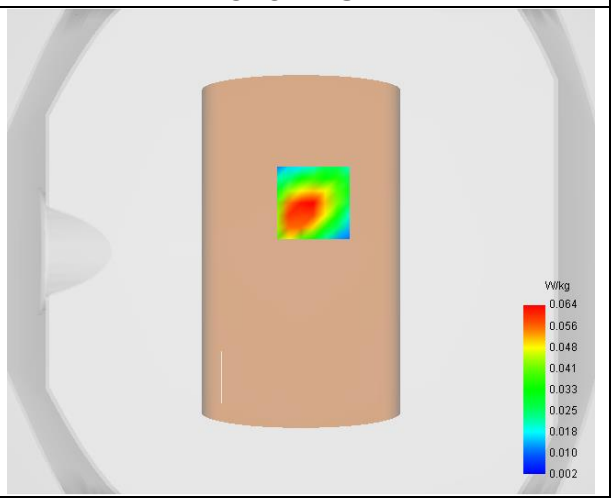
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
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	Bluetooth
Signal	Bluetooth
Channels/Frequency	Middle (39)/ frequency 2441.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2441.00
Relative permitivity (real part)	40.76
Relative permitivity (imaginary part)	12.90
Conductivity (S/m)	1.75

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

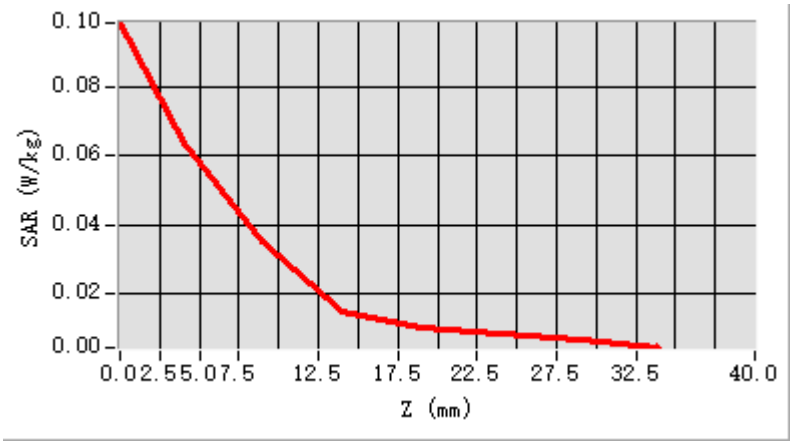
Maximum location: X=5.00, Y=20.00 ; SAR Peak: 0.10 W/kg

D. SAR 1g & 10g

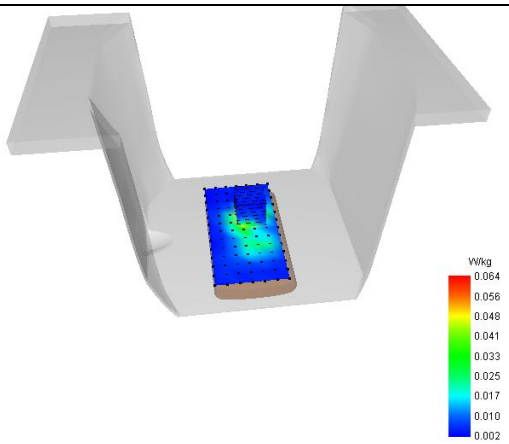
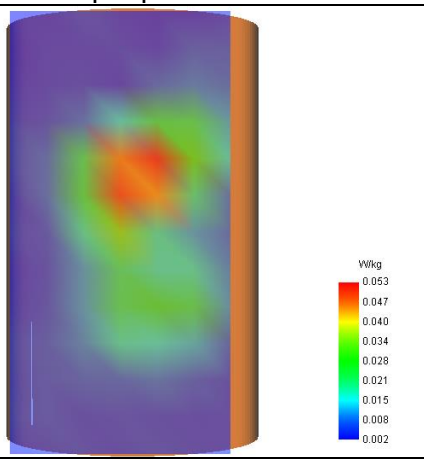
SAR 10g (W/Kg)	0.028
SAR 1g (W/Kg)	0.057
Variation (%)	1.65
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	55.31

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.098	0.064	0.035	0.015	0.010	0.008	0.007



F. 3D Image

3D screen shot	Hot spot position
	

13# SAR Measurement at U-NII-1 (Cheek, Left)
Date of measurement: 30/3/2025

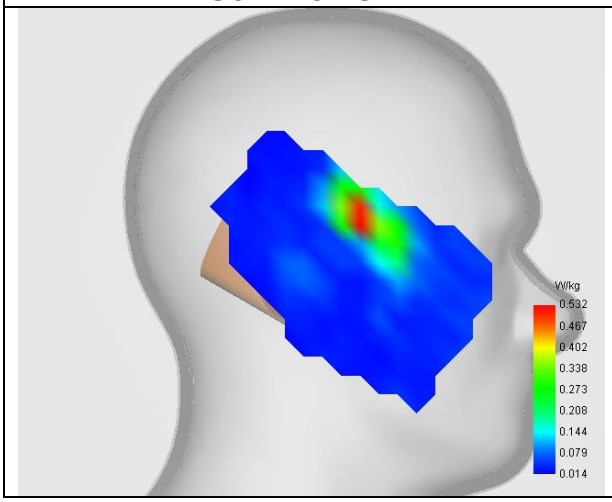
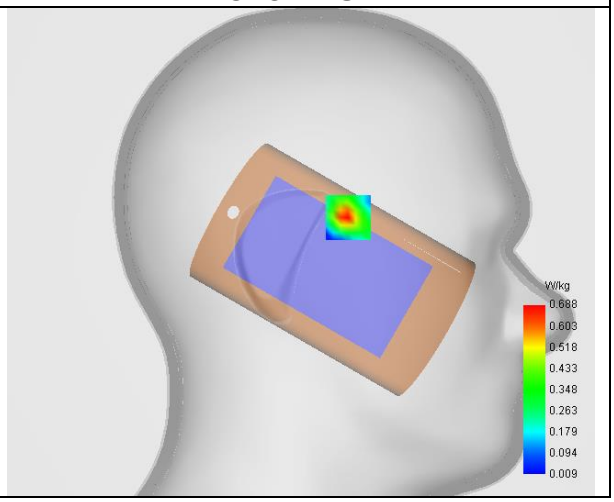
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-1
Signal	IEEE 802.11 a
Channels/Frequency	Middle (40)/ frequency 5200.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5200.00
Relative permitivity (real part)	36.19
Relative permitivity (imaginary part)	16.66
Conductivity (S/m)	4.81

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

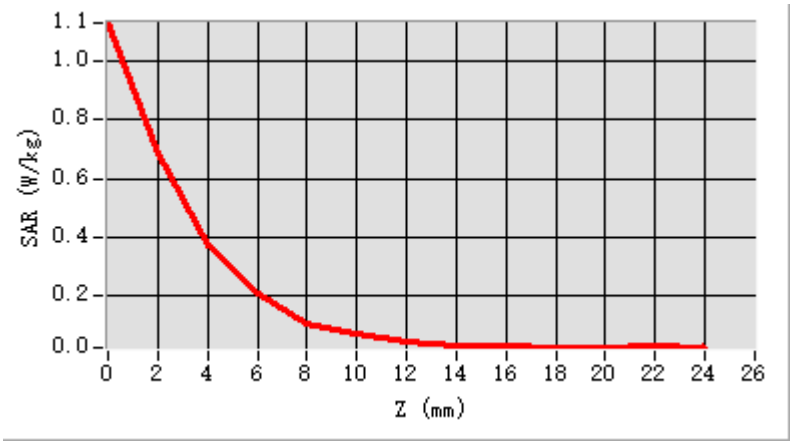
Maximum location: X=-25.00, Y=18.00 ; SAR Peak: 1.73 W/kg

D. SAR 1g & 10g

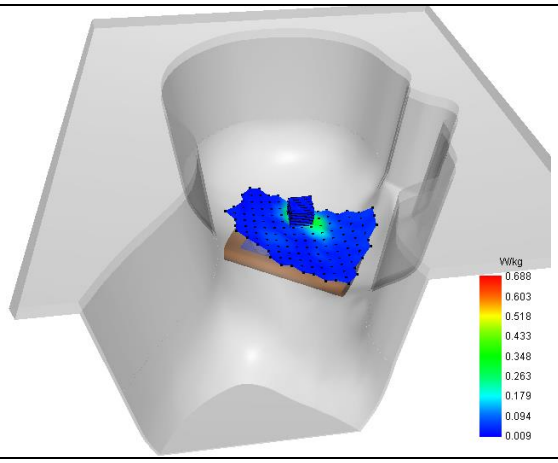
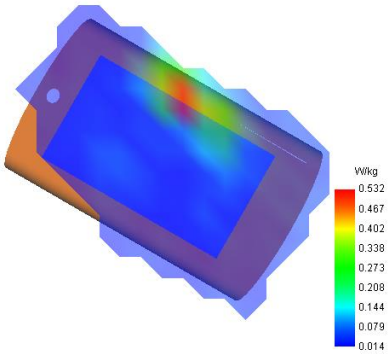
SAR 10g (W/Kg)	0.205
SAR 1g (W/Kg)	0.626
Variation (%)	-1.70
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	54.10

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.131	0.688	0.372	0.205	0.106	0.071	0.041	0.030	0.030	0.023	0.023	0.030



F. 3D Image

3D screen shot	Hot spot position
	

14# SAR Measurement at U-NII-1 (Body, Validation Plane)
Date of measurement: 30/3/2025

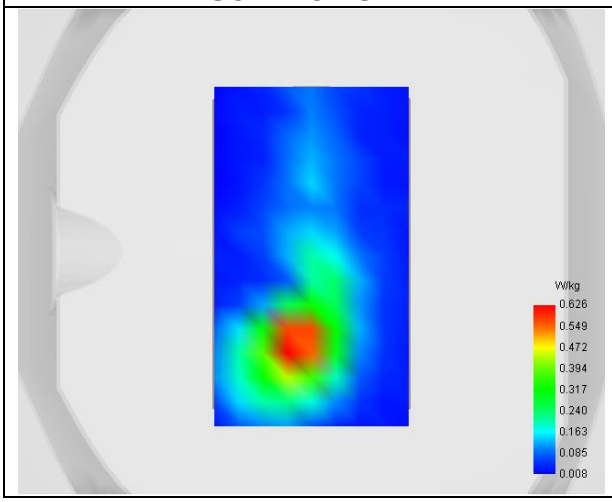
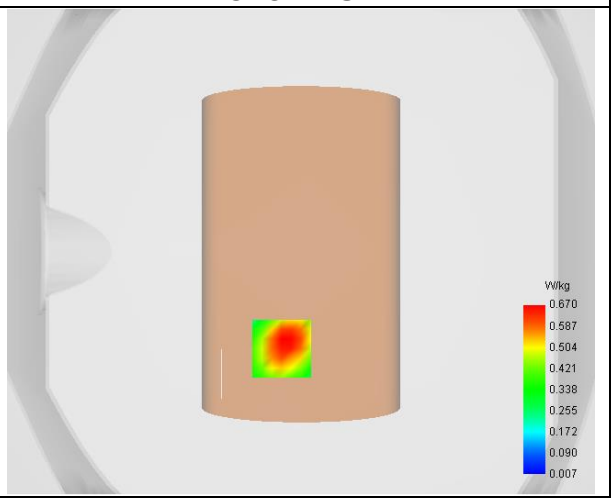
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.89
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 a
Channels/Frequency	Middle (40)/ frequency 5200.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5200.00
Relative permitivity (real part)	36.19
Relative permitivity (imaginary part)	16.66
Conductivity (S/m)	4.81

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

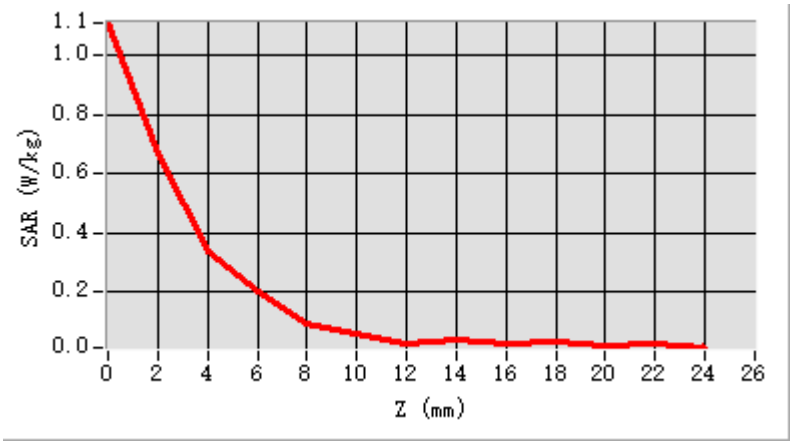
Maximum location: X=-8.00, Y=-40.00 ; SAR Peak: 1.09 W/kg

D. SAR 1g & 10g

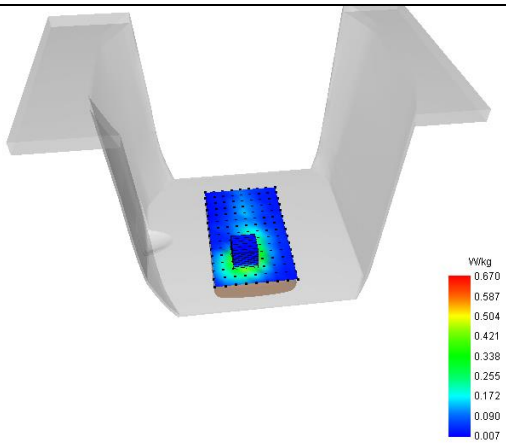
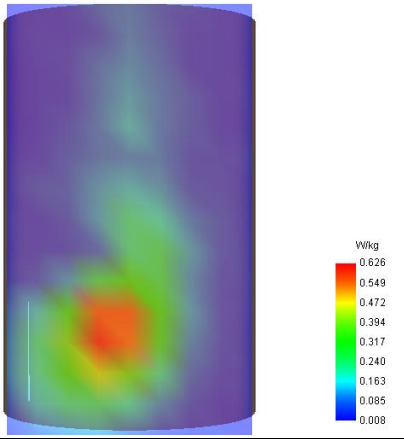
SAR 10g (W/Kg)	0.148
SAR 1g (W/Kg)	0.395
Variation (%)	1.58
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	56.99

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.112	0.670	0.337	0.199	0.093	0.055	0.023	0.036	0.025	0.027	0.015	0.025



F. 3D Image

3D screen shot	Hot spot position
	

15# SAR Measurement at U-NII-3 (Cheek, Left)
Date of measurement: 2/4/2025

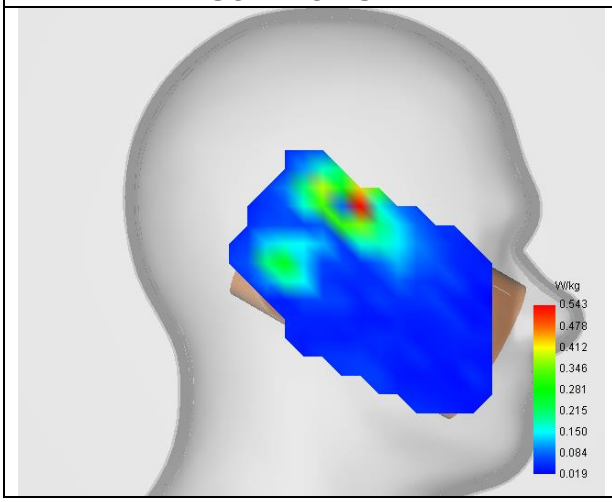
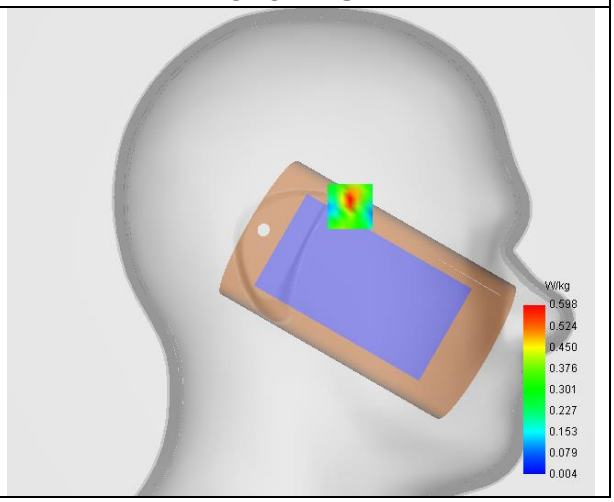
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.90
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-3
Signal	IEEE 802.11 a
Channels/Frequency	Middle (157)/ frequency 5785.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5785.00
Relative permitivity (real part)	35.46
Relative permitivity (imaginary part)	15.96
Conductivity (S/m)	5.13

