FCC SAR EVALUATION REPORT

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

Product Name:	MOBILE PHONE
Model No.:	Q8-1
Serial Model:	Q8, Q9, Q9-1, Q9+, Q7, Q7+, Q1, Q2, Q3, Q5, Q6, Q10, K1, K1+, K2, K3, K5, K6, K7, K9, E11, E12, E13, E15, E16, E18, E19
Brand Name:	YEEMI
Report No.:	AiTSZ-241203083FW1
FCC ID:	2BMJP-08-1

Prepared for

Shenzhen Jinkewei Technology Co., LTD

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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name:	Shenzhen Jinkewei Technology Co., LTD
Address:	5302B, Seg Square, No.1002, Huaqiang North Road, Futian District, Shenzhen City
Manufacturer's Name:	Shenzhen Jinkewei Technology Co., LTD
Address:	5302B, Seg Square, No.1002, Huaqiang North Road, Futian District, Shenzhen City
Product description	
Product name:	MOBILE PHONE
Trademark:	YEEMI
Model and/or type reference:	Q8-1
Serial Model:	Q8，Q9，Q9-1，Q9+，Q7，Q7+，Q1，Q2，Q3，Q5，Q6，Q10，K1，K1+，K2，K3，K5，K6，K7，K9，E11，E12，E13，E15，E16，E18，E19
Standards:	FCC 47 CFR Part 2(2.1093) 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.

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Date of Test

Date (s) of performance of tests:	Dec. 03, 2024 ~ Dec. 05, 2024
Date of Issue:	Dec. 06, 2024
Test Result:	**Pass**

Reviewed by: Simba Huang (signature)

Simba Huang

Approved by: Seal-Chen (signature)

Seal.chen

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Dec. 06, 2024	Seal.chen

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1. General Information

1.1. RF exposure limits

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.4	8.0	20.0

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

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

NOTE: ***Whole-Body SAR*** is averaged over the entire body, ***partial-body SAR*** is averaged over any 1 gram of tissue defined as a tissue volume in the shape of a cube. ***SAR for hands, wrists, feet and ankles*** is averaged over any 10 grams of tissue defined as a tissue volume in the shape of a cube.

Occupational/Controlled Environments:
Are defined as locations where there is exposure that may be incurred by people who are aware of the potential for exposure, (i.e. as a result of employment or occupation).

General Population/Uncontrolled Environments:
Are defined as locations where there is the exposure of individuals who have no knowledge or control of their exposure.

NOTE
HEAD AND TRUNK LIMIT
1.6 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

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

Band	Max SAR Value Reported(W/kg)		
	1-g Head (Separation distance of 0mm)	1-g Body&Hotspot (Separation distance of 10mm)	Max SAR Summation
LTE Band 5	0.131	0.284	N/A
LTE Band 38	0.261	0.487	
LTE Band 40a	0.184	0.363	

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	MOBILE PHONE		
Trademark	YEEMI		
Model Name	Q8-1		
Family Model	Q8，Q9，Q9-1，Q9+，Q7，Q7+，Q1，Q2，Q3，Q5，Q6，Q10，K1，K1+，K2，K3，K5，K6，K7，K9，E11，E12，E13，E15，E16，E18，E19		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna Type	FPC Antenna		
Battery Information	Input: DC 5V/0.5A DC 3.7V 16800mAh Rechargeable Li-ion battery		
Hardware version	SU109C_MB_V1.1		
Software version	SU109C_JKW_Q8_EN_NV7644-31_240x320_V02_T02-202306012058		
Device Operating Configurations			
Supporting Mode(s)	LTEBand5/38/40a		
Test Modulation	LTE(QPSK/16QAM)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 5	824-849	869-894
	LTE Band 38	2570-2620	
	LTE Band 40a	2305-2315	
Power Class	3, tested with power control all Max.(LTE Band 5)		
	3, tested with power control all Max.(LTE Band 38)		
	3, tested with power control all Max.(LTE Band 40a)		

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
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 941225 D05 SAR for LTE Devices
KDB 941225 D06 Hotspot SAR
KDB 648474 D04 Handset SAR

1.5. Ambient Condition

Ambient temperature	20°C – 24°C
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

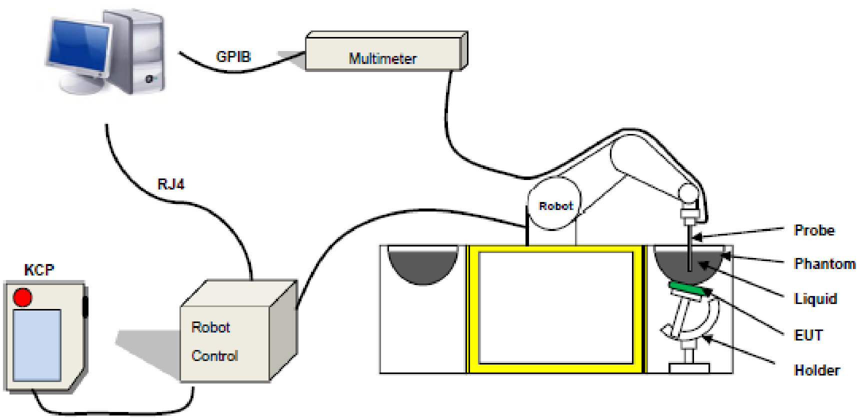
The 3m Semi-anechoic chamber of Guangdong Asia Hongke Test Technology Limited has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing with Registration No.: 31737c

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

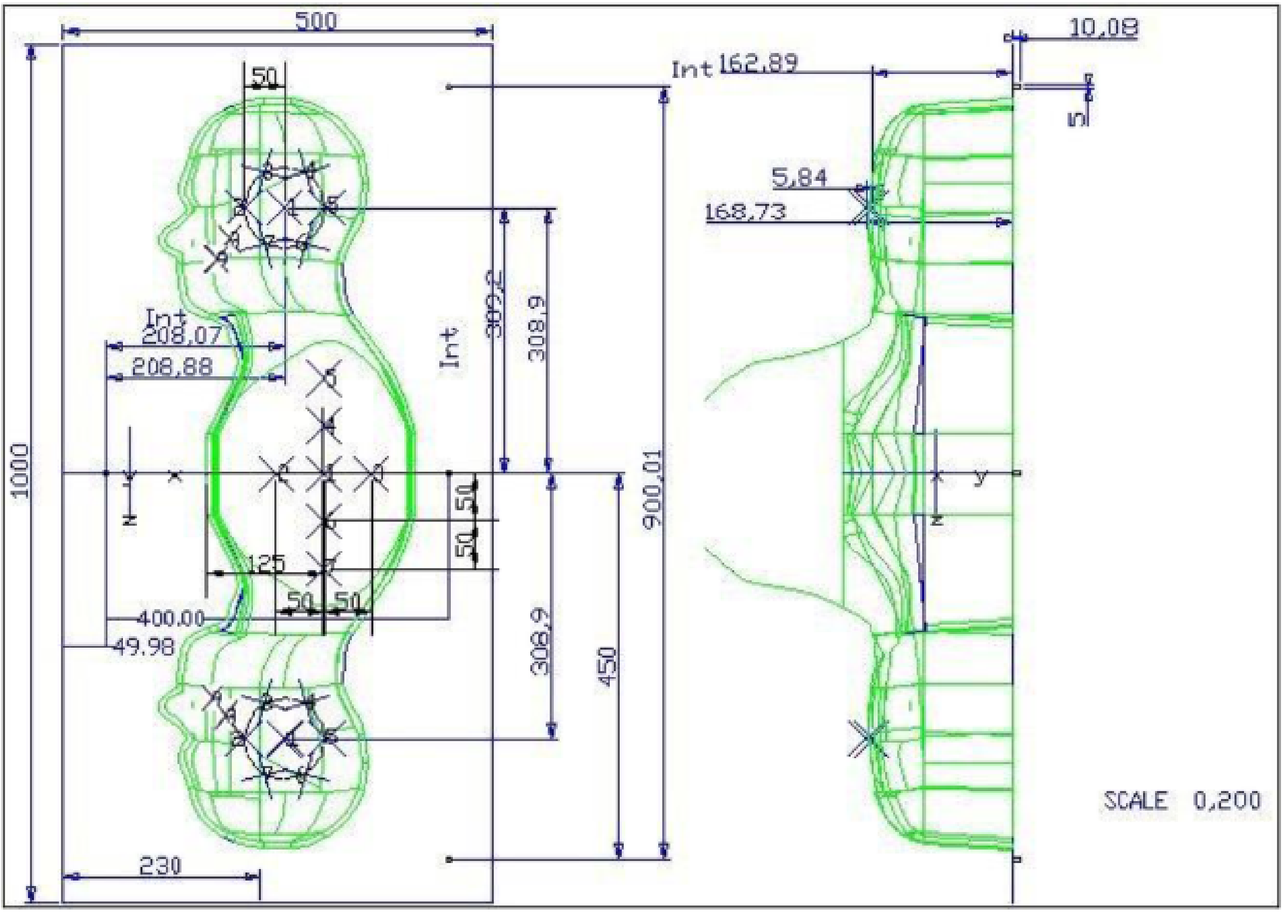
Each probe needs to be calibrated according to a dosimetric assessment procedure with accuracy better than ±10%. The spherical isotropy shall be evaluated and within ±0.25dB. The sensitivity parameters (Norm X, Norm Y, and Norm Z), the diode compression parameter (DCP) and the conversion factor (Conv 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

