FCC SAR EVALUATION REPORT

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

Product Name:	Rugged Smart Phone
Model No.:	16 Rugged Ultra
Serial Model:	S26 Ultra Rugged/Titan X/Titan T1 pro/Xone /Xone pro/17PROMA X/16PROMA X
Brand Name:	N/A
Report No.:	AiTSZ-251126039FW1
FCC ID:	2BDI3-RUGGEDULTRA

Prepared for

Shenzhen Haimeilan Technology Co., Ltd.
9V777, East 9th Floor, Building 2, SEG Science and Technology Park,
Huaqiang North Street, Futian District, Shenzhen

Prepared by

Guangdong Asia Hongke Test Technology Limited
B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Tel.: +86 0755-230967639 Fax.: +86 0755-230967639

TEST RESULT CERTIFICATION

Applicant's name	:	Shenzhen Haimeilan Technology Co., Ltd.
Address	:	9V777, East 9th Floor, Building 2, SEG Science and Technology Park, Huaqiang North Street, Futian District, Shenzhen
Manufacturer's Name	:	Shenzhen Haimeilan Technology Co., Ltd.
Address	:	9V777, East 9th Floor, Building 2, SEG Science and Technology Park, Huaqiang North Street, Futian District, Shenzhen

Product description

Product name	:	Rugged Smart Phone
Trademark	:	N/A
Model and/or type reference	:	16 Rugged Ultra
Serial Model	:	S26 Ultra Rugged/Titan X/Titan T1 pro/Xone /Xone pro/17PROMA X/16PROMA X
		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 Guangdong Asia Hongke Test Technology Limited. 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.

Date of Test

Date (s) of performance of tests	:	Nov. 26, 2025 ~ Dec. 03, 2025
Date of Issue	:	Dec. 03, 2025
Test Result	:	**Pass**

Reviewed by: Ken Zou
Ken Zou

Approved by: Jack Li
Jack Li

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Dec. 03, 2025	Jack Li

TABLE OF CONTENTS

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 as follows.

Band	Max SAR Value Reported(W/kg)		
	1-g Head (Separation distance of 0mm)	1-g Body&Hotspot (Separation distance of 5mm)	Max SAR Summation
LTE band 5	0.445	0.546	Head: 1.017 Body: 1.068 Hotspot: 1.068
LTE band 7	0.424	0.213	
LTE band 38	0.332	0.363	
2.4GHz WLAN	0.572	0.370	
5.2GHz WLAN	0.416	0.329	
5.3GHz WLAN	0.568	0.439	
5.6GHz WLAN	0.420	0.376	
5.8GHz WLAN	0.361	0.522	

NOTE: The Max SAR Summation 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	Rugged Smart Phone		
Model Name	16 Rugged Ultra		
Family Model	S26 Ultra Rugged/Titan X/Titan T1 pro/Xone /Xone pro/17PROMA X/16PROMA X		
Model Difference	All the model are the same circuit and RF module, except the model names.		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	FPC Antenna		
Power rating:	DC 3.87V 7500mAh 29.025Wh Rechargeable Li-ion battery		
Hardware version	N/A		
Software version	N/A		
Device Operating Configurations			
Supporting Mode(s)	LTEBand5/7/38, WLAN 2.4G/5G, Bluetooth, NFC		
Test Modulation	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)
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690
	LTE Band 38	2570-2620	
	WLAN 2.4G	2412-2462	
	WLAN 5.2G	5180-5240	
	WLAN 5.3G	5260-5320	
	WLAN 5.6G	5500-5700	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
	NFC	13.56	
Power Class	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 38)		

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 D05 SAR for LTE Devices v02r05
KDB 941225 D06 Hotspot SAR v02r01
KDB 648474 D04 Handset SAR v01r03

1.5. Ambient Condition

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

1.6. Test Facility

Test Laboratory:
Guangdong Asia Hongke Test Technology Limited
B1/F, Building 11, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

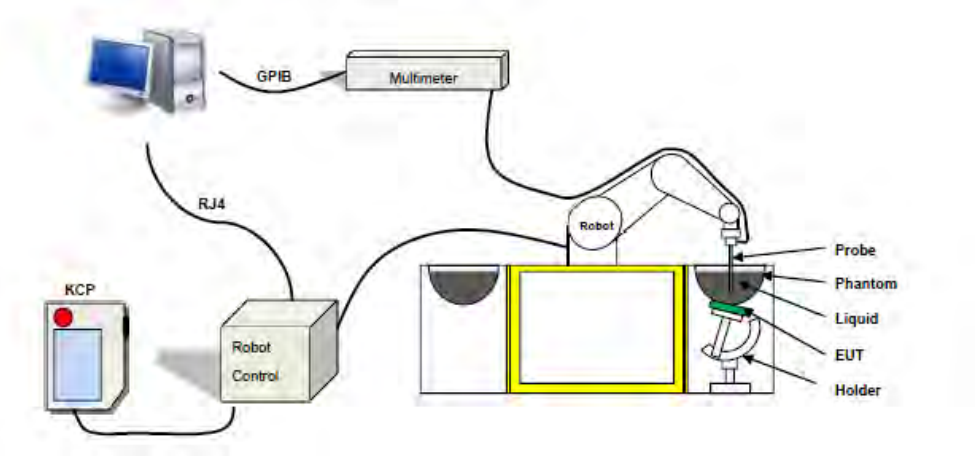
The test facility is recognized, certified or accredited by the following organizations:
FCC-Registration No.: 251906 Designation Number: CN1376
Guangdong Asia Hongke Test Technology Limited has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.

IC —Registration No.: 31737 CAB identifier: CN0165
The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737

A2LA-Lab Cert. No.: 7133.01
Guangdong Asia Hongke Test Technology Limited has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2017 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing.

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. 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 EPGO 0523-403 with following specifications is used.

- Probe Length: 330 mm
- Length of Individual Dipoles: 2 mm
- Maximum external diameter: 8 mm
- Probe Tip External Diameter: 2.5 mm
- Distance between dipole/probe extremity: 1 mm
- Dynamic range: 0.01-100 W/kg
- Probe linearity: 3%
- Axial Isotropy: < 0.10 dB
- Spherical Isotropy: < 0.10 dB
- Calibration range: 150 MHz to 6 GHz for head & body simulating liquid.
- Angle between probe axis (evaluation axis) and surface normal line: less than 30°

2.3.1. E-Field Probe Calibration

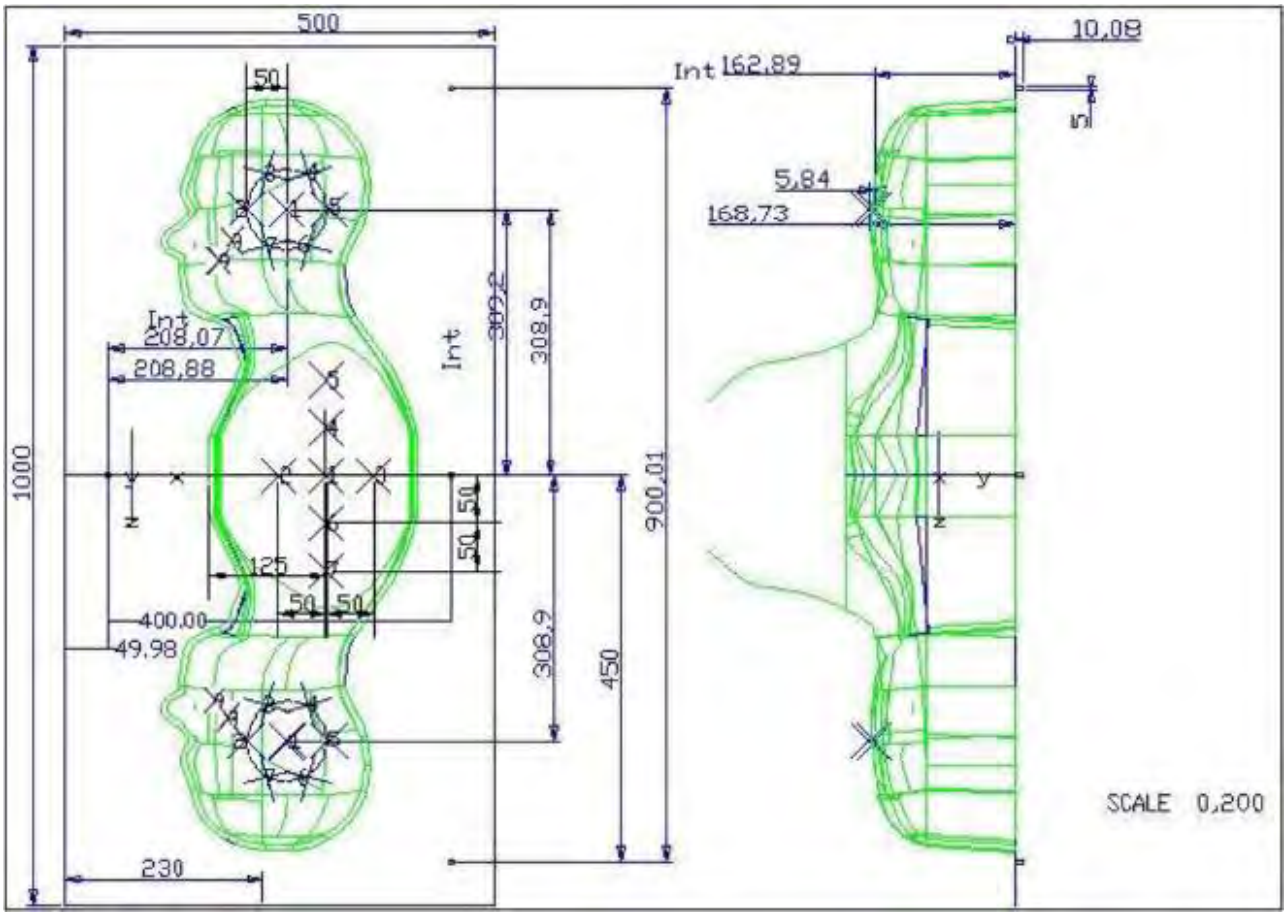
Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv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

2.4. Phantoms

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

SAM

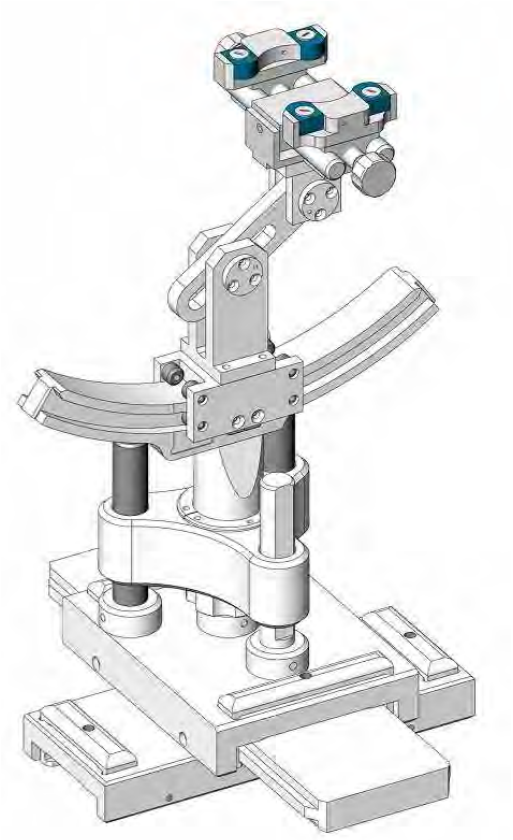
2.5. Technical Data



Left Head(mm)		Right Head(mm)		Flat Part(mm)	
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.

2.6. Device Holder



The SAR in the phantom is approximately inversely proportional to the square of the distance between the source and the liquid surface. For a source at 5 mm distance, a positioning uncertainty of ± 0.5 mm would produce a SAR uncertainty of ± 20 %. Accurate device positioning is therefore crucial for accurate and repeatable measurements. The positions in which the devices must be measured are defined by the standards.

2.7. 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	EPGO 0523-403	Sep. 09, 2025	Sep. 08, 2026
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DI P 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	2300 MHz Dipole	SID2300	SN 03/16 DIP 2G300-358	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	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026

☒	R&S	Wideband radio communication tester	CMW500	116581	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	HP	Network Analyzer	8753D	3410J01136	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	Power meter	E4419B	MY45102538	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	Power meter	E4419B	MY45102140	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	Power meter	E4419B	MY45102215	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	JFW	attenuator	50FPE-006	4360846-494-4	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025

					Jun. 30, 2025	Jun. 29, 2026
☒	JFW	attenuator	50FPE-006	4360846-492-1	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	JFW	attenuator	50FPE-006	4360846-490-6	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	Power sensor	E9301A	MY41495644	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	Agilent	Power sensor	E9301A	US39212148	Jul. 02, 2023	Jul. 01, 2024
					Jul. 01, 2024	Jun. 30, 2025
					Jun. 30, 2025	Jun. 29, 2026
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Jul. 18, 2021	Jul. 17, 2024
					Jul. 17, 2024	Jul. 16, 2027
☒	N/A	Thermometer	N/A	LES-085	Sep. 23, 2024	Sep. 22, 2027
☒	MVG	SAR Phantom	SSM2	SN 24/11 SAM87	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 24/11 MSH73	NCR	NCR

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.

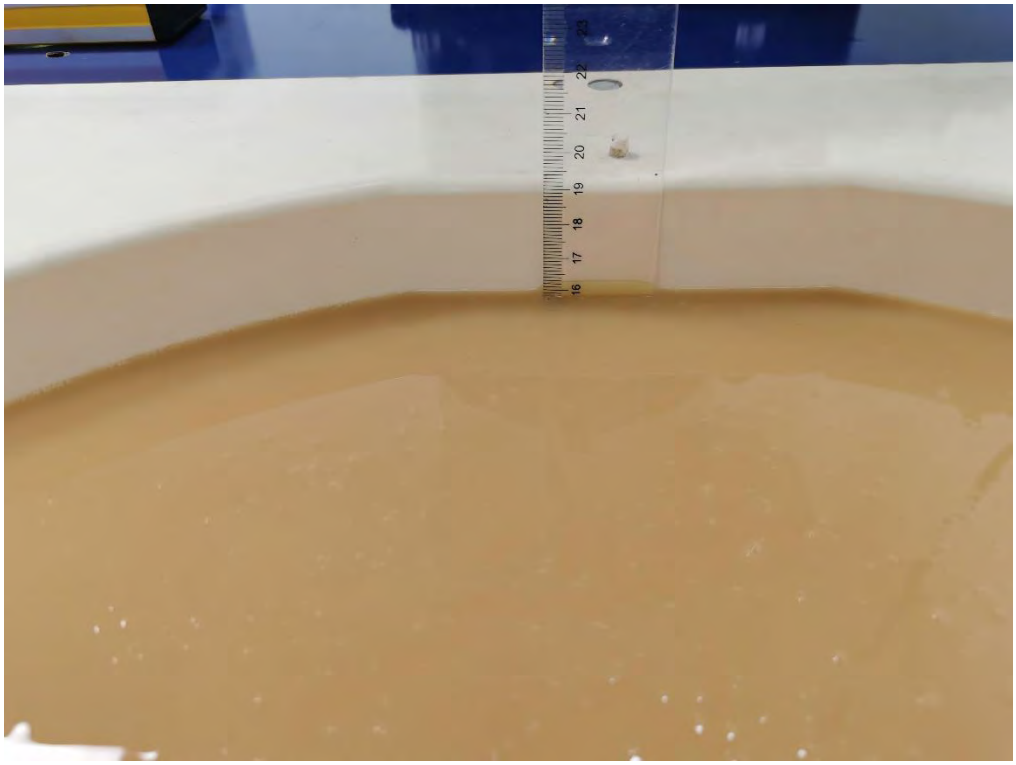
4. System Verification Procedure

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.



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.

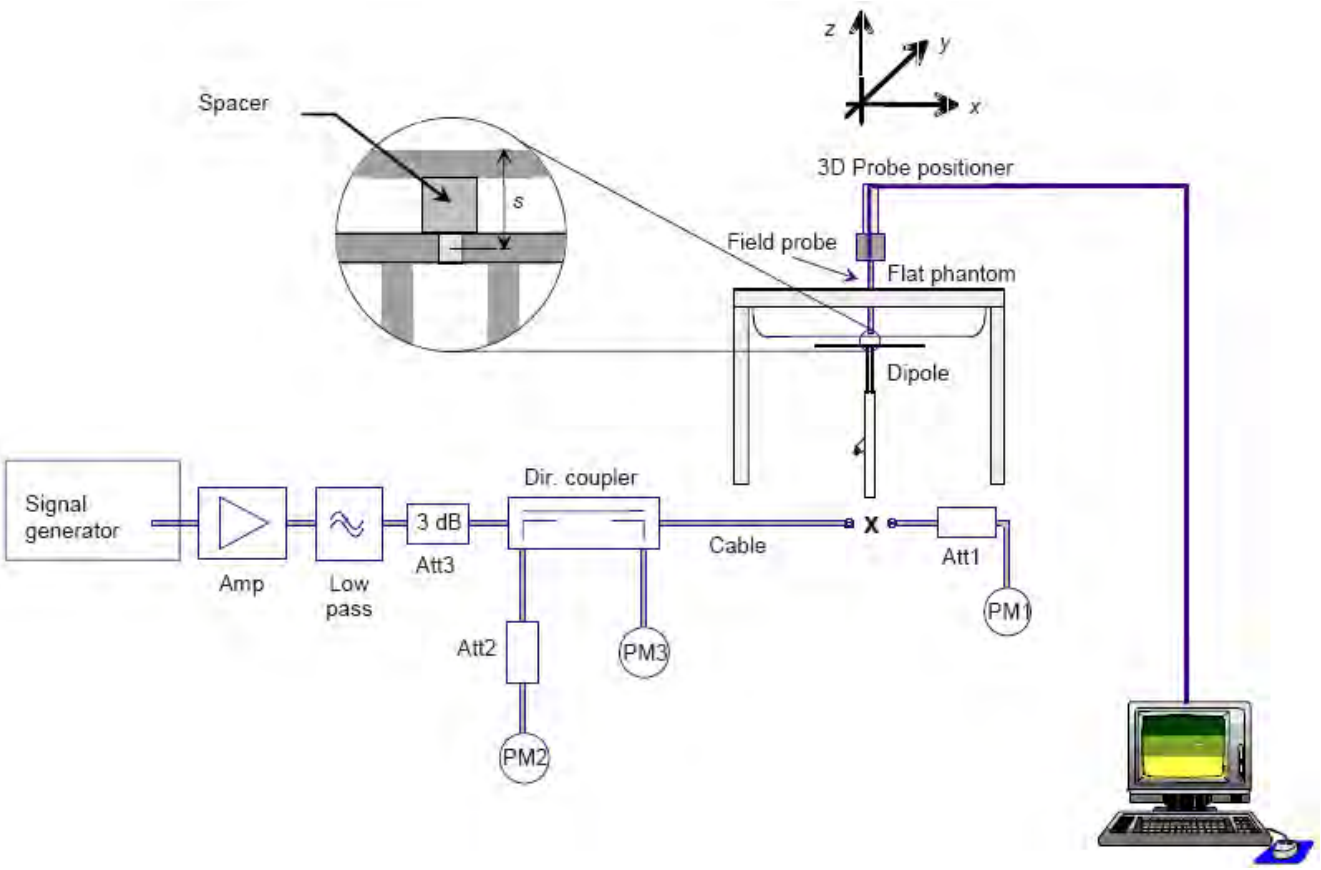
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		εr (±5%)	σ (S/m) (±5%)	εr	σ (S/m)		
Head 850	829	41.53 (39.45~43.60)	0.90 (0.85~0.94)	41.09	0.88	21.3 ℃	Nov. 26, 2025
Head 850	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	40.94	0.90	21.3 ℃	Nov. 26, 2025
Head 850	836.5	41.50 (39.43~43.58)	0.90 (0.85~0.94)	41.50	0.90	21.3 ℃	Nov. 26, 2025
Head 850	844	41.50 (39.43~43.58)	0.91 (0.86~0.95)	40.87	0.90	21.3 ℃	Nov. 26, 2025
Head 2450	2412	39.27 (37.30~41.23)	1.77 (1.68~1.85)	39.21	1.77	21.5 ℃	Nov. 28, 2025
Head 2450	2437	39.22 (37.26~41.18)	1.79 (1.70~1.88)	39.23	1.79	21.5 ℃	Nov. 28, 2025
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	40.04	1.80	21.5 ℃	Nov. 28, 2025
Head 2450	2462	39.18 (37.22~41.14)	1.81 (1.72~1.90)	39.21	1.81	21.5 ℃	Nov. 28, 2025
Head 2600	2510	39.12 (37.16~41.08)	1.86 (1.77~1.95)	39.12	1.87	21.4 ℃	Nov. 29, 2025
Head 2600	2535	39.09 (37.13~41.04)	1.89 (1.80~1.99)	39.10	1.89	21.4 ℃	Nov. 29, 2025
Head 2600	2560	39.05 (37.10~41.01)	1.92 (1.82~2.01)	39.08	1.92	21.4 ℃	Nov. 29, 2025
Head 2600	2580	39.03 (37.08~40.98)	1.94 (1.84~2.04)	39.06	1.94	21.4 ℃	Nov. 29, 2025
Head 2600	2595	39.01 (37.06~40.96)	1.95 (1.86~2.05)	39.02	1.95	21.4 ℃	Nov. 29, 2025
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	39.00	1.96	21.4 ℃	Nov. 29, 2025
	2610						
Head 5200	5180	36.02 (34.22~37.82)	4.64 (4.41~4.87)	36.00	4.64	21.1 ℃	Nov. 30, 2025
Head	5200	36.00	4.66	36.00	4.66	21.1 ℃	Nov. 30, 2025

5200		(34.20~37.80)	(4.43~4.89)				
Head 5200	5240	35.96 (34.16~37.76)	4.70 (4.47~4.94)	34.47	4.55	21.1 ℃	Nov. 30, 2025
Head 5200	5260	35.94 (34.14~37.74)	4.72 (4.48~4.96)	35.91	4.72	21.1 ℃	Nov. 30, 2025
Head 5200	5280	35.92 (34.12~37.72)	4.74 (4.50~5.02)	35.85	4.78	21.1 ℃	Nov. 30, 2025
Head 5400	5320	35.88 (34.09~37.67)	4.78 (4.54~4.98)	35.87	4.80	21.8 ℃	Dec. 01, 2025
Head 5400	5400	35.80 (34.01~37.59)	4.86 (4.62~5.10)	35.80	4.86	21.8 ℃	Dec. 01, 2025
Head 5600	5500	35.65 (33.87~37.43)	4.97 (4.72~5.21)	35.70	4.96	21.7 ℃	Dec. 02, 2025
Head 5600	5600	35.50 (33.73~37.28)	5.07 (4.82~5.32)	35.50	5.07	21.7 ℃	Dec. 02, 2025
Head 5600	5700	35.40 (33.63~37.17)	5.17 (4.91~5.43)	35.50	5.16	21.7 ℃	Dec. 02, 2025
Head 5800	5745	35.36 (33.59~37.12)	5.22 (4.95~5.48)	35.31	5.22	21.9 ℃	Dec. 03, 2025
Head 5800	5785	35.32 (33.55~37.08)	5.26 (4.99~5.52)	35.32	5.26	21.9 ℃	Dec. 03, 2025
Head 5800	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	35.30	5.27	21.9 ℃	Dec. 03, 2025
Head 5800	5825	35.28 (33.51~37.04)	5.30 (5.03~5.56)	35.32	5.29	21.9 ℃	Dec. 03, 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. It is fed with a power of 100mW (below 5GHz) or 25mW (above 5GHz). To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).
The system verification is shown as below picture:



4.2.1. System Verification Results

Comparing to the original SAR value provided by SATIMO, the verification data should be within its specification of ±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	Power fed to reference dipole (mW)	Measured SAR Value		Measured SAR (Normalized to 1W)		Target SAR Value (1W)		Deviation (%)		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)	1-g (W/Kg)	10-g (W/Kg)	
835MHz	100	1.011	0.612	10.11	6.12	9.40	6.28	7.55%	-2.55%	Nov. 26, 2025
2450MHz	100	5.184	2.359	51.84	23.59	50.05	23.80	3.58%	-0.88%	Nov. 28, 2025
2600MHz	100	5.433	2.523	54.33	25.23	54.16	24.85	0.31%	1.53%	Nov. 29, 2025
5200MHz	25	3.678	1.303	147.12	52.12	162.59	56.21	-9.51%	-7.28%	Nov. 30, 2025
5400MHz	25	3.705	1.383	148.20	55.32	159.81	55.00	-7.26%	0.58%	Dec. 01, 2025
5600MHz	25	4.106	1.401	164.21	56.02	179.15	61.01	-8.34%	-8.18%	Dec. 02, 2025
5800MHz	25	4.106	1.406	164.21	56.23	182.2	61.32	-9.87%	-8.30%	Dec. 03, 2025

5. SAR measurement variabilit

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.

6. 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.

7. RF Exposure Positions

7.1. Ear and handset reference point

Figure 7.1.1 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 7.1.1 Front, back, and side views of SAM phantom

7.2. 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 wt of the handset at the level of the acoustic output (point A in Figure 7.2.1 and Figure 7.2.2), and the midpoint of the width wb 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 7.2.1). 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 7.2.2), 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 7.2.3), 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 7.2.3. The actual rotation angles should be documented in the test report.