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

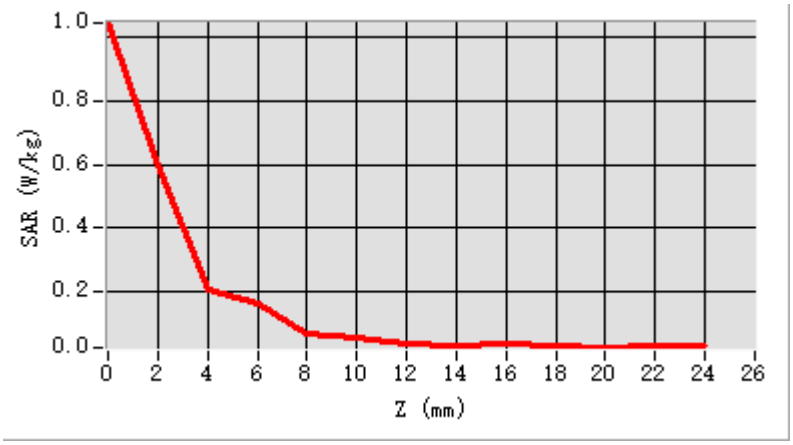
Maximum location: X=-26.00, Y=24.00 ; SAR Peak: 1.62 W/kg

D. SAR 1g & 10g

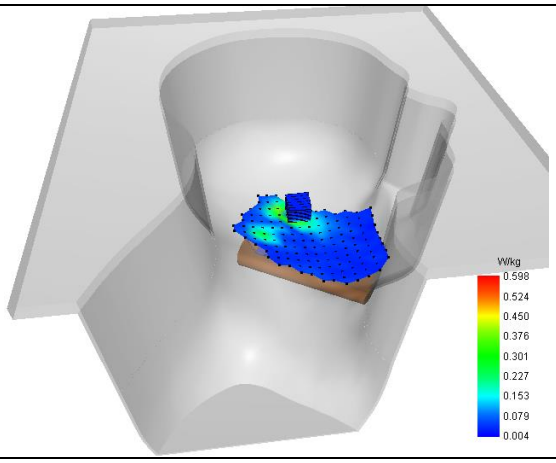
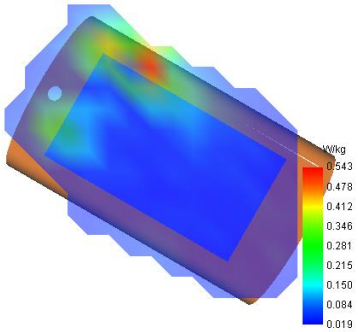
SAR 10g (W/Kg)	0.182
SAR 1g (W/Kg)	0.527
Variation (%)	0.12
Horizontal validation criteria: minimum distance (mm)	8.00
Vertical validation criteria: SAR ratio M2/M1 (%)	51.55

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.046	0.598	0.205	0.161	0.068	0.056	0.039	0.030	0.041	0.033	0.025	0.035



F. 3D Image

3D screen shot	Hot spot position
	

16# SAR Measurement at U-NII-3 (Body, Validation Plane)
Date of measurement: 2/4/2025

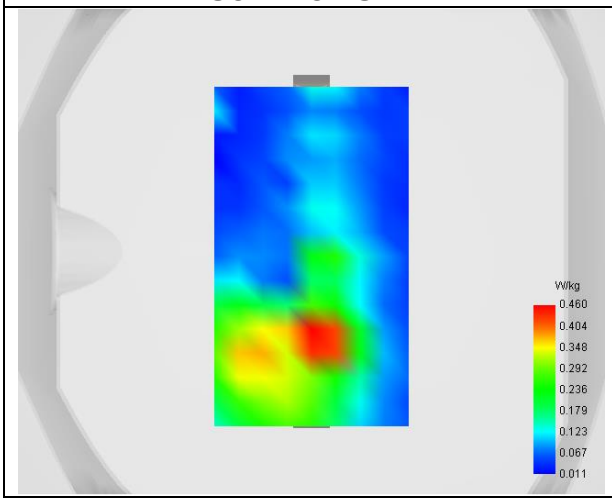
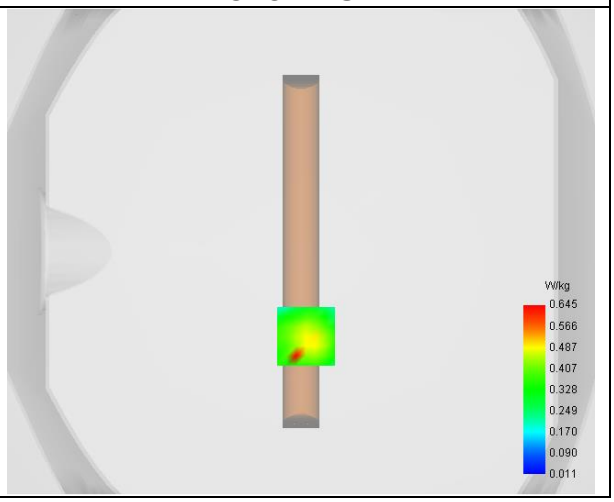
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	1.90
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-3
Signal	IEEE 802.11 a
Channels/Frequency	Middle (157)/ frequency 5785.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5785.00
Relative permitivity (real part)	35.46
Relative permitivity (imaginary part)	15.96
Conductivity (S/m)	5.13

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

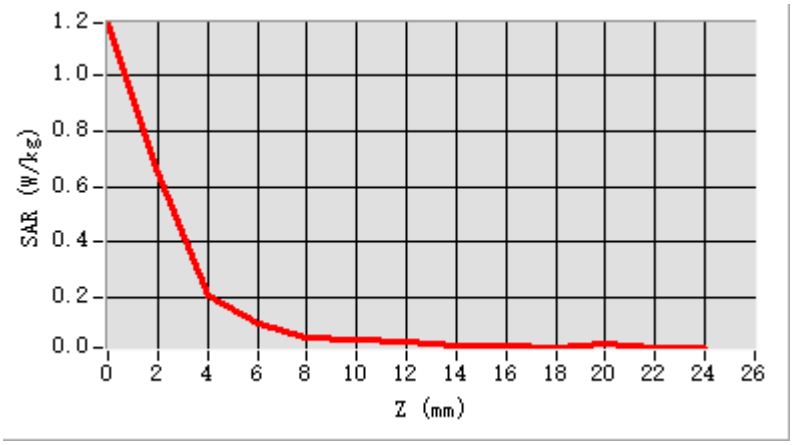
Maximum location: X=2.00, Y=-35.00 ; SAR Peak: 1.53 W/kg

D. SAR 1g & 10g

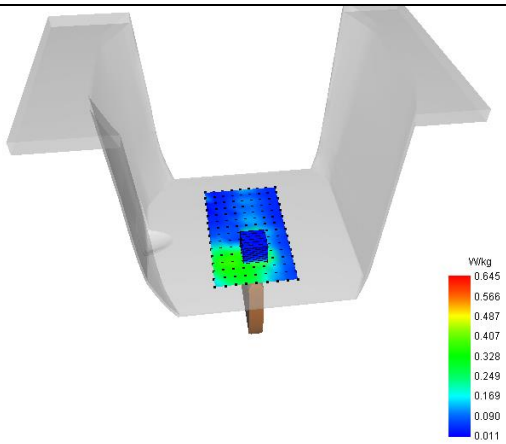
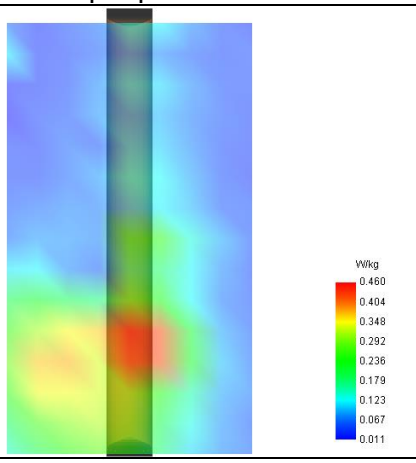
SAR 10g (W/Kg)	0.103
SAR 1g (W/Kg)	0.307
Variation (%)	2.78
Horizontal validation criteria: minimum distance (mm)	12.65
Vertical validation criteria: SAR ratio M2/M1 (%)	40.41

E. Z Axis Scan

Z (mm)	0.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
SAR (W/Kg)	1.185	0.645	0.212	0.111	0.061	0.051	0.044	0.033	0.029	0.025	0.038	0.026



F. 3D Image

3D screen shot	Hot spot position
	

17# SAR Measurement at ISM (Cheek, Left)
Date of measurement: 28/3/2025

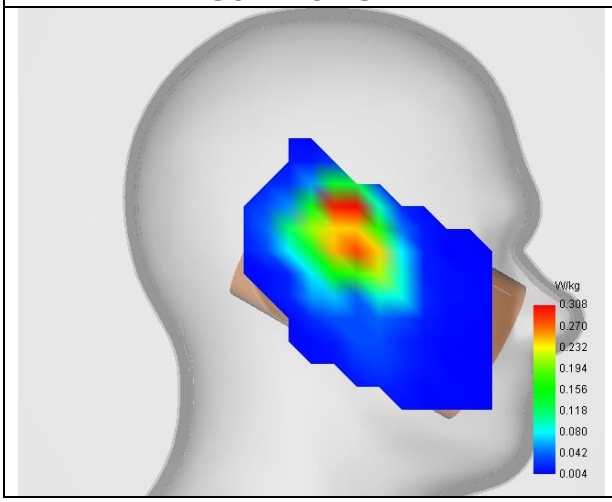
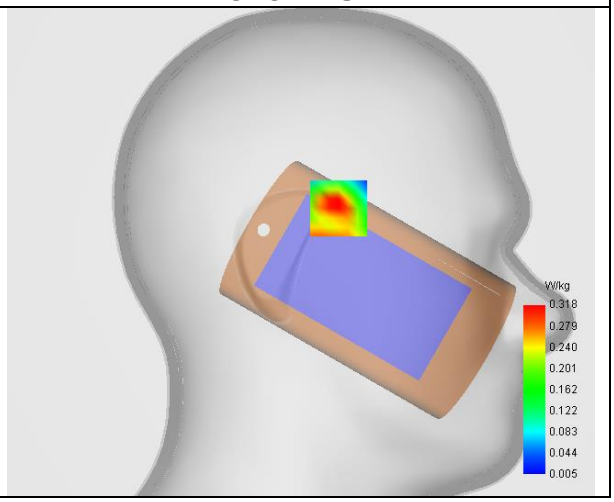
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	ISM
Signal	IEEE 802.11 b
Channels/Frequency	Middle (6)/ frequency 2437.00 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2437.00
Relative permitivity (real part)	40.79
Relative permitivity (imaginary part)	12.89
Conductivity (S/m)	1.74

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

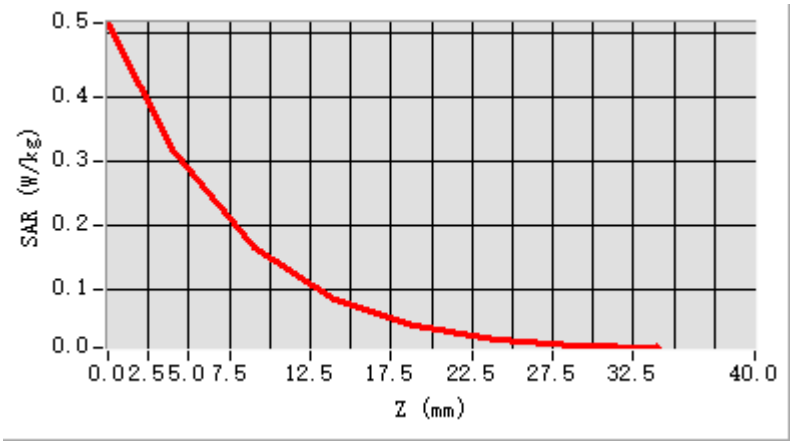
Maximum location: X=-20.00, Y=23.00 ; SAR Peak: 0.54 W/kg

D. SAR 1g & 10g

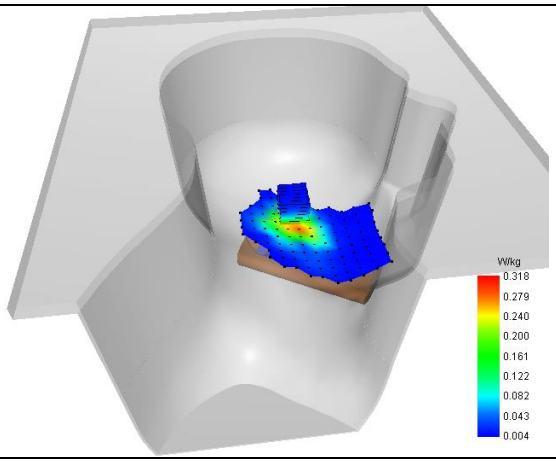
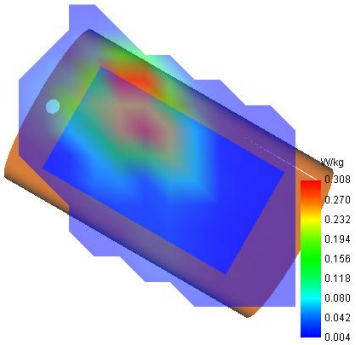
SAR 10g (W/Kg)	0.136
SAR 1g (W/Kg)	0.300
Variation (%)	-1.98
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	52.58

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.516	0.318	0.165	0.083	0.042	0.019	0.011



F. 3D Image

3D screen shot	Hot spot position
	

18# SAR Measurement at ISM (Body, Validation Plane)
Date of measurement: 28/3/2025

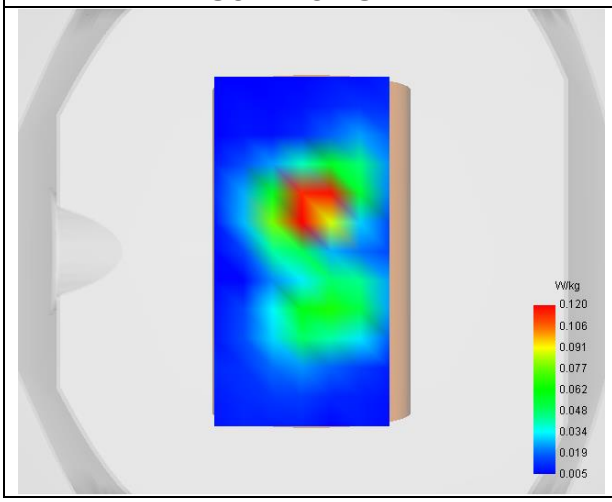
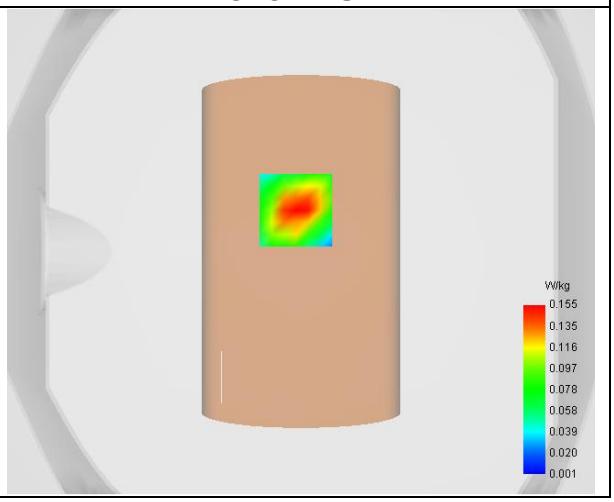
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.74
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. Permitivity

Middle TX Frequency (MHz)	2437.00
Relative permitivity (real part)	40.79
Relative permitivity (imaginary part)	12.89
Conductivity (S/m)	1.74

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

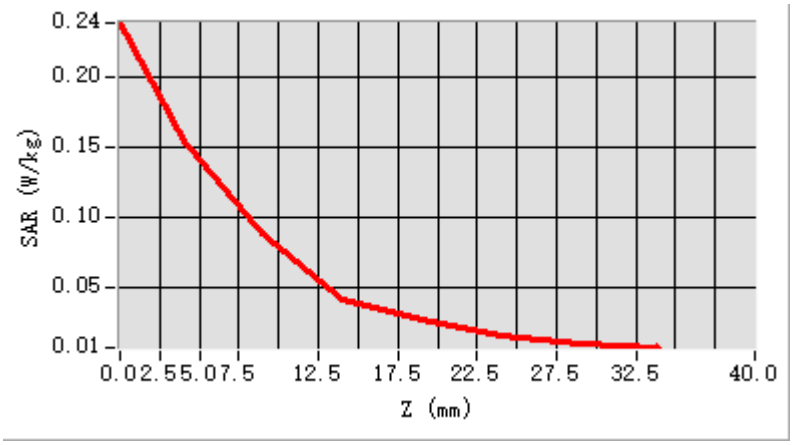
Maximum location: X=-2.00, Y=17.00 ; SAR Peak: 0.24 W/kg

D. SAR 1g & 10g

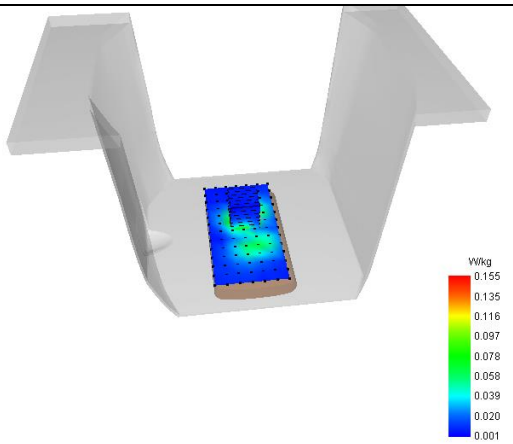
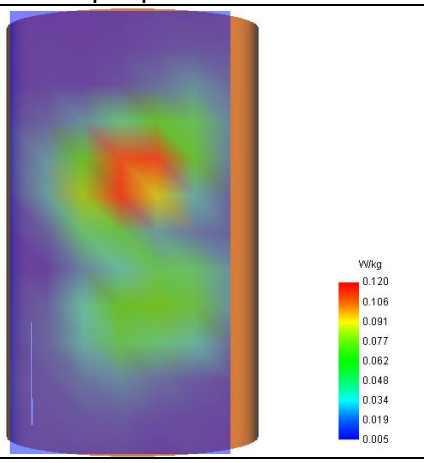
SAR 10g (W/Kg)	0.072
SAR 1g (W/Kg)	0.140
Variation (%)	-3.52
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	57.12