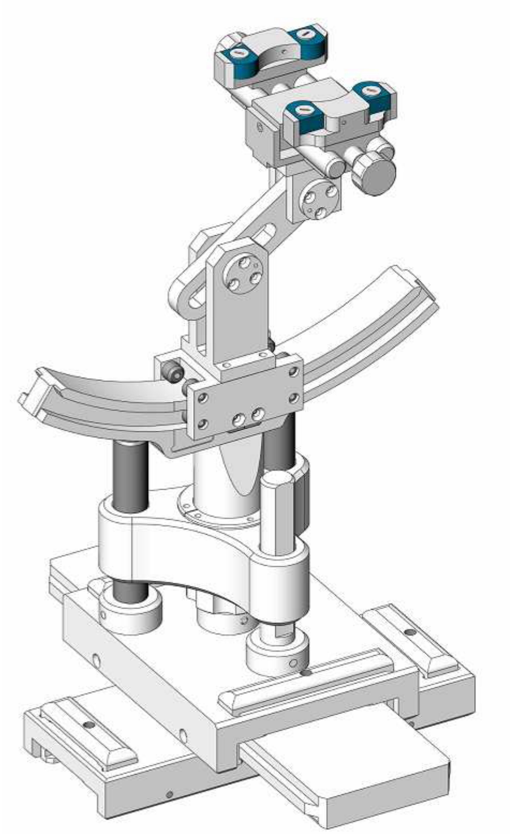
2.5. Technical Data



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. 11, 2024	Sep. 10, 2025
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 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. 01, 2024	Jun. 30, 2025
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	Jul. 01, 2024	Jun. 30, 2025
☐	R&S	Universal radio communication tester	CMU200	117858	Jul. 01, 2024	Jun. 30, 2025
☒	R&S	Wideband radio communication tester	CMW500	116581	Jul. 01, 2024	Jun. 30, 2025
☒	HP	Network Analyzer	8753D	3410J01136	Jul. 01, 2024	Jun. 30, 2025

☒	Agilent	PSG Analog Signal Generator	E8257D	MY51110112	Jul. 01, 2024	Jun. 30, 2025
☒	Agilent	Power meter	E4419B	MY45102538	Jul. 01, 2024	Jun. 30, 2025
☒	Agilent	Power meter	E4419B	MY45102140	Jul. 01, 2024	Jun. 30, 2025
☒	Agilent	Power meter	E4419B	MY45102215	Jul. 01, 2024	Jun. 30, 2025
☒	JFW	attenuator	50FPE-006	4360846-494-4	Jul. 01, 2024	Jun. 30, 2025
☒	JFW	attenuator	50FPE-006	4360846-492-1	Jul. 01, 2024	Jun. 30, 2025
☒	JFW	attenuator	50FPE-006	4360846-490-6	Jul. 01, 2024	Jun. 30, 2025
☒	Agilent	Power sensor	E9301A	MY41495644	Jul. 01, 2024	Jun. 30, 2025
☒	Agilent	Power sensor	E9301A	US39212148	Jul. 01, 2024	Jun. 30, 2025
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Jul. 17, 2024	Jul. 16, 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.

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	½·δ·ln(2) ± 0.5 mm
Maximum probe angle from probe axis to phantom surface normal at the measurement location			30° ± 1°	20° ± 1°
Maximum area scan spatial resolution: Δx_{Area}, Δy_{Area}			≤ 2 GHz: ≤ 15 mm 2 – 3 GHz: ≤ 12 mm	3 – 4 GHz: ≤ 12 mm 4 – 6 GHz: ≤ 10 mm
			When the x or y dimension of the test device, in the measurement plane orientation, is smaller than the above, the measurement resolution must be ≤ the corresponding x or y dimension of the test device with at least one measurement point on the test device.	
Maximum zoom scan spatial resolution: Δx_{Zoom}, Δy_{Zoom}			≤ 2 GHz: ≤ 8 mm 2 – 3 GHz: ≤ 5 mm*	3 – 4 GHz: ≤ 5 mm* 4 – 6 GHz: ≤ 4 mm*
Maximum zoom scan spatial resolution, normal to phantom surface	uniform grid: $\Delta z_{Zoom}(n)$		≤ 5 mm	3 – 4 GHz: ≤ 4 mm 4 – 5 GHz: ≤ 3 mm 5 – 6 GHz: ≤ 2 mm
	graded grid	$\Delta z_{Zoom}(1)$: between 1st two points closest to phantom surface	≤ 4 mm	3 – 4 GHz: ≤ 3 mm 4 – 5 GHz: ≤ 2.5 mm 5 – 6 GHz: ≤ 2 mm
		$\Delta z_{Zoom}(n>1)$: between subsequent points	≤ 1.5·$\Delta z_{Zoom}(n-1)$	
Minimum zoom scan volume	x, y, z		≥ 30 mm	3 – 4 GHz: ≥ 28 mm 4 – 5 GHz: ≥ 25 mm 5 – 6 GHz: ≥ 22 mm
Note: δ is the penetration depth of a plane-wave at normal incidence to the tissue medium; see draft standard IEEE P1528-2011 for details. * When zoom scan is required and the *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.				

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.