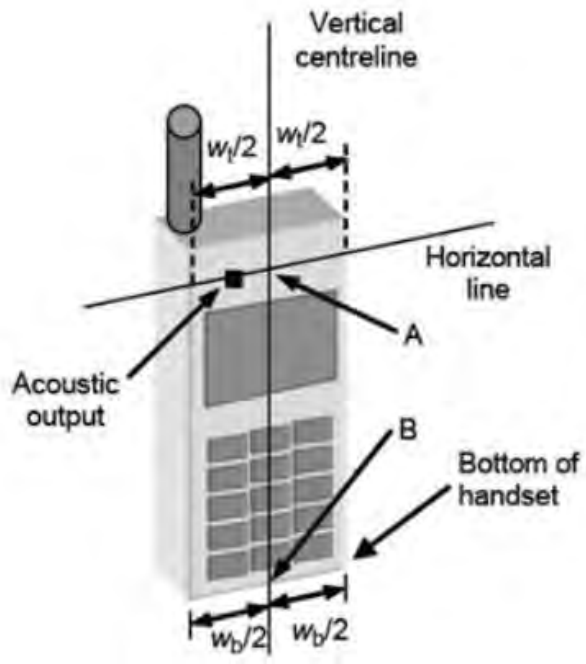


Fig 7.2.1 Handset vertical and horizontal reference lines——fixed case

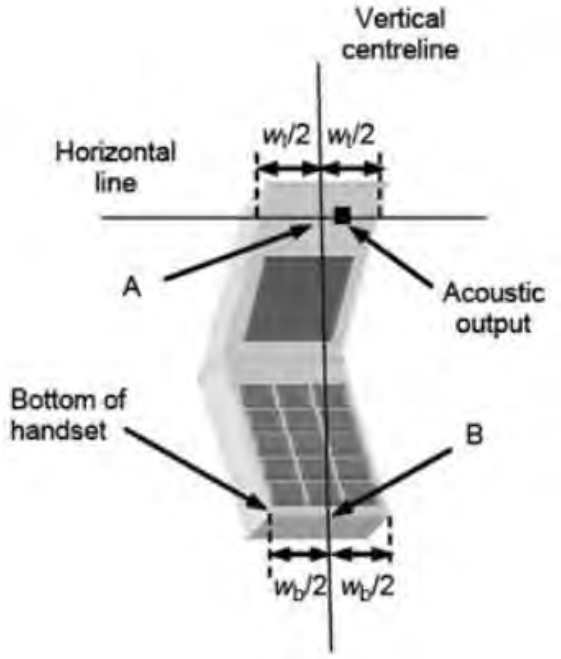


Fig 7.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

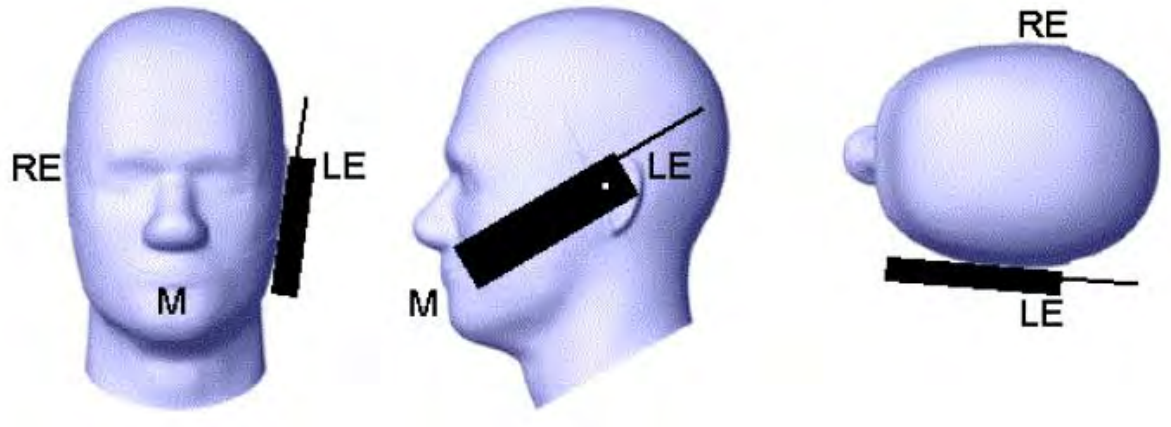


Fig 7.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

7.3. 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 7.3.1).
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 7.3.1 – Tilt position of the wireless device on the left side of SAM

7.4. 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 7.4.1). 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.

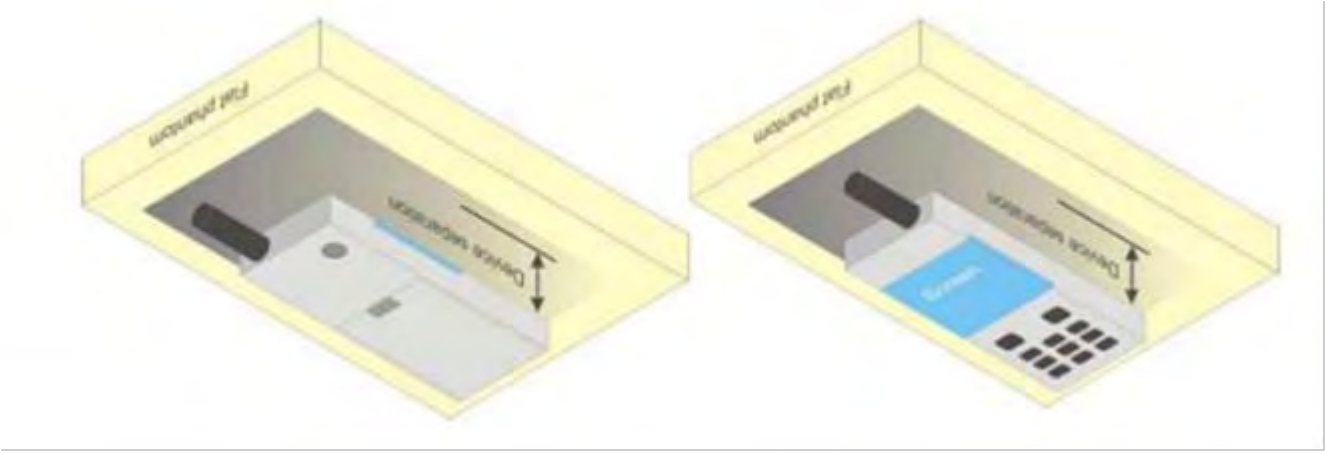


Figure 7.4.1 – Test positions for body-worn devices

7.5. 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.

8. RF Output Power

8.1. LTE Conducted Power

1. The following tests were conducted according to the test requirements outlines in 3GPP TS 36.521-1 specification. A summary of these configurations are illustrated below:

Test Parameters for Channel Bandwidths				
	Downlink Configuration	Uplink Configuration		
Ch BW	N/A for Max UE output power testing	Mod'n	RB allocation	
			FDD	TDD
1.4MHz		QPSK	1	1
1.4MHz		QPSK	5	5
3MHz		QPSK	1	1
3MHz		QPSK	4	4
5MHz		QPSK	1	1
5MHz		QPSK	8	8
10MHz		QPSK	1	1
10MHz		QPSK	12	12
15MHz		QPSK	1	1
15MHz		QPSK	16	16
20MHz		QPSK	1	1
20MHz		QPSK	18	18

Note 1: Test Channel Bandwidths are checked separately for each E-UTRA band, the applicable channel bandwidths are specified in Table 5.4.2.1-1.

Note 2: For E-UTRA bands not applied with Note 2 in Table 6.2.2.3-1:

- The 1 RB allocation shall be tested at RB#0 for low and mid range, RB #max for high range test frequency.
- The RBstart of non-1RB allocation shall be RB #0 for low and mid range, RB# (max +1 - RB allocation) for high range test frequency.

Note 3: For E-UTRA bands applied with Note 2 in Table 6.2.2.3-1:

- If the test channel bandwidth is larger than 4MHz, then the 1 RB allocation shall be tested at both RB #0 and RB #max.
- If the test channel bandwidth is smaller or equal to 4MHz, then the 1 RB allocation shall be tested at RB #0.
- If the test channel bandwidth = (FUL_high - FUL_low) specified by the operating band, then only one frequency range shall be tested and the 1 RB allocation shall be tested at RB #0, RB #$\lceil N_{RB}^{UL}/2 \rceil$ and RB #max.
- For non-1RB allocation, test frequency is middle range, and the RBstart shall be RB #0.

2. LTE Conducted Power Results

LTE output list

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	24.50	23.93	23.83	23.90
			1	2	24.50	24.01	23.96	24.02
			1	5	24.50	23.90	23.84	23.88
			3	0	24.50	24.02	24.00	24.04
			3	1	24.50	24.02	24.02	23.98
			3	2	24.50	23.99	24.00	24.00
			6	0	23.00	22.94	22.91	22.93
		16QAM	1	0	23.50	23.06	22.93	22.93
			1	2	23.50	23.17	22.99	23.03
			1	5	23.50	23.01	22.90	22.94
			3	0	23.50	22.99	23.15	23.07
			3	1	23.50	23.01	23.22	23.05
			3	2	23.50	23.00	23.21	23.04
			6	0	22.00	21.99	21.99	21.91
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	24.50	23.87	23.86	23.89
			1	7	24.50	23.94	23.98	24.01
			1	14	24.50	23.76	23.84	23.86
			8	0	23.00	22.85	22.85	22.92
			8	4	23.00	22.85	22.89	22.89
			8	7	23.00	22.79	22.85	22.83
			15	0	23.00	22.83	22.87	22.88
		16QAM	1	0	24.00	23.44	22.92	23.05
			1	7	24.00	23.54	23.03	23.17
			1	14	24.00	23.35	22.87	23.04
			8	0	22.50	22.04	22.03	21.97
			8	4	22.50	22.07	22.03	21.96
			8	7	22.50	22.00	21.96	21.91
			15	0	22.50	21.95	22.01	21.91
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	24.00	23.67	23.72	23.74
			1	12	24.00	23.78	23.84	23.93
			1	24	24.00	23.69	23.71	23.73
			12	0	23.00	22.71	22.84	22.90
			12	6	23.00	22.76	22.87	22.91
			12	11	23.00	22.74	22.79	22.74
			25	0	23.00	22.72	22.83	22.84
		16QAM	1	0	23.50	22.94	22.56	22.81
			1	12	23.50	23.10	22.68	23.00
			1	24	23.50	22.93	22.60	22.86
			12	0	22.00	21.79	21.90	21.95
			12	6	22.00	21.91	21.97	22.00

			12	11	22.00	21.87	21.82	21.82
			25	0	22.00	21.80	21.92	21.94
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	24.00	23.69	23.72	23.79
			1	24	24.00	23.81	23.84	23.93
			1	49	24.00	23.64	23.66	23.73
			25	0	23.00	22.69	22.83	22.79
			25	12	23.00	22.71	22.78	22.80
			25	24	23.00	22.72	22.75	22.70
			50	0	23.00	22.73	22.82	22.73
		16QAM	1	0	24.00	22.86	23.31	22.82
			1	24	24.00	23.01	23.50	22.93
			1	49	24.00	22.86	23.31	22.78
			25	0	22.50	21.80	22.02	21.98
			25	12	22.50	21.81	21.96	21.97
			25	24	22.50	21.88	21.92	21.87
			50	0	22.00	21.82	21.96	21.85

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20775/2502.5	21100/2535	21425/2567.5
LTE Band 7	5MHz	QPSK	1	0	23.00	22.69	22.04	21.85
			1	12	23.00	22.75	22.13	22.05
			1	24	23.00	22.54	21.97	21.88
			12	0	22.00	21.70	21.05	20.96
			12	6	22.00	21.71	21.11	21.01
			12	11	22.00	21.63	21.01	20.97
			25	0	22.00	21.62	21.01	20.94
		16QAM	1	0	22.00	21.69	21.20	20.69
			1	12	22.00	21.75	21.29	20.83
			1	24	22.00	21.61	21.11	20.70
			12	0	21.00	20.68	20.09	19.93
			12	6	21.00	20.74	20.15	20.02
			12	11	21.00	20.63	20.05	20.01
			25	0	21.00	20.67	20.04	20.04
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	23.00	22.71	22.22	21.96
			1	24	23.00	22.76	22.34	22.13
			1	49	23.00	22.48	22.07	21.94
			25	0	22.00	21.66	21.09	20.95
			25	12	22.00	21.58	21.10	20.99
			25	24	22.00	21.56	21.04	21.06
			50	0	22.00	21.57	21.05	21.01
		16QAM	1	0	22.50	22.14	21.11	21.12
			1	24	22.50	22.22	21.24	21.30
			1	49	22.50	21.96	20.95	21.10
			25	0	21.00	20.77	20.21	20.00
			25	12	21.00	20.67	20.18	20.06

			25	24	21.00	20.69	20.15	20.10
			50	0	21.00	20.63	20.10	20.08
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	23.00	22.64	22.15	21.85
			1	37	23.00	22.56	22.14	21.99
			1	74	23.00	22.25	21.88	21.86
			36	0	22.00	21.73	21.27	21.01
			36	18	22.00	21.65	21.24	21.02
			36	37	22.00	21.53	21.12	21.10
			75	0	22.00	21.67	21.21	21.04
		16QAM	1	0	22.00	21.87	21.26	21.40
			1	37	22.00	21.83	21.20	21.49
			1	74	22.00	21.58	20.98	21.34
			36	0	21.00	20.64	20.19	20.06
			36	18	21.00	20.58	20.20	20.06
			36	37	21.00	20.48	20.10	20.10
			75	0	21.00	20.60	20.17	20.07
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	23.00	22.38	21.99	21.70
			1	49	23.00	22.61	22.27	22.10
			1	99	23.00	21.94	21.62	21.68
			50	0	22.00	21.51	21.08	20.92
			50	24	22.00	21.50	21.08	21.00
			50	49	22.00	21.38	20.89	20.95
			100	0	21.50	21.47	20.98	20.96
		16QAM	1	0	22.50	21.85	21.13	20.92
			1	49	22.50	22.11	21.31	21.41
			1	99	22.50	21.52	20.72	20.91
			50	0	21.00	20.52	20.07	19.95
			50	24	21.00	20.48	20.11	20.01
			50	49	21.00	20.44	19.94	20.04
			100	0	21.00	20.51	20.01	19.99

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		37775/2572.5	38000/2595	38225/2617.5
LTE Band 38	5MHz	QPSK	1	0	22.50	22.02	21.97	22.17
			1	12	22.50	22.02	22.17	22.25
			1	24	22.50	21.98	22.01	22.15
			12	0	21.50	21.02	21.03	21.13
			12	6	21.50	21.12	21.04	21.28
			12	11	21.50	21.01	21.10	21.22
			25	0	21.50	21.06	21.07	21.15
		16QAM	1	0	21.50	21.20	21.04	21.16
			1	12	21.50	21.37	21.29	21.27
			1	24	21.50	20.86	20.71	21.10
			12	0	20.50	19.95	20.00	20.12
			12	6	20.50	20.16	20.09	20.19
			12	11	20.50	20.02	20.04	20.11

			25	0	20.50	20.07	20.07	20.24
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		37800/2575	38000/2595	38200/2615
LTE Band 38	10MHz	QPSK	1	0	22.50	22.11	22.16	22.24
			1	24	22.50	22.24	22.32	22.40
			1	49	22.50	22.02	22.10	22.25
			25	0	21.50	21.00	21.06	21.11
			25	12	21.50	21.14	21.15	21.19
			25	24	21.50	20.99	21.15	21.24
			50	0	21.50	21.04	21.03	21.22
		16QAM	1	0	21.50	21.00	20.82	21.05
			1	24	21.50	21.17	21.13	21.11
			1	49	21.50	21.13	21.23	20.97
			25	0	20.50	20.14	20.07	20.19
			25	12	20.50	20.18	20.10	20.25
			25	24	20.50	20.11	20.17	20.30
			50	0	20.50	19.98	20.11	20.17
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		37825/2577.5	38000/2595	38175/2615
LTE Band 38	15MHz	QPSK	1	0	22.50	22.06	22.08	22.10
			1	37	22.50	22.07	22.18	22.19
			1	74	22.50	21.93	21.99	22.21
			36	0	21.50	21.04	21.06	21.23
			36	18	21.50	21.11	21.08	21.32
			36	37	21.50	21.07	21.14	21.27
			75	0	21.50	21.08	21.07	21.17
		16QAM	1	0	21.50	20.97	20.75	20.77
			1	37	21.50	21.01	21.19	21.16
			1	74	21.50	20.83	20.71	20.85
			36	0	20.50	20.02	20.12	20.19
			36	18	20.50	20.03	20.06	20.25
			36	37	20.50	20.03	20.08	20.25
			75	0	20.50	20.00	20.08	20.25
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		37850/2580	38000/2595	38150/2610
LTE Band 38	20MHz	QPSK	1	0	22.50	21.88	21.80	21.87
			1	49	22.50	22.30	22.23	22.35
			1	99	22.50	21.81	21.79	21.86
			50	0	21.50	20.96	20.94	21.00
			50	24	21.50	20.97	21.00	21.23
			50	49	21.50	20.91	21.09	21.14
			100	0	21.50	21.02	21.01	21.09
		16QAM	1	0	21.50	20.79	20.41	20.65
			1	49	21.50	21.20	20.79	21.06
			1	99	21.50	20.76	20.83	20.64
			50	0	20.50	20.09	20.07	20.04
			50	24	20.50	20.08	20.12	20.25
			50	49	20.50	19.90	20.06	20.21
			100	0	20.50	20.04	20.00	20.20

8.2. Wi-Fi & BT Output Power

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11b	1	2412	15.50	15.18
	6	2437	15.50	15.01
	11	2462	15.50	15.08
802.11g	1	2412	16.00	15.64
	6	2437	16.00	15.50
	11	2462	16.00	15.61
802.11n HT20	1	2412	16.00	15.56
	6	2437	16.00	15.51
	11	2462	16.00	15.65
802.11n HT40	3	2422	16.50	15.82
	6	2437	16.50	15.76
	9	2452	16.50	16.03

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	36	5180	13.50	13.34
	40	5200	13.50	13.25
	48	5240	13.50	12.50
802.11n HT20	36	5180	13.00	12.69
	40	5200	13.00	12.85
	48	5240	13.00	12.24
802.11n HT40	38	5190	11.50	11.15
	46	5230	11.50	10.81

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	52	5260	12.50	12.22
	56	5280	12.50	11.77
	64	5320	12.50	11.93
802.11n HT20	52	5260	12.50	12.16
	56	5280	12.50	11.75
	64	5320	12.50	11.98
802.11n HT40	54	5270	11.00	11.00
	62	5310	11.00	10.68

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	100	5500	14.50	13.67
	120	5600	14.50	14.07

	140	5700	14.50	14.23
802.11n	100	5500	14.00	13.33
	120	5600	14.00	13.93
	140	5700	14.00	13.85
802.11n	102	5510	13.00	11.40
	118	5590	13.00	11.82
	134	5670	13.00	12.57

Mode	Channel	Frequency (MHz)	Tune-up (dBm)	Output Power (dBm)
802.11a	149	5745	14.00	13.92
	157	5785	14.00	13.95
	165	5825	14.00	13.82
802.11n HT20	149	5745	14.00	13.73
	157	5785	14.00	13.71
	165	5825	14.00	13.67
802.11n HT40	151	5755	14.00	13.65
	159	5795	14.00	13.77

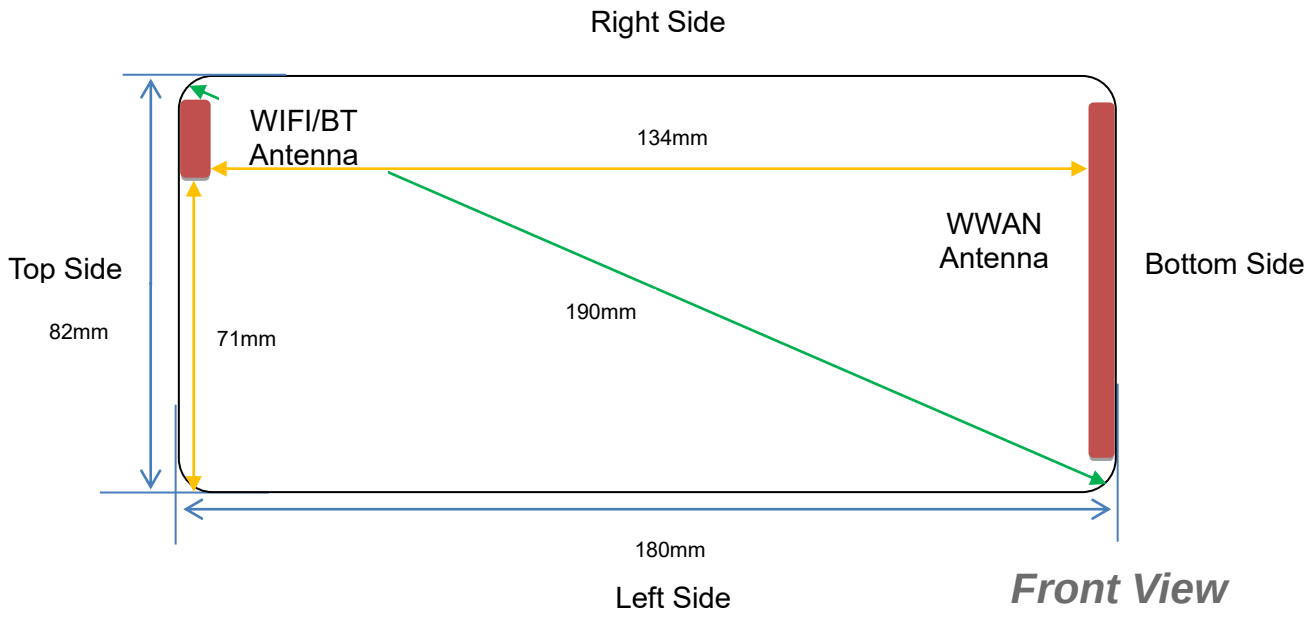
	Output Power (dBm)				
BR+EDR	Channel	Tune-up (dBm)	Data Rates		
			1M	2M	3M
	0CH	1.00	0.48	-0.09	-0.14
	39CH	1.50	1.24	0.34	0.43
	78CH	1.00	0.88	0.05	-0.06

Mode	Channel	Tune-up (dBm)	Output Power (dBm)
BLE1M	CH00	1.00	0.39
	CH19	1.00	0.90
	CH39	1.00	0.96
BLE2M	CH00	1.50	0.78
	CH19	1.50	1.15
	CH39	1.50	1.23

8.3. NFC

Frequency (MHz)	EIRP(dBm)	tune-up(dBm)
13.56MHz	<0.00	0.00

9. Antenna Location



Antenna information:

Distance of The Antenna to the EUT surface and edge (mm)						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
BT/WLAN	≤25mm	≤25mm	>25mm	≤25mm	≤25mm	>25mm
WWAN	≤25mm	≤25mm	≤25mm	≤25mm	>25mm	≤25mm

Positions for SAR tests						
Antennas	Front Side	Back Side	Left Side	Right Side	Top Side	Bottom Side
BT/WLAN	Yes	Yes	NO	Yes	Yes	NO
WWAN	Yes	Yes	Yes	Yes	NO	Yes

10. 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)]·[√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	Pmax (dBm)	Pmax (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	1.50	1.41	5	2.480	0.4	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)] * [√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	Pmax (dBm)	Pmax (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/kg)
Bluetooth	Head	1.50	1.41	5	2.48	7.5	0.059
Bluetooth	Body	1.50	1.41	5	2.48	7.5	0.059
Bluetooth	Hotspot	1.50	1.41	5	2.48	7.5	0.059

NOTE: Estimated SAR calculation for Bluetooth.