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.239	0.155	0.088	0.042	0.028	0.016	0.011



F. 3D Image

3D screen shot	Hot spot position
	

19# SAR Measurement at LTE band 2 (Cheek, Left)
Date of measurement: 18/4/2025

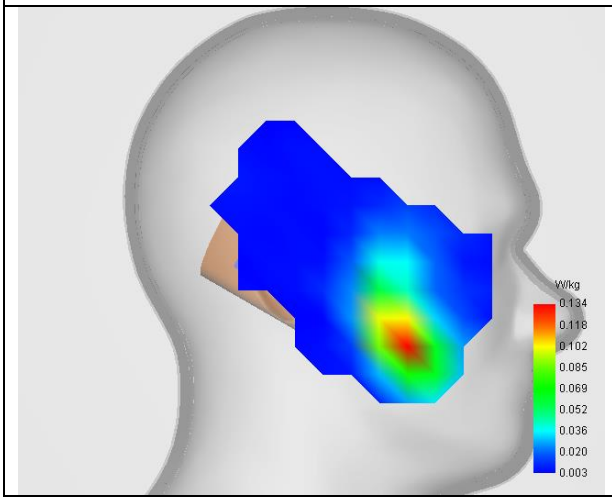
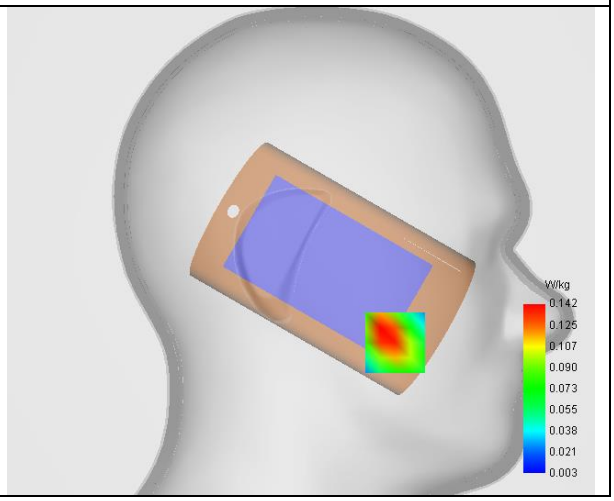
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 2
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (18900)/ frequency 1880.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1880.00

B. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

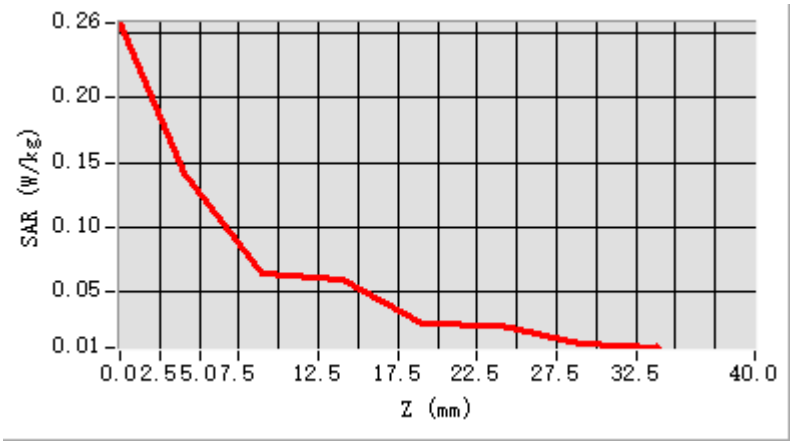
Maximum location: X=-50.00, Y=-49.00 ; SAR Peak: 0.21 W/kg

D. SAR 1g & 10g

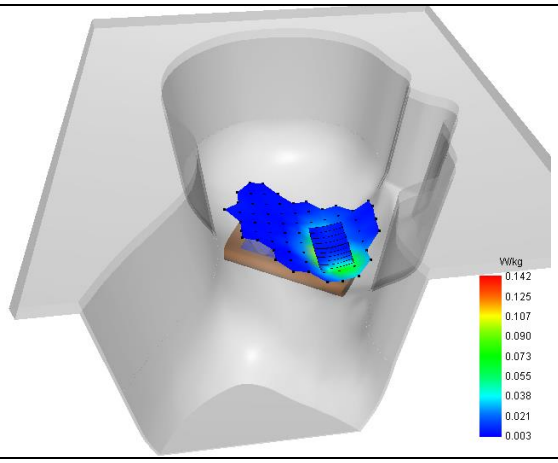
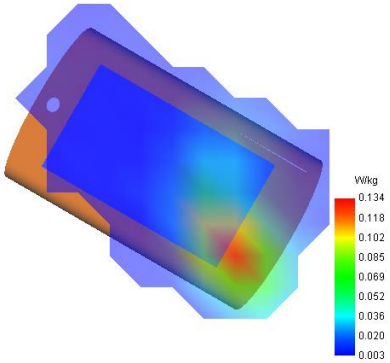
SAR 10g (W/Kg)	0.078
SAR 1g (W/Kg)	0.141
Variation (%)	4.41
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	64.10

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.258	0.142	0.063	0.059	0.025	0.024	0.010



F. 3D Image

3D screen shot	Hot spot position
	

20# SAR Measurement at LTE band 2 (Body, Validation Plane)
Date of measurement: 18/4/2025

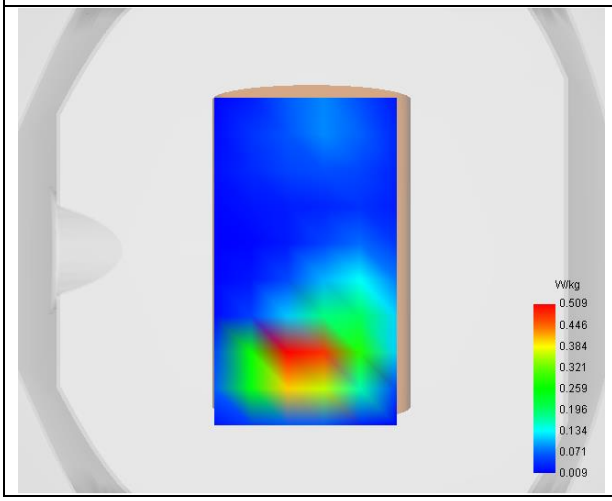
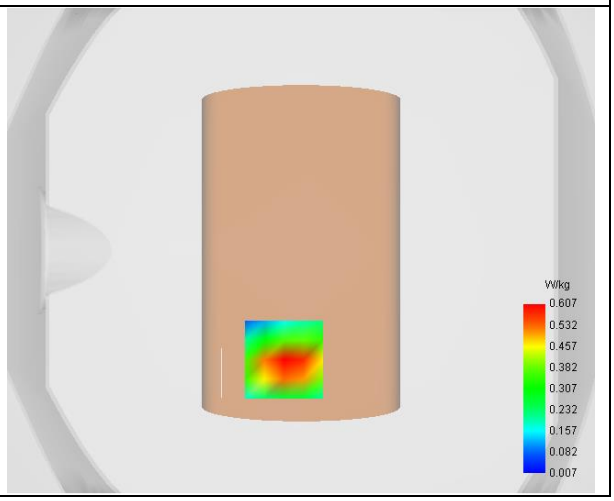
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.57
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 2
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (18900)/ frequency 1880.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	1880.00

B. Permitivity

Middle TX Frequency (MHz)	1880.00
Relative permitivity (real part)	38.76
Relative permitivity (imaginary part)	13.79
Conductivity (S/m)	1.44

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

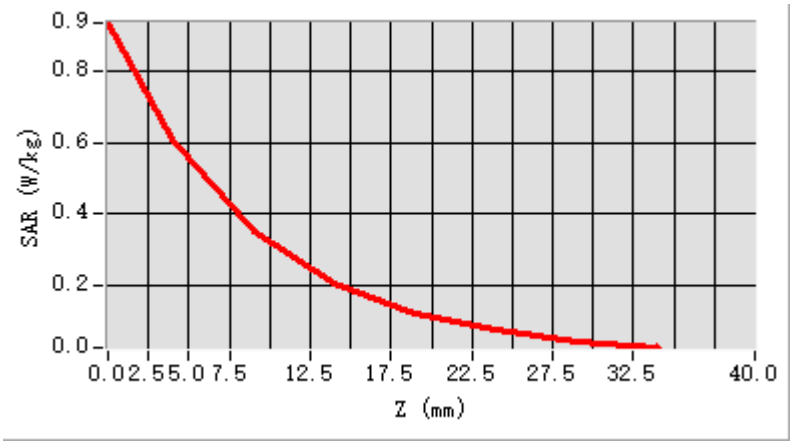
Maximum location: X=-7.00, Y=-45.00 ; SAR Peak: 0.96 W/kg

D. SAR 1g & 10g

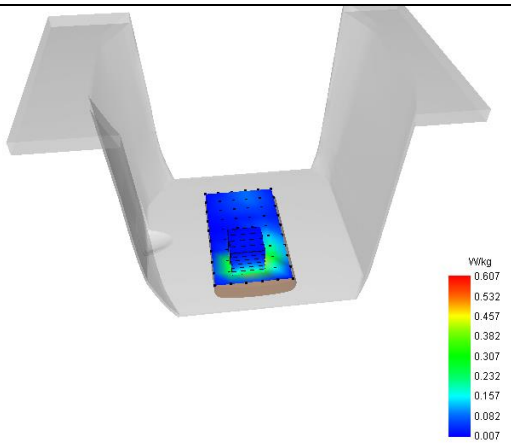
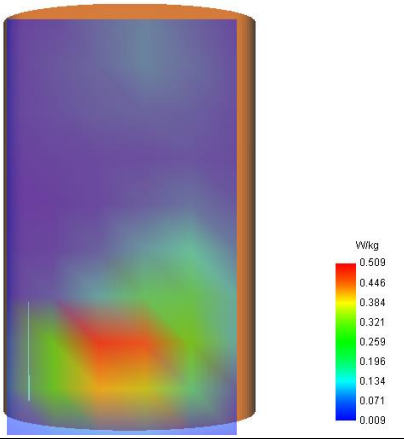
SAR 10g (W/Kg)	0.310
SAR 1g (W/Kg)	0.597
Variation (%)	4.93
Horizontal validation criteria: minimum distance (mm)	11.31
Vertical validation criteria: SAR ratio M2/M1 (%)	57.43

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.936	0.607	0.349	0.204	0.119	0.073	0.039



F. 3D Image

3D screen shot	Hot spot position
	

21# SAR Measurement at LTE band 4 (Cheek, Left)
Date of measurement: 14/4/2025

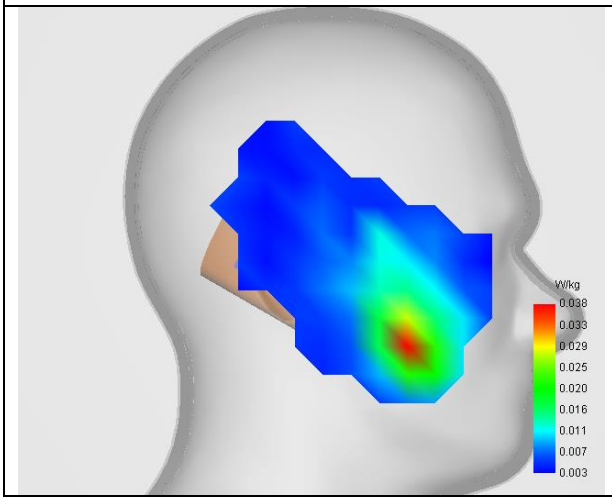
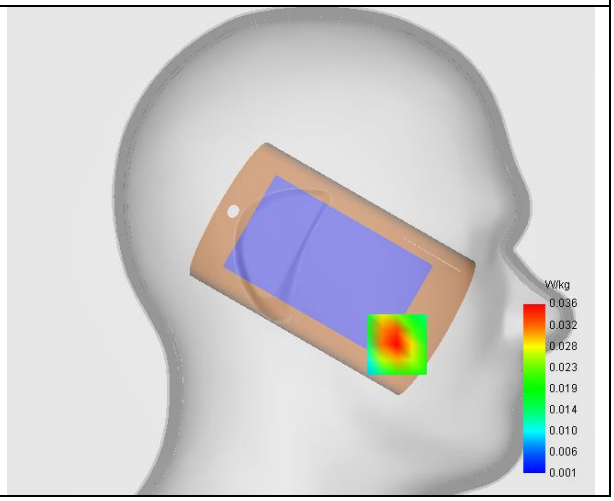
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
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. Permitivity

Middle TX Frequency (MHz)	1732.50
Relative permitivity (real part)	39.33
Relative permitivity (imaginary part)	13.71
Conductivity (S/m)	1.32

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

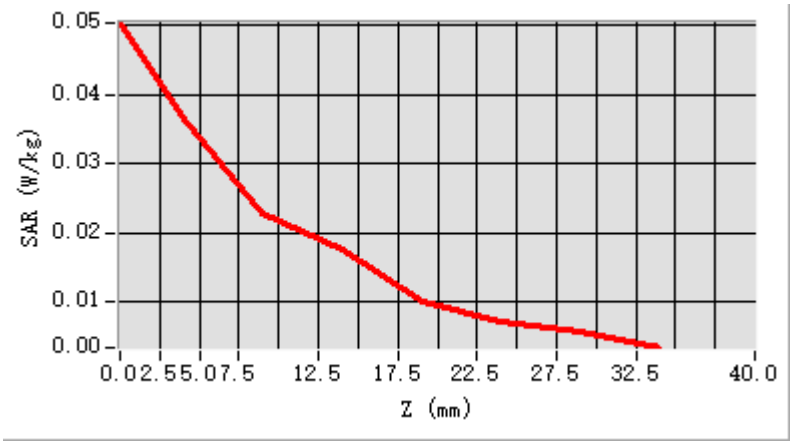
Maximum location: X=-51.00, Y=-50.00 ; SAR Peak: 0.06 W/kg

D. SAR 1g & 10g

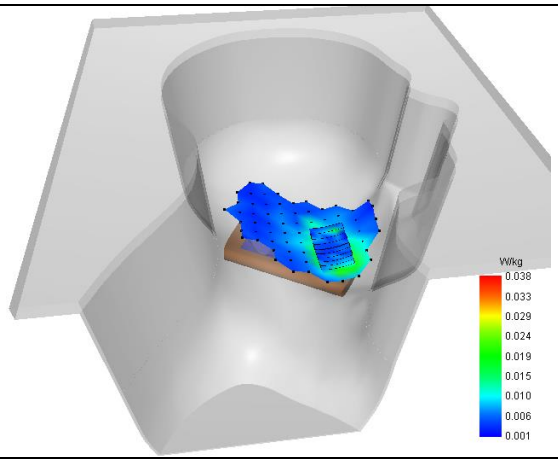
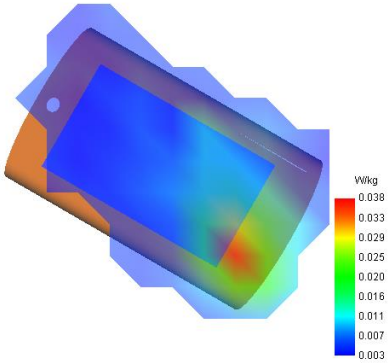
SAR 10g (W/Kg)	0.019
SAR 1g (W/Kg)	0.035
Variation (%)	0.26
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	66.55

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.050	0.036	0.023	0.017	0.010	0.007	0.006



F. 3D Image

3D screen shot	Hot spot position
	

22# SAR Measurement at LTE band 4 (Body, Validation Plane)
Date of measurement: 14/4/2025

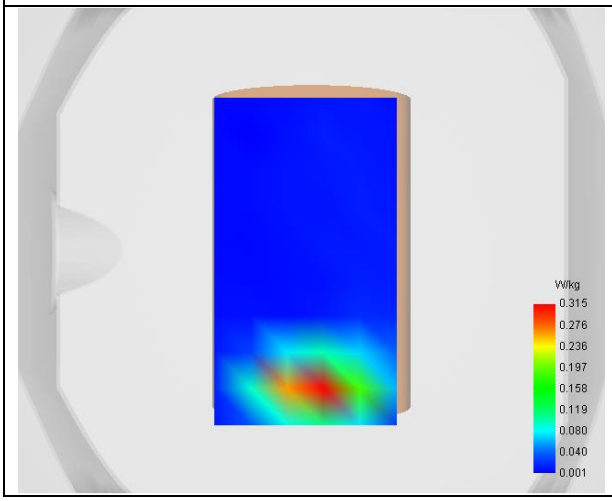
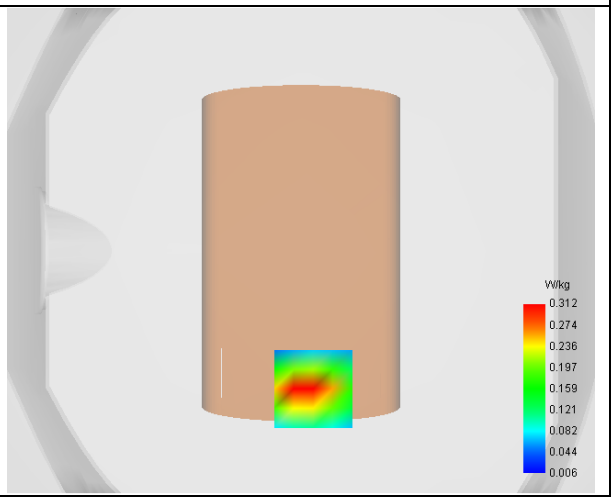
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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. Permitivity