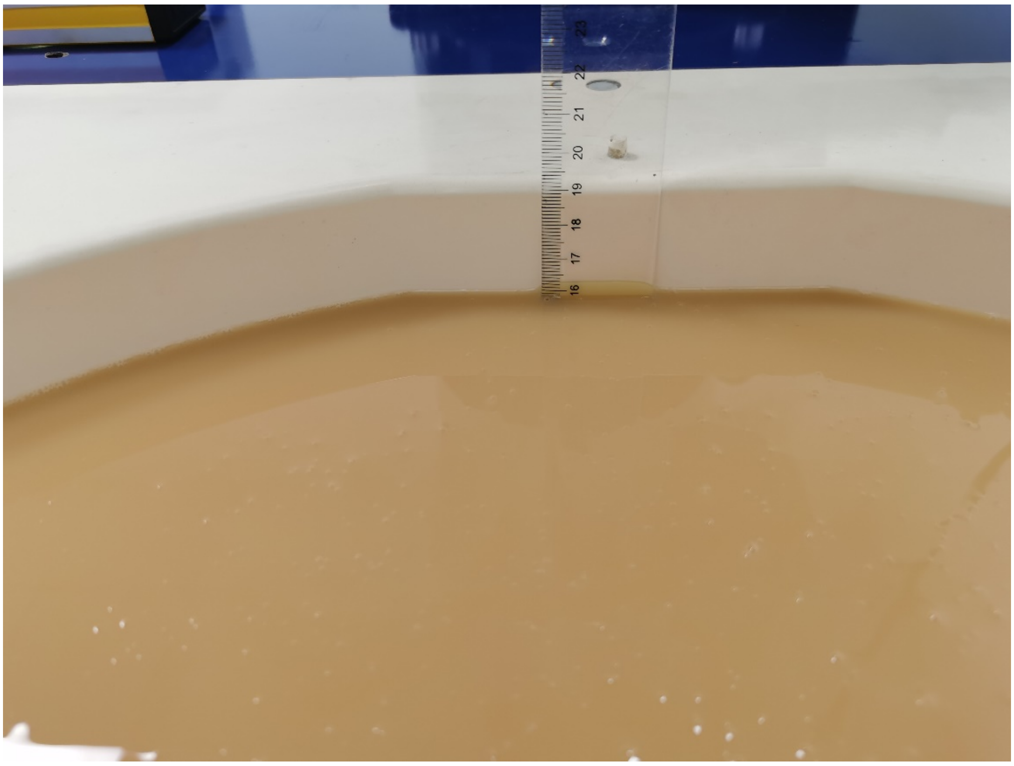
4. System Verification Procedure

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

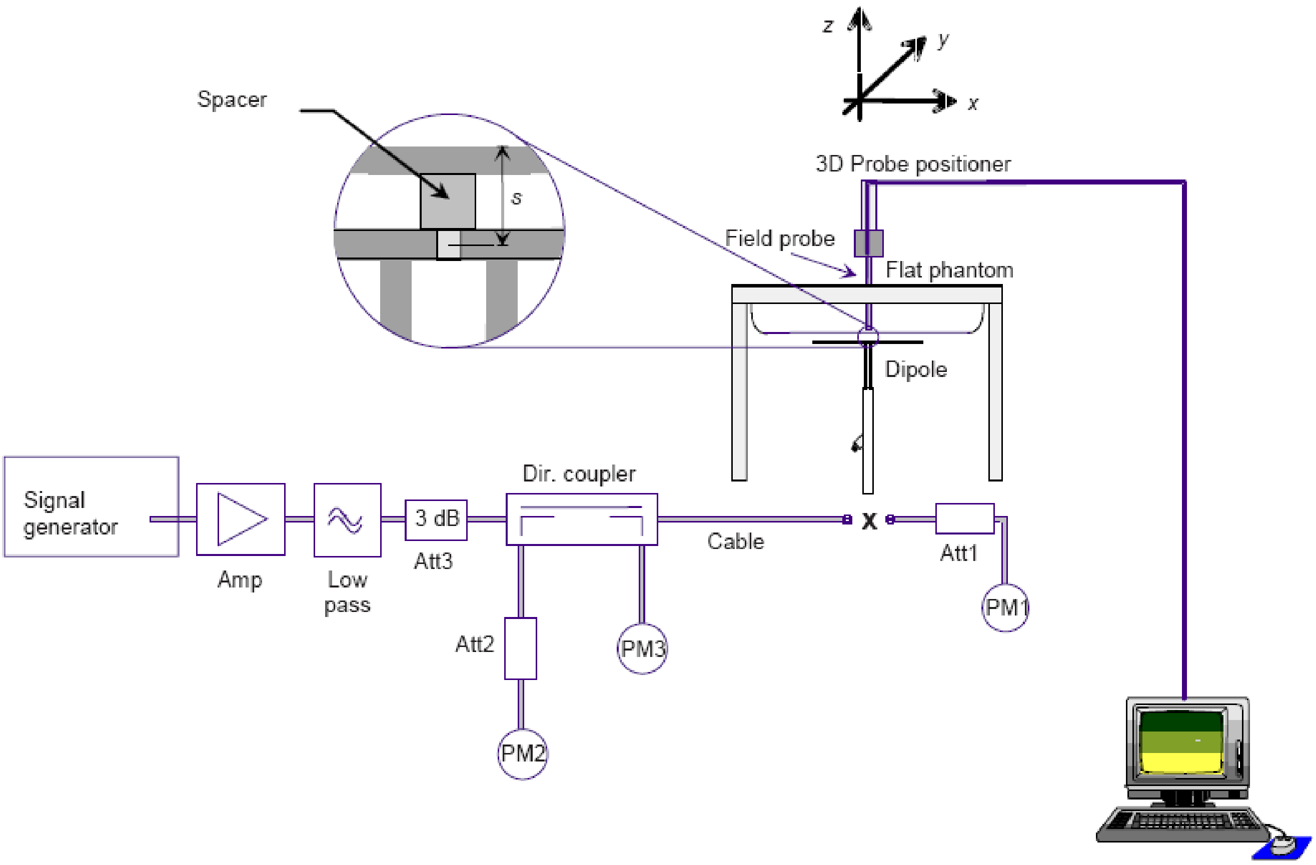
The simulating liquids should be checked at the beginning of a series of SAR measurements to determine of the dielectric parameter are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within ±5% of the target values.

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	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	42.01	0.94	21.7 °C	Dec. 03, 2024
Head 2300	2300	39.47 (37.50~41.44)	1.66 (1.58~1.74)	40.12	1.70	21.6 °C	Dec. 04, 2024
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	39.43	1.99	21.4 °C	Dec. 05, 2024

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

4.2. System Verification Procedure

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



4.2.1. System Verification Results

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

System Verification	Target SAR (1W) (±10%)		Measured SAR 100mW		Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
835MHz	9.40 (8.46~10.34)	6.28 (5.65~6.91)	1.011	0.612	10.11	6.12	21.7 °C	Dec. 03, 2024
2300MHz	50.63 (45.57~55.69)	23.51 (21.16~25.86)	5.172	2.340	51.72	23.40	21.6 °C	Dec. 04, 2024
2600MHz	54.16 (48.74~59.58)	24.85 (22.37~27.34)	5.433	2.523	54.33	25.23	21.4 °C	Dec. 05, 2024

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.