11. SAR Measurement Results

< LTE Band 5>

Test Position	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										
Left Cheek	20525/836.5	10M QPSK(1,24)	0.429	0.223	3.62	23.84	24.00	0.445	2025/11/26	#11
Left Tilt 15 Degree	20525/836.5	10M QPSK(1,24)	0.253	0.132	-0.52	23.84	24.00	0.262	2025/11/26	
Right Cheek	20525/836.5	10M QPSK(1,24)	0.387	0.201	0.75	23.84	24.00	0.402	2025/11/26	
Right Tilt 15 Degree	20525/836.5	10M QPSK(1,24)	0.176	0.091	0.69	23.84	24.00	0.183	2025/11/26	
50%RB										
Left Cheek	20525/836.5	10M QPSK(25,0)	0.239	0.114	3.97	22.83	23.00	0.249	2025/11/26	
Left Tilt 15 Degree	20525/836.5	10M QPSK(25,0)	0.127	0.079	-1.34	22.83	23.00	0.132	2025/11/26	
Right Cheek	20525/836.5	10M QPSK(25,0)	0.210	0.114	-2.12	22.83	23.00	0.218	2025/11/26	
Right Tilt 15 Degree	20525/836.5	10M QPSK(25,0)	0.091	0.046	-0.95	22.83	23.00	0.095	2025/11/26	

Test Position of Hotspot with 5mm	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(1,24)	0.342	0.176	-2.85	23.84	24.00	0.355	2025/11/26	
Back	20525/836.5	10M QPSK(1,24)	0.526	0.276	-2.39	23.84	24.00	0.546	2025/11/26	#12

Side										
Left Side	20525/836.5	10M QPSK(1,24)	0.171	0.090	-1.30	23.84	24.00	0.177	2025/11/26	
Right Side	20525/836.5	10M QPSK(1,24)	0.168	0.084	3.02	23.84	24.00	0.174	2025/11/26	
Bottom Side	20525/836.5	10M QPSK(1,24)	0.275	0.137	-1.24	23.84	24.00	0.285	2025/11/26	
50%RB										
Front Side	20525/836.5	10M QPSK(25,0)	0.174	0.097	-2.36	22.83	23.00	0.181	2025/11/26	
Back Side	20525/836.5	10M QPSK(25,0)	0.312	0.151	4.51	22.83	23.00	0.324	2025/11/26	
Left Side	20525/836.5	10M QPSK(25,0)	0.086	0.048	-0.63	22.83	23.00	0.089	2025/11/26	
Right Side	20525/836.5	10M QPSK(25,0)	0.087	0.049	-4.86	22.83	23.00	0.090	2025/11/26	
Bottom Side	20525/836.5	10M QPSK(25,0)	0.141	0.077	1.13	22.83	23.00	0.147	2025/11/26	

< LTE Band 7>

Test Position	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										
Left Cheek	21100/2535	20M QPSK(1,49)	0.358	0.236	1.20	22.27	23.00	0.424	2025/11/29	#13
Left Tilt 15 Degree	21100/2535	20M QPSK(1,49)	0.195	0.129	-0.77	22.27	23.00	0.231	2025/11/29	
Right Cheek	21100/2535	20M QPSK(1,49)	0.327	0.213	-3.95	22.27	23.00	0.387	2025/11/29	
Right Tilt 15 Degree	21100/2535	20M QPSK(1,49)	0.171	0.107	3.19	22.27	23.00	0.202	2025/11/29	
50%RB										
Left Cheek	21100/2535	20M QPSK(50,0)	0.190	0.118	-1.98	21.08	22.00	0.235	2025/11/29	
Left Tilt 15	21100/2535	20M QPSK(50,0)	0.114	0.071	-4.28	21.08	22.00	0.141	2025/11/29	

Degree										
Right Cheek	21100/2535	20M QPSK(50,0)	0.182	0.110	-4.58	21.08	22.00	0.225	2025/11/29	
Right Tilt 15 Degree	21100/2535	20M QPSK(50,0)	0.099	0.056	-1.38	21.08	22.00	0.122	2025/11/29	

Test Position of Hotspot with 5mm	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(1,49)	0.108	0.074	1.63	22.27	23.00	0.128	2025/11/29	
Back Side	21100/2535	20M QPSK(1,49)	0.180	0.123	2.54	22.27	23.00	0.213	2025/11/29	#14
Left Side	21100/2535	20M QPSK(1,49)	0.054	0.036	-3.47	22.27	23.00	0.064	2025/11/29	
Right Side	21100/2535	20M QPSK(1,49)	0.066	0.044	0.18	22.27	23.00	0.078	2025/11/29	
Bottom Side	21100/2535	20M QPSK(1,49)	0.100	0.066	-3.30	22.27	23.00	0.118	2025/11/29	
50%RB										
Front Side	21100/2535	20M QPSK(50,0)	0.055	0.040	-0.18	21.08	22.00	0.068	2025/11/29	
Back Side	21100/2535	20M QPSK(50,0)	0.099	0.073	-2.52	21.08	22.00	0.122	2025/11/29	
Left Side	21100/2535	20M QPSK(50,0)	0.028	0.018	2.95	21.08	22.00	0.035	2025/11/29	
Right Side	21100/2535	20M QPSK(50,0)	0.038	0.025	3.08	21.08	22.00	0.047	2025/11/29	
Bottom Side	21100/2535	20M QPSK(50,0)	0.058	0.035	1.24	21.08	22.00	0.072	2025/11/29	

< LTE Band 38>

Test Position	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g	Date	Plot
			1g	10g						

								(W/Kg)		
1RB										
Left Cheek	38000/2595	20M QPSK(1,49)	0.312	0.167	2.13	22.23	22.50	0.332	2025/11/29	#15
Left Tilt 15 Degree	38000/2595	20M QPSK(1,49)	0.171	0.087	-2.42	22.23	22.50	0.182	2025/11/29	
Right Cheek	38000/2595	20M QPSK(1,49)	0.274	0.145	0.65	22.23	22.50	0.292	2025/11/29	
Right Tilt 15 Degree	38000/2595	20M QPSK(1,49)	0.145	0.076	3.89	22.23	22.50	0.154	2025/11/29	
50%RB										
Left Cheek	38000/2595	20M QPSK(50,24)	0.168	0.089	2.05	21.00	21.50	0.188	2025/11/29	
Left Tilt 15 Degree	38000/2595	20M QPSK(50,24)	0.091	0.047	-4.70	21.00	21.50	0.102	2025/11/29	
Right Cheek	38000/2595	20M QPSK(50,24)	0.163	0.080	1.58	21.00	21.50	0.183	2025/11/29	
Right Tilt 15 Degree	38000/2595	20M QPSK(50,24)	0.075	0.043	-4.56	21.00	21.50	0.084	2025/11/29	

Test Position of Hotspot with 5mm	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	38000/2595	20M QPSK(1,49)	0.216	0.125	1.02	22.23	22.50	0.230	2025/11/29	
Back Side	38000/2595	20M QPSK(1,49)	0.341	0.204	-0.17	22.23	22.50	0.363	2025/11/29	#16
Left Side	38000/2595	20M QPSK(1,49)	0.111	0.066	-1.68	22.23	22.50	0.118	2025/11/29	
Right Side	38000/2595	20M QPSK(1,49)	0.110	0.065	-3.95	22.23	22.50	0.117	2025/11/29	
Bottom	38000/2595	20M QPSK(1,49)	0.175	0.104	-1.21	22.23	22.50	0.186	2025/11/29	

Side										
50%RB										
Front Side	38000/2595	20M QPSK(50,24)	0.118	0.074	2.68	21.00	21.50	0.132	2025/11/29	
Back Side	38000/2595	20M QPSK(50,24)	0.201	0.119	-4.69	21.00	21.50	0.226	2025/11/29	
Left Side	38000/2595	20M QPSK(50,24)	0.059	0.034	-4.18	21.00	21.50	0.066	2025/11/29	
Right Side	38000/2595	20M QPSK(50,24)	0.062	0.033	-2.05	21.00	21.50	0.070	2025/11/29	
Bottom Side	38000/2595	20M QPSK(50,24)	0.096	0.056	3.82	21.00	21.50	0.108	2025/11/29	

< WiFi 2.4G>

Test Position	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						
Left Cheek	1/2412	802.11b	0.531	0.323	-0.94	15.18	15.50	0.572	2025/11/28	#9
Left Cheek	9/2452	802.11n HT40	0.512	0.308	1.47	16.03	16.50	0.571	2025/11/28	
Left Tilt 15 Degree	1/2412	802.11b	0.285	0.170	0.78	15.18	15.50	0.307	2025/11/28	
Right Cheek	1/2412	802.11b	0.481	0.278	0.95	15.18	15.50	0.518	2025/11/28	
Right Tilt 15 Degree	1/2412	802.11b	0.219	0.127	0.06	15.18	15.50	0.236	2025/11/28	

Test Position of Hotspot with 5mm	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	1/2412	802.11b	0.234	0.135	-0.12	15.18	15.50	0.252	2025/11/28	
Back	1/2412	802.11b	0.344	0.204	1.52	15.18	15.50	0.370	2025/11/28	#10

Side										
Back Side	9/2452	802.11n HT40	0.328	0.187	0.47	16.03	16.50	0.365	2025/11/28	
Right Side	1/2412	802.11b	0.117	0.066	-0.47	15.18	15.50	0.126	2025/11/28	
Top Side	1/2412	802.11b	0.114	0.067	2.31	15.18	15.50	0.123	2025/11/28	

< WiFi 5.2G>

Test Position	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						
Left Cheek	36/5180	802.11a	0.401	0.190	-4.95	13.34	13.50	0.416	2025/11/30	#1
Left Tilt 15 Degree	36/5180	802.11a	0.206	0.093	-1.00	13.34	13.50	0.214	2025/11/30	
Right Cheek	36/5180	802.11a	0.373	0.171	1.34	13.34	13.50	0.387	2025/11/30	
Right Tilt 15 Degree	36/5180	802.11a	0.203	0.092	2.43	13.34	13.50	0.211	2025/11/30	

Test Position of Hotspot with 5mm	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	36/5180	802.11a	0.204	0.107	1.37	13.34	13.50	0.212	2025/11/30	
Back Side	36/5180	802.11a	0.317	0.166	3.70	13.34	13.50	0.329	2025/11/30	#2
Right Side	36/5180	802.11a	0.099	0.051	-1.59	13.34	13.50	0.103	2025/11/30	
Top Side	36/5180	802.11a	0.102	0.052	2.69	13.34	13.50	0.106	2025/11/30	

< WiFi 5.3G>

Test Position	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						
Left Cheek	52/5260	802.11a	0.533	0.265	-0.78	12.22	12.50	0.568	2025/12/1	#3
Left Tilt 15 Degree	52/5260	802.11a	0.303	0.151	-1.79	12.22	12.50	0.323	2025/12/1	
Right Cheek	52/5260	802.11a	0.485	0.239	-1.10	12.22	12.50	0.517	2025/12/1	
Right Tilt 15 Degree	52/5260	802.11a	0.239	0.115	2.65	12.22	12.50	0.255	2025/12/1	

Test Position of Hotspot with 5mm	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	52/5260	802.11a	0.258	0.137	0.11	12.22	12.50	0.275	2025/12/1	
Back Side	52/5260	802.11a	0.412	0.223	0.60	12.22	12.50	0.439	2025/12/1	#4
Right Side	52/5260	802.11a	0.129	0.068	0.93	12.22	12.50	0.138	2025/12/1	
Top Side	52/5260	802.11a	0.126	0.068	-0.50	12.22	12.50	0.134	2025/12/1	

< WiFi 5.6G>

Test Position	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						
Left Cheek	140/5700	802.11a	0.395	0.174	1.35	14.23	14.50	0.420	2025/12/2	#5
Left Tilt 15 Degree	140/5700	802.11a	0.211	0.093	-0.64	14.23	14.50	0.225	2025/12/2	

Right Cheek	140/5700	802.11a	0.359	0.155	-3.38	14.23	14.50	0.382	2025/12/2	
Right Tilt 15 Degree	140/5700	802.11a	0.185	0.079	-3.48	14.23	14.50	0.197	2025/12/2	

Test Position of Hotspot with 5mm	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	140/5700	802.11a	0.234	0.120	-1.91	14.23	14.50	0.249	2025/12/2	
Back Side	140/5700	802.11a	0.353	0.184	4.04	14.23	14.50	0.376	2025/12/2	#6
Right Side	140/5700	802.11a	0.117	0.061	-2.38	14.23	14.50	0.125	2025/12/2	
Top Side	140/5700	802.11a	0.108	0.053	1.92	14.23	14.50	0.115	2025/12/2	

< WiFi 5.8G>

Test Position	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						
Left Cheek	157/5785	802.11a	0.357	0.231	-4.27	13.95	14.00	0.361	2025/12/3	#7
Left Tilt 15 Degree	157/5785	802.11a	0.181	0.114	-3.49	13.95	14.00	0.183	2025/12/3	
Right Cheek	157/5785	802.11a	0.334	0.207	3.44	13.95	14.00	0.338	2025/12/3	
Right Tilt 15 Degree	157/5785	802.11a	0.170	0.110	-0.51	13.95	14.00	0.172	2025/12/3	

Test Position of	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g	Date	Plot
			1g	10g						

Hotspot with 5mm								(W/Kg)		
Front Side	157/5785	802.11a	0.330	0.157	1.41	13.95	14.00	0.334	2025/12/3	
Back Side	157/5785	802.11a	0.516	0.253	3.54	13.95	14.00	0.522	2025/12/3	#8
Right Side	157/5785	802.11a	0.159	0.075	-3.38	13.95	14.00	0.161	2025/12/3	
Top Side	157/5785	802.11a	0.168	0.082	-3.60	13.95	14.00	0.170	2025/12/3	

12. 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.

No.	Simultaneous Tx	Head	Body-worn	Hotspot
1	WWAN+WLAN	Yes	Yes	Yes
2	WWAN+Bluetooth	Yes	Yes	Yes

Note：WiFi and Bluetooth use the same antenna and cannot be transmitted at the same time.

Exposure Position		WWAN Band	NII/DTS/DSS	Simultaneous Tx SAR(W/Kg)
		SAR(W/Kg)	SAR(W/Kg)	
Head	Left Cheek	0.445	0.572	1.017
	Left Tilt 15 Degree	0.262	0.323	0.585
	Right Cheek	0.402	0.518	0.920
	Right Tilt 15 Degree	0.202	0.255	0.457
Body&Hotspot	Front Side	0.355	0.334	0.689
	Back Side	0.546	0.522	1.068
	Left Side	0.177	/	0.177
	Right Side	0.174	0.161	0.335
	Top Side	/	0.170	0.170
	Bottom Side	0.285	/	0.285

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

Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

Appendix B. System Check Plots

Table of contents
#1 System Performance Check - 850MHz
#2 System Performance Check - 2450MHz
#3 System Performance Check - 2600MHz
#4 System Performance Check - 5200MHz
#5 System Performance Check - 5400MHz
#6 System Performance Check - 5600MHz
#7 System Performance Check - 5800MHz

#1

Date of measurement: 26/11/2025

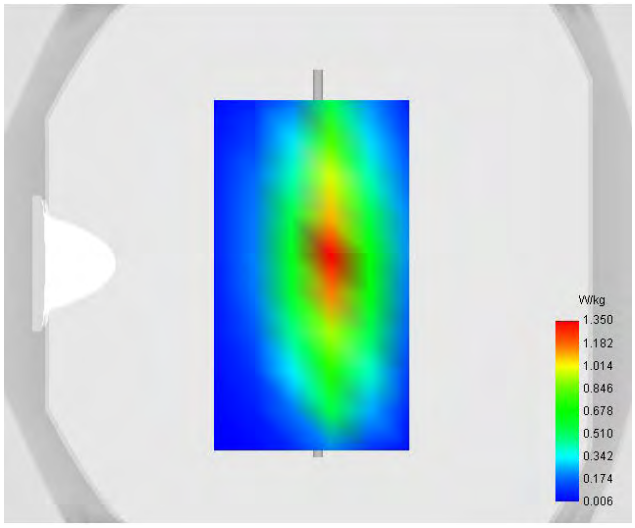
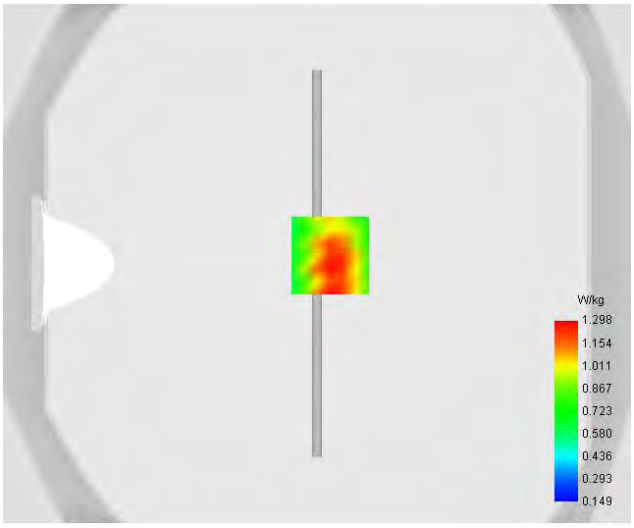
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	1.66
Area Scan	dx=15mm dy=15mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	835.000
Relative permitivity (real part)	40.940
Relative permitivity (imaginary part)	19.300
Conductivity (S/m)	0.895

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

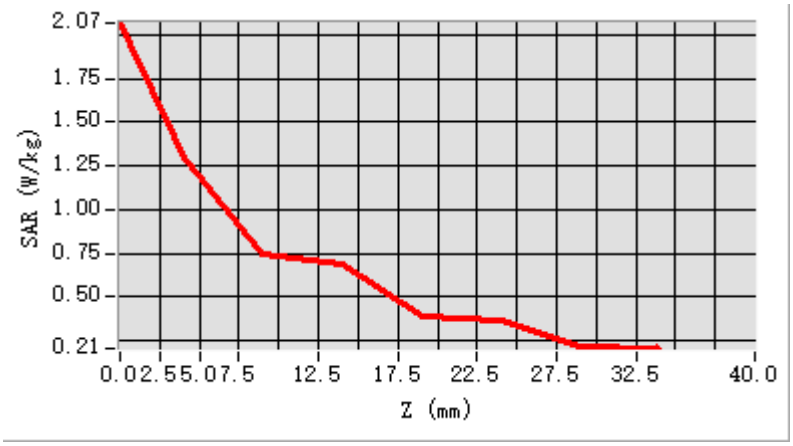
Maximum location: X=5.00, Y=3.00 ; SAR Peak: 1.90 W/kg

D. SAR 1g & 10g

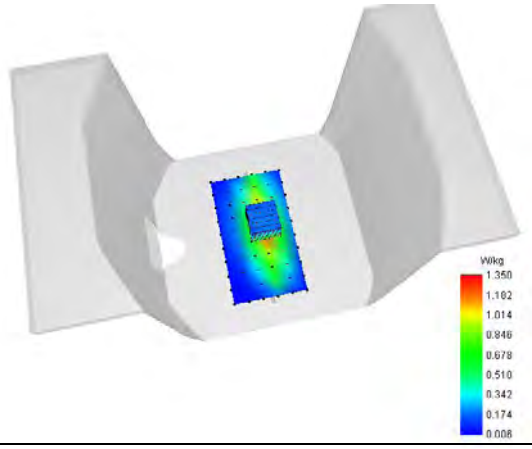
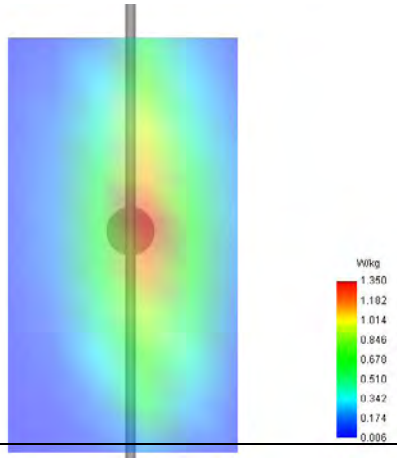
SAR 10g (W/Kg)	0.612
SAR 1g (W/Kg)	1.011
Variation (%)	2.200
Horizontal validation criteria: minimum distance (mm)	15.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	57.716049

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.064	1.296	0.748	0.687	0.392	0.367	0.223



F. 3D Image

3D screen shot	Hot spot position
	

#2

Date of measurement: 28/11/2025

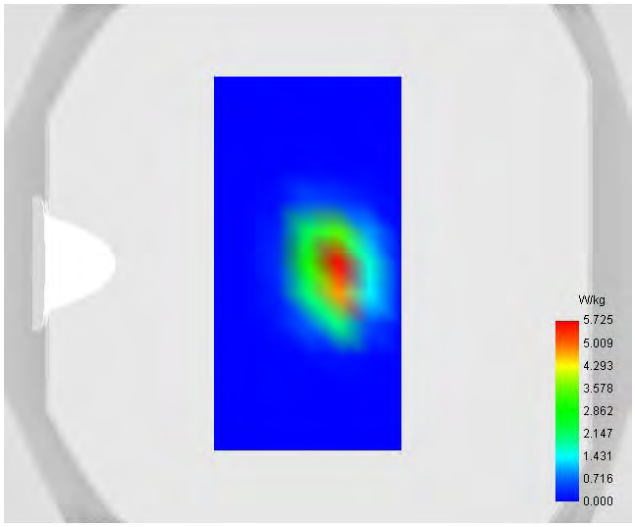
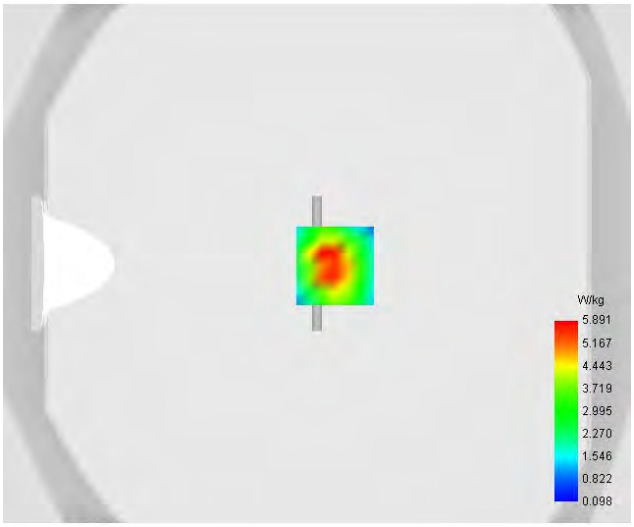
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.38
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

B. Permitivity

Middle TX Frequency (MHz)	2450.000
Relative permitivity (real part)	41.040
Relative permitivity (imaginary part)	13.220
Conductivity (S/m)	1.799

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

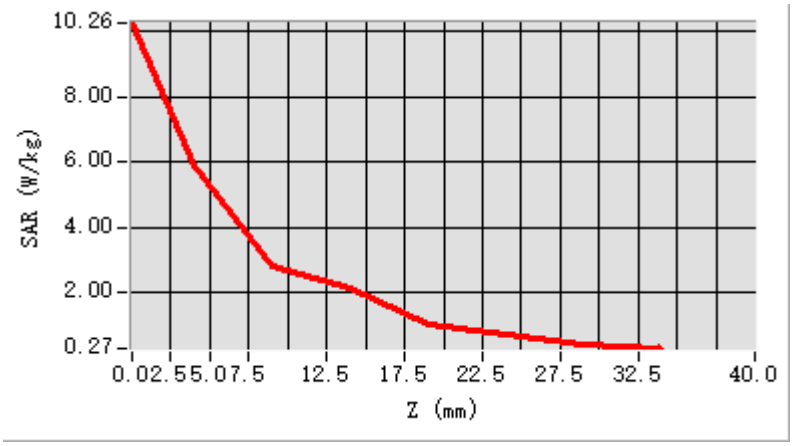
Maximum location: X=7.00, Y=-1.00 ; SAR Peak: 8.99 W/kg

D. SAR 1g & 10g

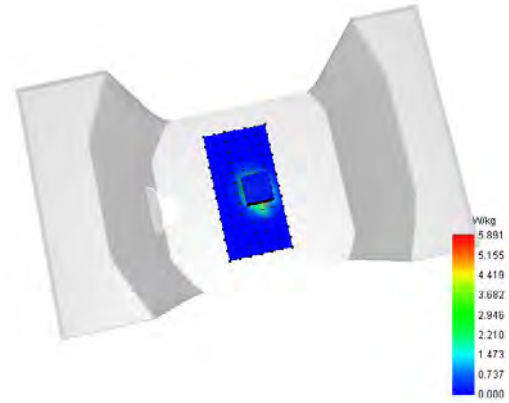
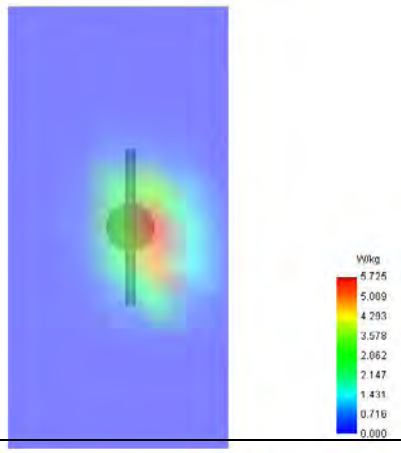
SAR 10g (W/Kg)	2.359
SAR 1g (W/Kg)	5.184
Variation (%)	-3.040
Horizontal validation criteria: minimum distance (mm)	10.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	47.564081

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	10.263	5.891	2.802	2.126	1.045	0.723	0.415



F. 3D Image

3D screen shot	Hot spot position
	

#3

Date of measurement: 29/11/2025

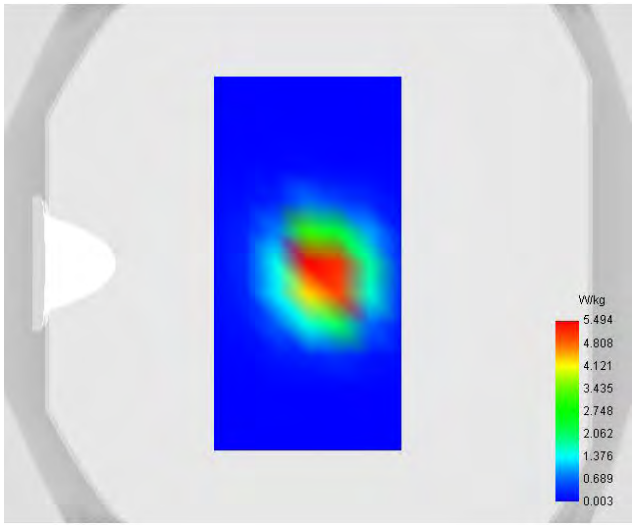
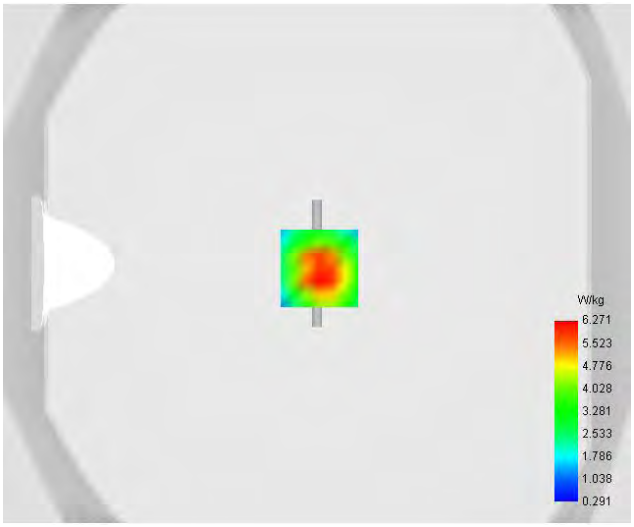
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.35
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

B. Permitivity

Middle TX Frequency (MHz)	2600.000
Relative permitivity (real part)	39.000
Relative permitivity (imaginary part)	13.570
Conductivity (S/m)	1.960

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

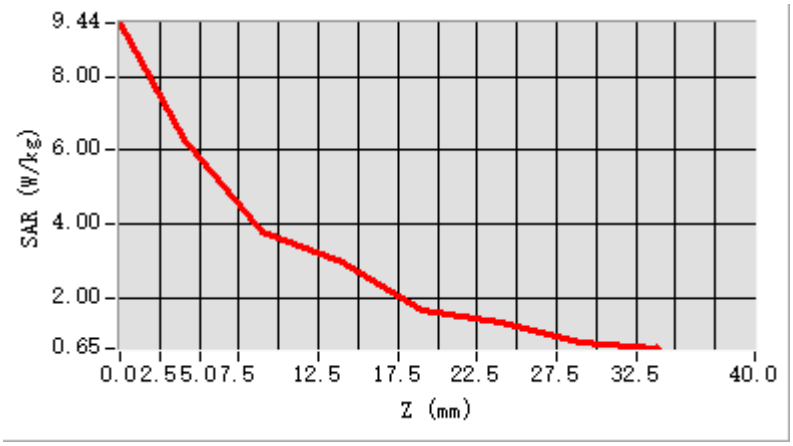
Maximum location: X=1.00, Y=-2.00 ; SAR Peak: 8.65 W/kg

D. SAR 1g & 10g

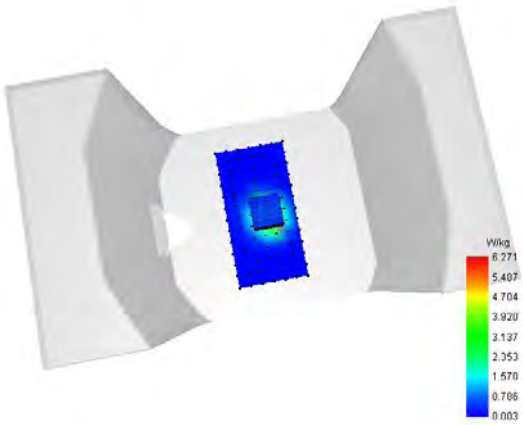
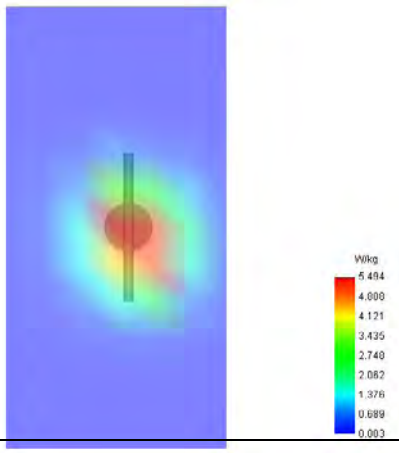
SAR 10g (W/Kg)	2.523
SAR 1g (W/Kg)	5.433
Variation (%)	-0.710
Horizontal validation criteria: minimum distance (mm)	11.180340
Vertical validation criteria: SAR ratio M2/M1 (%)	60.197736