Middle TX Frequency (MHz)	1732.50
Relative permitivity (real part)	39.33
Relative permitivity (imaginary part)	13.71
Conductivity (S/m)	1.32

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

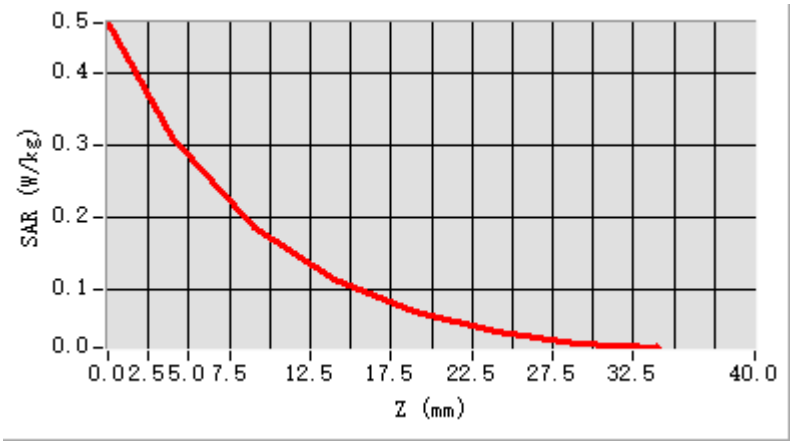
Maximum location: X=5.00, Y=-57.00 ; SAR Peak: 0.49 W/kg

D. SAR 1g & 10g

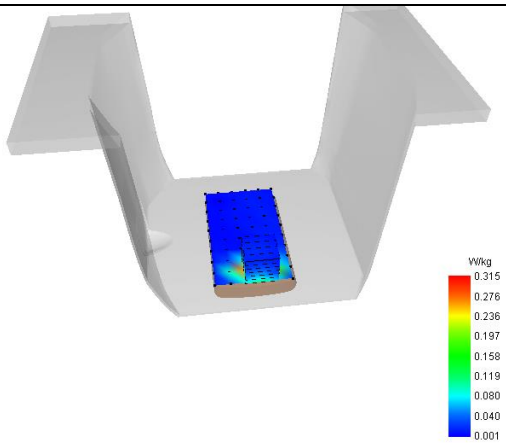
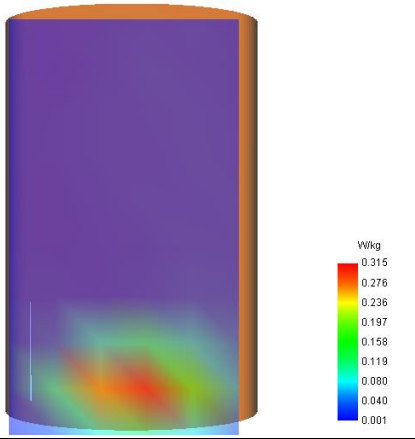
SAR 10g (W/Kg)	0.156
SAR 1g (W/Kg)	0.297
Variation (%)	3.28
Horizontal validation criteria: minimum distance (mm)	16.00
Vertical validation criteria: SAR ratio M2/M1 (%)	59.28

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.471	0.312	0.185	0.113	0.068	0.040	0.024



F. 3D Image

3D screen shot	Hot spot position
	

23# SAR Measurement at LTE band 5 (Cheek, Left)
Date of measurement: 9/4/2025

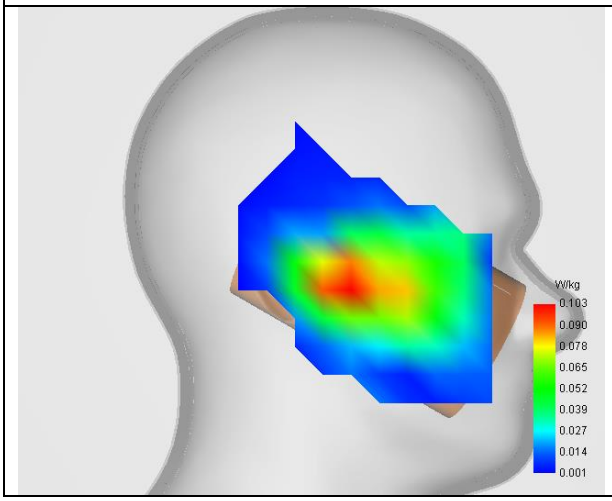
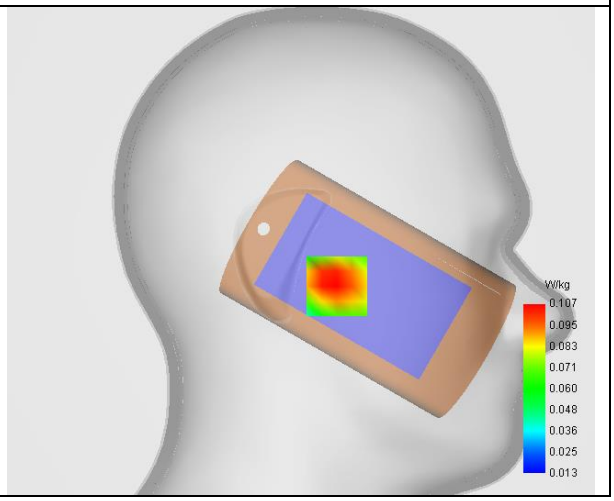
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 5
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20525)/ frequency 836.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	836.50

B. Permitivity

Middle TX Frequency (MHz)	836.50
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

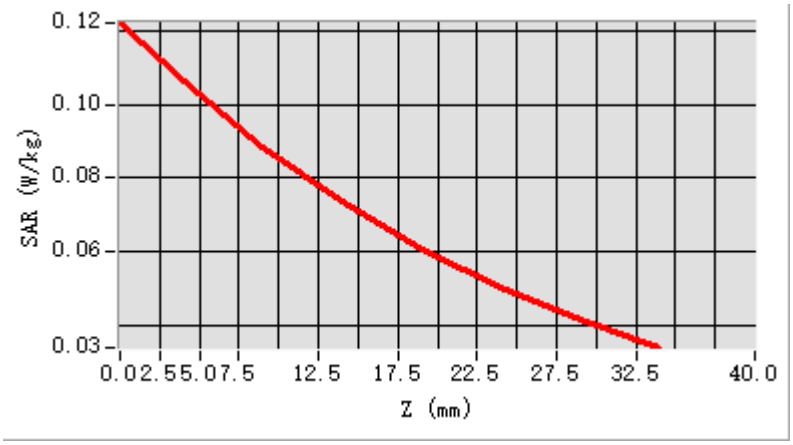
Maximum location: X=-19.00, Y=-19.00 ; SAR Peak: 0.13 W/kg

D. SAR 1g & 10g

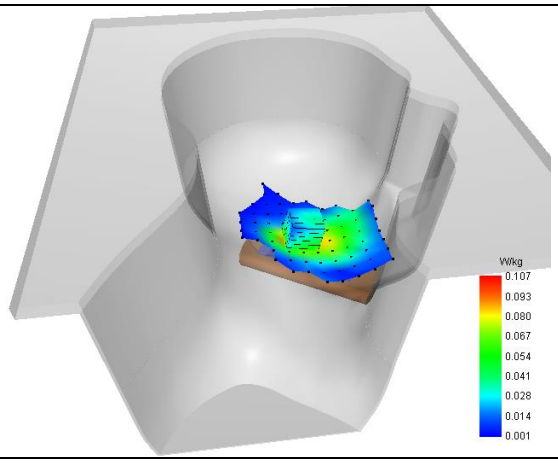
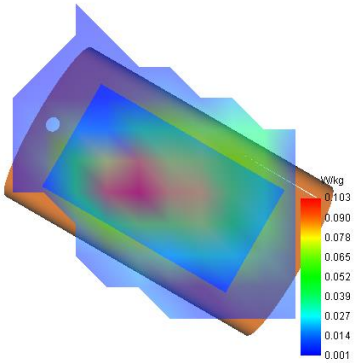
SAR 10g (W/Kg)	0.077
SAR 1g (W/Kg)	0.105
Variation (%)	0.75
Horizontal validation criteria: minimum distance (mm)	22.63
Vertical validation criteria: SAR ratio M2/M1 (%)	83.20

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.122	0.107	0.089	0.074	0.061	0.050	0.041



F. 3D Image

3D screen shot	Hot spot position
	

24# SAR Measurement at LTE band 5 (Body, Validation Plane)
Date of measurement: 9/4/2025

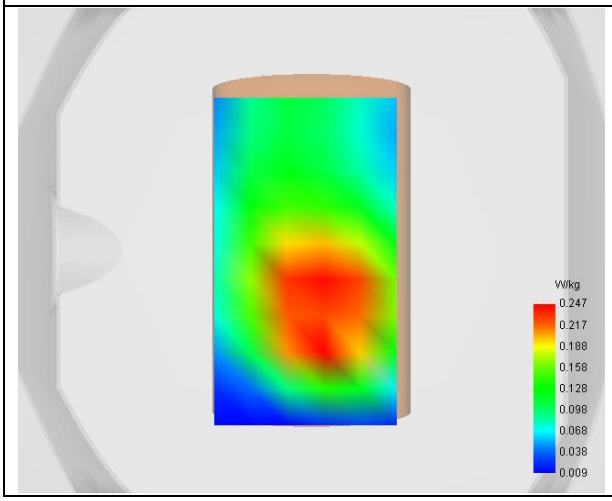
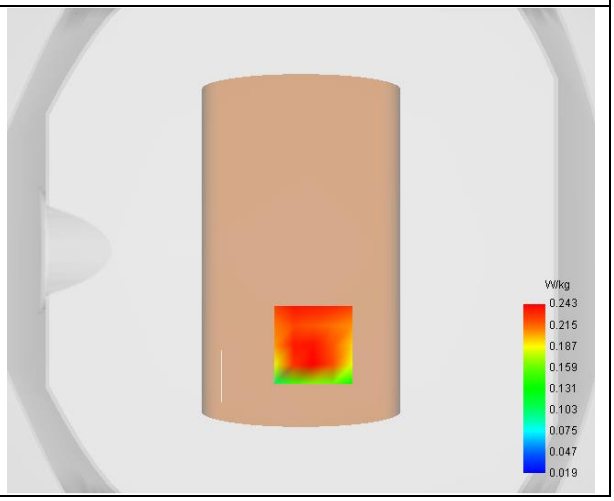
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.34
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 5
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (20525)/ frequency 836.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	836.50

B. Permitivity

Middle TX Frequency (MHz)	836.50
Relative permitivity (real part)	40.82
Relative permitivity (imaginary part)	19.06
Conductivity (S/m)	0.89

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

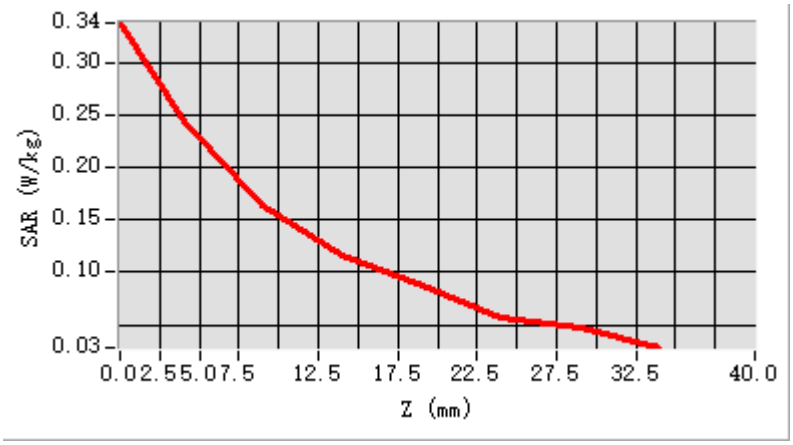
Maximum location: X=5.00, Y=-39.00 ; SAR Peak: 0.35 W/kg

D. SAR 1g & 10g

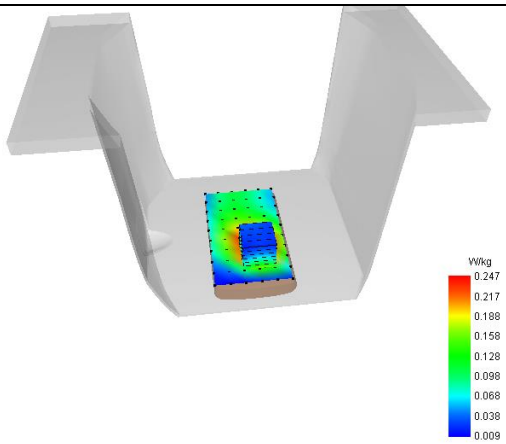
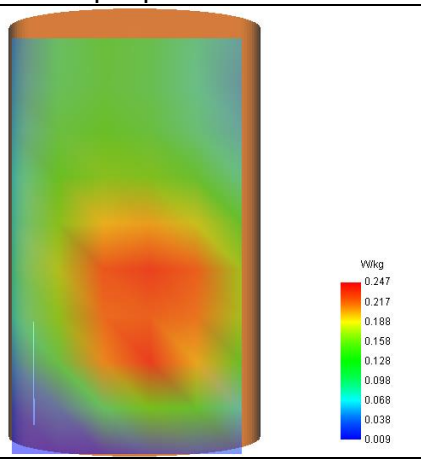
SAR 10g (W/Kg)	0.140
SAR 1g (W/Kg)	0.240
Variation (%)	0.40
Horizontal validation criteria: minimum distance (mm)	17.89
Vertical validation criteria: SAR ratio M2/M1 (%)	72.80

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.338	0.243	0.164	0.116	0.088	0.058	0.047



F. 3D Image

3D screen shot	Hot spot position
	

25# SAR Measurement at LTE band 7 (Cheek, Left)
Date of measurement: 12/4/2025

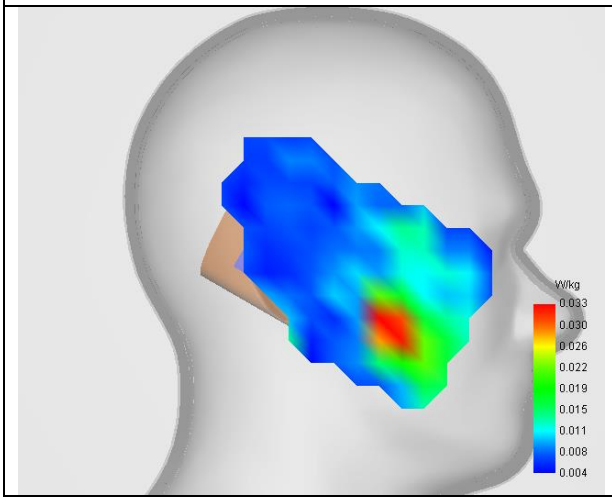
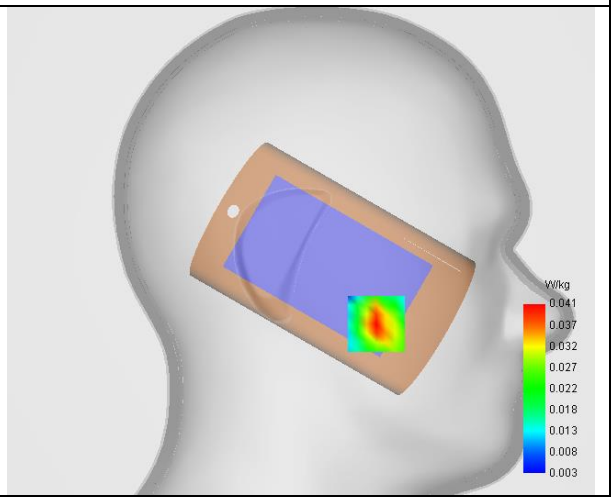
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
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. Permitivity

Middle TX Frequency (MHz)	2535.00
Relative permitivity (real part)	40.17
Relative permitivity (imaginary part)	13.35
Conductivity (S/m)	1.88

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

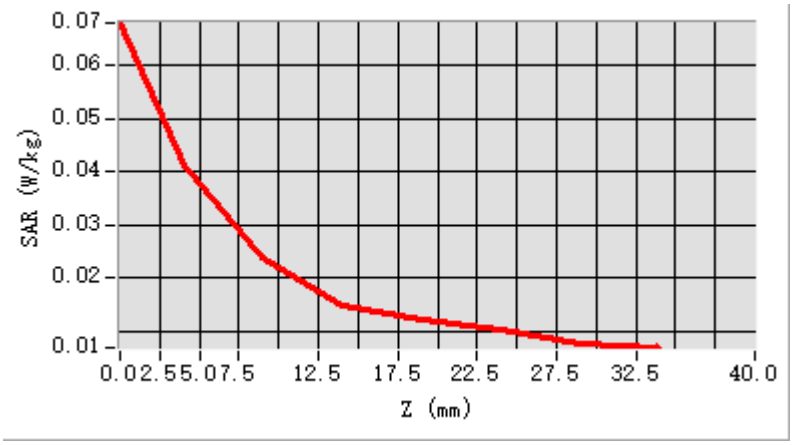
Maximum location: X=-40.00, Y=-39.00 ; SAR Peak: 0.07 W/kg