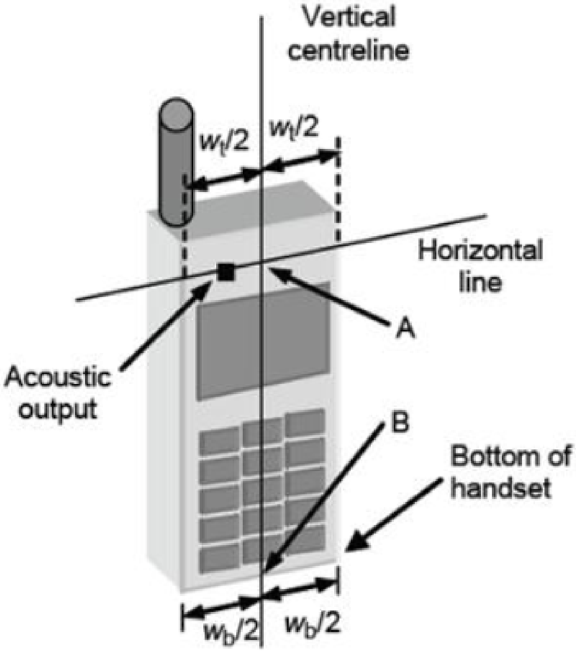


Fig 7.2.1 Handset vertical and horizontal reference lines——fixed case

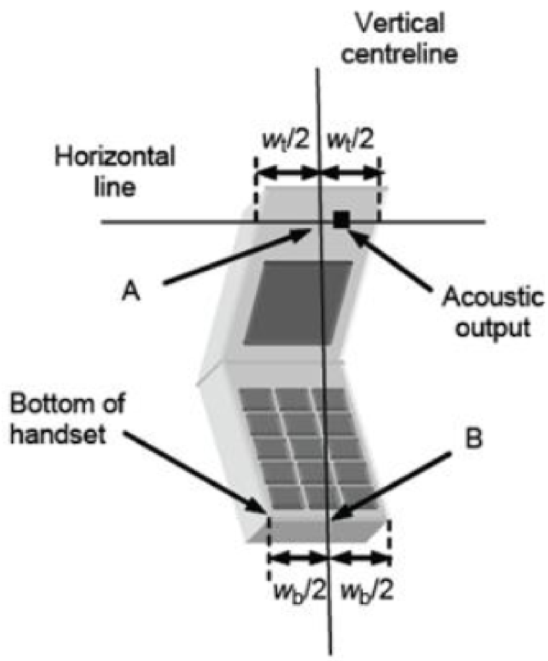


Fig 7.2.2 Handset vertical and horizontal reference lines—“clam-shell case”

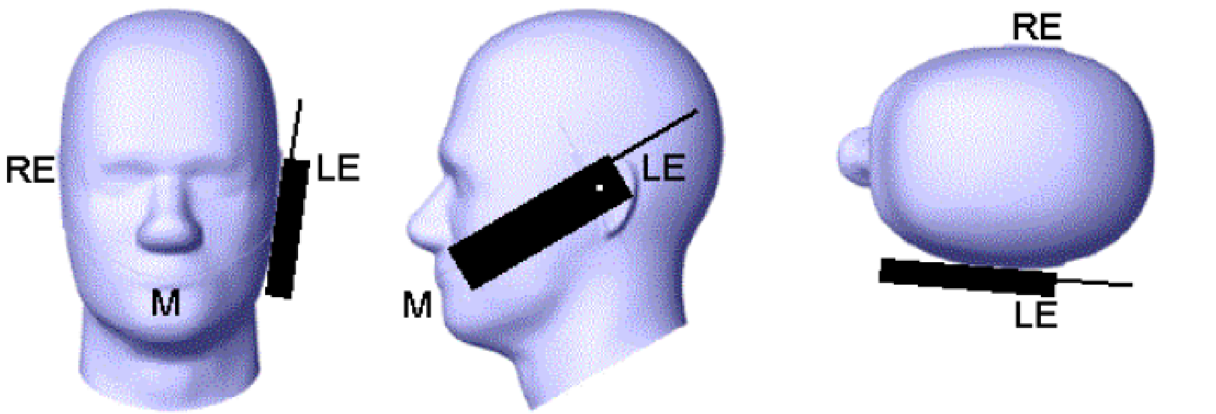


Fig 7.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

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.

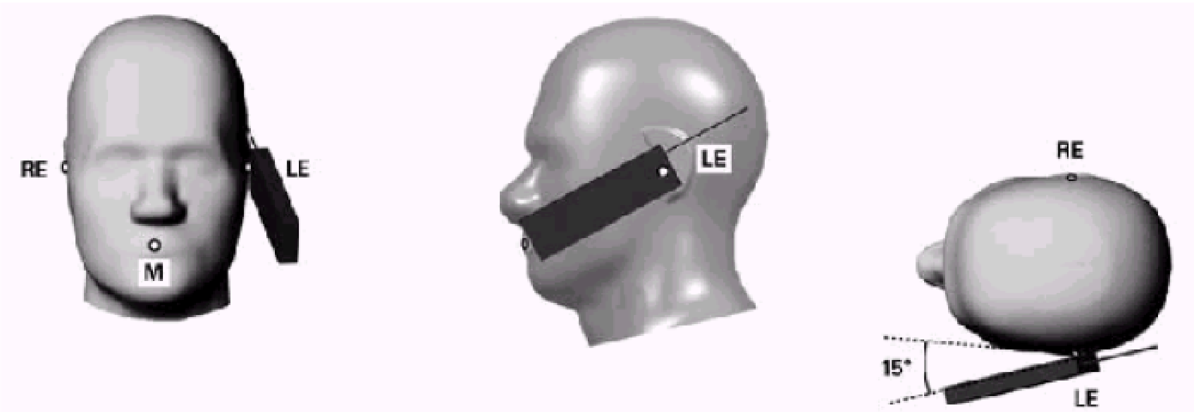


Figure 7.3.1 – Tilt position of the wireless device on the left side of SAM

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.

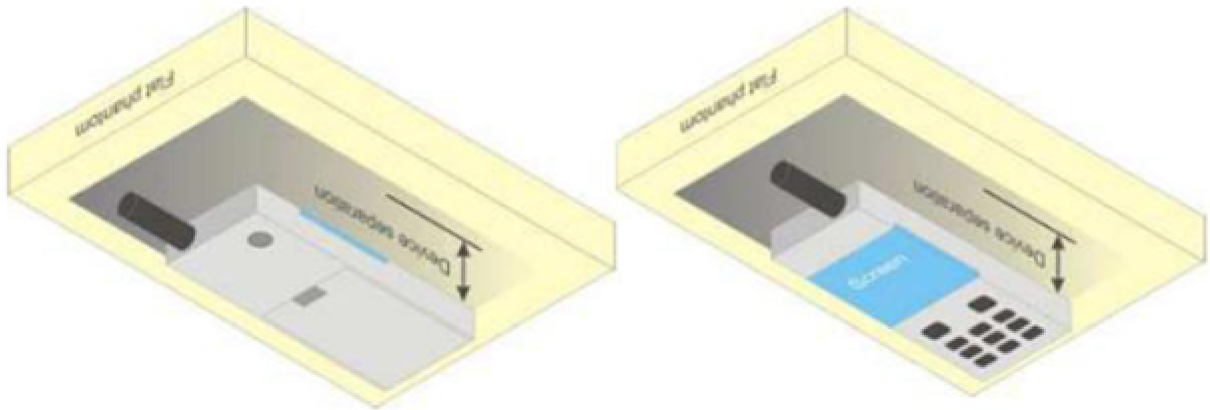


Figure 7.4.1 – Test positions for body-worn devices

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	23.00	22.88	22.67	22.79
			1	2	23.00	22.86	22.75	22.87
			1	5	23.00	22.88	22.75	22.83
			3	0	23.00	22.81	22.87	22.77
			3	1	23.00	22.80	22.88	22.81
			3	2	23.00	22.83	22.87	22.86
			6	0	22.00	21.80	21.82	21.77
		16QAM	1	0	22.00	21.87	21.90	21.36
			1	2	22.00	21.91	21.89	21.33
			1	5	22.00	21.95	21.91	21.36
			3	0	22.00	21.89	21.67	21.55
			3	1	22.00	21.80	21.71	21.54
			3	2	22.00	21.85	21.72	21.54
			6	0	21.50	20.92	21.20	20.85