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	9.444	6.271	3.775	2.988	1.706	1.361	0.819



F. 3D Image

3D screen shot	Hot spot position
	

#4

Date of measurement: 30/11/2025

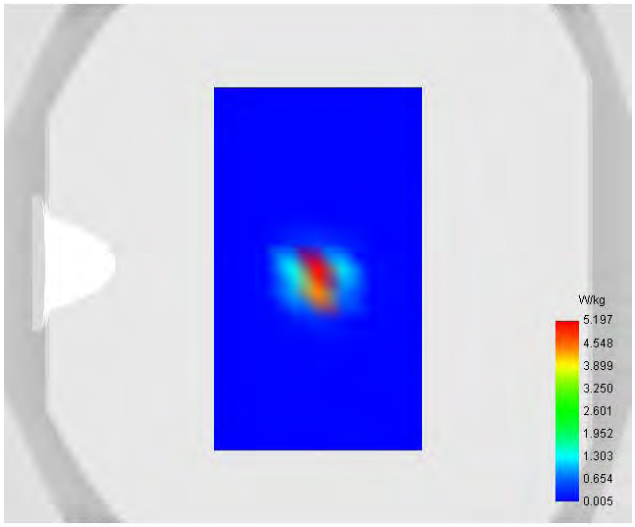
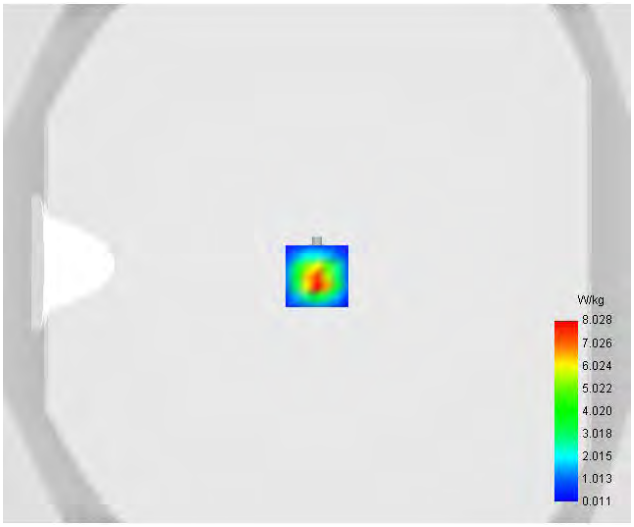
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
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	CW5200
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5200.000
Relative permitivity (real part)	36.000
Relative permitivity (imaginary part)	16.130
Conductivity (S/m)	4.660

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

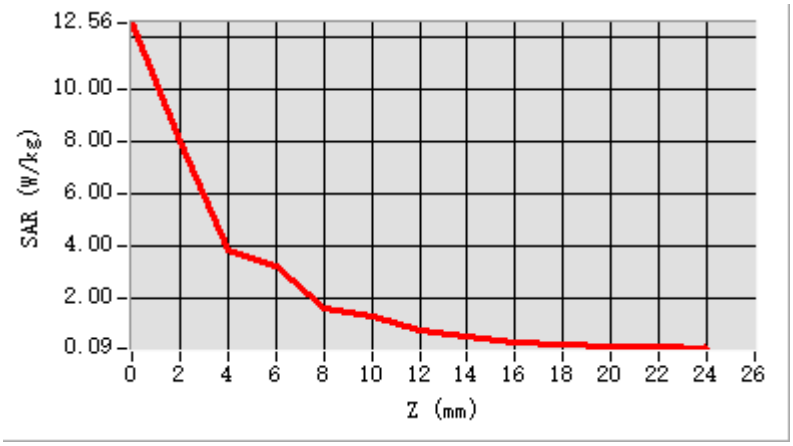
Maximum location: X=0.00, Y=-5.00 ; SAR Peak: 13.42 W/kg

D. SAR 1g & 10g

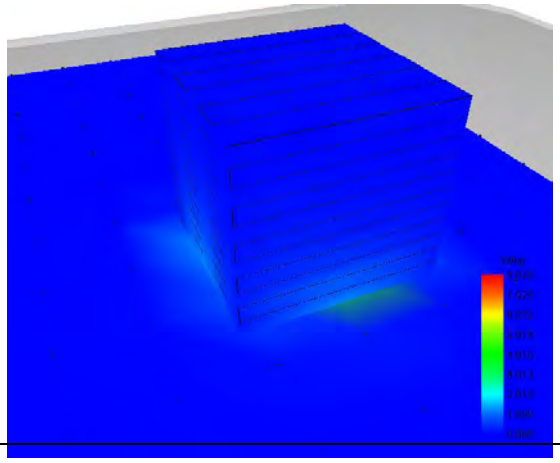
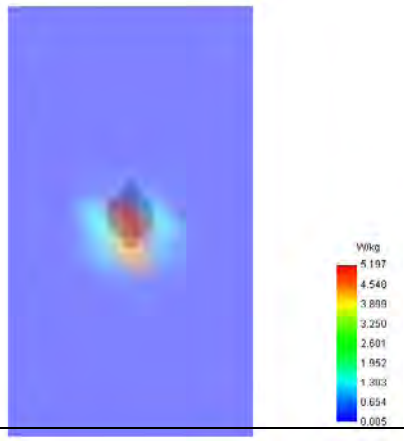
SAR 10g (W/Kg)	1.303
SAR 1g (W/Kg)	3.678
Variation (%)	4.620
Horizontal validation criteria: minimum distance (mm)	4.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	48.169909

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)	12.564	8.028	3.867	3.214	1.625	1.324	0.785	0.581	0.314	0.263	0.145	0.126



F. 3D Image

3D screen shot	Hot spot position
	

#5

Date of measurement: 1/12/2025

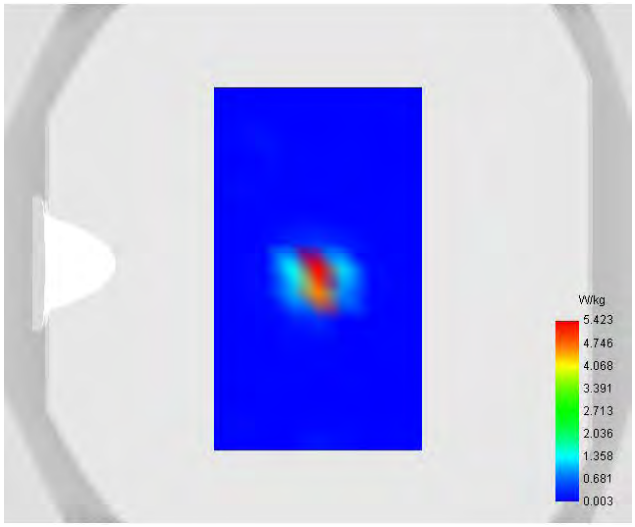
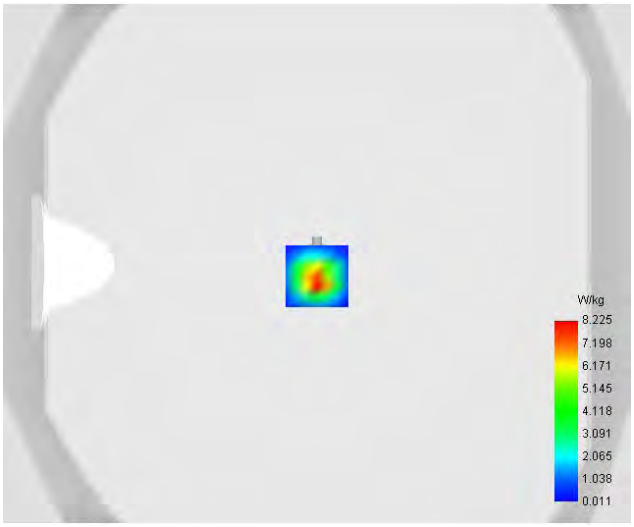
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
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	CW5400
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5400.000
Relative permitivity (real part)	35.800
Relative permitivity (imaginary part)	16.200
Conductivity (S/m)	4.860

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

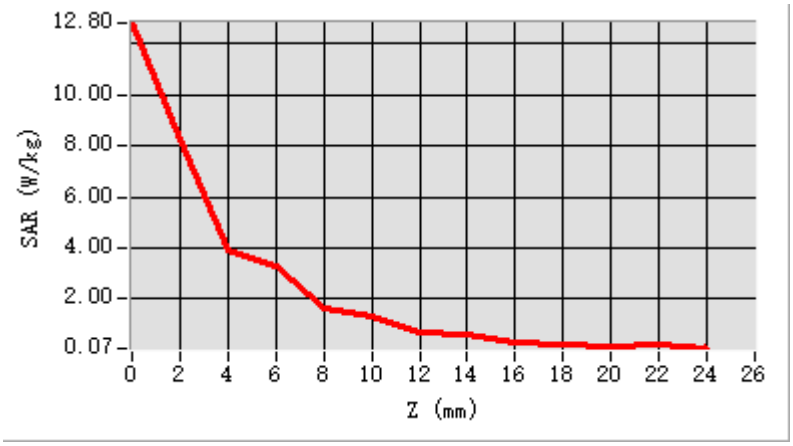
Maximum location: X=0.00, Y=-5.00 ; SAR Peak: 13.65 W/kg

D. SAR 1g & 10g

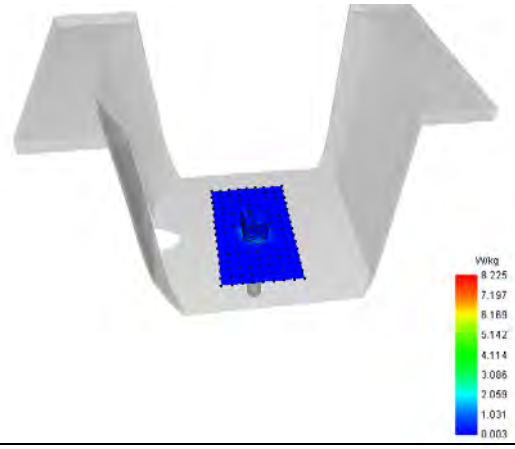
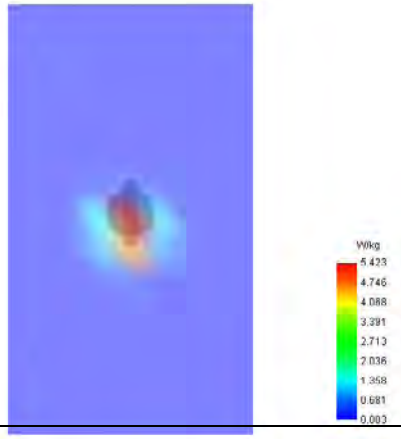
SAR 10g (W/Kg)	1.383
SAR 1g (W/Kg)	3.705
Variation (%)	2.400
Horizontal validation criteria: minimum distance (mm)	4.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	47.562310

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)	12.799	8.225	3.912	3.312	1.619	1.364	0.720	0.584	0.300	0.253	0.139	0.225



F. 3D Image

3D screen shot	Hot spot position
	

#6

Date of measurement: 2/12/2025

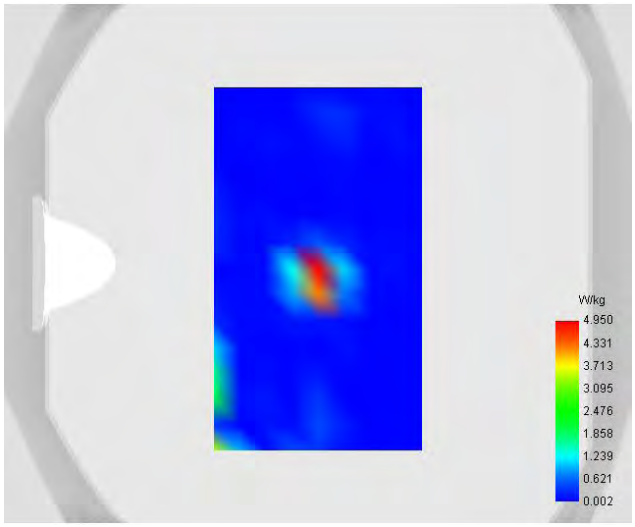
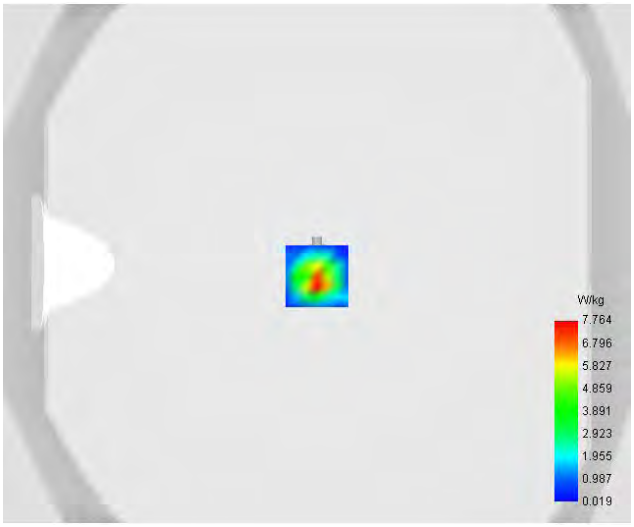
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.29
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	CW5600
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5600.000
Relative permitivity (real part)	35.500
Relative permitivity (imaginary part)	16.300
Conductivity (S/m)	5.071

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

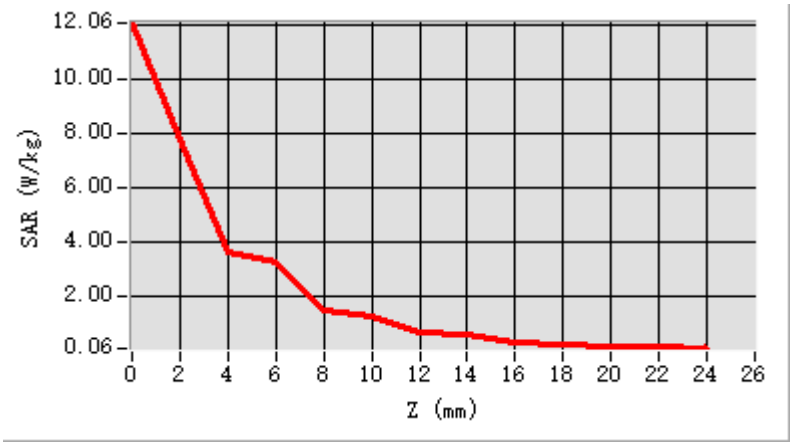
Maximum location: X=0.00, Y=-5.00 ; SAR Peak: 13.29 W/kg

D. SAR 1g & 10g

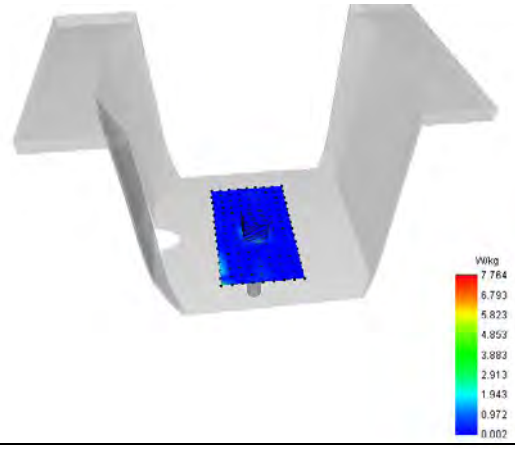
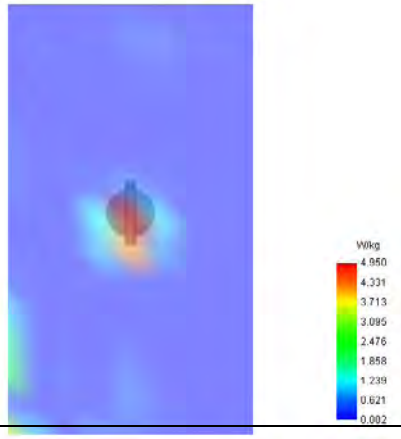
SAR 10g (W/Kg)	1.401
SAR 1g (W/Kg)	4.106
Variation (%)	2.170
Horizontal validation criteria: minimum distance (mm)	4.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	46.535291

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)	12.064	7.764	3.613	3.268	1.499	1.252	0.632	0.611	0.273	0.227	0.123	0.104



F. 3D Image

3D screen shot	Hot spot position
	

#7

Date of measurement: 3/12/2025

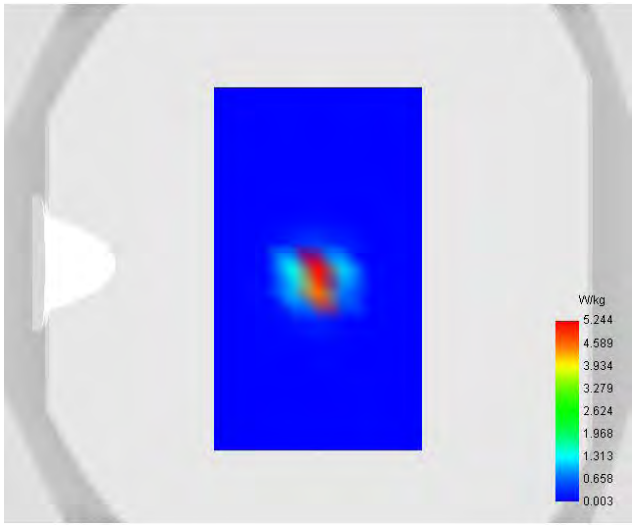
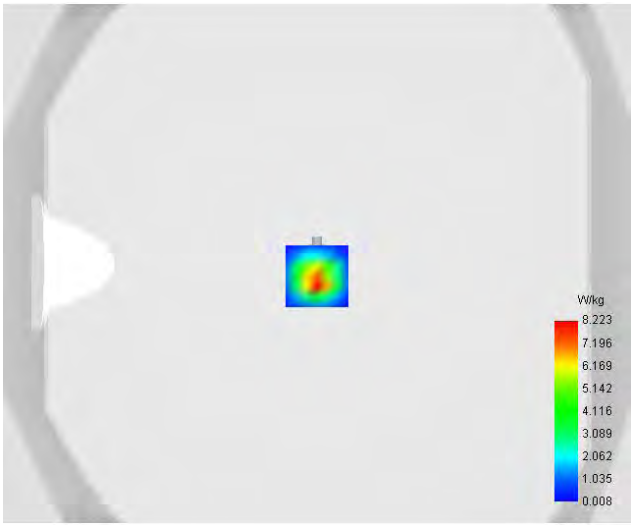
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.27
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	CW5800
Channels/Frequency	Middle

B. Permitivity

Middle TX Frequency (MHz)	5800.000
Relative permitivity (real part)	35.300
Relative permitivity (imaginary part)	16.360
Conductivity (S/m)	5.272

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

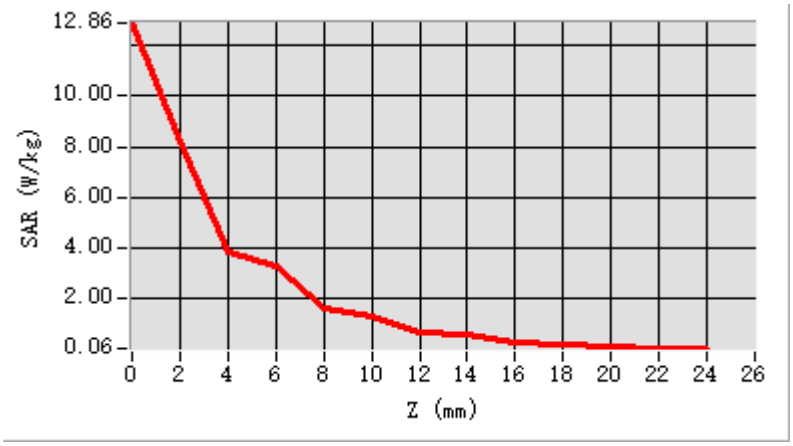
Maximum location: X=0.00, Y=-5.00 ; SAR Peak: 13.82 W/kg

D. SAR 1g & 10g

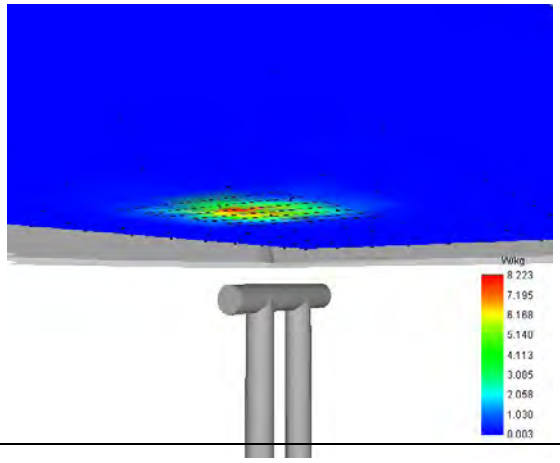
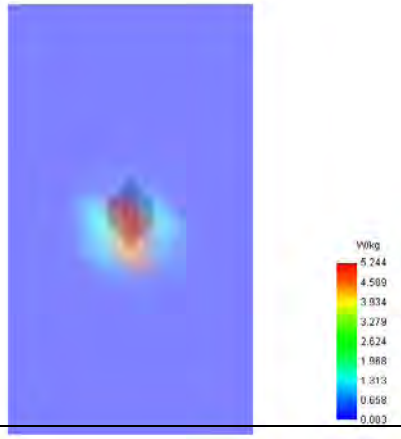
SAR 10g (W/Kg)	1.406
SAR 1g (W/Kg)	4.106
Variation (%)	1.050
Horizontal validation criteria: minimum distance (mm)	4.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	47.257692

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)	12.863	8.223	3.886	3.302	1.611	1.337	0.671	0.582	0.287	0.232	0.129	0.083



F. 3D Image

3D screen shot	Hot spot position
	

Appendix C. SAR Test Plots

Table of contents
#1 WALN 5.2G Head
#2 WALN 5.2G Body
#3 WALN 5.3G Head
#4 WALN 5.3G Body
#5 WALN 5.6G Head
#6 WALN 5.6G Body
#7 WALN 5.8G Head
#8 WALN 5.8G Body
#9 WALN 2.4G Head
#10 WALN 2.4G Body
#11 LTE Band 5 Head
#12 LTE Band 5 Body
#13 LTE Band 7 Head
#14 LTE Band 7 Body
#15 LTE Band 38 Head
#16 LTE Band 38 Body

#1

Date of measurement: 30/11/2025

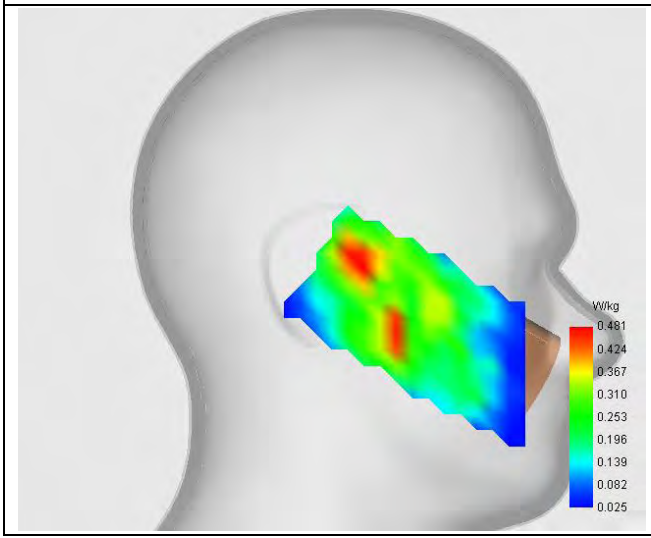
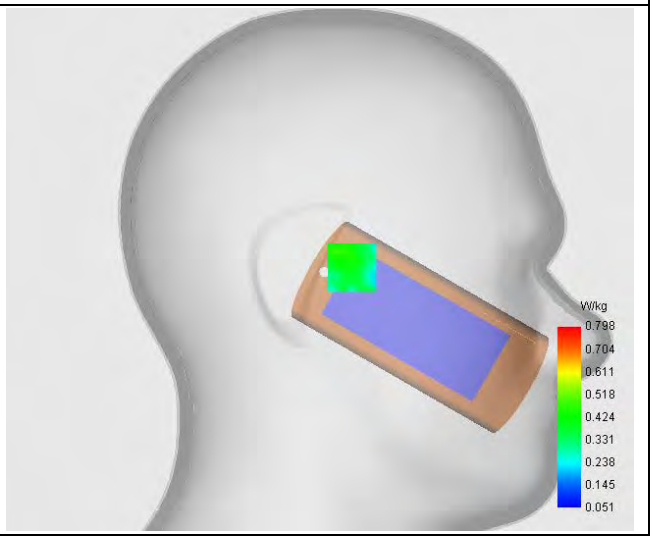
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-1
Channels/Frequency	Low (36)/ frequency 5180.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5180.000
Relative permitivity (real part)	36.000
Relative permitivity (imaginary part)	16.120
Conductivity (S/m)	4.639

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

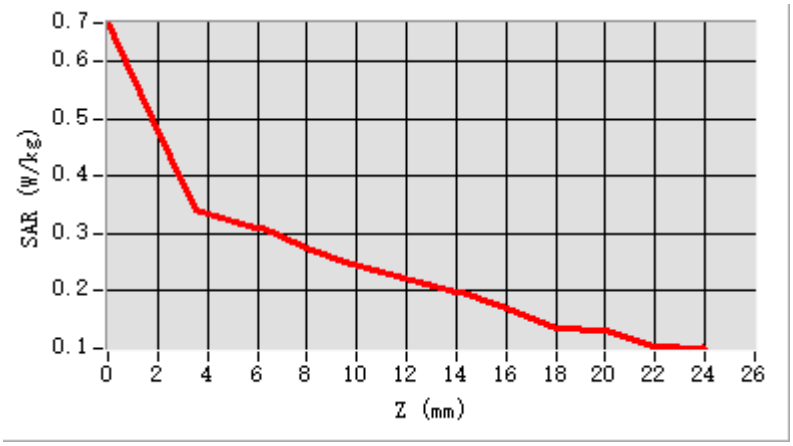
Maximum location: X=-16.00, Y=1.00 ; SAR Peak: 2.06 W/kg