D. SAR 1g & 10g

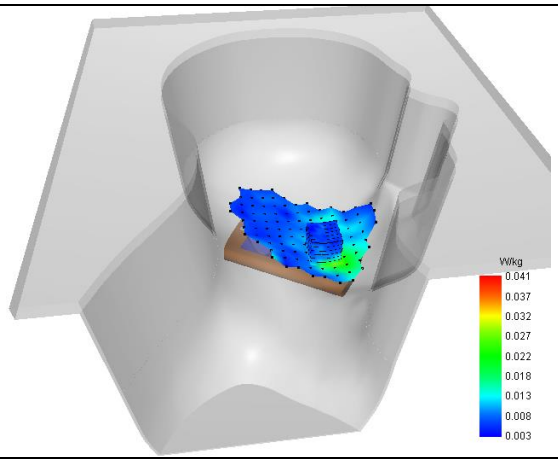
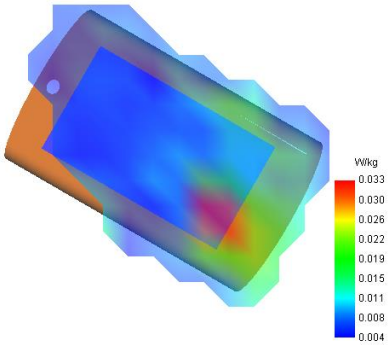
SAR 10g (W/Kg)	0.020
SAR 1g (W/Kg)	0.037
Variation (%)	1.19
Horizontal validation criteria: minimum distance (mm)	11.18
Vertical validation criteria: SAR ratio M2/M1 (%)	59.29

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.068	0.041	0.024	0.015	0.012	0.010	0.008



F. 3D Image

3D screen shot	Hot spot position
	

26# SAR Measurement at LTE band 7 (Body, Validation Plane)
Date of measurement: 12/4/2025

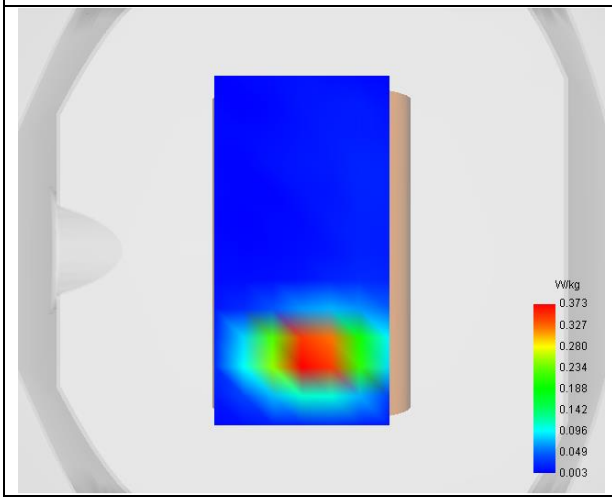
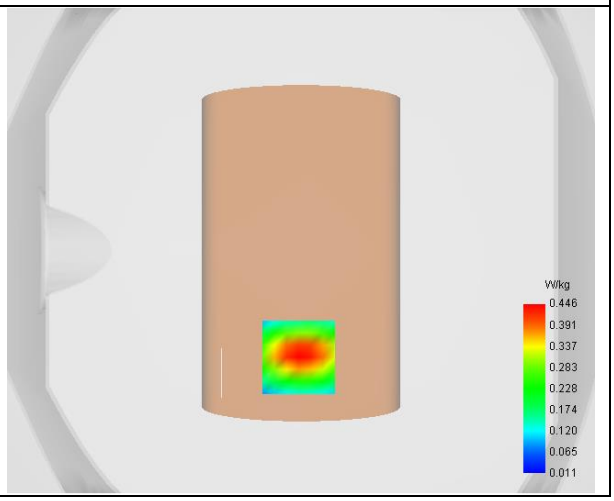
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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. Permitivity

Middle TX Frequency (MHz)	2535.00
Relative permitivity (real part)	40.17
Relative permitivity (imaginary part)	13.35
Conductivity (S/m)	1.88

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

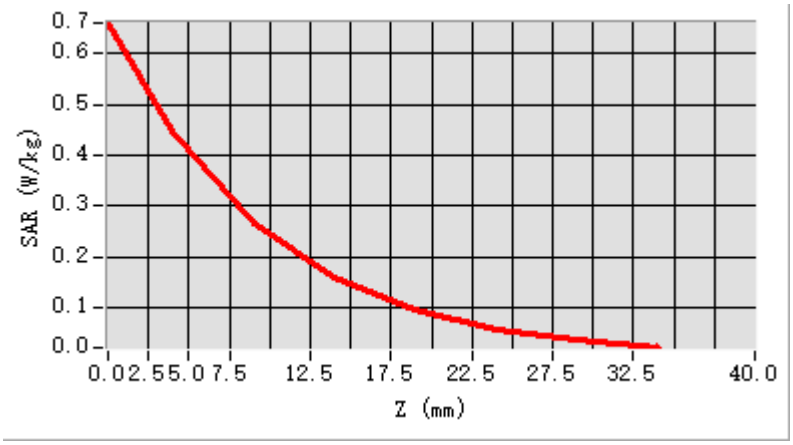
Maximum location: X=-1.00, Y=-44.00 ; SAR Peak: 0.66 W/kg

D. SAR 1g & 10g

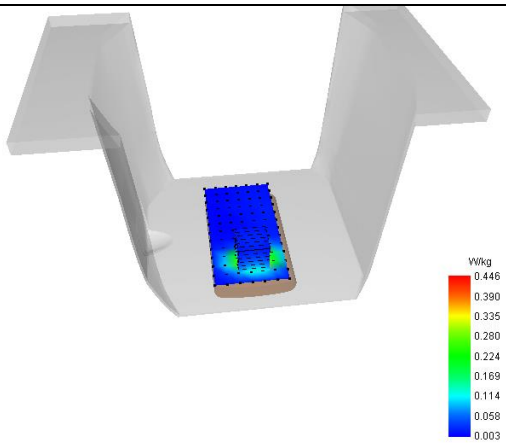
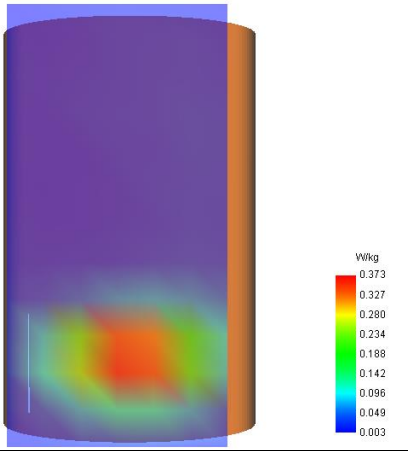
SAR 10g (W/Kg)	0.221
SAR 1g (W/Kg)	0.411
Variation (%)	2.66
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	59.81

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.660	0.446	0.267	0.160	0.099	0.058	0.040



F. 3D Image

3D screen shot	Hot spot position
	

27# SAR Measurement at LTE band 12 (Cheek, Left)
Date of measurement: 11/4/2025

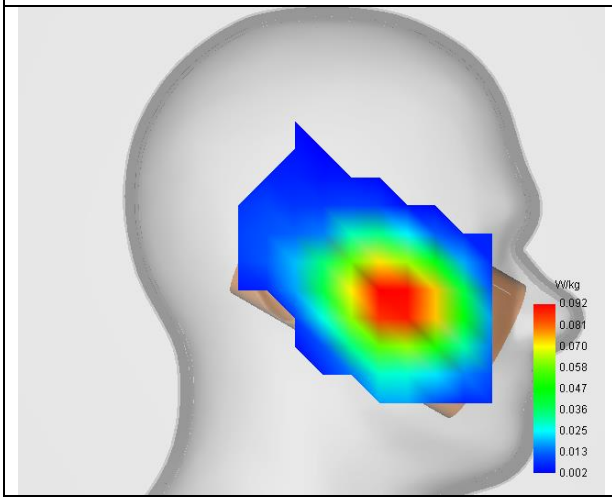
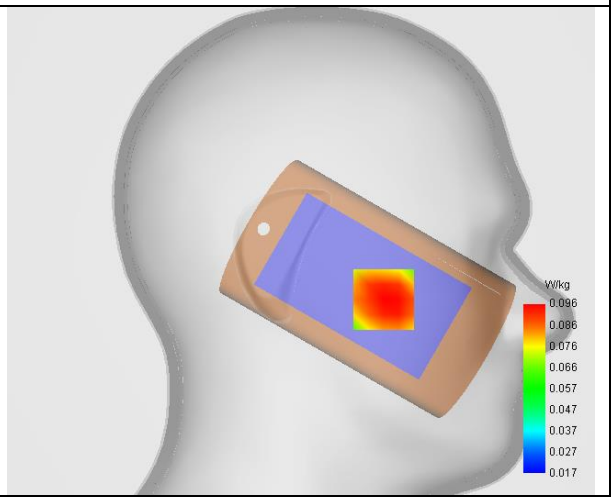
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 12
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23095)/ frequency 707.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	707.50

B. Permitivity

Middle TX Frequency (MHz)	707.50
Relative permitivity (real part)	41.11
Relative permitivity (imaginary part)	21.75
Conductivity (S/m)	0.86

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

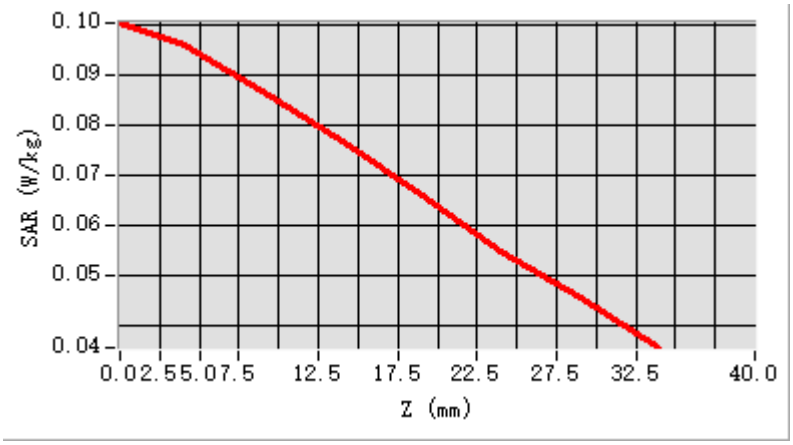
Maximum location: X=-44.00, Y=-26.00 ; SAR Peak: 0.10 W/kg

D. SAR 1g & 10g

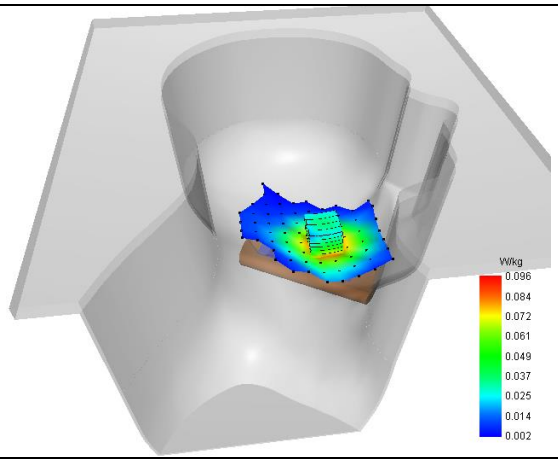
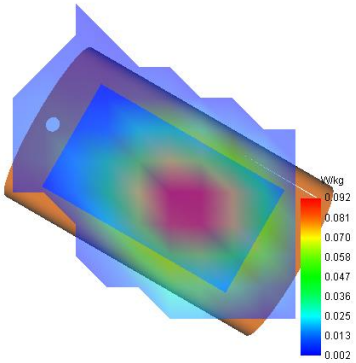
SAR 10g (W/Kg)	0.078
SAR 1g (W/Kg)	0.094
Variation (%)	-4.48
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.100	0.096	0.087	0.077	0.066	0.055	0.046



F. 3D Image

3D screen shot	Hot spot position
	

28# SAR Measurement at LTE band 12 (Body, Validation Plane)
Date of measurement: 11/4/2025

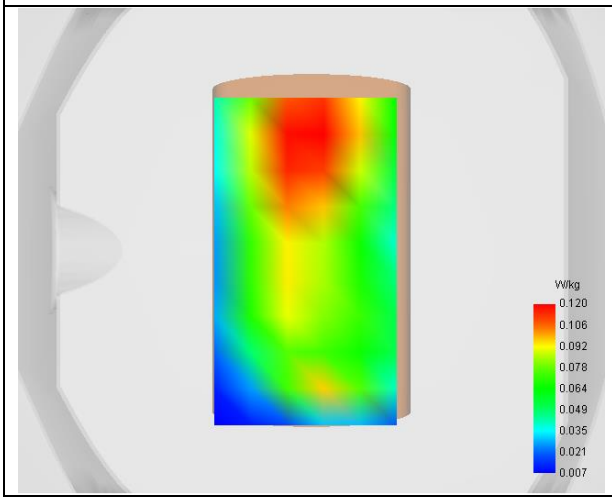
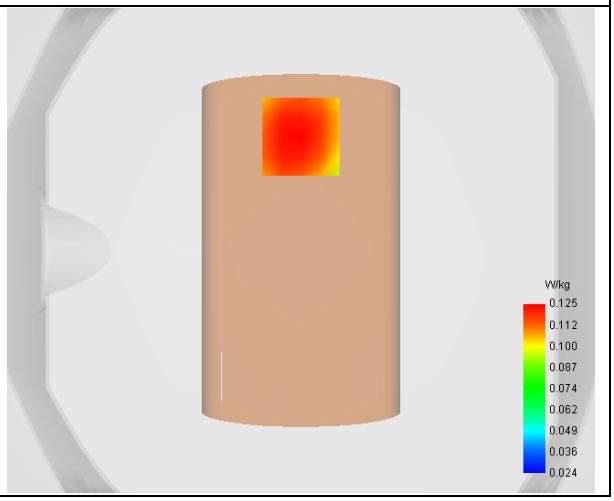
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
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 12
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23095)/ frequency 707.50 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	707.50

B. Permitivity

Middle TX Frequency (MHz)	707.50
Relative permitivity (real part)	41.11
Relative permitivity (imaginary part)	21.75
Conductivity (S/m)	0.86

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

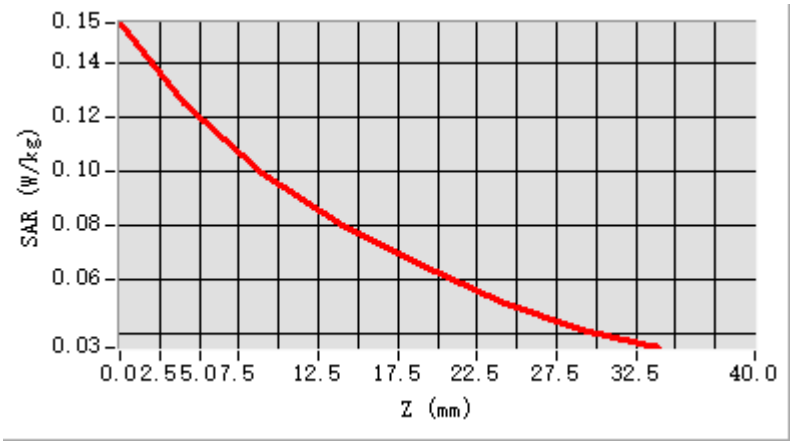
Maximum location: X=0.00, Y=47.00 ; SAR Peak: 0.15 W/kg

D. SAR 1g & 10g

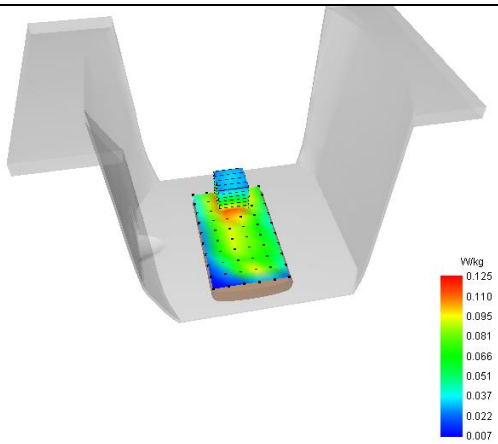
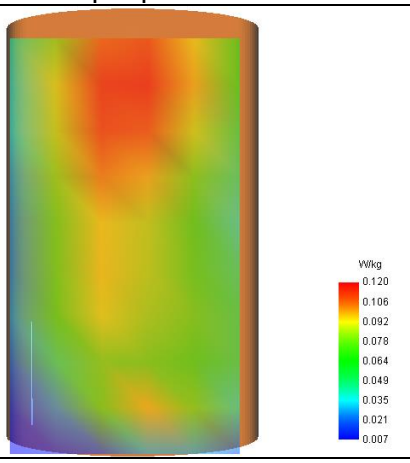
SAR 10g (W/Kg)	0.092
SAR 1g (W/Kg)	0.122
Variation (%)	1.51
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.155	0.125	0.099	0.080	0.065	0.052	0.041