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20415/825.5	20525/836.5	20635/847.5
LTE Band 5	3MHz	QPSK	1	0	23.00	22.79	22.65	22.85
			1	7	23.00	22.81	22.70	22.77
			1	14	23.00	22.76	22.79	22.88
			8	0	22.00	21.75	21.74	21.76
			8	4	22.00	21.80	21.77	21.84
			8	7	22.00	21.74	21.85	21.76
			15	0	22.00	21.77	21.86	21.80
		16QAM	1	0	23.00	21.97	21.55	22.65
			1	7	23.00	21.84	21.51	22.65
			1	14	23.00	21.81	21.53	22.60
			8	0	21.50	21.05	20.91	20.96
			8	4	21.50	20.96	21.38	20.91
			8	7	21.50	21.04	21.26	20.89
			15	0	21.50	20.85	21.22	20.94

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20425/826.5	20525/836.5	20625/846.5
LTE Band 5	5MHz	QPSK	1	0	23.00	22.79	22.75	22.85
			1	12	23.00	22.76	22.73	22.81
			1	24	23.00	22.75	22.66	22.80
			12	0	22.00	21.82	21.84	21.73
			12	6	22.00	21.85	21.92	21.77
			12	11	22.00	21.83	21.85	21.79
			25	0	22.00	21.74	21.87	21.83
		16QAM	1	0	22.00	21.10	21.95	21.87
			1	12	22.00	21.00	21.87	21.94
			1	24	22.00	21.02	21.94	21.96
			12	0	21.50	20.80	20.89	20.98
			12	6	21.50	20.88	21.22	20.92
			12	11	21.50	20.80	21.16	20.93

			25	0	21.50	20.93	21.21	20.88

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20450/829	20525/836.5	20600/844
LTE Band 5	10MHz	QPSK	1	0	23.00	22.89	22.78	22.89
			1	24	23.00	22.86	22.90	22.92
			1	49	23.00	22.72	22.82	22.99
			25	0	22.00	21.83	21.93	21.94
			25	12	22.00	21.84	21.95	21.86
			25	24	22.00	21.84	21.88	21.89
			50	0	22.00	21.83	21.90	21.89
		16QAM	1	0	22.50	22.32	21.33	22.01
			1	24	22.50	22.32	21.39	21.99
			1	49	22.50	22.14	21.41	21.98
			25	0	21.50	20.91	21.02	21.05
			25	12	21.50	21.27	21.33	20.98
			25	24	21.50	21.24	21.04	21.00
			50	0	21.50	21.26	21.15	20.98

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	23.50	22.94	22.80	22.98
			1	12	23.50	23.01	22.92	23.09
			1	24	23.50	23.00	22.93	23.13
			12	0	22.50	22.03	21.90	22.04
			12	6	22.50	21.96	21.98	21.99
			12	11	22.50	22.13	21.94	22.04
			25	0	22.50	21.96	21.97	22.07
		16QAM	1	0	23.00	21.51	22.81	22.03
			1	12	23.00	21.52	22.87	22.21
			1	24	23.00	21.72	22.97	21.93
			12	0	21.50	21.00	20.99	21.13
			12	6	21.50	20.96	20.93	21.11
			12	11	21.50	20.89	21.09	21.11
			25	0	21.50	21.10	21.27	21.17
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	23.50	23.17	22.88	23.06
			1	24	23.50	22.96	22.90	22.97
			1	49	23.50	23.02	22.99	22.96
			25	0	22.50	22.03	21.92	22.01
			25	12	22.50	22.02	21.95	22.07
			25	24	22.50	21.91	21.89	22.04
			50	0	22.50	21.97	22.02	22.08
		16QAM	1	0	23.50	22.37	22.03	22.90
			1	24	23.50	22.38	22.21	22.86
			1	49	23.50	22.39	21.99	23.08
			25	0	21.50	21.22	21.41	21.18
			25	12	21.50	20.98	21.49	21.12
			25	24	21.50	21.06	21.44	21.10

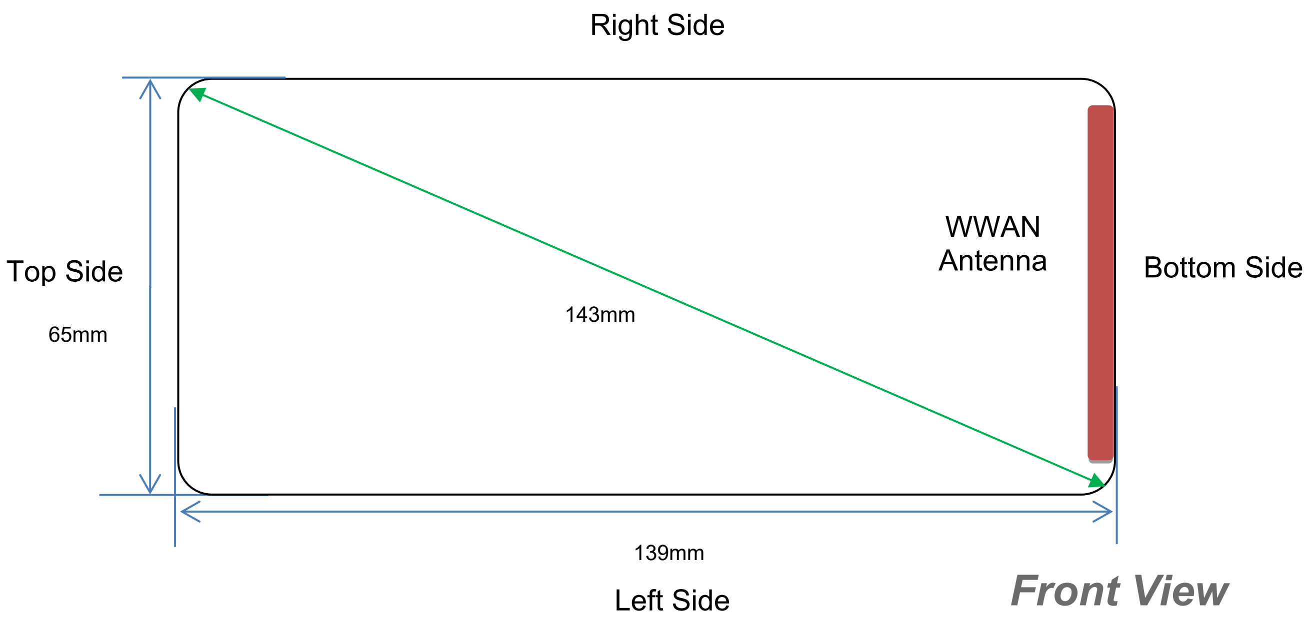
			50	0	21.50	21.02	21.40	21.07
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		37825/2577.5	38000/2595	38175/2615
LTE Band 38	15MHz	QPSK	1	0	23.50	23.09	22.89	22.95
			1	37	23.50	23.06	22.87	23.04
			1	74	23.50	23.06	22.97	22.89
			36	0	22.50	22.05	21.95	22.08
			36	18	22.50	22.01	21.92	21.91
			36	37	22.50	21.97	21.97	21.97
			75	0	22.50	22.07	21.90	21.96
		16QAM	1	0	23.50	21.99	22.01	23.14
			1	37	23.50	22.37	22.44	23.25
			1	74	23.50	22.31	21.92	23.01
			36	0	21.50	21.19	21.25	21.05
			36	18	21.50	21.06	21.24	21.04
			36	37	21.50	21.00	21.16	21.18
			75	0	21.50	21.05	21.10	21.19
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	23.50	23.06	23.14	22.85
			1	49	23.50	22.86	23.02	22.80
			1	99	23.50	22.77	23.11	22.71
			50	0	22.50	21.87	21.92	21.85
			50	24	22.50	22.03	22.00	21.92
			50	49	22.50	22.02	22.01	22.04
			100	0	22.50	22.03	22.05	21.92
		16QAM	1	0	23.00	22.93	22.48	21.97
			1	49	23.00	22.58	22.92	21.99
			1	99	23.00	22.48	22.72	22.02
			50	0	21.50	21.22	21.32	21.23
			50	24	21.50	21.21	21.30	21.15
			50	49	21.50	21.24	21.29	21.13
			100	0	21.50	21.22	21.19	21.13