D. SAR 1g & 10g

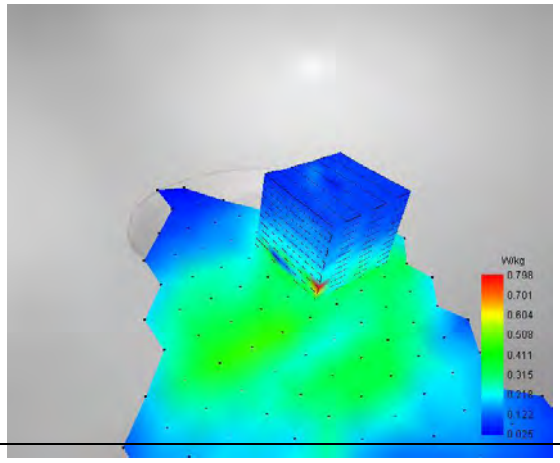
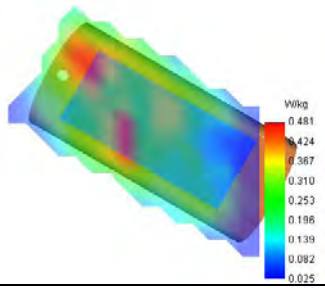
SAR 10g (W/Kg)	0.190
SAR 1g (W/Kg)	0.401
Variation (%)	-4.950
Horizontal validation criteria: minimum distance (mm)	20.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	62.212944

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)	0.667	0.479	0.298	0.315	0.273	0.244	0.296	0.200	0.171	0.136	0.131	0.103



F. 3D Image

3D screen shot	Hot spot position
	

#2

Date of measurement: 30/11/2025

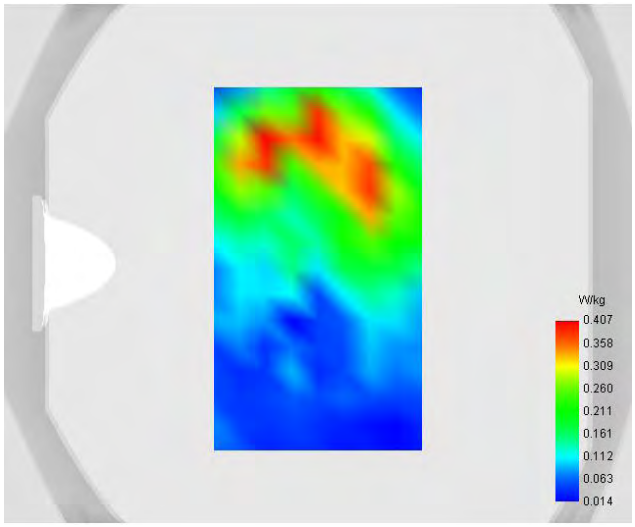
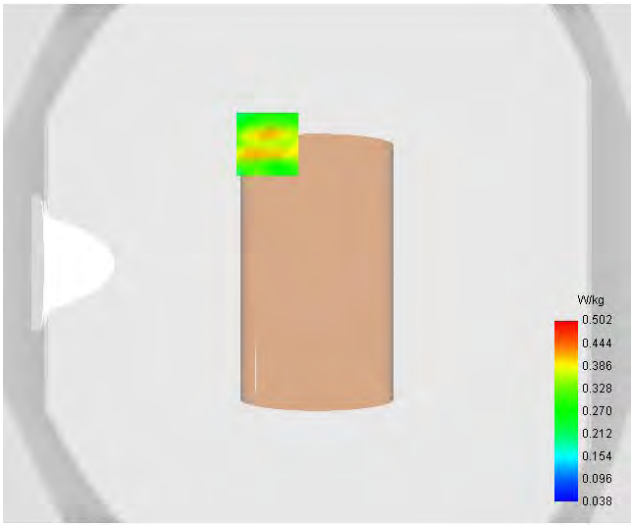
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
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
Channels/Frequency	Low (36)/ frequency 5180.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5180.000
Relative permitivity (real part)	36.000
Relative permitivity (imaginary part)	16.120
Conductivity (S/m)	4.639

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

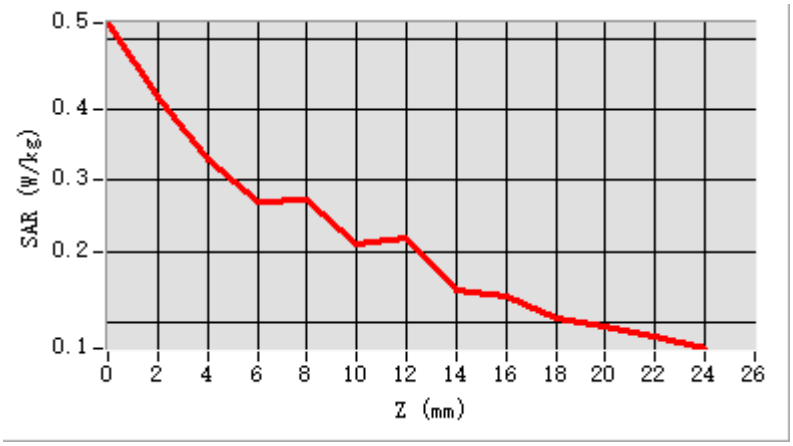
Maximum location: X=-19.00, Y=46.00 ; SAR Peak: 0.78 W/kg

D. SAR 1g & 10g

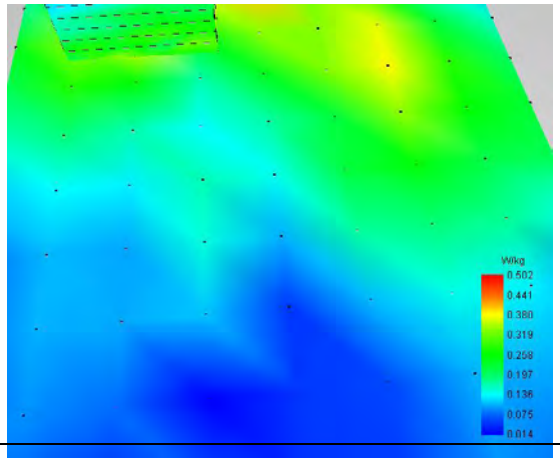
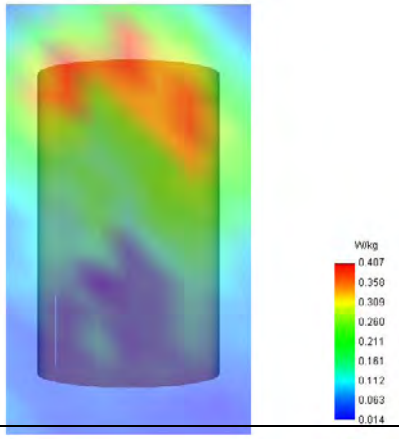
SAR 10g (W/Kg)	0.166
SAR 1g (W/Kg)	0.317
Variation (%)	3.700
Horizontal validation criteria: minimum distance (mm)	14.422205
Vertical validation criteria: SAR ratio M2/M1 (%)	78.758950

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)	0.522	0.419	0.330	0.270	0.272	0.212	0.220	0.146	0.137	0.106	0.094	0.079



F. 3D Image

3D screen shot	Hot spot position
	

#3

Date of measurement: 1/12/2025

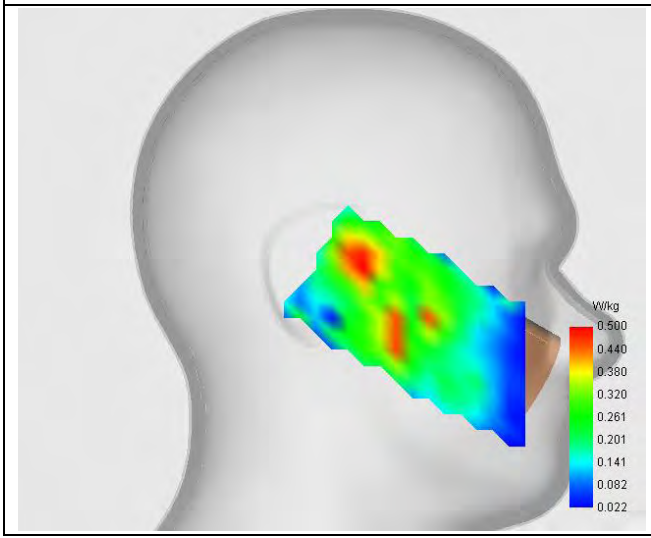
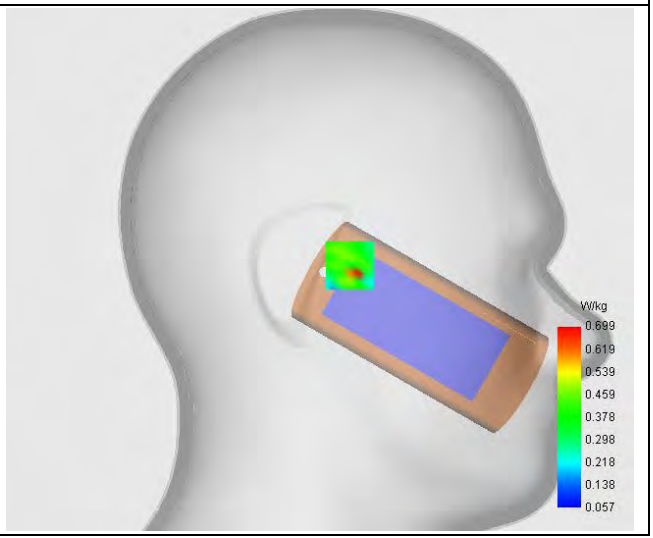
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-2a
Channels/Frequency	Low (52)/ frequency 5260.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5260.000
Relative permitivity (real part)	35.910
Relative permitivity (imaginary part)	16.154
Conductivity (S/m)	4.721

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

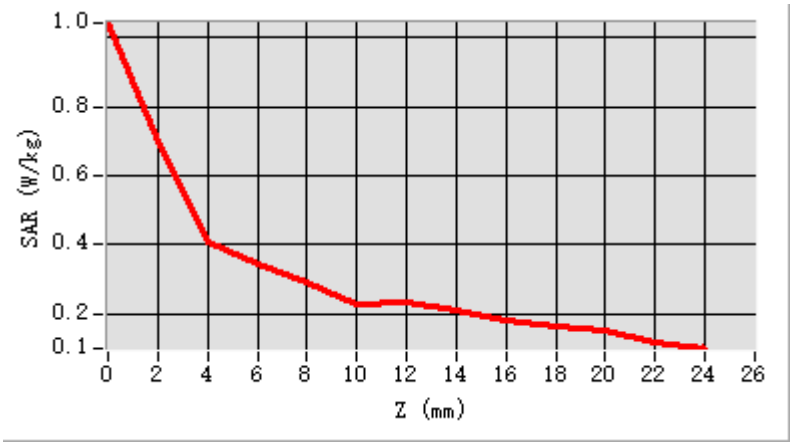
Maximum location: X=-15.00, Y=2.00 ; SAR Peak: 2.26 W/kg

D. SAR 1g & 10g

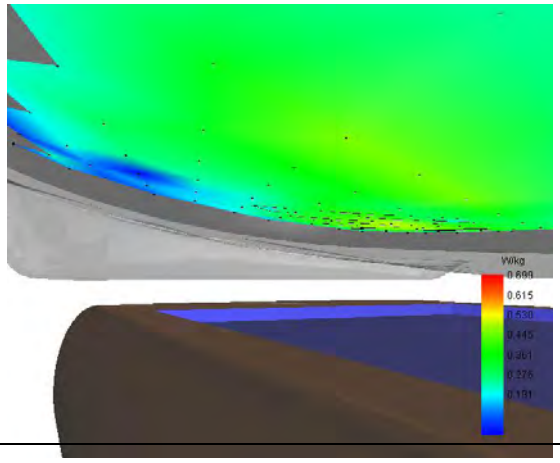
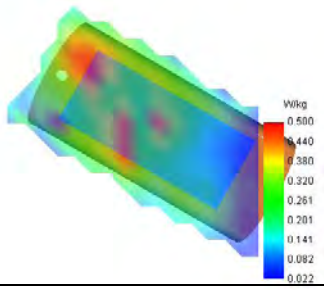
SAR 10g (W/Kg)	0.265
SAR 1g (W/Kg)	0.533
Variation (%)	-0.780
Horizontal validation criteria: minimum distance (mm)	4.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	57.939914

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)	1.042	0.699	0.405	0.342	0.293	0.224	0.232	0.210	0.179	0.165	0.148	0.118



F. 3D Image

3D screen shot	Hot spot position
	

#4

Date of measurement: 1/12/2025

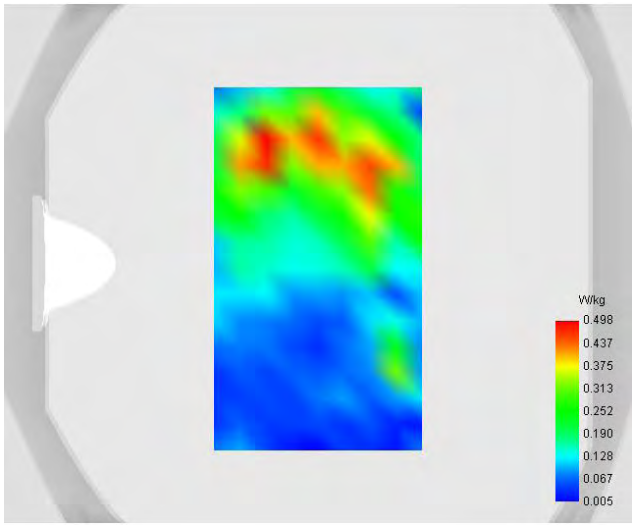
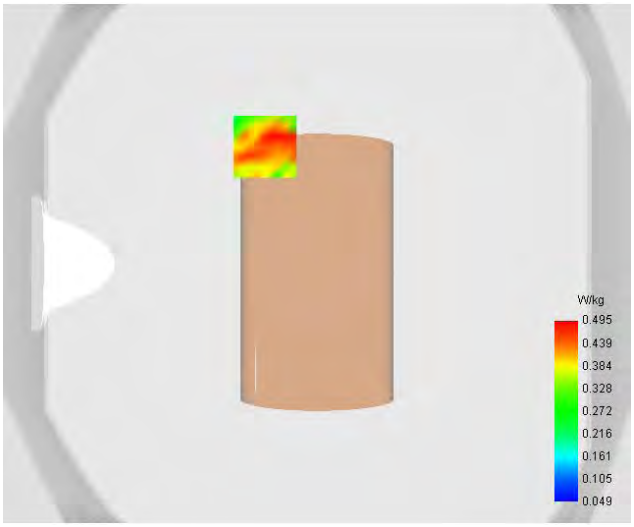
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.30
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2a
Channels/Frequency	Low (52)/ frequency 5260.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5260.000
Relative permitivity (real part)	35.910
Relative permitivity (imaginary part)	16.154
Conductivity (S/m)	4.721

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

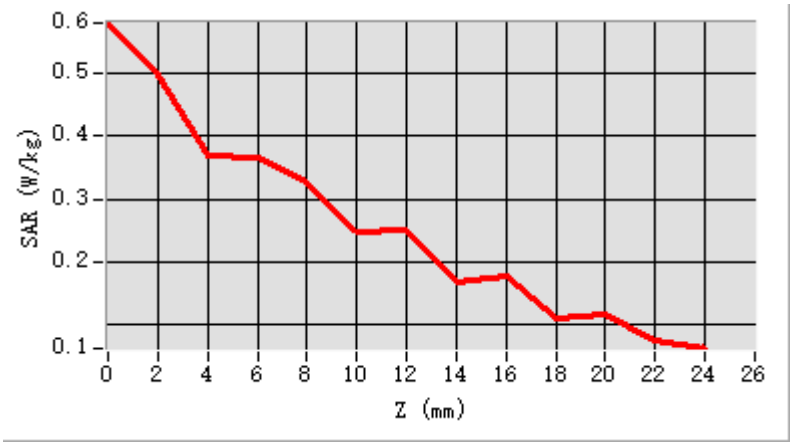
Maximum location: X=-20.00, Y=45.00 ; SAR Peak: 0.75 W/kg

D. SAR 1g & 10g

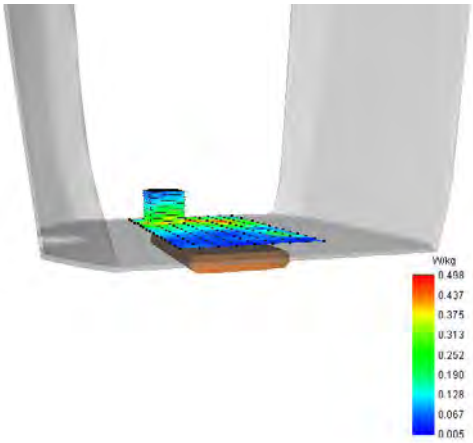
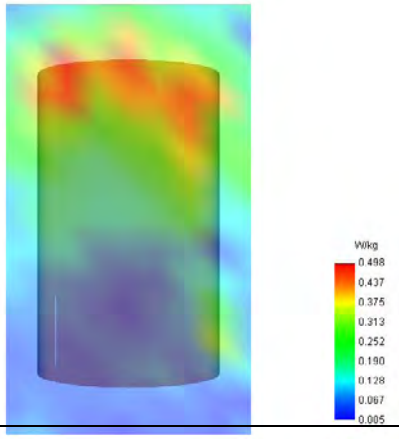
SAR 10g (W/Kg)	0.223
SAR 1g (W/Kg)	0.412
Variation (%)	0.600
Horizontal validation criteria: minimum distance (mm)	17.888544
Vertical validation criteria: SAR ratio M2/M1 (%)	74.343434

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)	0.579	0.495	0.368	0.366	0.328	0.247	0.249	0.169	0.177	0.110	0.116	0.077



F. 3D Image

3D screen shot	Hot spot position
	

#5

Date of measurement: 2/12/2025

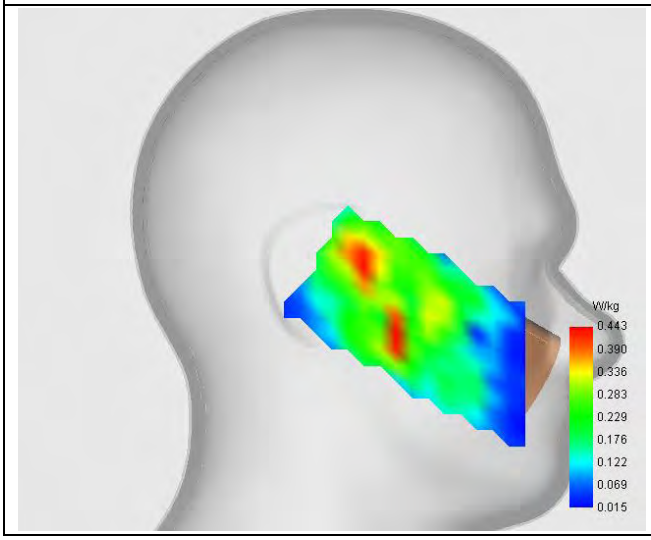
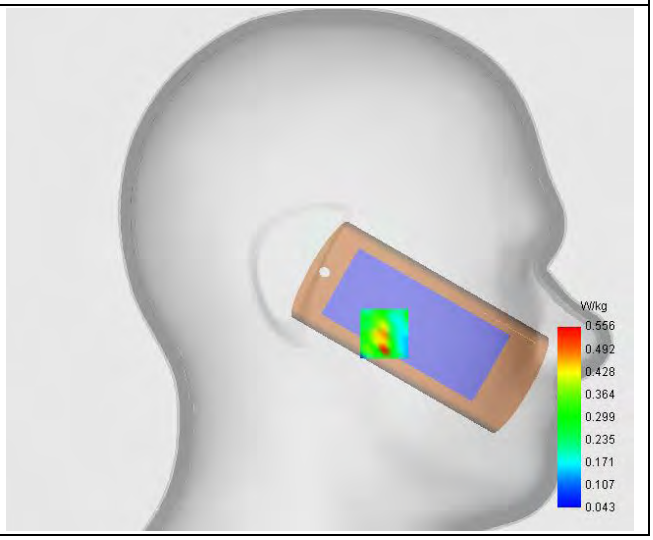
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.29
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-2c
Channels/Frequency	High (140)/ frequency 5700.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5700.000
Relative permitivity (real part)	35.500
Relative permitivity (imaginary part)	16.300
Conductivity (S/m)	5.162

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

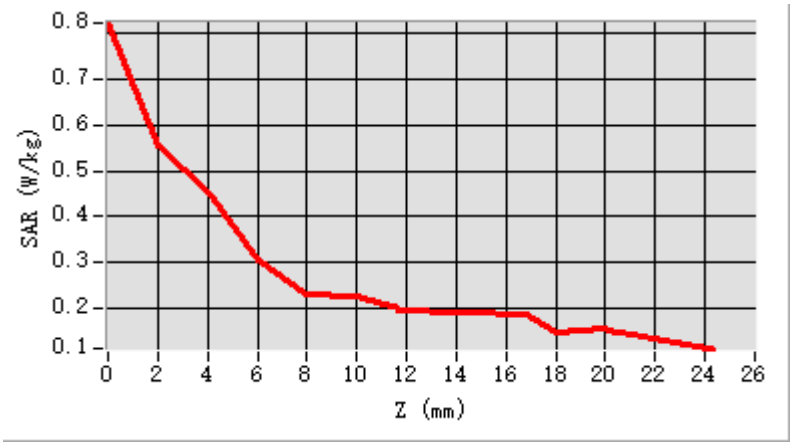
Maximum location: X=-32.00, Y=-32.00 ; SAR Peak: 1.53 W/kg

D. SAR 1g & 10g

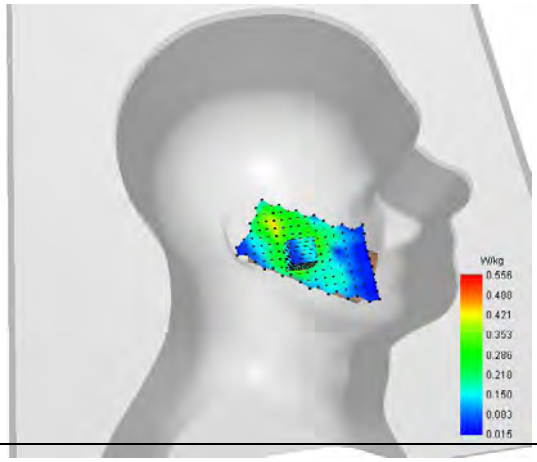
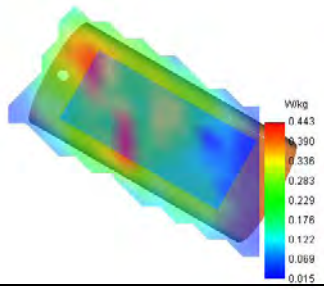
SAR 10g (W/Kg)	0.174
SAR 1g (W/Kg)	0.395
Variation (%)	1.350
Horizontal validation criteria: minimum distance (mm)	5.656854
Vertical validation criteria: SAR ratio M2/M1 (%)	82.014388

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)	0.822	0.556	0.456	0.307	0.231	0.228	0.196	0.184	0.213	0.149	0.157	0.113



F. 3D Image

3D screen shot	Hot spot position
	

#6

Date of measurement: 2/12/2025

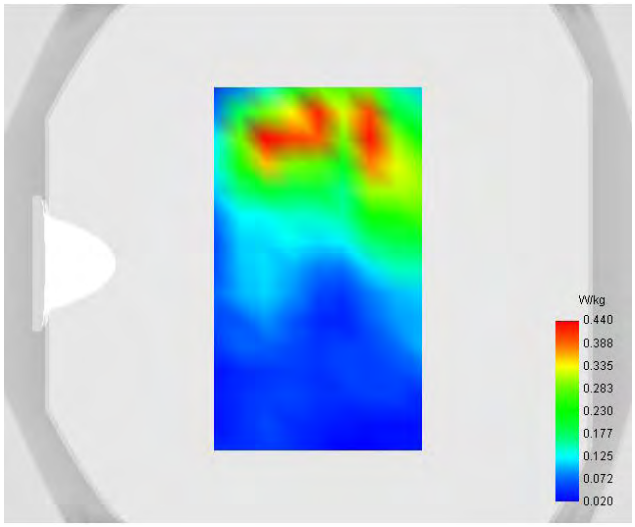
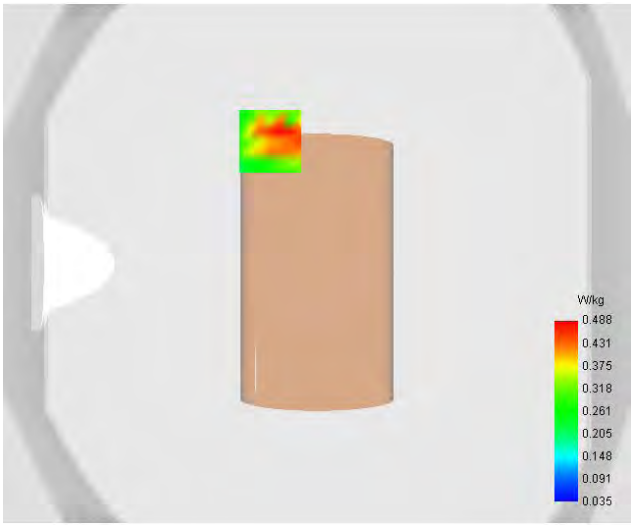
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.29
Area Scan	dx=10mm dy=10mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Validation plane
Device Position	Body
Band	U-NII-2c
Channels/Frequency	High (140)/ frequency 5700.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5700.000
Relative permitivity (real part)	35.500
Relative permitivity (imaginary part)	16.300
Conductivity (S/m)	5.162

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

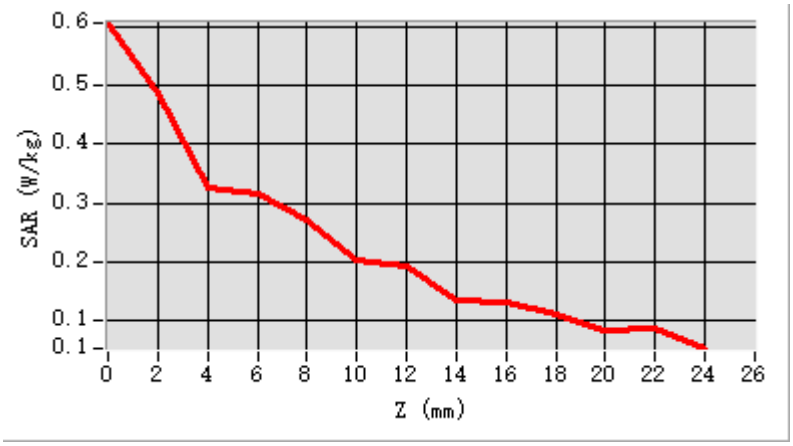
Maximum location: X=-18.00, Y=47.00 ; SAR Peak: 0.70 W/kg