F. 3D Image

3D screen shot	Hot spot position
	

29# SAR Measurement at LTE band 17 (Cheek, Left)
Date of measurement: 11/4/2025

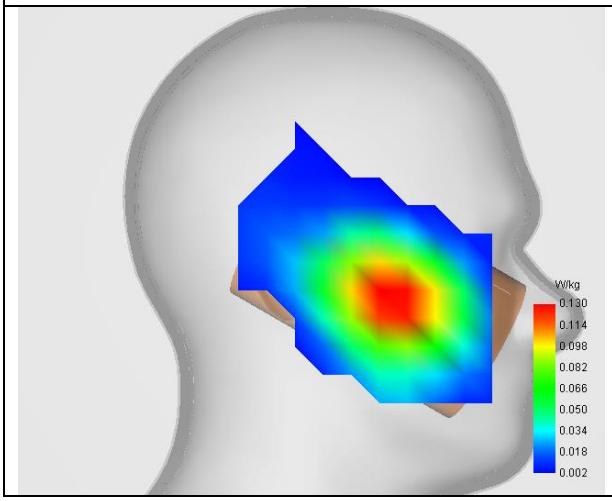
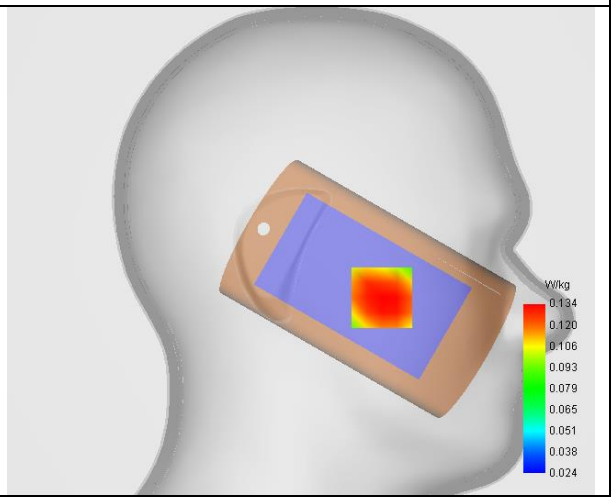
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 17
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23790)/ frequency 710.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	710.00

B. Permitivity

Middle TX Frequency (MHz)	710.00
Relative permitivity (real part)	41.10
Relative permitivity (imaginary part)	21.69
Conductivity (S/m)	0.86

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

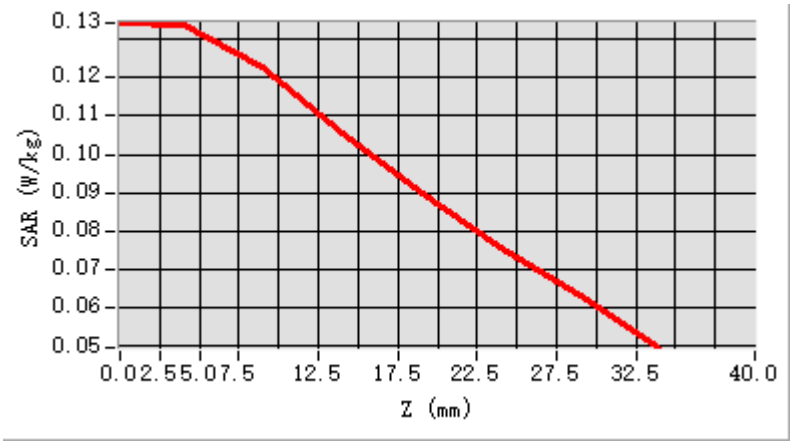
Maximum location: X=-43.00, Y=-25.00 ; SAR Peak: 0.15 W/kg

D. SAR 1g & 10g

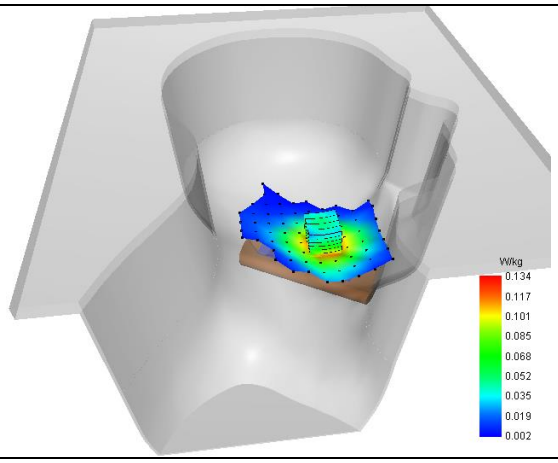
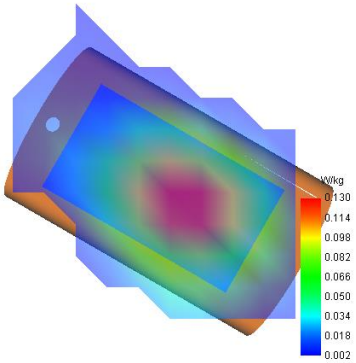
SAR 10g (W/Kg)	0.107
SAR 1g (W/Kg)	0.132
Variation (%)	-3.91
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.134	0.134	0.123	0.106	0.090	0.076	0.063



F. 3D Image

3D screen shot	Hot spot position
	

30# SAR Measurement at LTE band 17 (Body, Validation Plane)
Date of measurement: 11/4/2025

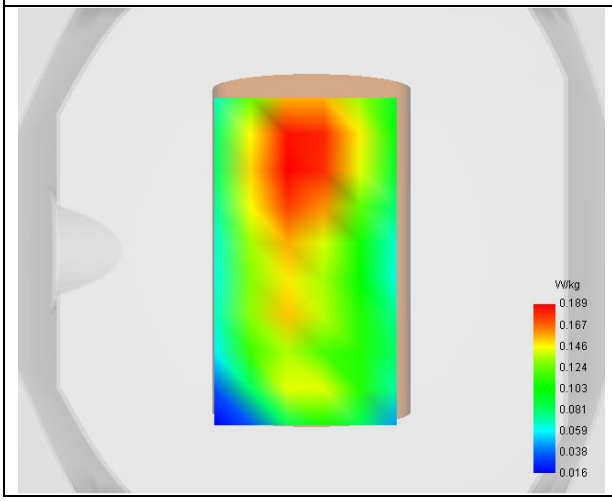
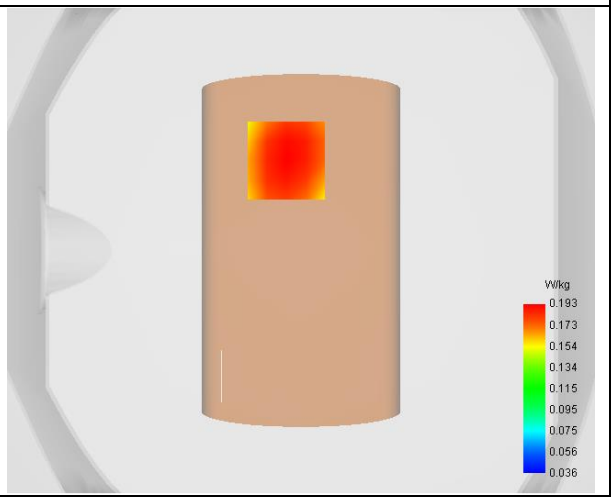
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.42
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 17
Signal	LTE FDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (23790)/ frequency 710.00 Mhz
Cell Bandwidth	10 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	710.00

B. Permitivity

Middle TX Frequency (MHz)	710.00
Relative permitivity (real part)	41.10
Relative permitivity (imaginary part)	21.69
Conductivity (S/m)	0.86

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

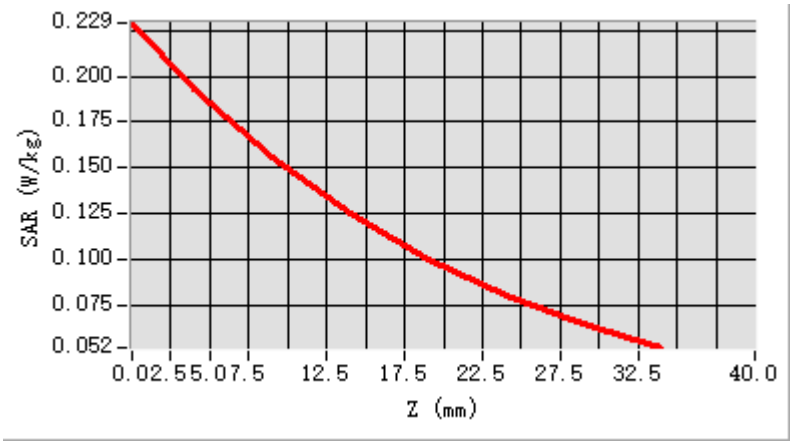
Maximum location: X=-6.00, Y=37.00 ; SAR Peak: 0.23 W/kg

D. SAR 1g & 10g

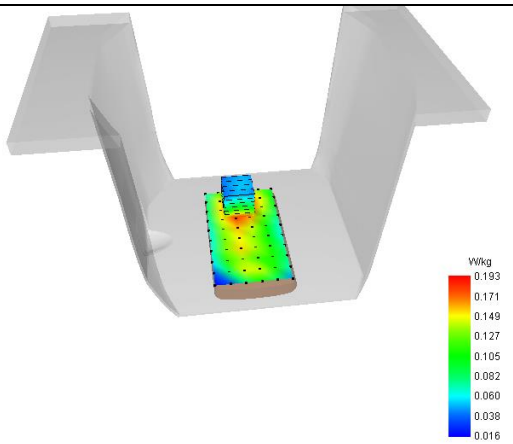
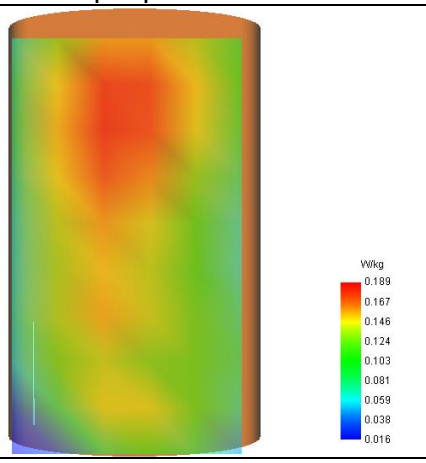
SAR 10g (W/Kg)	0.145
SAR 1g (W/Kg)	0.187
Variation (%)	0.39
Horizontal validation criteria: minimum distance (mm)	0.00
Vertical validation criteria: SAR ratio M2/M1 (%)	0.00

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.229	0.193	0.155	0.125	0.100	0.081	0.065



F. 3D Image

3D screen shot	Hot spot position
	

31# SAR Measurement at LTE band 41 (Cheek, Left)
Date of measurement: 12/4/2025

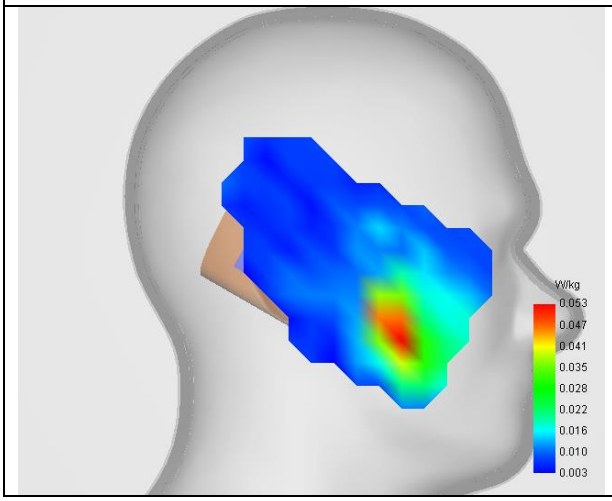
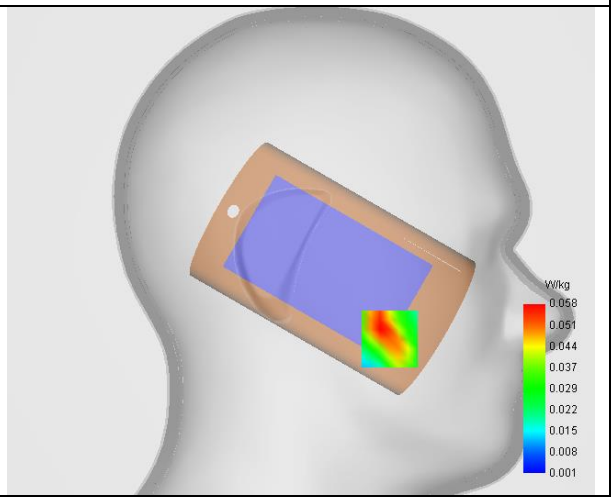
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
Area Scan	dx=12mm dy=12mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 41
Signal	LTE TDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (40620)/ frequency 2593.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2593.00

B. Permitivity

Middle TX Frequency (MHz)	2593.00
Relative permitivity (real part)	39.89
Relative permitivity (imaginary part)	13.51
Conductivity (S/m)	1.95

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

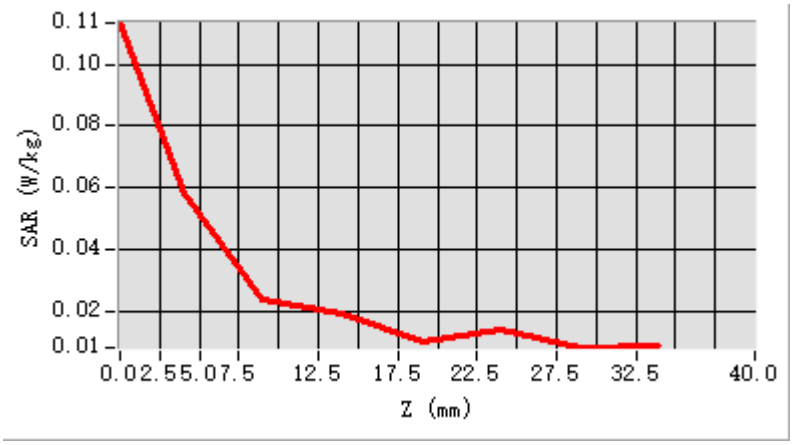
Maximum location: X=-47.00, Y=-47.00 ; SAR Peak: 0.10 W/kg

D. SAR 1g & 10g

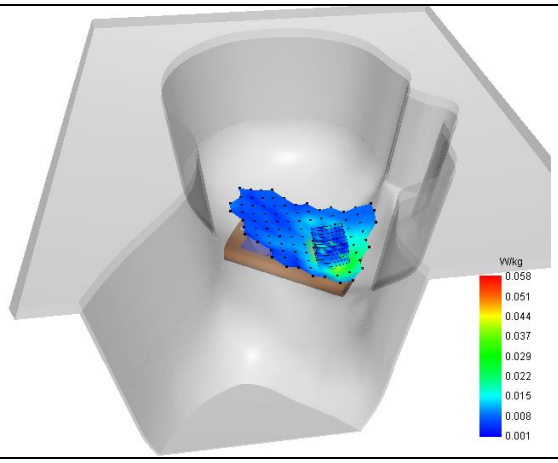
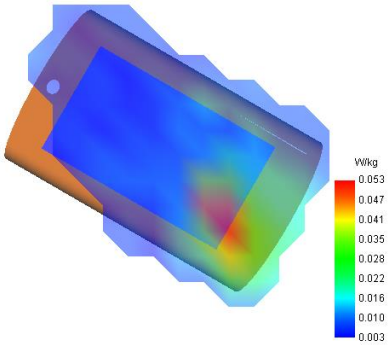
SAR 10g (W/Kg)	0.027
SAR 1g (W/Kg)	0.054
Variation (%)	3.28
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	60.51

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.113	0.058	0.024	0.019	0.010	0.014	0.008



F. 3D Image

3D screen shot	Hot spot position
	

32# SAR Measurement at LTE band 41 (Body, Validation Plane)
Date of measurement: 12/4/2025

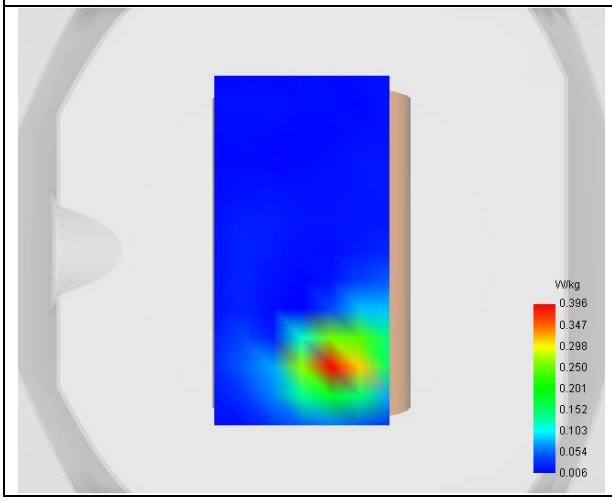
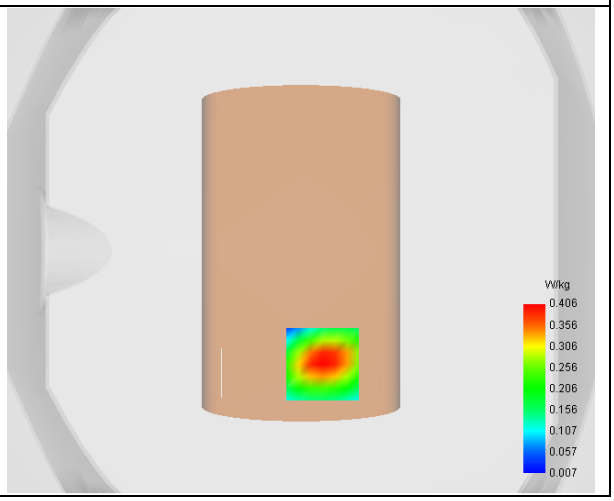
A. Experimental conditions.