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		38725/2307.5	38750/2310	38775/2312.5
LTE Band 40	5MHz	QPSK	1	0	23.00	22.84	22.76	22.70
			1	12	23.00	22.85	22.82	22.85
			1	24	23.00	22.81	22.93	22.91
			12	0	22.00	21.80	21.83	21.87
			12	6	22.00	21.88	21.71	21.98
			12	11	22.00	21.81	21.85	21.75
			25	0	22.00	21.89	21.81	21.83
		16QAM	1	0	23.00	21.86	21.41	22.70
			1	12	23.00	22.74	21.86	21.31
			1	24	23.00	21.65	22.71	21.84
			12	0	21.00	20.88	20.84	20.90
			12	6	21.00	20.74	20.91	20.96
			12	11	21.00	20.95	20.79	20.96

			25	0	21.50	21.02	21.00	20.90

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		/	38750/2310	/
LTE Band 40	10MHz	QPSK	1	0	23.00	/	22.84	/
			1	24	23.00	/	22.95	/
			1	49	23.00	/	22.80	/
			25	0	22.00	/	21.82	/
			25	12	22.00	/	21.82	/
			25	24	22.00	/	21.97	/
			50	0	22.00	/	21.86	/
		16QAM	1	0	22.50	/	22.40	/
			1	24	22.50	/	21.71	/
			1	49	22.50	/	22.14	/
			25	0	21.50	/	21.02	/
			25	12	21.50	/	21.09	/
			25	24	21.50	/	20.88	/
			50	0	21.50	/	21.02	/

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
WWAN	5	5	5	5	>25mm	5

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

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

10. 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(1,49)	0.126	0.089	4.47	22.82	23.00	0.131	2024/12/3	1#
Left Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.075	0.052	-2.18	22.82	23.00	0.078	2024/12/3	
Right Cheek	20525/836.5	10M QPSK(1,49)	0.111	0.074	3.69	22.82	23.00	0.116	2024/12/3	
Right Tilt 15 Degree	20525/836.5	10M QPSK(1,49)	0.053	0.037	-2.74	22.82	23.00	0.055	2024/12/3	
50%RB										
Left Cheek	20525/836.5	10M QPSK(25,12)	0.075	0.050	-3.10	21.95	22.00	0.076	2024/12/3	
Left Tilt 15 Degree	20525/836.5	10M QPSK(25,12)	0.039	0.029	3.92	21.95	22.00	0.039	2024/12/3	
Right Cheek	20525/836.5	10M QPSK(25,12)	0.057	0.041	-2.81	21.95	22.00	0.058	2024/12/3	
Right Tilt 15 Degree	20525/836.5	10M QPSK(25,12)	0.028	0.019	2.51	21.95	22.00	0.028	2024/12/3	

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
1RB										
Front Side	20525/836.5	10M QPSK(1,49)	0.174	0.097	-3.33	22.82	23.00	0.181	2024/12/3	
Back	20525/836.5	10M QPSK(1,49)	0.272	0.159	1.69	22.82	23.00	0.284	2024/12/3	2#

Side										
Left Side	20525/836.5	10M QPSK(1,49)	0.093	0.053	1.84	22.82	23.00	0.097	2024/12/3	
Right Side	20525/836.5	10M QPSK(1,49)	0.091	0.052	2.80	22.82	23.00	0.095	2024/12/3	
Bottom Side	20525/836.5	10M QPSK(1,49)	0.150	0.084	-0.70	22.82	23.00	0.156	2024/12/3	
50%RB										
Front Side	20525/836.5	10M QPSK(25,12)	0.100	0.051	4.14	21.95	22.00	0.101	2024/12/3	
Back Side	20525/836.5	10M QPSK(25,12)	0.141	0.084	0.25	21.95	22.00	0.143	2024/12/3	
Left Side	20525/836.5	10M QPSK(25,12)	0.051	0.029	-2.65	21.95	22.00	0.052	2024/12/3	
Right Side	20525/836.5	10M QPSK(25,12)	0.047	0.030	2.45	21.95	22.00	0.048	2024/12/3	
Bottom Side	20525/836.5	10M QPSK(25,12)	0.090	0.044	-2.00	21.95	22.00	0.091	2024/12/3	

< 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 (W/Kg)	Date	Plot
			1g	10g						
1RB										
Left Cheek	38000/2595	20M QPSK(1,0)	0.240	0.162	3.79	23.14	23.50	0.261	2024/12/5	3#
Left Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0.124	0.083	1.11	23.14	23.50	0.135	2024/12/5	
Right Cheek	38000/2595	20M QPSK(1,0)	0.204	0.131	2.57	23.14	23.50	0.222	2024/12/5	
Right Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0.109	0.072	0.23	23.14	23.50	0.118	2024/12/5	
50%RB										
Left Cheek	38000/2595	20M QPSK(50,49)	0.122	0.086	2.66	22.01	22.50	0.137	2024/12/5	
Left Tilt 15 Degree	38000/2595	20M QPSK(50,49)	0.073	0.045	0.79	22.01	22.50	0.082	2024/12/5	

Right Cheek	38000/2595	20M QPSK(50,49)	0.117	0.068	1.23	22.01	22.50	0.131	2024/12/5	
Right Tilt 15 Degree	38000/2595	20M QPSK(50,49)	0.062	0.043	3.12	22.01	22.50	0.069	2024/12/5	

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
1RB										
Front Side	38000/2595	20M QPSK(1,0)	0.282	0.164	-3.41	23.14	23.50	0.306	2024/12/5	
Back Side	38000/2595	20M QPSK(1,0)	0.448	0.266	-1.54	23.14	23.50	0.487	2024/12/5	4#
Left Side	38000/2595	20M QPSK(1,0)	0.135	0.079	0.48	23.14	23.50	0.147	2024/12/5	
Right Side	38000/2595	20M QPSK(1,0)	0.132	0.076	0.43	23.14	23.50	0.143	2024/12/5	
Bottom Side	38000/2595	20M QPSK(1,0)	0.240	0.135	-1.61	23.14	23.50	0.261	2024/12/5	
50%RB										
Front Side	38000/2595	20M QPSK(50,49)	0.160	0.088	1.58	22.01	22.50	0.179	2024/12/5	
Back Side	38000/2595	20M QPSK(50,49)	0.254	0.150	-0.43	22.01	22.50	0.284	2024/12/5	
Left Side	38000/2595	20M QPSK(50,49)	0.072	0.046	1.55	22.01	22.50	0.081	2024/12/5	
Right Side	38000/2595	20M QPSK(50,49)	0.070	0.040	-1.53	22.01	22.50	0.078	2024/12/5	
Bottom Side	38000/2595	20M QPSK(50,49)	0.126	0.068	3.57	22.01	22.50	0.141	2024/12/5	