D. SAR 1g & 10g

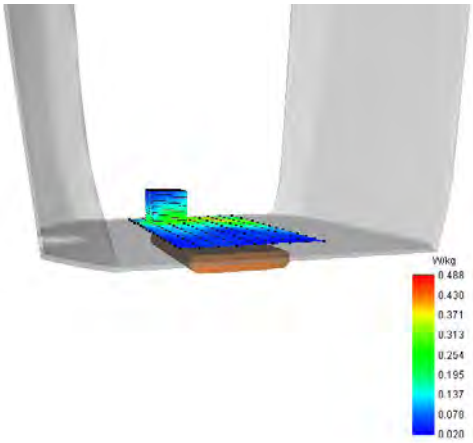
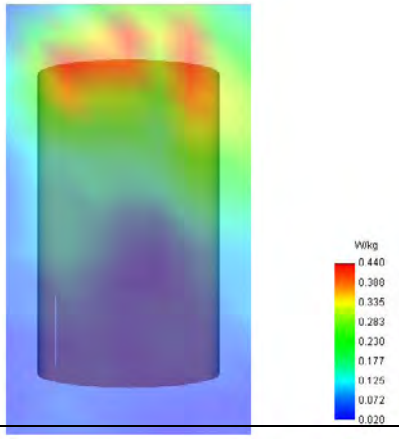
SAR 10g (W/Kg)	0.184
SAR 1g (W/Kg)	0.353
Variation (%)	4.040
Horizontal validation criteria: minimum distance (mm)	17.888544
Vertical validation criteria: SAR ratio M2/M1 (%)	67.008197

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)	0.606	0.488	0.327	0.317	0.274	0.203	0.192	0.136	0.132	0.111	0.086	0.086



F. 3D Image

3D screen shot	Hot spot position
	

#7

Date of measurement: 3/12/2025

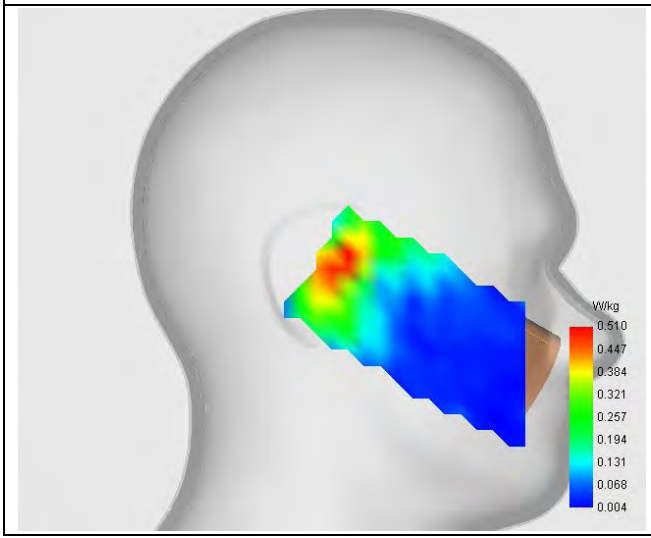
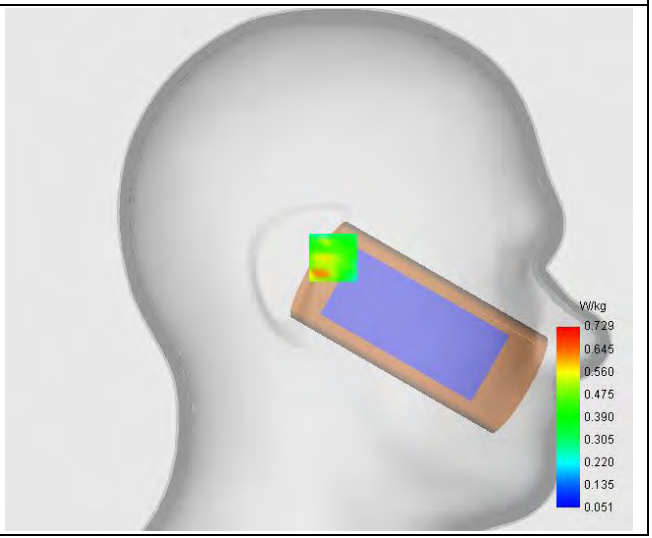
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.27
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x12,dx=4mm dy=4mm dz=2.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	U-NII-3
Channels/Frequency	Middle (157)/ frequency 5785.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5785.000
Relative permitivity (real part)	35.315
Relative permitivity (imaginary part)	16.355
Conductivity (S/m)	5.256

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

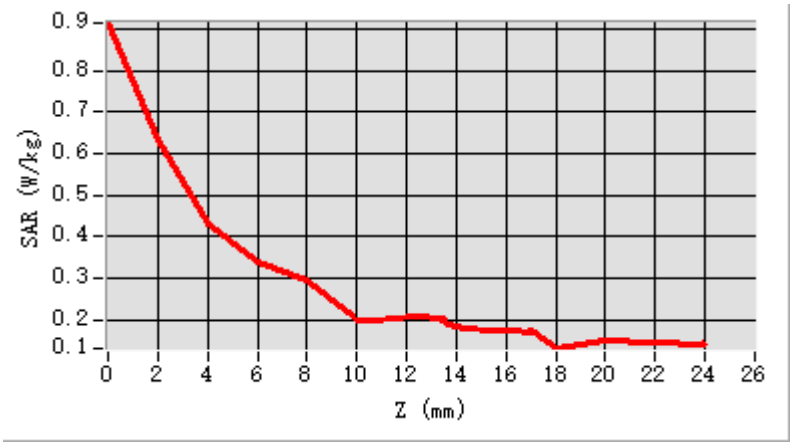
Maximum location: X=-7.00, Y=6.00 ; SAR Peak: 1.17 W/kg

D. SAR 1g & 10g

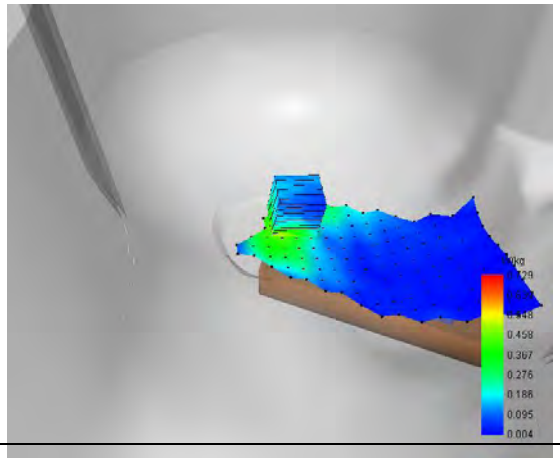
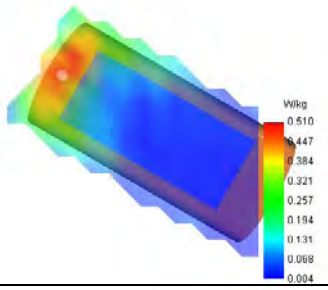
SAR 10g (W/Kg)	0.231
SAR 1g (W/Kg)	0.357
Variation (%)	-4.270
Horizontal validation criteria: minimum distance (mm)	16.492423
Vertical validation criteria: SAR ratio M2/M1 (%)	67.665615

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)	0.914	0.634	0.429	0.340	0.294	0.201	0.260	0.173	0.215	0.130	0.151	0.144



F. 3D Image

3D screen shot	Hot spot position
	

#8

Date of measurement: 3/12/2025

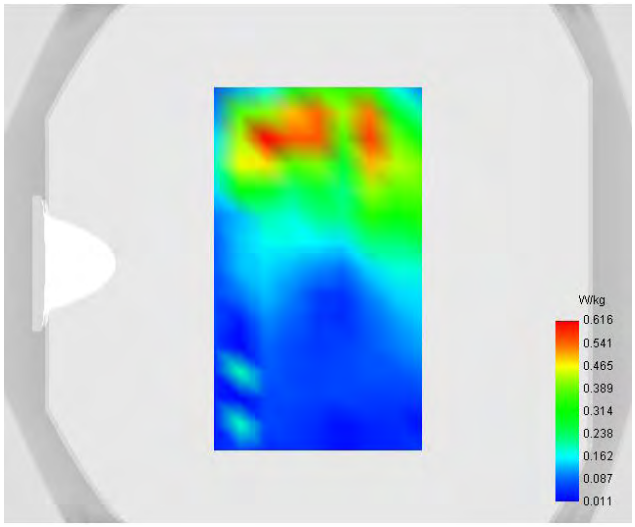
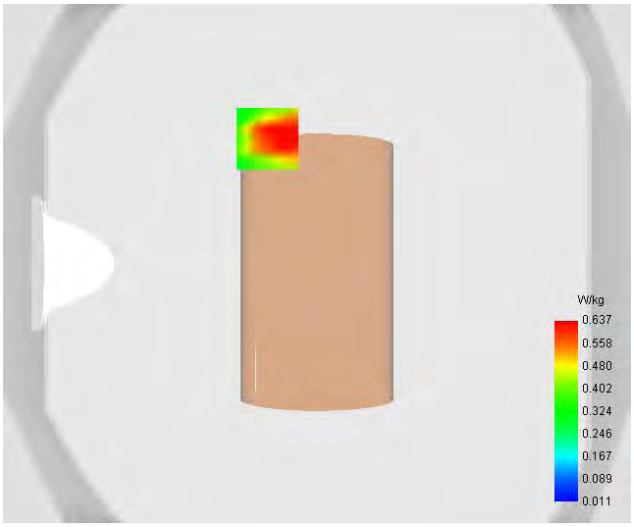
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.27
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
Channels/Frequency	Middle (157)/ frequency 5785.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	5785.000
Relative permitivity (real part)	35.315
Relative permitivity (imaginary part)	16.355
Conductivity (S/m)	5.256

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

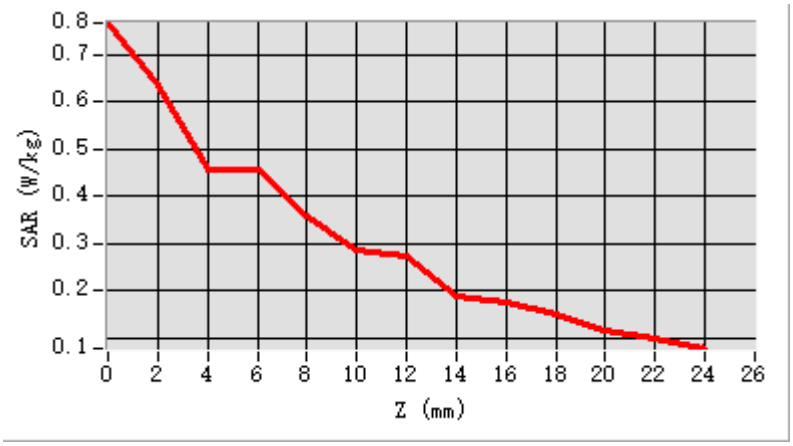
Maximum location: X=-19.00, Y=48.00 ; SAR Peak: 1.06 W/kg

D. SAR 1g & 10g

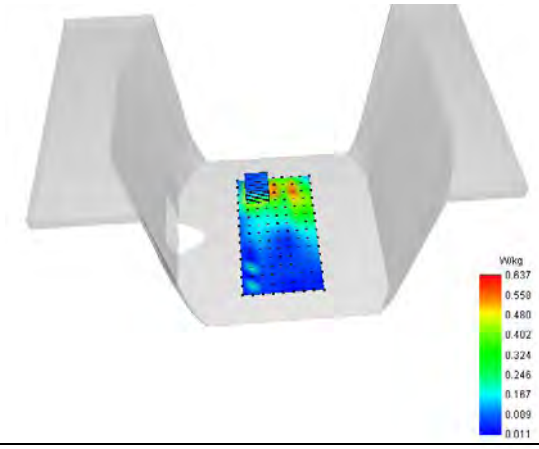
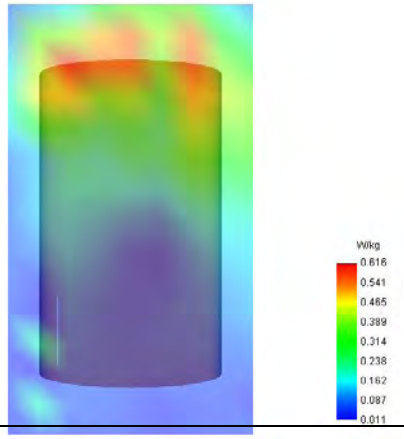
SAR 10g (W/Kg)	0.253
SAR 1g (W/Kg)	0.516
Variation (%)	3.540
Horizontal validation criteria: minimum distance (mm)	16.492423
Vertical validation criteria: SAR ratio M2/M1 (%)	71.742543

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)	0.766	0.637	0.457	0.458	0.358	0.288	0.271	0.190	0.174	0.150	0.117	0.098



F. 3D Image

3D screen shot	Hot spot position
	

#9

Date of measurement: 28/11/2025

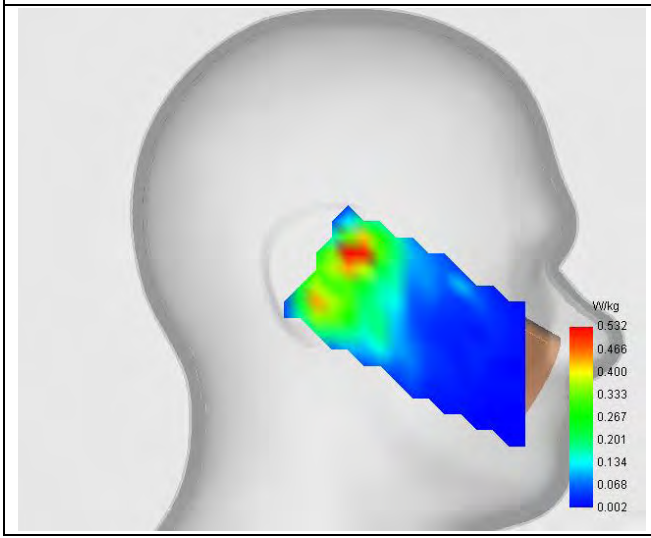
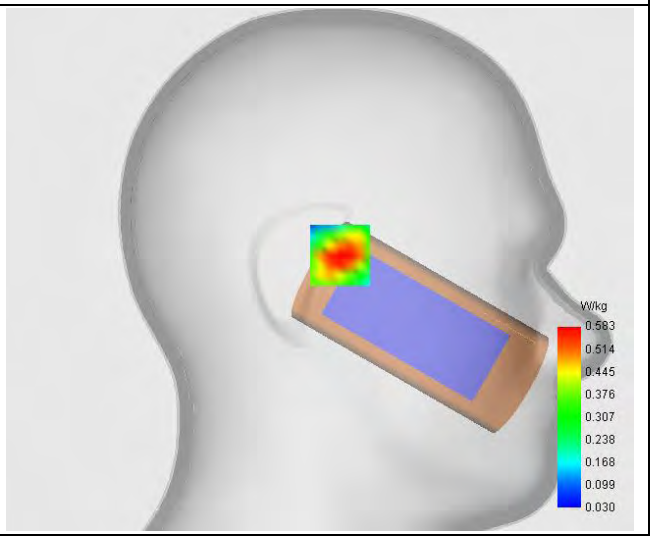
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.38
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	ISM
Channels/Frequency	Low (1)/ frequency 2412.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2412.000
Relative permitivity (real part)	39.214
Relative permitivity (imaginary part)	13.210
Conductivity (S/m)	1.770

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

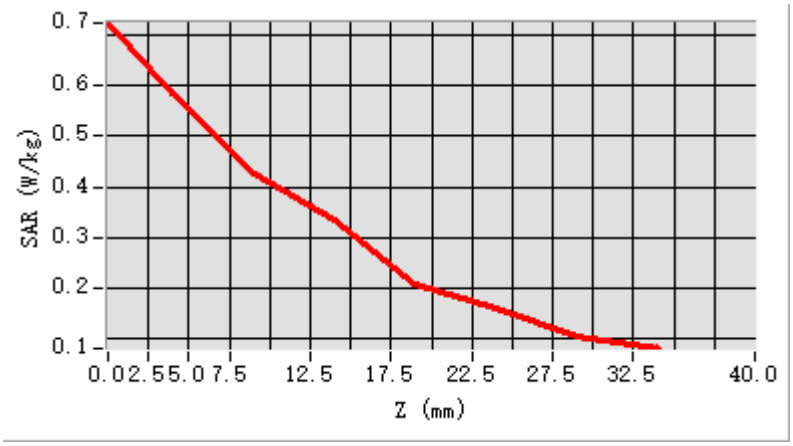
Maximum location: X=-10.00, Y=7.00 ; SAR Peak: 0.76 W/kg

D. SAR 1g & 10g

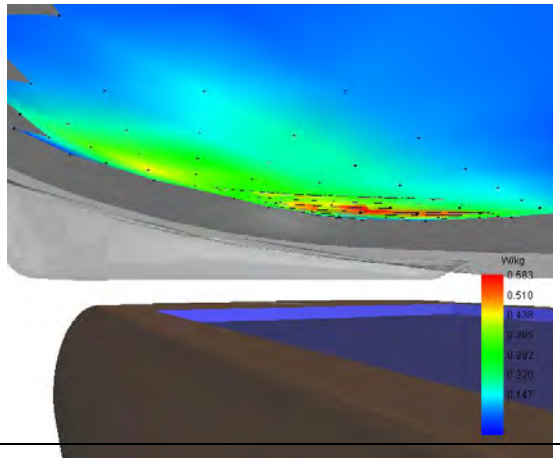
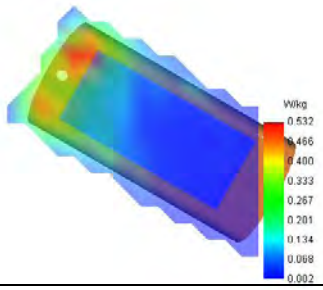
SAR 10g (W/Kg)	0.323
SAR 1g (W/Kg)	0.531
Variation (%)	-0.940
Horizontal validation criteria: minimum distance (mm)	14.142136
Vertical validation criteria: SAR ratio M2/M1 (%)	72.727273

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.724	0.583	0.424	0.335	0.208	0.158	0.105



F. 3D Image

3D screen shot	Hot spot position
	

#10

Date of measurement: 28/11/2025

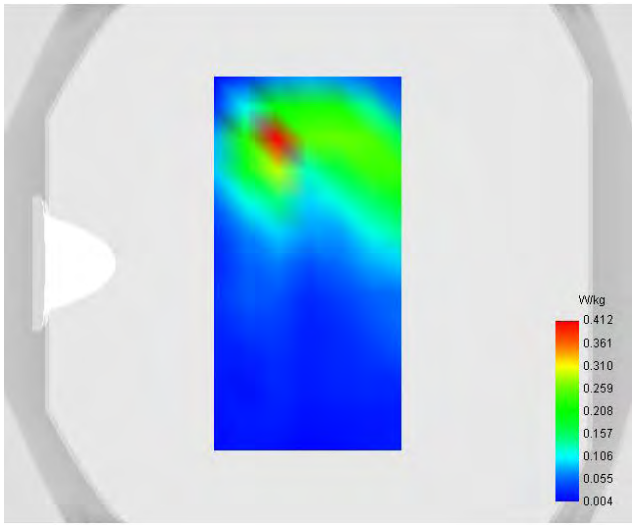
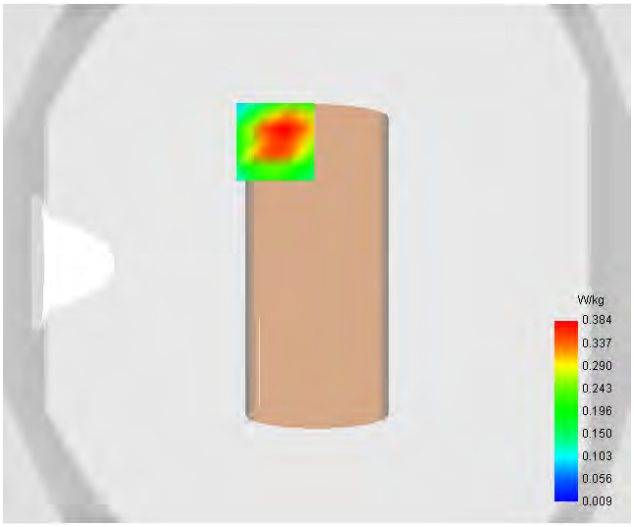
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.38
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
Channels/Frequency	Low (1)/ frequency 2412.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2412.000
Relative permitivity (real part)	39.214
Relative permitivity (imaginary part)	13.210
Conductivity (S/m)	1.770

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

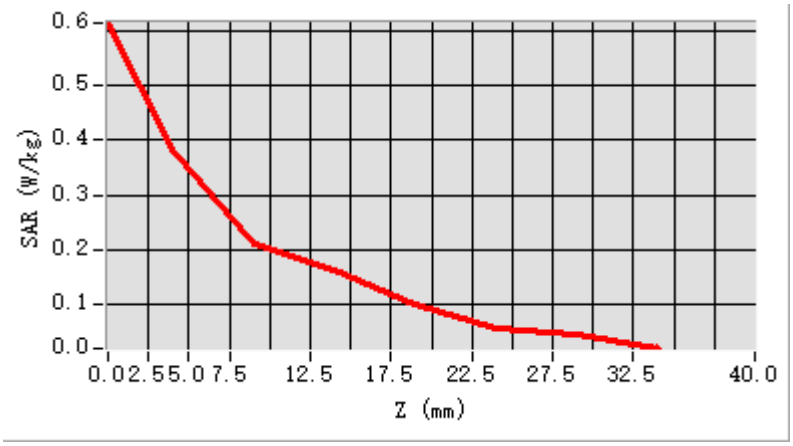
Maximum location: X=-16.00, Y=47.00 ; SAR Peak: 0.53 W/kg

D. SAR 1g & 10g

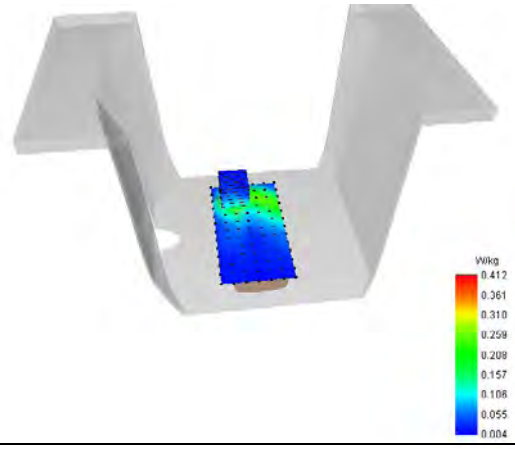
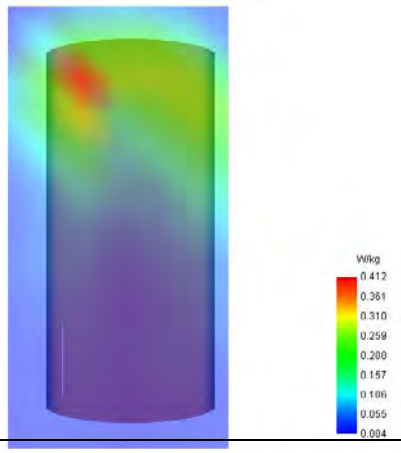
SAR 10g (W/Kg)	0.204
SAR 1g (W/Kg)	0.344
Variation (%)	1.520
Horizontal validation criteria: minimum distance (mm)	11.180340
Vertical validation criteria: SAR ratio M2/M1 (%)	54.166667

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.616	0.384	0.208	0.161	0.099	0.054	0.044



F. 3D Image

3D screen shot	Hot spot position
	

#11

Date of measurement: 26/11/2025

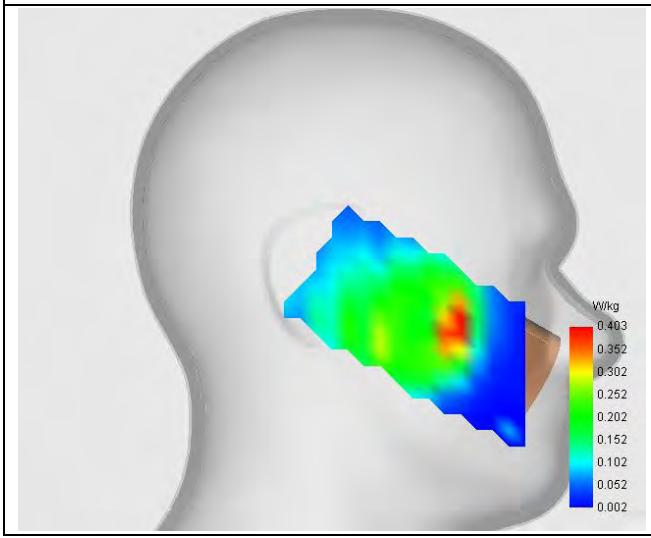
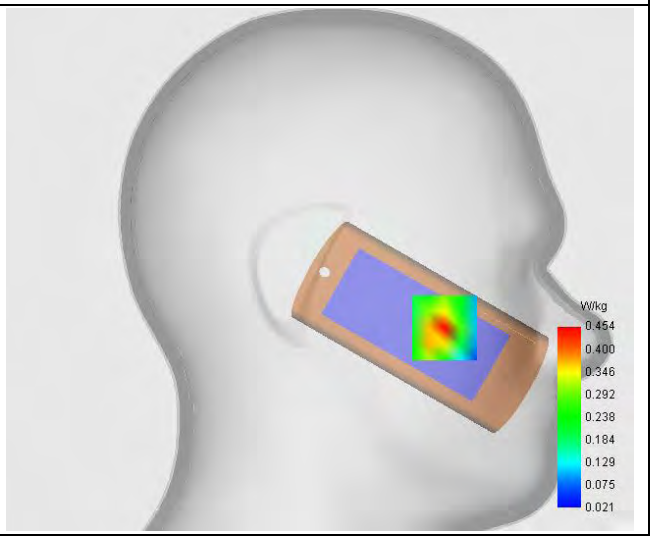
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	1.66
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	5x5x7,dx=8mm dy=8mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 5
Channels/Frequency	Middle (20525)/ frequency 836.500 Mhz