Probe	4024-EPGO-442
ConvF	2.51
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 41
Signal	LTE TDD
Channel Center [EARFCN] / Channel Center [MHz]	Middle (40620)/ frequency 2593.00 Mhz
Cell Bandwidth	20 Mhz
Modulation	SC-OFDM - QPSK
Middle TX Frequency (MHz)	2593.00

B. Permitivity

Middle TX Frequency (MHz)	2593.00
Relative permitivity (real part)	39.89
Relative permitivity (imaginary part)	13.51
Conductivity (S/m)	1.95

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

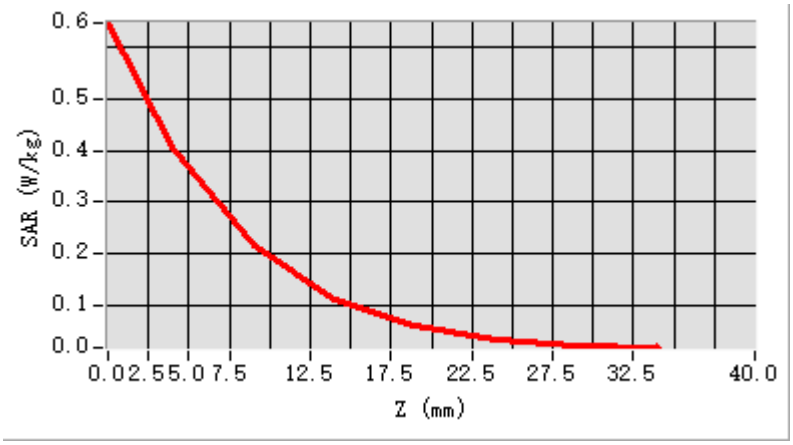
Maximum location: X=9.00, Y=-47.00 ; SAR Peak: 0.66 W/kg

D. SAR 1g & 10g

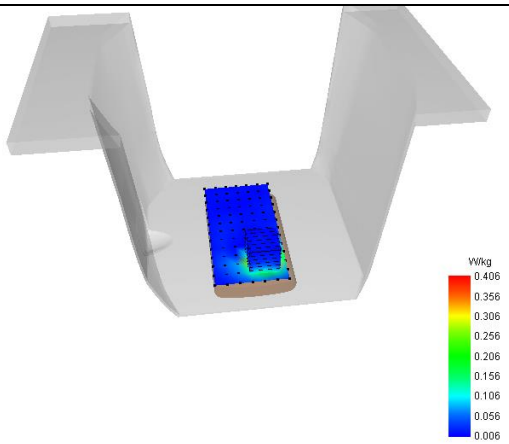
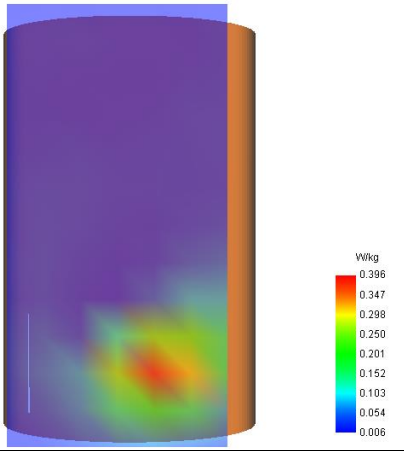
SAR 10g (W/Kg)	0.183
SAR 1g (W/Kg)	0.377
Variation (%)	1.42
Horizontal validation criteria: minimum distance (mm)	14.14
Vertical validation criteria: SAR ratio M2/M1 (%)	53.12

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.648	0.406	0.216	0.111	0.058	0.034	0.021



F. 3D Image

3D screen shot	Hot spot position
	

14. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 4024-EPGO-442
750 MHz Dipole - SN 03/15 DIP 0G750-355
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

Docusign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3

COMOSAR E-Field Probe Calibration Report

Ref : ACR.278.12.24.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 DOSIMETRIC E-FIELD PROBE

SERIAL NO.: 4024-EPGO-442

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 10/04/2024

Accreditations #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 CALIPROBE test bench, for use with a MVG COMOSAR system only. The test results covered by accreditation are traceable to the International System of Units (SI).

Docusign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

	Name	*Function*	*Date*	*Signature*
Prepared by :	Cyrille ONNEE	Measurement Responsible	10/4/2024	
Checked & approved by:	Pedro Ruiz	Technical Manager	10/4/2024	
Authorized by:	Pedro Ruiz	Laboratory Director	10/4/2024 Assinado por: Pedro RUIZ 29093B31C46F428...	

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

Issue	*Name*	*Date*	*Modifications*
A	Cyrille ONNEE	10/4/2024	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	4024-EPGO-442
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.206 MΩ Dipole 2: R2=0.223 MΩ Dipole 3: R3=0.235 MΩ

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

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



Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

Probe Length	330 mm
Length of Individual Dipoles	2 mm
Maximum external diameter	8 mm
Probe Tip External Diameter	2.5 mm
Distance between dipoles / probe extremity	1 mm

3 MEASUREMENT METHOD

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

3.1 SENSITIVITY

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

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3.2 LINEARITY

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

3.3 ISOTROPY

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

3.4 BOUNDARY EFFECT

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

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

$$\mathrm{SAR}_{\mathrm{uncertainty}}[\%] = \delta\mathrm{SAR}_{be}\,\frac{(d_{be}+d_{step})^2}{2d_{step}}\,\frac{\left(e^{-d_{be}/(\delta/2)}\right)}{\delta/2} \quad \text{for } (d_{be}+d_{step}) < 10\ \mathrm{mm}$$

where

$\mathrm{SAR}_{\mathrm{uncertainty}}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *zoom-scan* 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;
$\Delta\mathrm{SAR}_{be}$	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

The measured worst case boundary effect SARuncertainty[%] for scanning distances larger than 4mm is 1.0% Limit ,2%).

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3.5 PROBE MODULATION RESPONSE

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

4 MEASUREMENT UNCERTAINTY

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

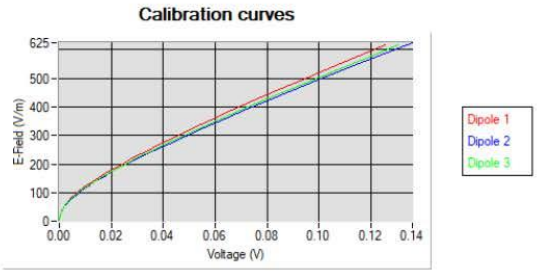
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

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

5.1 CALIBRATION IN AIR

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



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

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

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where
Vi=voltage readings on the 3 channels of the probe
DCPi=diode compression point given below for the 3 channels of the probe
Normi=dipole sensitivity given below for the 3 channels of the probe

Normx dipole 1 (μV/(V/m)^2)	Normy dipole 2 (μV/(V/m)^2)	Normz dipole 3 (μV/(V/m)^2)
0.73	0.79	0.78

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
105	109	103

5.2 CALIBRATION IN LIQUID

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

$$ConvF = \frac{E^2_{liquid}}{E^2_{air}}$$

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

$$E^2_{liquid} = \frac{\rho\, SAR}{\sigma}$$

where
σ=the conductivity of the liquid
ρ=the volumetric density of the liquid
SAR=the SAR measured from the formula that depends on the setup used. The SAR formulas are given below

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

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

where
c=the specific heat for the liquid
dT/dt=the temperature rises over the time

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

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

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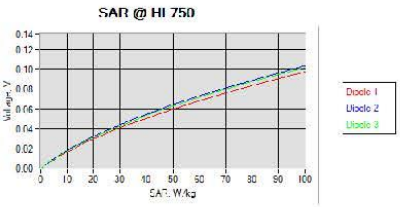
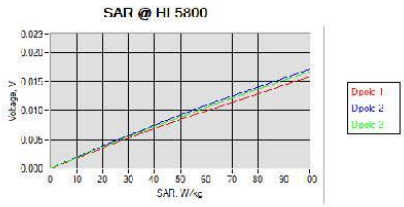
where
a=the larger cross-sectional of the waveguide
b=the smaller cross-sectional of the waveguide
δ=the skin depth for the liquid in the waveguide
Pw=the power delivered to the liquid

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	2.42
HL850	835	2.34
HL900	900	2.24
HL1800	1800	2.51
HL1900	1900	2.57
HL2000	2000	2.64
HL2300	2300	2.73
HL2450	2450	2.74
HL2600	2600	2.51
HL3300	3300	2.11
HL3500	3500	2.15
HL3700	3700	2.08
HL3900	3900	2.27
HL4200	4200	2.39
HL4600	4600	2.30
HL4900	4900	2.13
HL5200	5200	1.89
HL5400	5400	1.97
HL5600	5600	1.88
HL5800	5800	1.90

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





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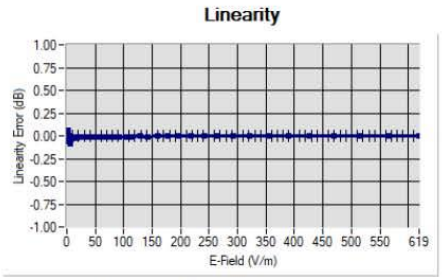
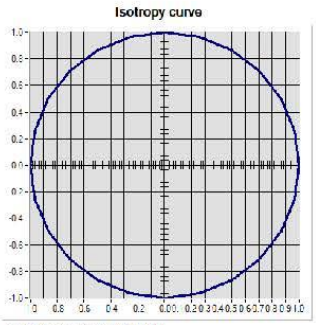
6 VERIFICATION RESULTS

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



Linearity:+/-1.90% (+/-0.08dB)



Isotropy +/-0.12% (+/-0.01dB)

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2026
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2026
USB Sensor	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2022	09/2025
Coaxial cell	MVG	SN 32/16 COAXCELL_1	Validated. No cal required.	Validated. No cal required.

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Docusign Envelope ID: 223C1A7C-4751-4B95-8502-1618DC0951E3

Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44235403	02/2024	02/2027

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SAR Reference Dipole Calibration Report

Ref : ACR.53.23.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 750 MHZ

SERIAL NO.: SN 03/15DIP0G750-355

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.23.24.BES.A

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

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

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 750 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID750
Serial Number	SN 03/15DIP0G750-355
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – *MVG COMOSAR Validation Dipole*

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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 +/-19% with respect to measurement conditions.

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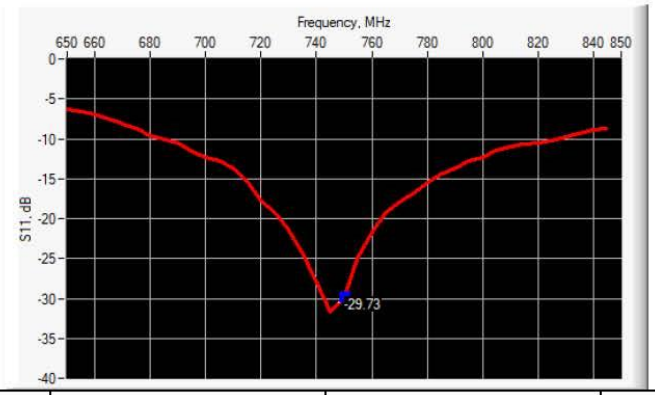
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
750	-29.73	-20	52.5Ω + 2.2jΩ

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.

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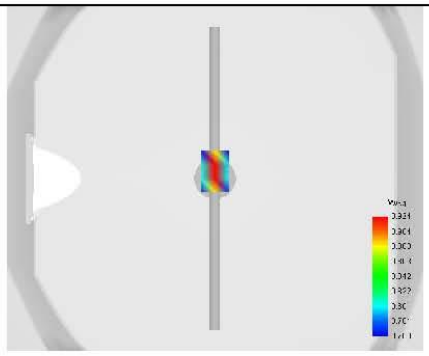
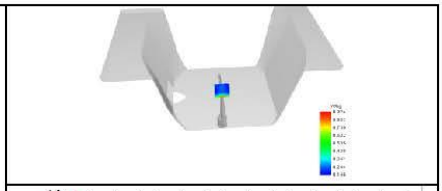
SAR REFERENCE DIPOLE CALIBRATION REPORT

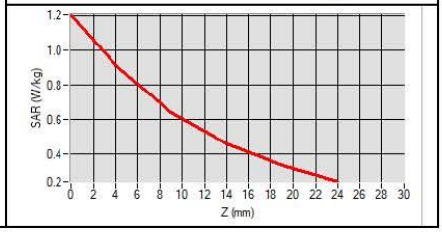
REF : ACR.53.23.24.BES.A

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

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







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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.24.24.BES.A

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

Yann Toutain ID

Signature numérique de Yann Toutain ID
Date : 2024.02.27 08:55:11 +01'00'

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 835 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID835
Serial Number	SN 03/15DIP0G835-347
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*

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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 +/-19% with respect to measurement conditions.

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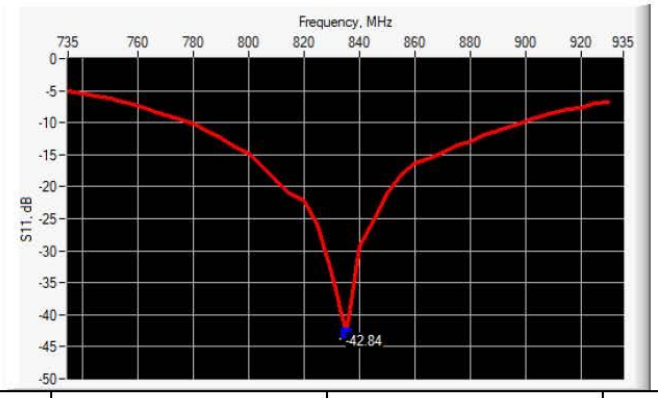
6 CALIBRATION RESULTS

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.

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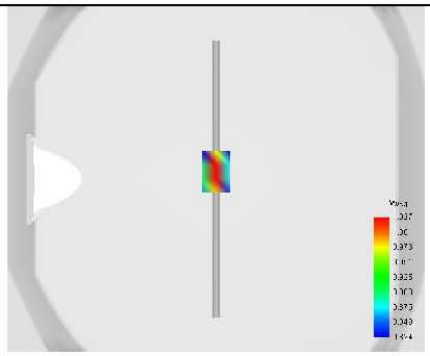
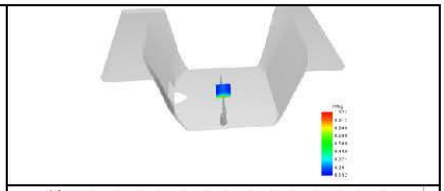
SAR REFERENCE DIPOLE CALIBRATION REPORT

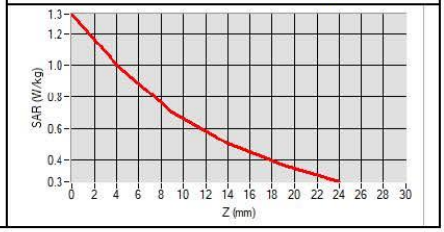
Ref : ACR.53.24.24.BES.A

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







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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.26.24.BES.A

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

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

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – *MVG COMOSAR Validation Dipole*

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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 +/-19% with respect to measurement conditions.

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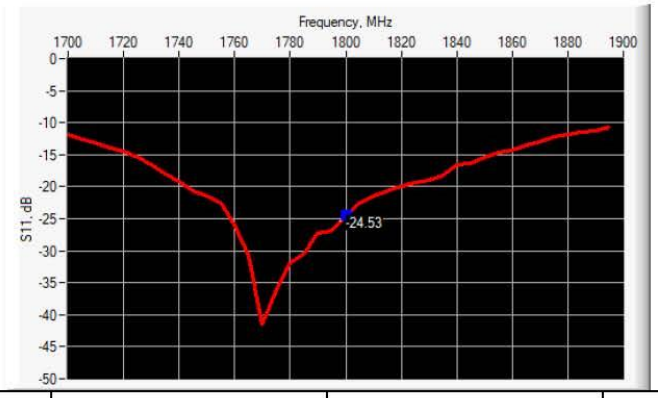
6 CALIBRATION RESULTS

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.

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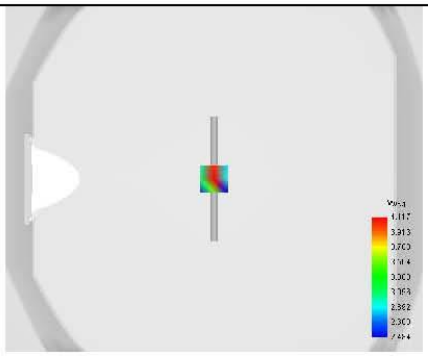
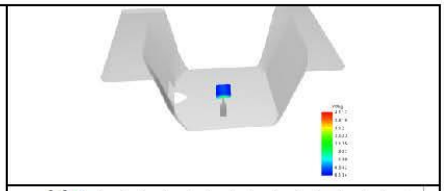
SAR REFERENCE DIPOLE CALIBRATION REPORT

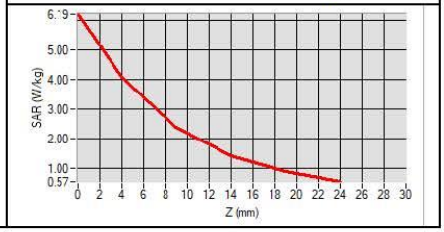
Ref : ACR.53.26.24.BES.A

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







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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

REF : ACR.53.27.24.BES.A

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

Yann Toutain ID Signature numérique de Yann Toutain ID Date : 2024.02.27 08:56:45 +01'00'

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 1900 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID1900
Serial Number	SN 03/15DIP1G900-350
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*

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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 +/-19% with respect to measurement conditions.