< LTE Band 40a>

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	38750/2310	10M QPSK(1,24)	0.182	0.135	-2.92	22.95	23.00	0.184	2024/12/4	5#
Left Tilt 15 Degree	38750/2310	10M QPSK(1,24)	0.100	0.070	3.23	22.95	23.00	0.101	2024/12/4	
Right Cheek	38750/2310	10M QPSK(1,24)	0.165	0.119	-3.52	22.95	23.00	0.167	2024/12/4	
Right Tilt 15 Degree	38750/2310	10M QPSK(1,24)	0.086	0.062	-0.17	22.95	23.00	0.087	2024/12/4	
50%RB										
Left Cheek	38750/2310	10M QPSK(25,24)	0.107	0.070	3.37	21.97	22.00	0.108	2024/12/4	
Left Tilt 15 Degree	38750/2310	10M QPSK(25,24)	0.060	0.038	-2.86	21.97	22.00	0.060	2024/12/4	
Right Cheek	38750/2310	10M QPSK(25,24)	0.093	0.062	4.95	21.97	22.00	0.094	2024/12/4	
Right Tilt 15 Degree	38750/2310	10M QPSK(25,24)	0.051	0.033	0.03	21.97	22.00	0.051	2024/12/4	

Test Position of Hotspot with 10mm	Test channel /Freq.	Test Mode	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 1g (W/Kg)	Date	Plot
			1g	10g						
1RB										
Front Side	38750/2310	10M QPSK(1,24)	0.216	0.135	3.87	22.95	23.00	0.219	2024/12/4	
Back Side	38750/2310	10M QPSK(1,24)	0.359	0.236	-4.74	22.95	23.00	0.363	2024/12/4	6#
Left Side	38750/2310	10M QPSK(1,24)	0.120	0.078	1.08	22.95	23.00	0.121	2024/12/4	
Right Side	38750/2310	10M QPSK(1,24)	0.108	0.071	1.91	22.95	23.00	0.109	2024/12/4	
Bottom Side	38750/2310	10M QPSK(1,24)	0.185	0.117	-0.63	22.95	23.00	0.187	2024/12/4	
50%RB										

Front Side	38750/2310	10M QPSK(25,24)	0.119	0.072	3.91	21.97	22.00	0.120	2024/12/4	
Back Side	38750/2310	10M QPSK(25,24)	0.184	0.132	-2.59	21.97	22.00	0.185	2024/12/4	
Left Side	38750/2310	10M QPSK(25,24)	0.065	0.040	-1.33	21.97	22.00	0.065	2024/12/4	
Right Side	38750/2310	10M QPSK(25,24)	0.061	0.039	-3.62	21.97	22.00	0.061	2024/12/4	
Bottom Side	38750/2310	10M QPSK(25,24)	0.109	0.069	-0.80	21.97	22.00	0.110	2024/12/4	

Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

Appendix B. System Check Plots

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MEASUREMENT 1

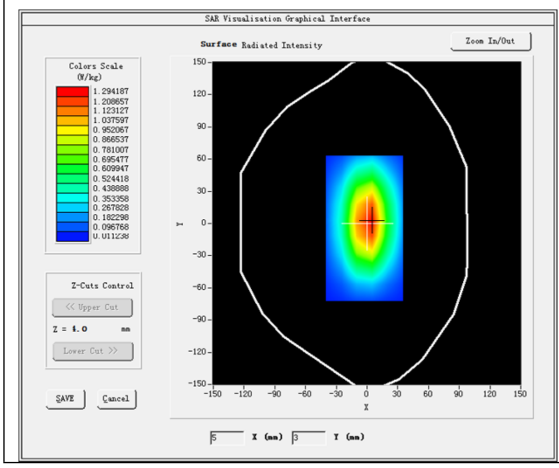
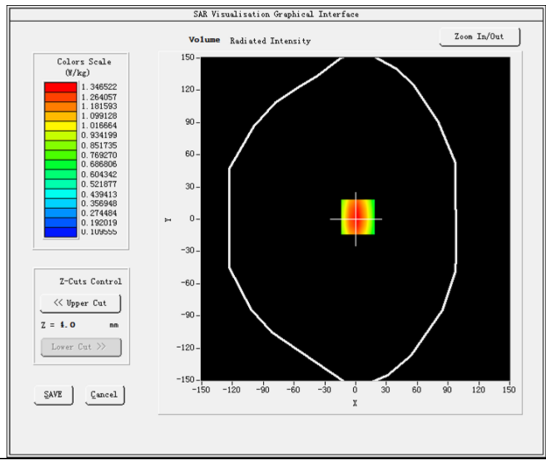
Date of measurement: 3/12/2024

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW835
Channels	Middle
Signal	CW (Crest factor: 1.0)
ConvF	1.66

B. SAR Measurement Results

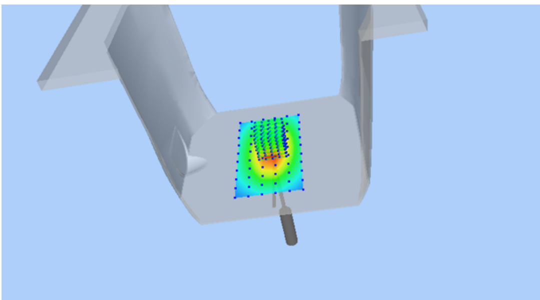
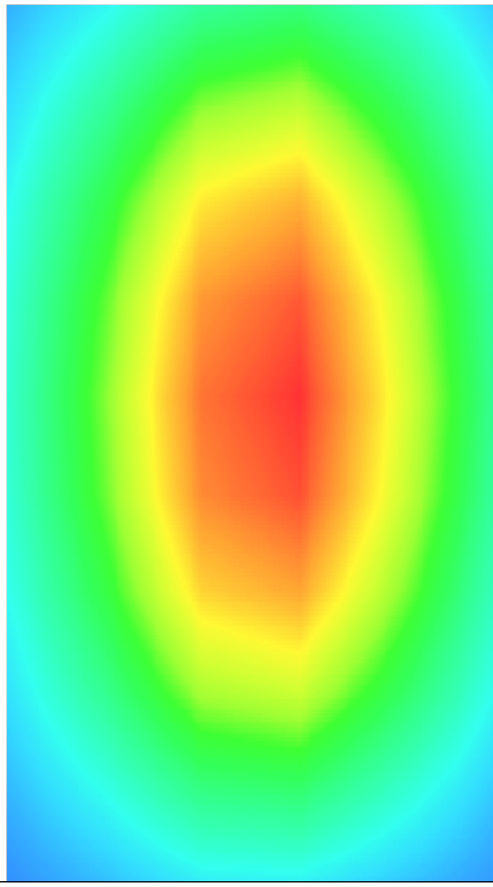
Frequency (MHz)	835.000000
Relative permittivity (real part)	42.012031
Relative permittivity (imaginary part)	19.131021
Conductivity (S/m)	0.941030
Variation (%)	0.310000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=2.00, Y=2.00