B. Permitivity

Middle TX Frequency (MHz)	836.500
Relative permitivity (real part)	41.501
Relative permitivity (imaginary part)	19.407
Conductivity (S/m)	0.902

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

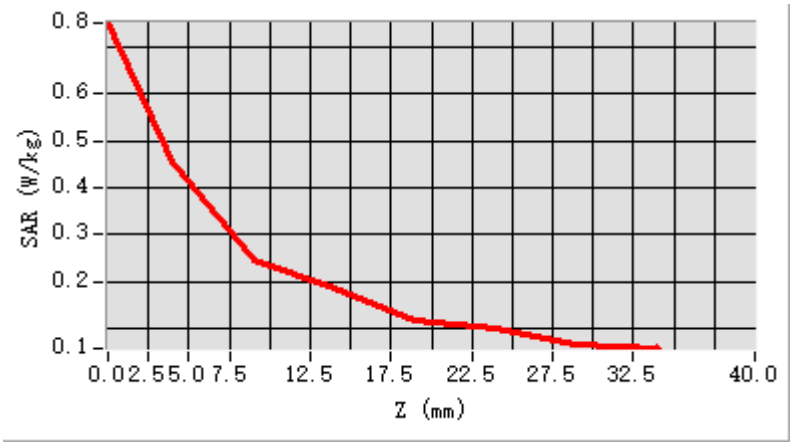
Maximum location: X=-62.00, Y=-29.00 ; SAR Peak: 0.75 W/kg

D. SAR 1g & 10g

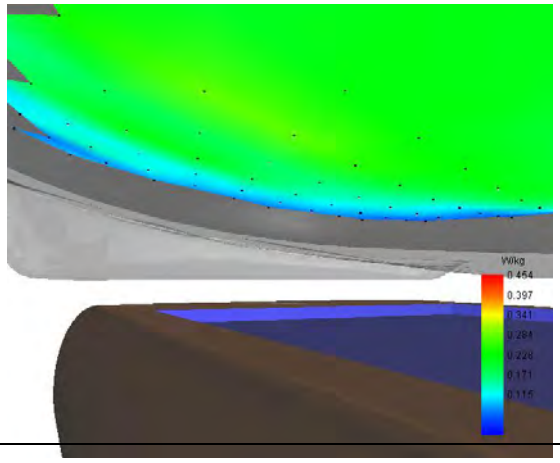
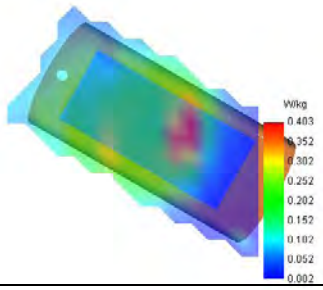
SAR 10g (W/Kg)	0.223
SAR 1g (W/Kg)	0.429
Variation (%)	3.620
Horizontal validation criteria: minimum distance (mm)	11.313708
Vertical validation criteria: SAR ratio M2/M1 (%)	54.625551

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.752	0.454	0.248	0.187	0.117	0.100	0.065



F. 3D Image

3D screen shot	Hot spot position
	

#12

Date of measurement: 26/11/2025

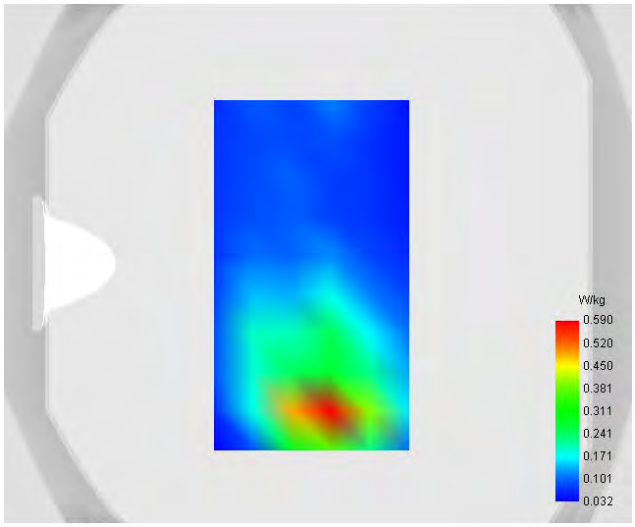
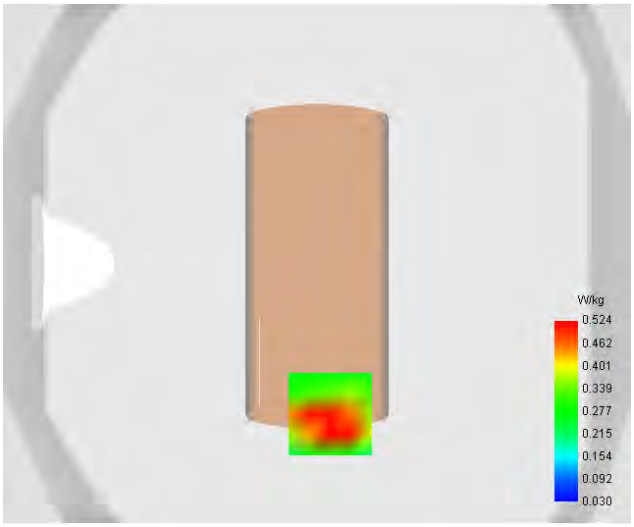
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	1.66
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
Channels/Frequency	Middle (20525)/ frequency 836.500 Mhz

B. Permitivity

Middle TX Frequency (MHz)	836.500
Relative permitivity (real part)	41.501
Relative permitivity (imaginary part)	19.407
Conductivity (S/m)	0.902

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

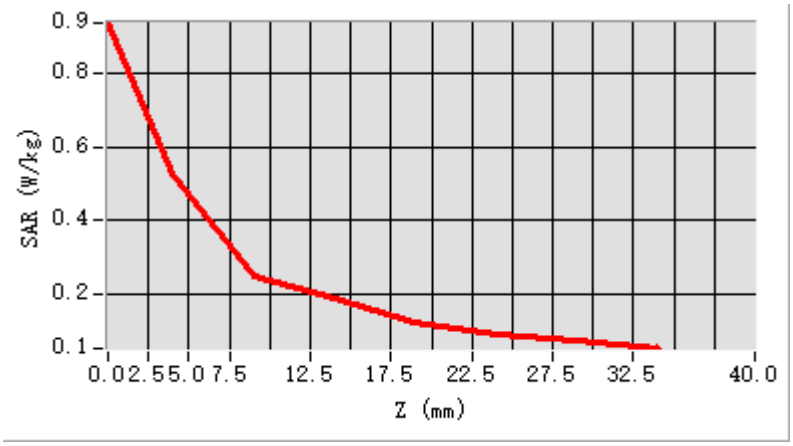
Maximum location: X=5.00, Y=-58.00 ; SAR Peak: 0.95 W/kg

D. SAR 1g & 10g

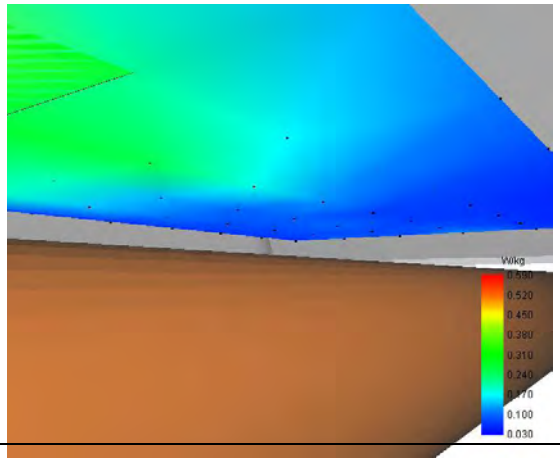
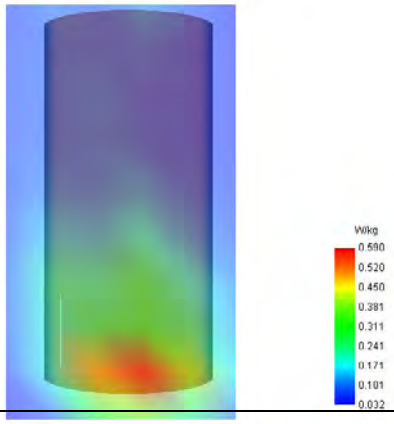
SAR 10g (W/Kg)	0.276
SAR 1g (W/Kg)	0.526
Variation (%)	-2.390
Horizontal validation criteria: minimum distance (mm)	17.888544
Vertical validation criteria: SAR ratio M2/M1 (%)	47.328244

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.937	0.524	0.249	0.185	0.119	0.089	0.070



F. 3D Image

3D screen shot	Hot spot position
	

#13

Date of measurement: 29/11/2025

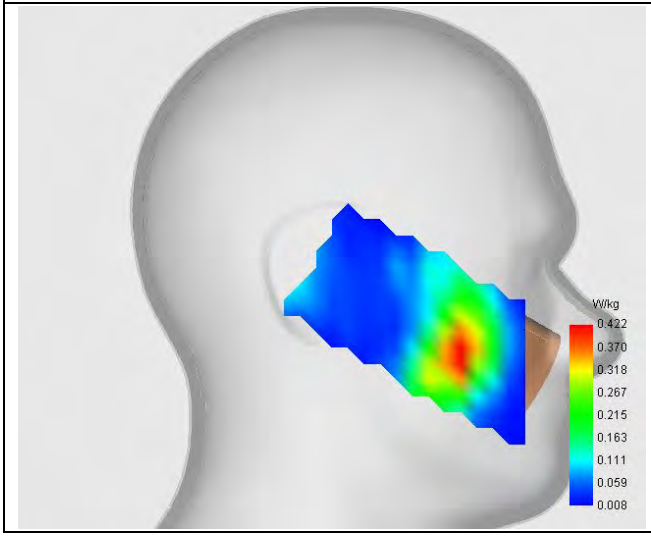
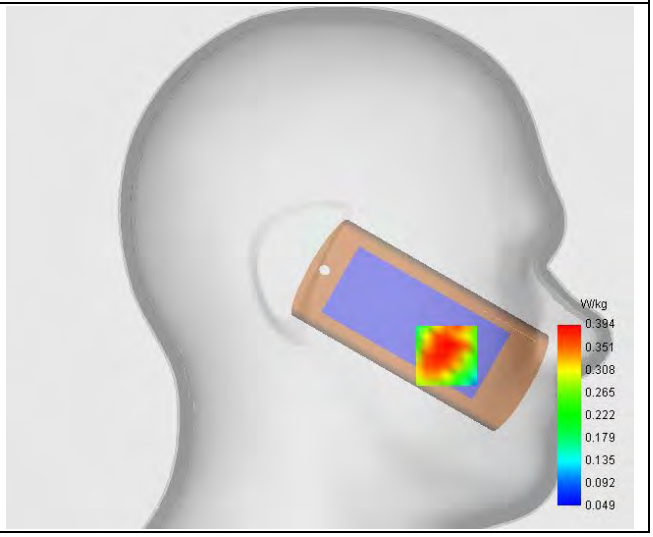
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.35
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 7
Channels/Frequency	Middle (21100)/ frequency 2535.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2535.000
Relative permitivity (real part)	39.095
Relative permitivity (imaginary part)	13.404
Conductivity (S/m)	1.888

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

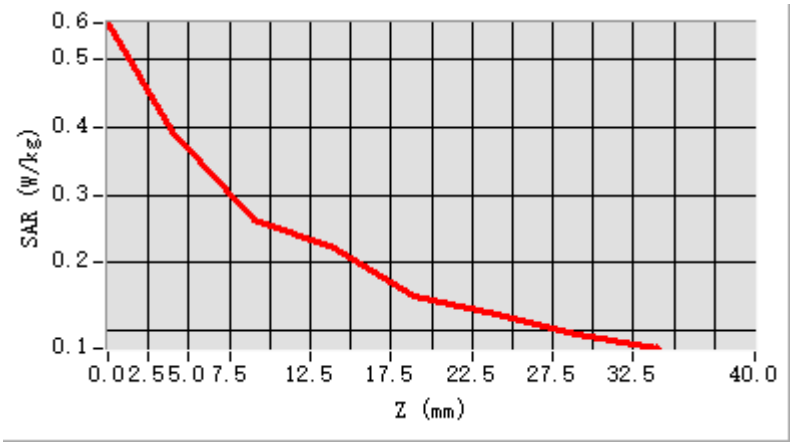
Maximum location: X=-63.00, Y=-44.00 ; SAR Peak: 0.59 W/kg

D. SAR 1g & 10g

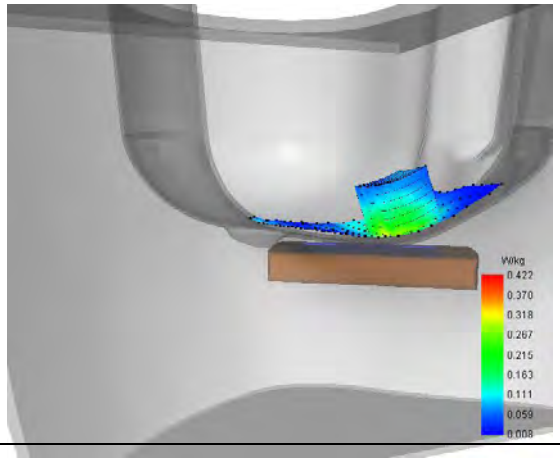
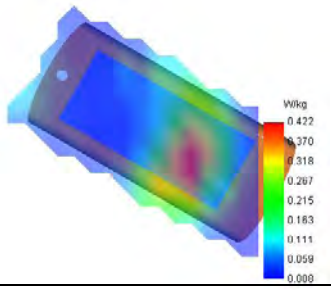
SAR 10g (W/Kg)	0.236
SAR 1g (W/Kg)	0.358
Variation (%)	1.200
Horizontal validation criteria: minimum distance (mm)	18.027756
Vertical validation criteria: SAR ratio M2/M1 (%)	66.751269

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.553	0.394	0.263	0.221	0.150	0.123	0.095



F. 3D Image

3D screen shot	Hot spot position
	

#14

Date of measurement: 29/11/2025

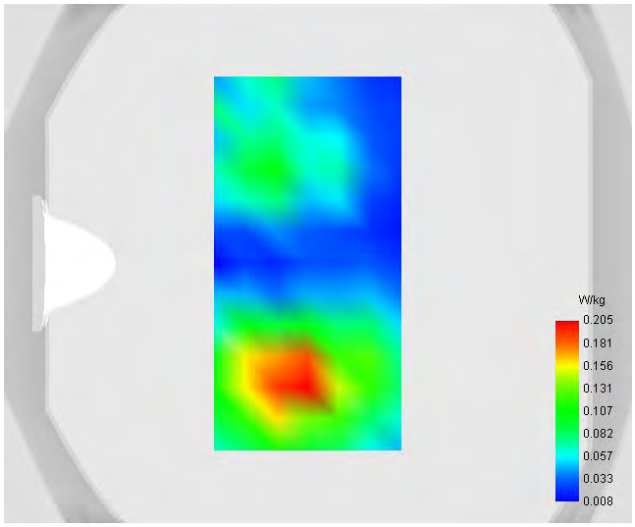
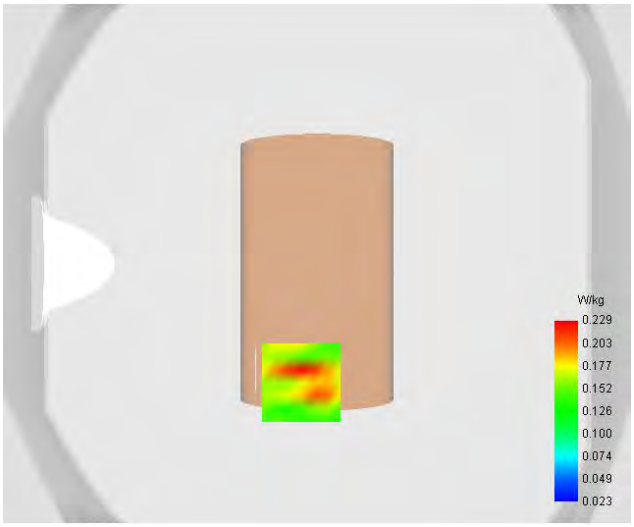
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.35
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
Channels/Frequency	Middle (21100)/ frequency 2535.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2535.000
Relative permitivity (real part)	39.095
Relative permitivity (imaginary part)	13.404
Conductivity (S/m)	1.888

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

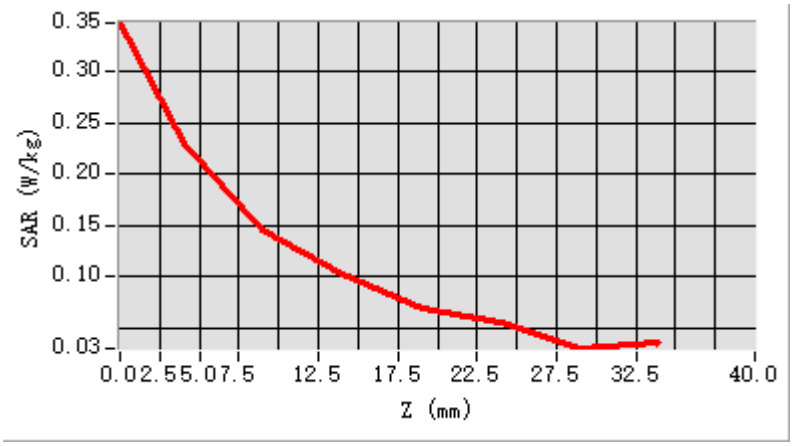
Maximum location: X=-6.00, Y=-46.00 ; SAR Peak: 0.31 W/kg

D. SAR 1g & 10g

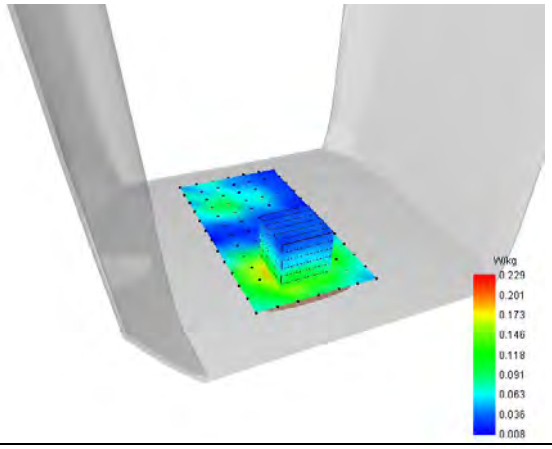
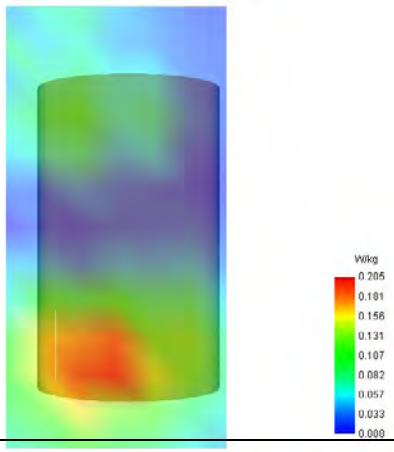
SAR 10g (W/Kg)	0.123
SAR 1g (W/Kg)	0.180
Variation (%)	2.540
Horizontal validation criteria: minimum distance (mm)	-1.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	63.755459

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.347	0.229	0.146	0.102	0.069	0.055	0.030



F. 3D Image

3D screen shot	Hot spot position
	

#15

Date of measurement: 29/11/2025

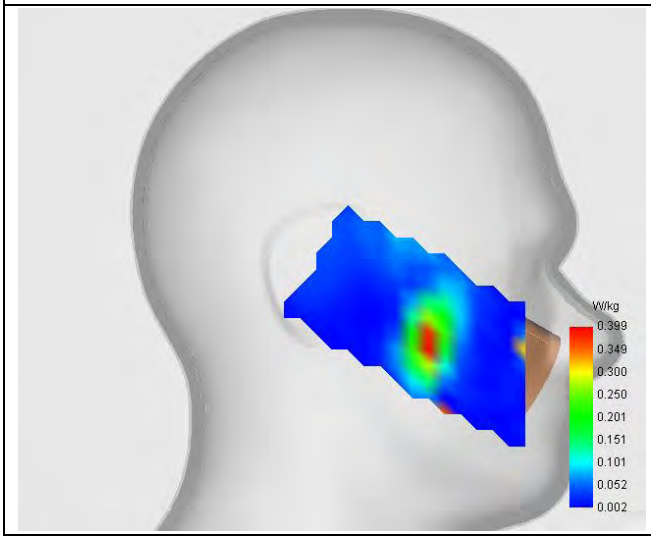
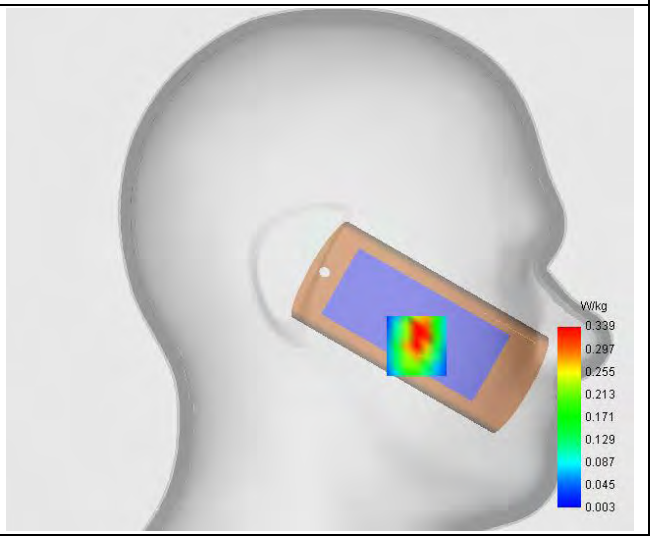
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.35
Area Scan	dx=8mm dy=8mm, Complete
Zoom Scan	7x7x7,dx=5mm dy=5mm dz=5.0mm,Complete
Phantom	Left head
Device Position	Cheek
Band	LTE band 38
Channels/Frequency	Middle (38000)/ frequency 2595.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2595.000
Relative permitivity (real part)	39.015
Relative permitivity (imaginary part)	13.544
Conductivity (S/m)	1.953

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

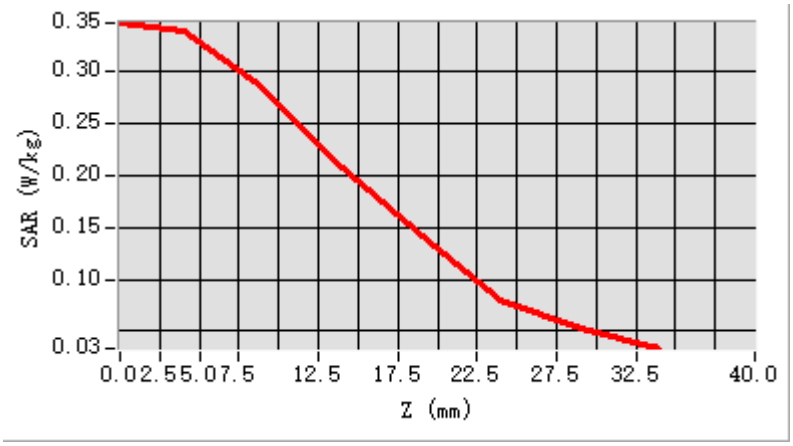
Maximum location: X=-48.00, Y=-38.00 ; SAR Peak: 0.59 W/kg

D. SAR 1g & 10g

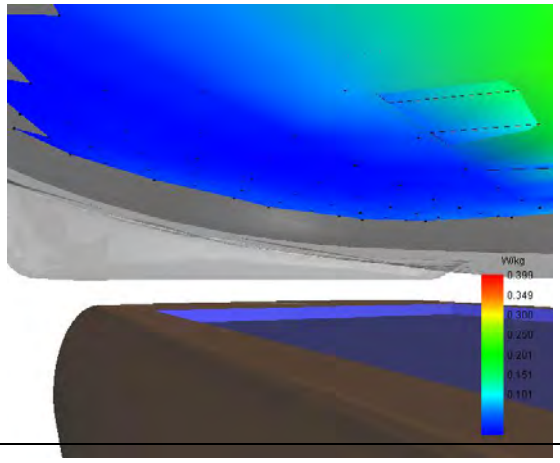
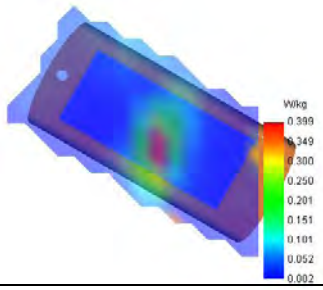
SAR 10g (W/Kg)	0.167
SAR 1g (W/Kg)	0.312
Variation (%)	2.130
Horizontal validation criteria: minimum distance (mm)	10.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	84.070796

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.346	0.339	0.285	0.207	0.141	0.079	0.052



F. 3D Image

3D screen shot	Hot spot position
	

#16

Date of measurement: 29/11/2025

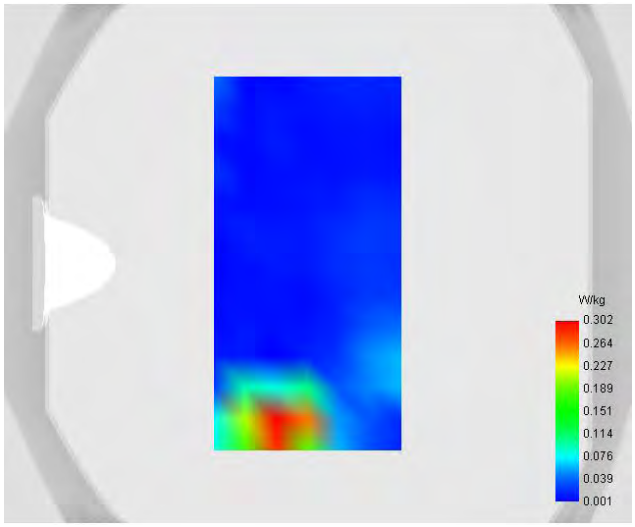
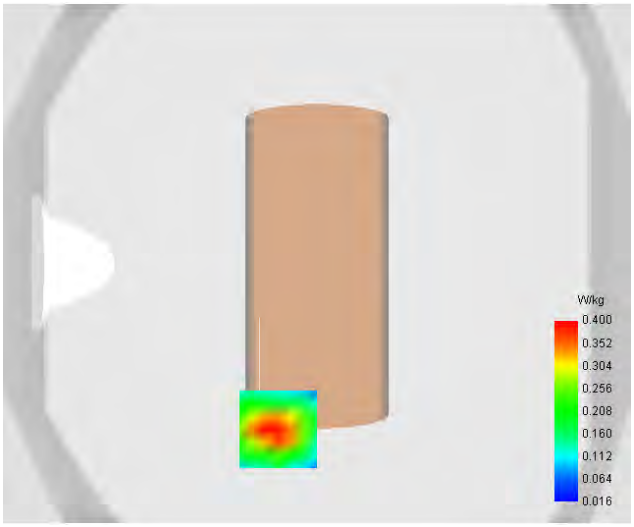
A. Experimental conditions.