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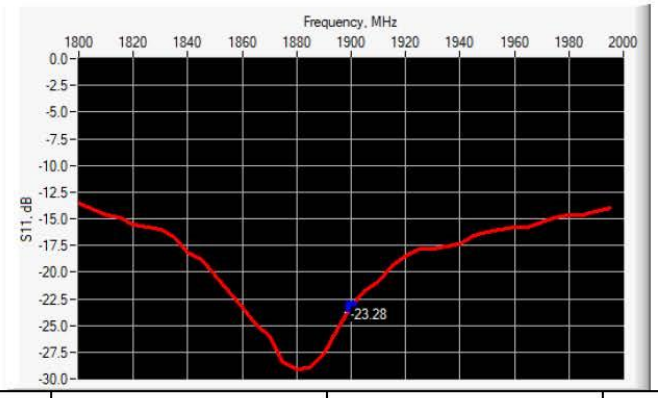
6 CALIBRATION RESULTS

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	46.2Ω + 5.4jΩ

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.

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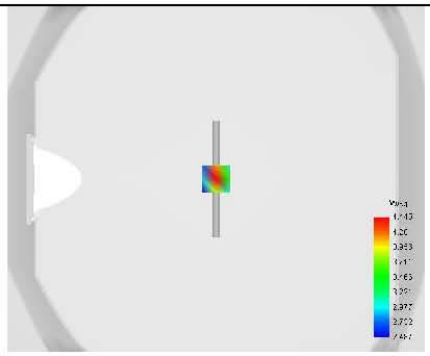
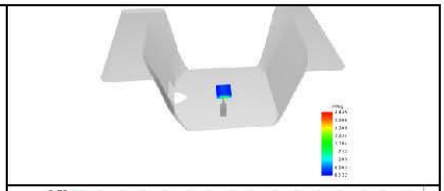
SAR REFERENCE DIPOLE CALIBRATION REPORT

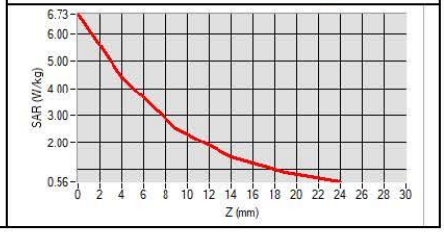
REF : ACR.53.27.24.BES.A

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values: eps' : 42.5 sigma : 1.39
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	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







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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.53.29.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 03/15DIP2G450-352

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

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

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

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – *MVG COMOSAR Validation Dipole*

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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 +/-19% with respect to measurement conditions.

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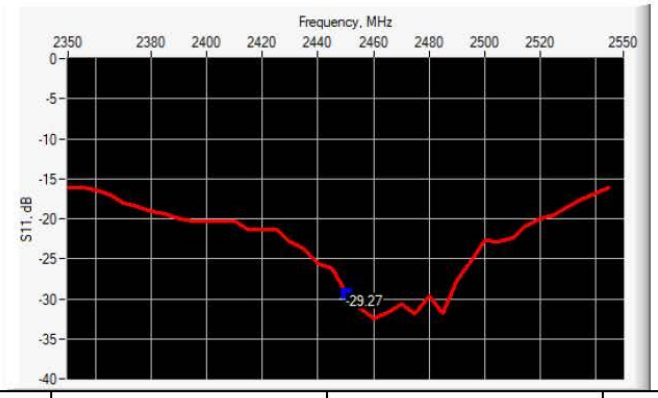
6 CALIBRATION RESULTS

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.

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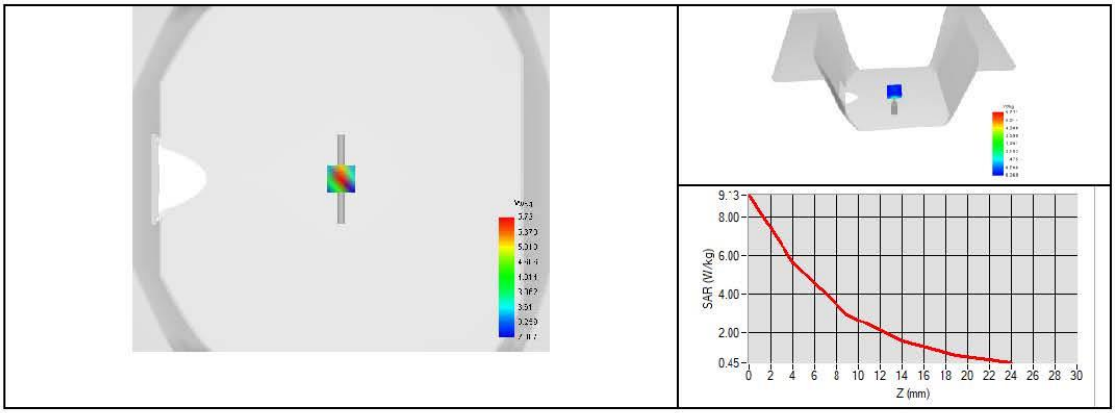
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.29.24.BES.A

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

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



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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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SAR Reference Dipole Calibration Report

Ref : ACR.53.30.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,

BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2600 MHZ

SERIAL NO.: SN 03/15DIP2G600-356

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 02/21/2024

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

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Summary:

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

SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.30.24.BES.A

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

Yann Toutain ID

Signature numérique de Yann Toutain ID
Date : 2024.02.27 08:58:12 +01'00'

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

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

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1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – *MVG COMOSAR Validation Dipole*

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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 +/-19% with respect to measurement conditions.

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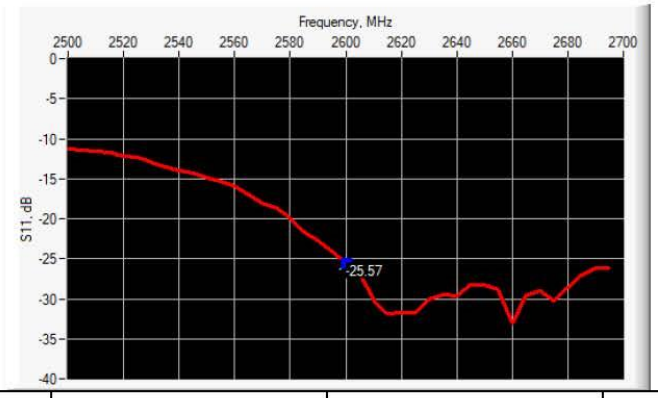
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2600	-25.57	-20	54.5Ω - 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.

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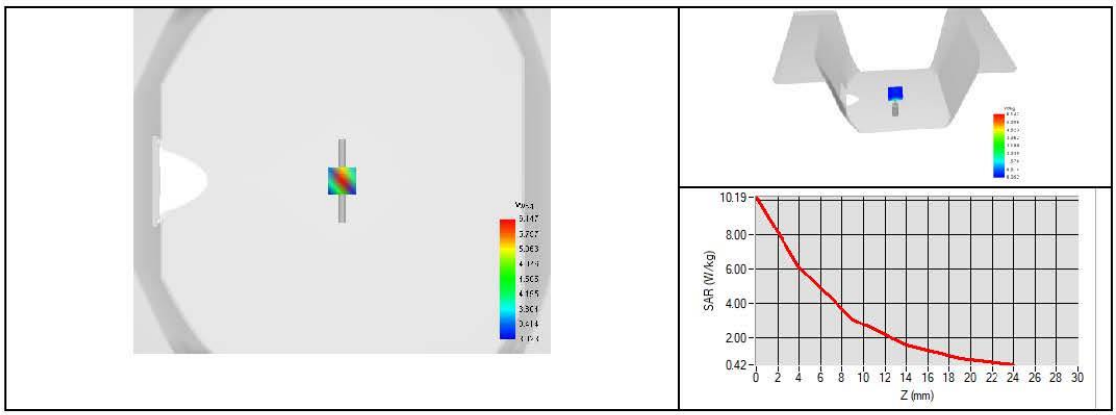
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref : ACR.53.30.24.BES.A

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

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



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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3523-EPGO-429	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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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

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Summary:

This document presents the method and results from an accredited SAR reference waveguide calibration performed at MVG, using the COMOSAR test bench. The test results covered by accreditation are traceable to the International System of Units (SI).

SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref : ACR.53.31.24.BES.A

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

Yann Toutain ID
Signature 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

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1 INTRODUCTION

This document contains a summary of the requirements set forth by the IEC/IEEE 62209-1528 and FCC KDB865664 D01 standards for reference 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.

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4.3 SAR REQUIREMENTS

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

5 MEASUREMENT UNCERTAINTY

5.1 MECHANICAL DIMENSIONS

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

5.2 S11 PARAMETER

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

5.3 SAR

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

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

6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

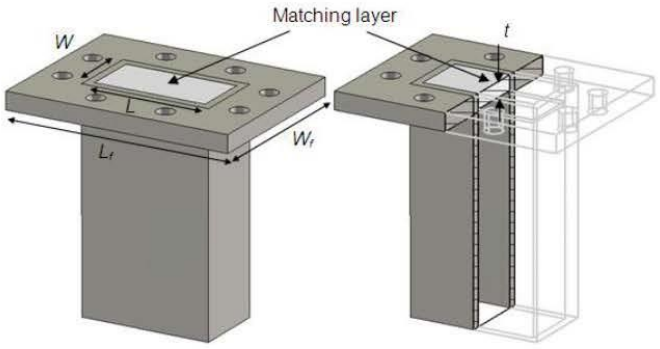

Figure 1: Validation Waveguide Dimensions

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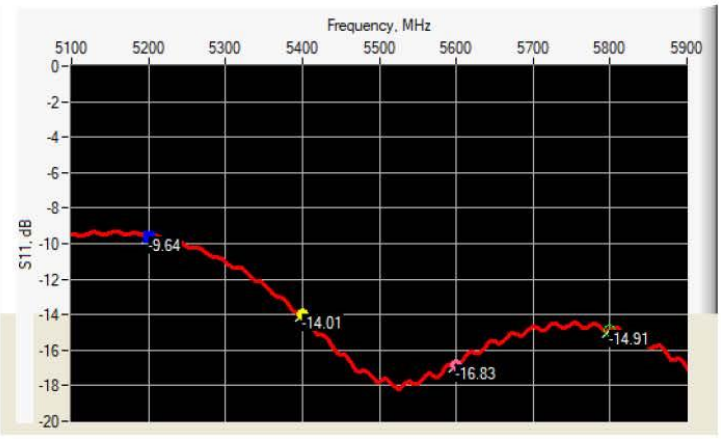
6.2 S11 PARAMETER

6.2.1 S11 parameter In Head Liquid



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

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.

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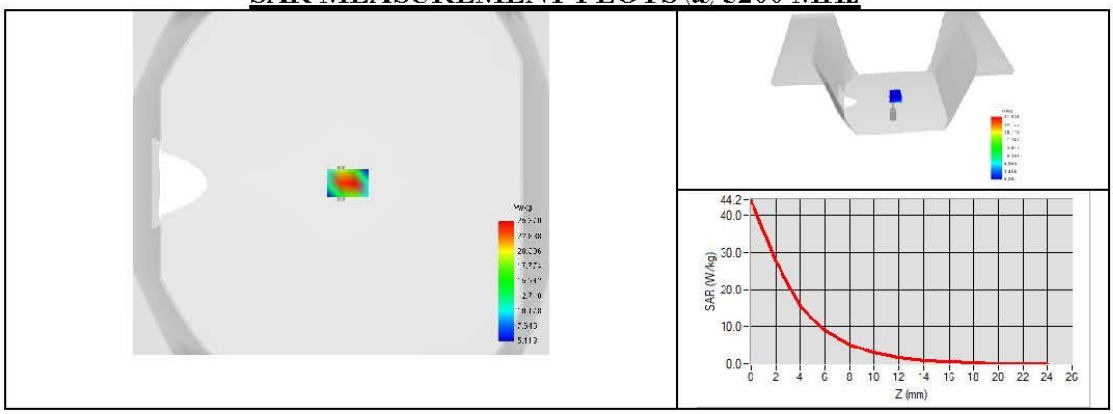
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref : ACR.53.31.24.BES.A

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

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

SAR MEASUREMENT PLOTS @ 5200 MHz



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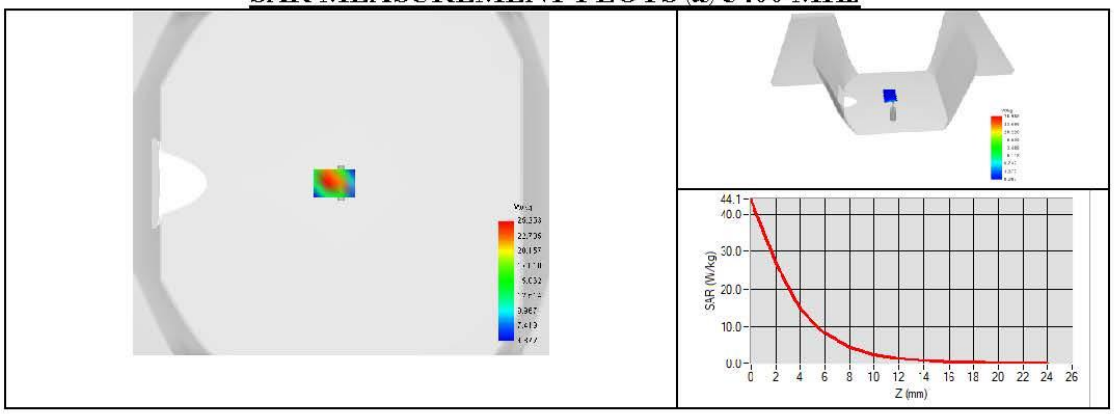
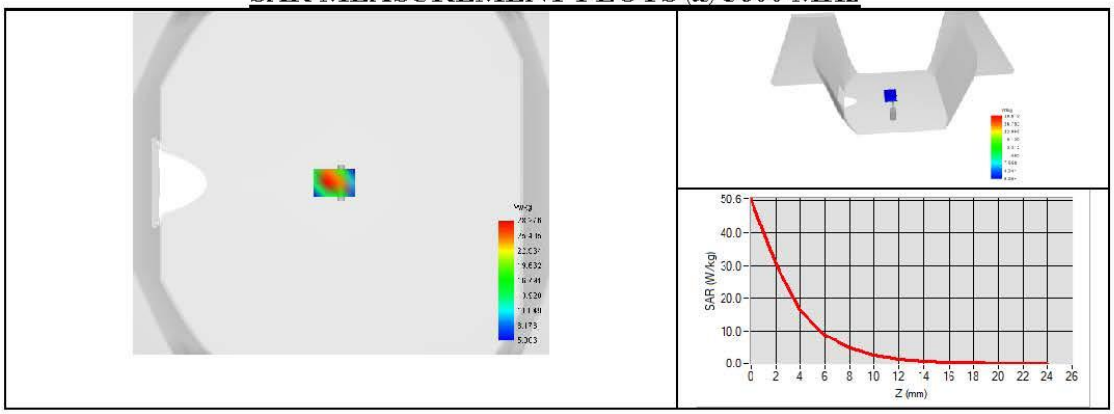
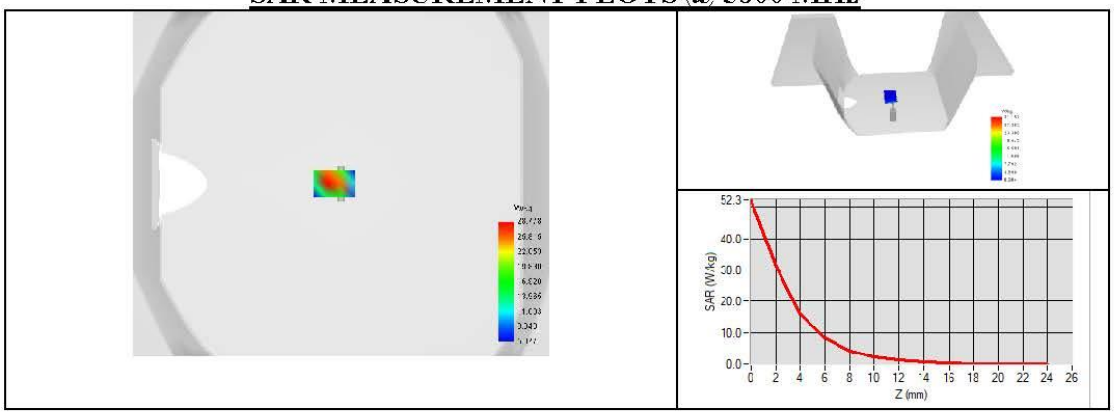
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz



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7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	**Manufacturer / Model**	**Identification No.**	**Current Calibration Date**	**Next Calibration Date**
SAM Phantom	MVG	SN 13/09 SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Calipers	Mitutoyo	SN 0009732	11/2022	11/2025
Reference Probe	MVG	3623-EPGO-431	11/2023	11/2024
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

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