Probe	0523-EPGO-403
ConvF	2.35
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 38
Channels/Frequency	Middle (38000)/ frequency 2595.000 Mhz

B. Permitivity

Middle TX Frequency (MHz)	2595.000
Relative permitivity (real part)	39.015
Relative permitivity (imaginary part)	13.544
Conductivity (S/m)	1.953

C. SAR Surface and Volume

SURFACE SAR	VOLUME SAR
	

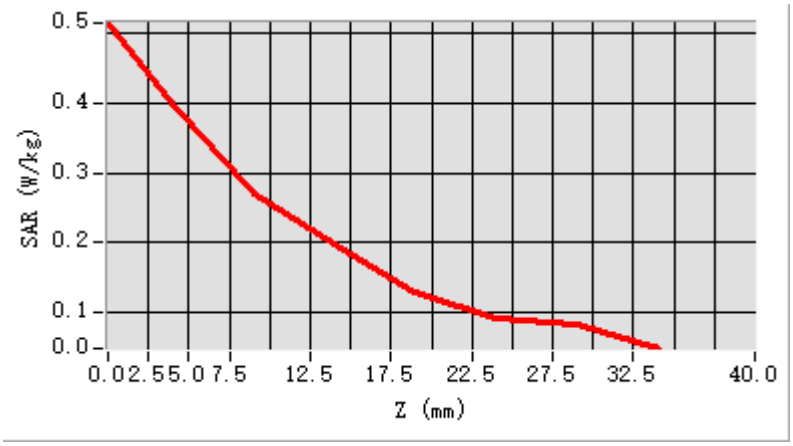
Maximum location: X=-15.00, Y=-64.00 ; SAR Peak: 0.53 W/kg

D. SAR 1g & 10g

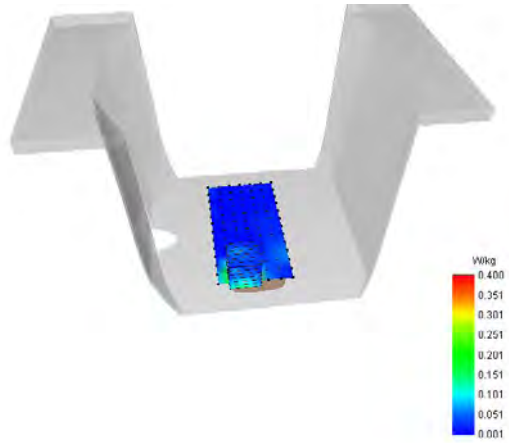
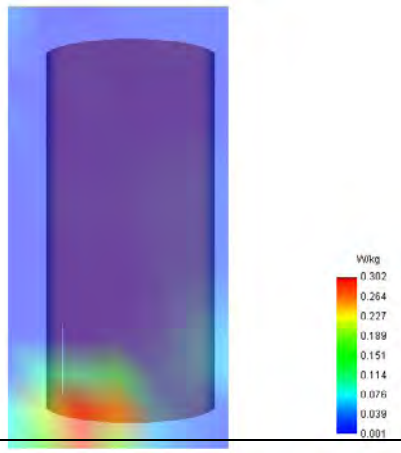
SAR 10g (W/Kg)	0.204
SAR 1g (W/Kg)	0.341
Variation (%)	-0.170
Horizontal validation criteria: minimum distance (mm)	10.000000
Vertical validation criteria: SAR ratio M2/M1 (%)	67.500000

E. Z Axis Scan

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.515	0.400	0.270	0.199	0.128	0.090	0.082



F. 3D Image

3D screen shot	Hot spot position
	

Appendix D. Calibration Certificate

Table of contents
E Field Probe - EPGO0523-403
835 MHz Dipole - SN 03/15 DIP 0G835-347
2450 MHz Dipole - SN 03/15 DIP 2G450-352
2600 MHz Dipole - SN 03/15 DIP 2G600-356
5000-6000 MHz Dipole - SN 03/14 WGA33

COMOSAR E-Field Probe Calibration Report

Ref : ACR.307.3.25.BES.A

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO., LTD
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK, CHONGQING ROAD, HEPING COMMUNITY, FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN, GUANGDONG 518055, P.R.CHINA

MVG COMOSAR DOSIMETRIC E-FIELD PROBE

SERIAL NO.: SN 39/21 EPGO0523-403

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

Calibration date: 09/09/2025

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

Summary:

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

COMOSAR E-FIELD PROBE CALIBRATION REPORT Ref: ACR.307.3.24.BES.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Le Gall	Measurement Responsible	09/08/2025	
Checked by :	Jérôme Luc	Technical Manager	09/08/2025	
Approved by :	Yann Toutain	Laboratory Director	09/09/2025	Yann TOUTAIN

	Customer Name
Distribution :	Shenzhen Asia Hongke

Issue	Name	Date	Modifications
A	Jérôme Luc	9/09/2025	Initial release

TABLE OF CONTENTS

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	SN 39/21 EPGO0523-403
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-6GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.199 MΩ Dipole 2: R2=0.218 MΩ Dipole 3: R3=0.210 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 affect. All calibrations / measurements performed meet the fore mentioned standards.

3.1 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.

3.2 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.

3.3 LOWER DETECTION LIMIT

The lower detection limit was assessed using the same measurement set up as used for the linearity measurement. The required lower detection limit is 10 mW/kg.

3.4 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°).

3.1 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%).

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

Uncertainty analysis of the probe calibration in waveguide					
ERROR SOURCES	**Uncertainty value (%)**	**Probability Distribution**	**Divisor**	**ci**	**Standard Uncertainty (%)**
Expanded uncertainty 95 % confidence level k = 2					14 %

5 CALIBRATION MEASUREMENT RESULTS

Calibration Parameters	
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

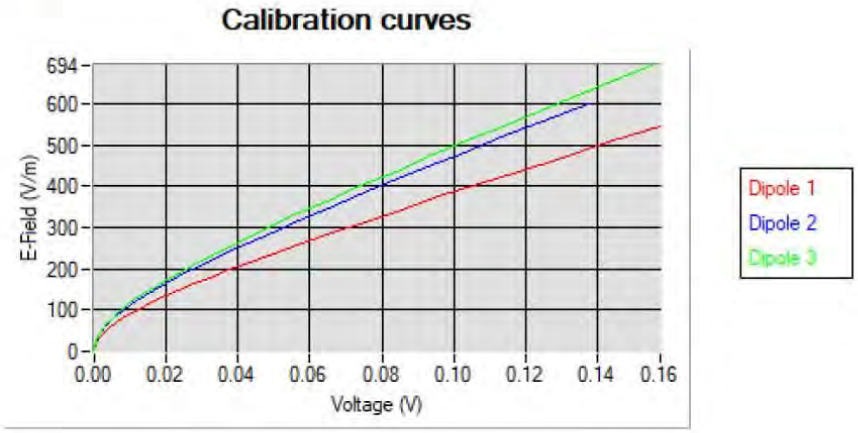
5.1 SENSITIVITY IN AIR

Normx dipole 1 (μV/(V/m)^2)	Normy dipole 2 (μV/(V/m)^2)	Normz dipole 3 (μV/(V/m)^2)
1.26	0.87	0.77

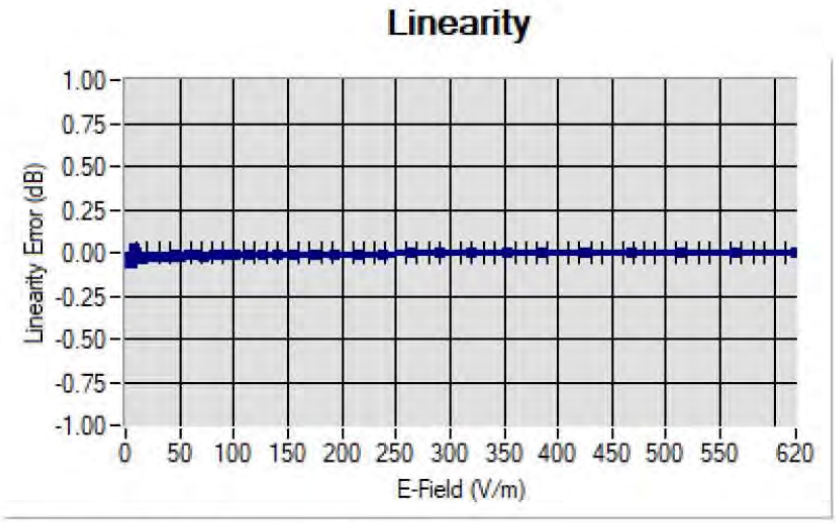
DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
113	108	113

Calibration curves ei=f(V) (i=1,2,3) allow to obtain E-field value using the formula:

$$E = \sqrt{E_1^{\,2} + E_2^{\,2} + E_3^{\,2}}$$



5.2 LINEARITY



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

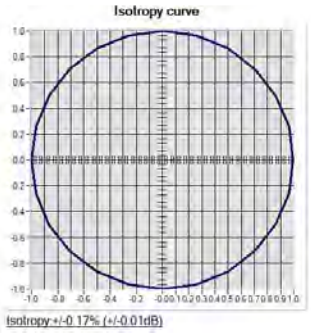
5.3 SENSITIVITY IN LIQUID

Liquid	Frequency (MHz +/- 100MHz)	ConvF
HL600	600	1.62
HL750	750	1.65
HL850	835	1.66
HL900	900	1.77
HL1500	1500	2.09
HL1750	1750	2.09
HL1800	1800	2.05
HL1900	1900	2.05
HL2000	2000	2.41
HL2100	2100	2.36
HL2300	2300	2.55
HL2450	2450	2.38
HL2600	2600	2.35
HL3300	3300	2.04
HL3500	3500	1.98
HL3700	3700	2.11
HL3900	3900	2.54
HL4200	4200	2.22
HL4600	4600	2.40
HL4900	4900	2.33
HL5200	5200	2.30
HL5400	5400	2.30
HL5600	5600	2.29
HL5800	5800	2.27

LOWER DETECTION LIMIT: 8mW/kg

5.4 ISOTROPY

HL1800 MHz



6 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	08/2024	08/2027
Network Analyzer	Agilent 8753ES	MY40003210	10/2022	10/2025
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2024	05/2027
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Multimeter	Keithley 2000	1160271	02/2024	02/2027
Signal Generator	Rohde & Schwarz SMB	106589	04/2024	04/2027
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2024	06/2027
Power Meter	Rohde & Schwarz NRVD	832839-056	11/2022	11/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. 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.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2024	06/2027

SAR Reference Dipole Calibration Report

Ref : ACR.53.24.24.BES.A

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO., LTD
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK, CHONGQING ROAD, HEPING COMMUNITY , FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN, GUANGDONG 518055, P.R.CHINA

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 835MHZ
SERIAL NO.: SN 03/15 DIP0G835-347

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

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.

	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 Asia Hongke

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

TABLE OF CONTENTS

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*

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.

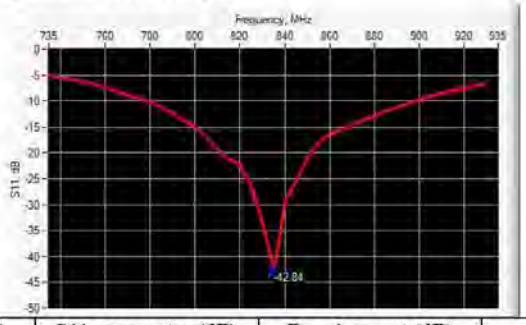
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



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

6.3 SAR

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

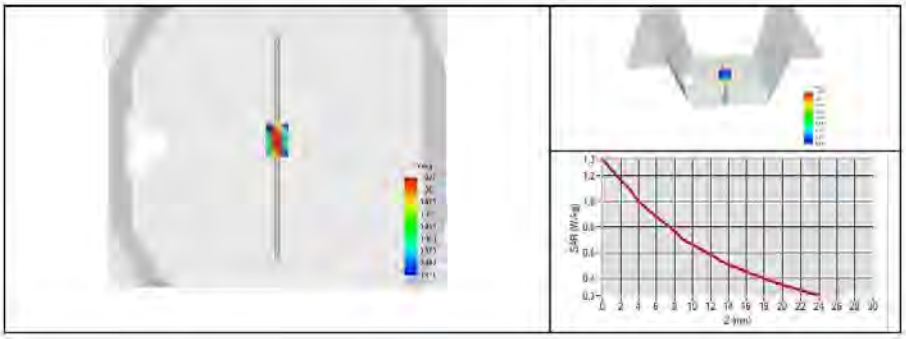
6.3.1 SAR with Head Liquid

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

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref : ACR.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



7 LIST OF EQUIPMENT

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

SAR Reference Dipole Calibration Report

Ref : ACR.53.29.24.BUS.A

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO., LTD
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK, CHONGQING ROAD, HEPING COMMUNITY , FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN, GUANGDONG 518055, P.R.CHINA

MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 2450MHZ
SERIAL NO.: SN 03/15 DIP2G450-352

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

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.33.2.24.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 Asia Hongke

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

TABLE OF CONTENTS

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*

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.

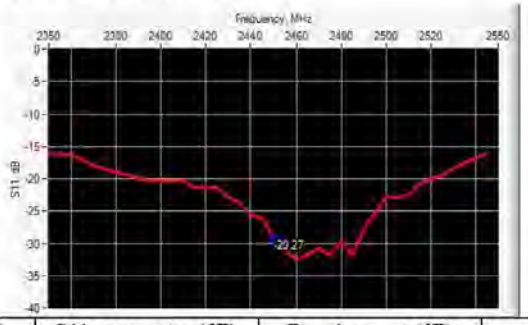
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2450	-29.27	-20	53.6Ω + 0.1jΩ

6.3 SAR

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

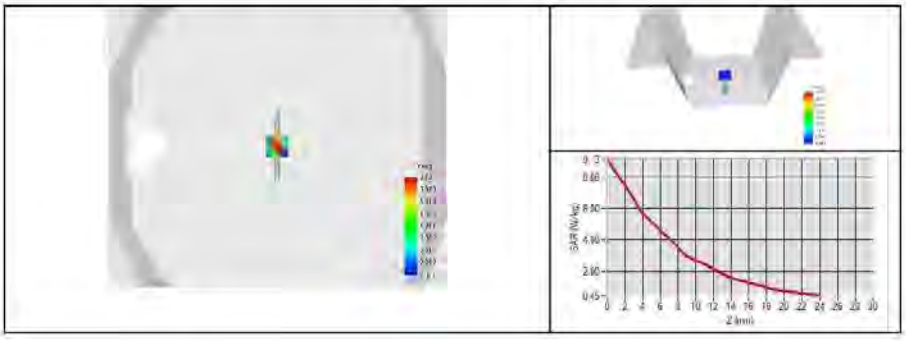
6.3.1 SAR with Head Liquid

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

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref : ACR.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



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	08/2021	08/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024

SAR Reference Dipole Calibration Report

Ref : ACR.53.30.24.BES.A

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO., LTD
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK, CHONGQING ROAD, HEPING COMMUNITY , FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN, GUANGDONG 518055, P.R.CHINA

MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 2600MHZ
SERIAL NO.: SN 03/15 DIP2G600-356

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

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 Asia Hongke

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

TABLE OF CONTENTS

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*

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.

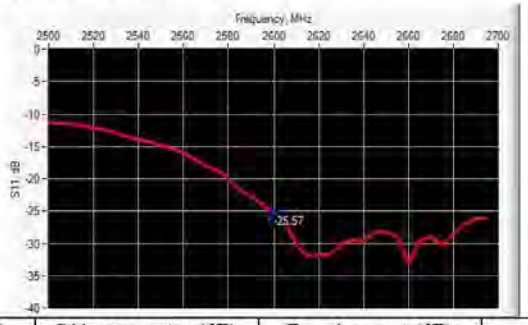
6 CALIBRATION RESULTS

6.1 MECHANICAL DIMENSIONS

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

6.2 S11 PARAMETER

6.2.1 S11 parameter in Head Liquid



Frequency (MHz)	S11 parameter (dB)	Requirement (dB)	Impedance
2600	-25.57	-20	54.5Ω - 3.2jΩ

6.3 SAR

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

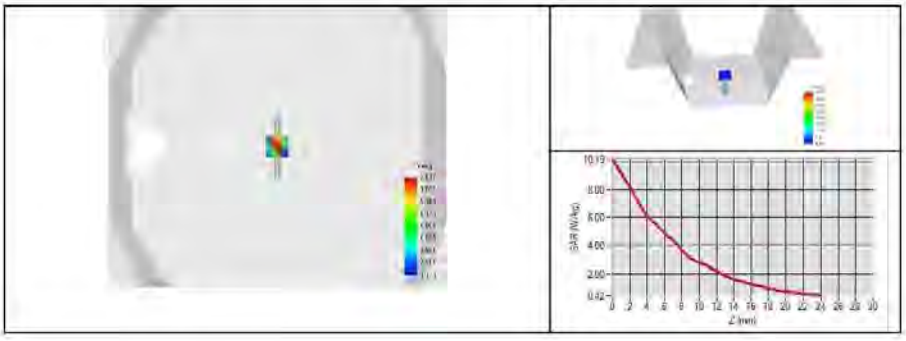
6.3.1 SAR with Head Liquid

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

SAR REFERENCE DIPOLE CALIBRATION REPORT Ref : ACR.53.3.24.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



7 LIST OF EQUIPMENT

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

SAR Reference Waveguide Calibration Report

Ref : ACR.53.31.24.BES.A

GUANGDONG ASIA HONGKE TEST TECHNOLOGY CO., LTD
NO.1/F,BUILDING B1, JUNFENG INDUSTRIAL PARK, CHONGQING ROAD, HEPING COMMUNITY , FUHAIHAI STREET, BAO'AN DISTRICT,SHENZHEN, GUANGDONG 518055, P.R.CHINA
MVG COMOSAR REFERENCE WAVEGUIDE
FREQUENCY: 5000-6000 MHZ
SERIAL NO.: SN 13/14 WGA33

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

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.53.3.24.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 Asia Hongke

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

TABLE OF CONTENTS

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.

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)		Lr (mm)		Wr (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	-

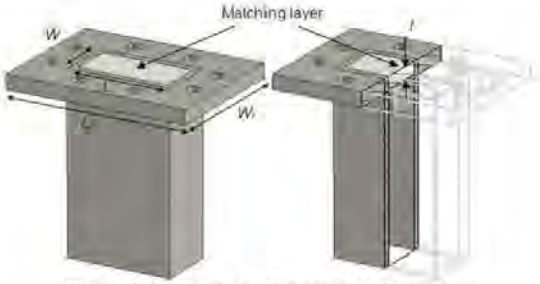
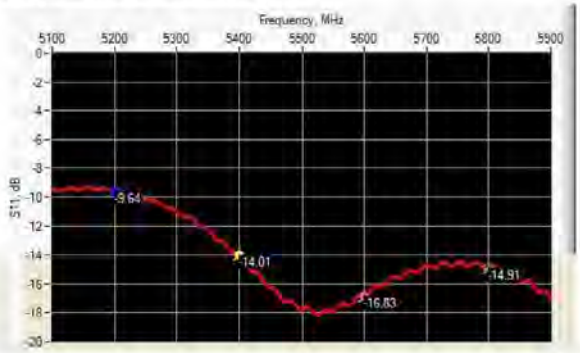


Figure 1: Validation Waveguide Dimensions

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

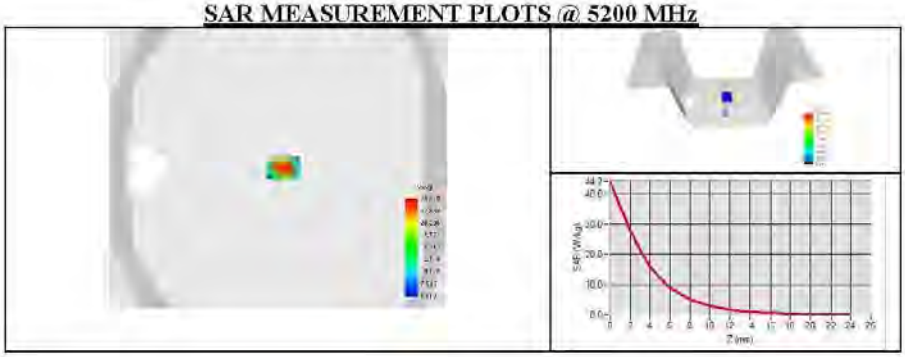
At those frequencies, the target SAR value can not be generic. Hereunder is the target SAR value defined by MVG, within the uncertainty for the system validation. All SAR values are normalized to 1 W net power. In bracket, the measured SAR is given with the used input power.

SAR REFERENCE WAVEGUIDE CALIBRATION REPORT Ref : ACR.53.31.24.BES.A

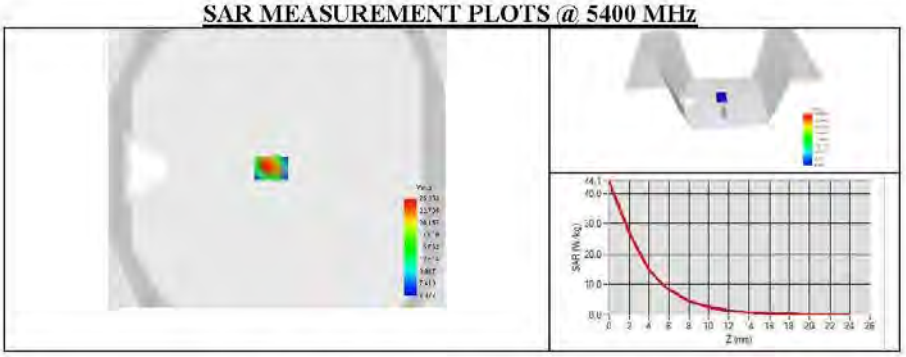
Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	3523-EPGO-429
Liquid	Head Liquid Values 5200 MHz: eps' :34.16 sigma : 4.42 Head Liquid Values 5400 MHz: eps' :33.63 sigma : 4.64 Head Liquid Values 5600 MHz: eps' :33.12 sigma : 4.87 Head Liquid Values 5800 MHz: eps' :32.57 sigma : 5.12
Distance between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

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

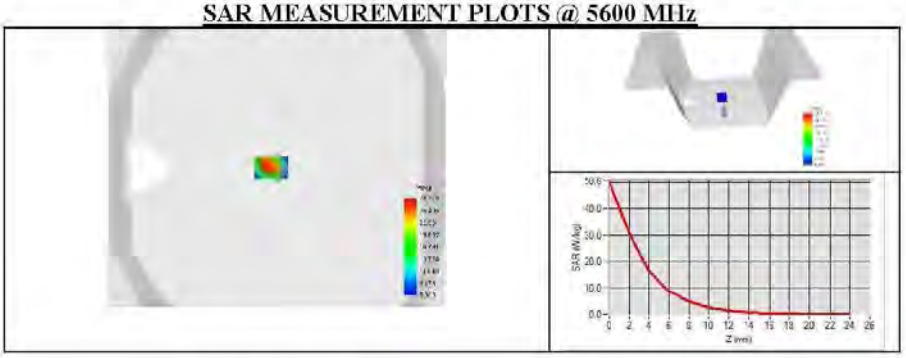
SAR MEASUREMENT PLOTS @ 5200 MHz



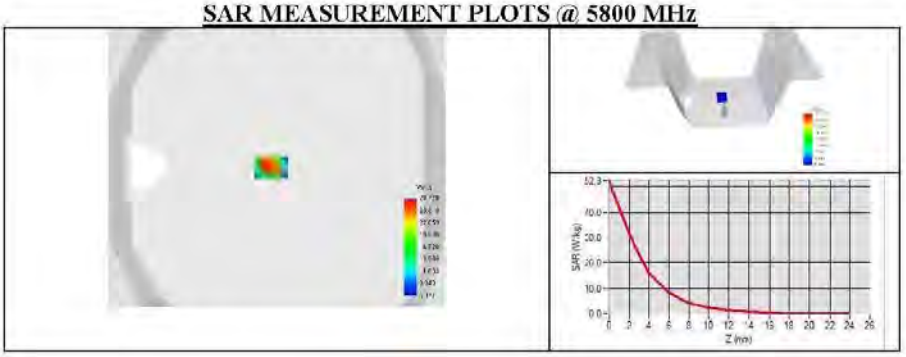
SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz



SAR MEASUREMENT PLOTS @ 5800 MHz



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

Appendix E. Justification of the extended calibration

If dipoles are verified in return loss (<-20dB, within 20% of prior calibration for below 3GHz, and <-8dB, within 20% of prior calibration for 5GHz to 6GHz), and in impedance (within 5 ohm of prior calibration), the annual calibration is not necessary and the calibration interval can be extended.

<Head 835MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-42.84	-	50.5	-	Feb. 21, 2024
-42.803	0.09	50.592	0.092	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 2450MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-29.27	-	53.6	-	Feb. 21, 2024
-29.39	0.41	53.742	0.142	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 2600MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-25.57	-	54.5	-	Feb. 21, 2024
-25.248	1.26	54.653	0.153	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 5200MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-9.64	-	25.80	-	Feb. 21, 2024
-9.1819	4.75	25.891	0.091	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 5400MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-14.01	-	51.53	-	Feb. 21, 2024
-14.1612	1.08	51.870	0.340	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 5600MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-16.83	-	44.12	-	Feb. 21, 2024
-16.9801	0.89	44.821	0.701	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

<Head 5800MHz>

Return Loss (dB)	Delta (%)	Impedance	Delta(ohm)	Date of Measurement
-14.91	-	38.53	-	Feb. 21, 2024
-14.349	3.76	38.715	0.185	Feb. 20, 2025

The return loss is <-20dB, within 20% of prior calibration; the impedance is within 5 ohm of prior calibration. Therefore the verification result should support extended calibration.

※※END OF THE REPORT※※