SAR Peak: 1.87 W/kg

SAR 10g (W/Kg)	0.612031
SAR 1g (W/Kg)	1.011231

3D screen shot	Hot spot position
	

MEASUREMENT 2

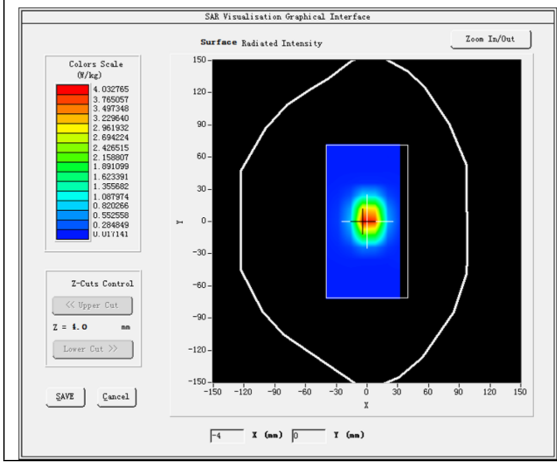
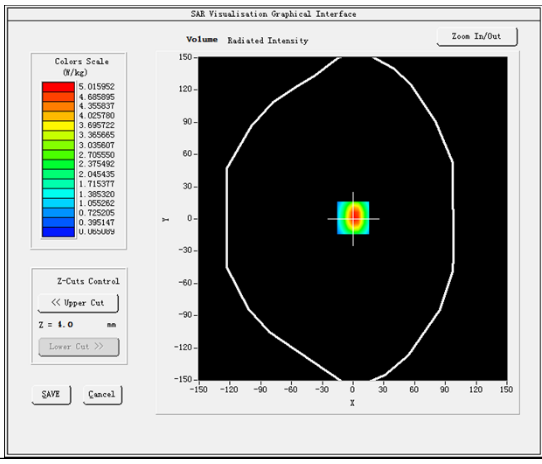
Date of measurement: 4/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2300
Channels	Middle
Signal	CW (Crest factor: 1.0)
ConvF	2.55

B. SAR Measurement Results

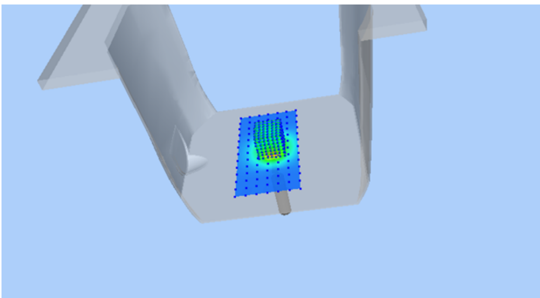
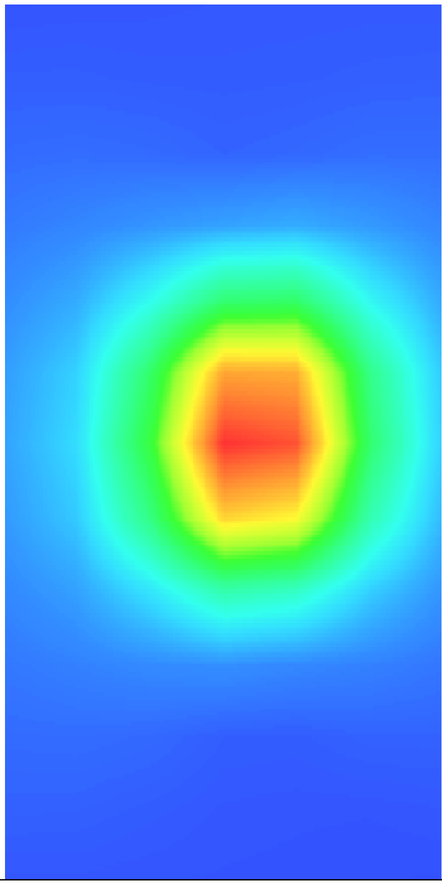
Frequency (MHz)	2300.000000
Relative permittivity (real part)	40.120345
Relative permittivity (imaginary part)	13.392012
Conductivity (S/m)	1.701209
Variation (%)	4.010000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=0.00, Y=1.00

SAR Peak: 8.14 W/kg

SAR 10g (W/Kg)	2.340123
SAR 1g (W/Kg)	5.172012

3D screen shot	Hot spot position
	

MEASUREMENT 3

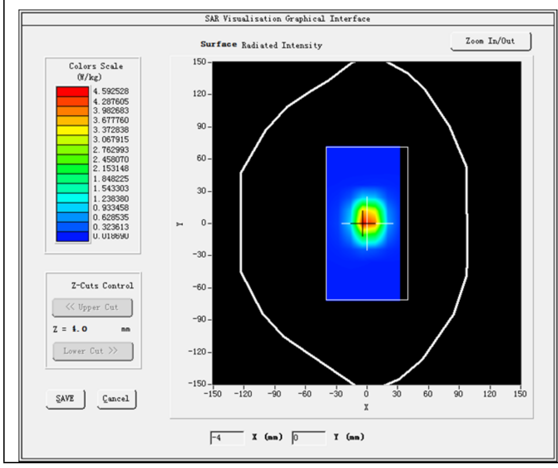
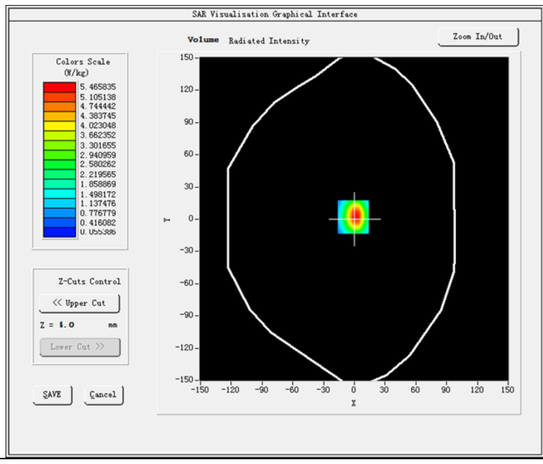
Date of measurement: 5/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW2600
Channels	Middle
Signal	CW (Crest factor: 1.0)
ConvF	2.35

B. SAR Measurement Results

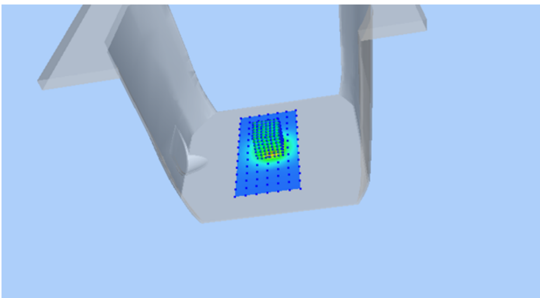
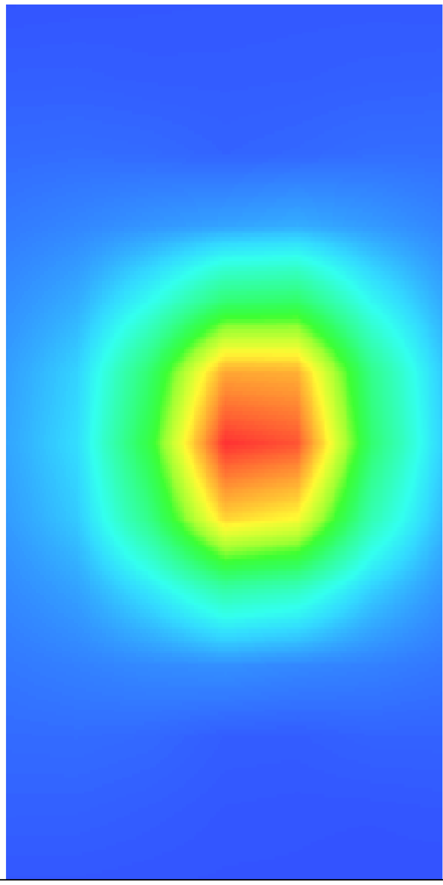
Frequency (MHz)	2600.000000
Relative permittivity (real part)	39.432362
Relative permittivity (imaginary part)	13.768602
Conductivity (S/m)	1.988798
Variation (%)	-3.980000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-1.00, Y=2.00

SAR Peak: 9.07 W/kg

SAR 10g (W/Kg)	2.523157
SAR 1g (W/Kg)	5.432595

3D screen shot	Hot spot position
	

Appendix C. SAR Test Plots

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MEASUREMENT 1

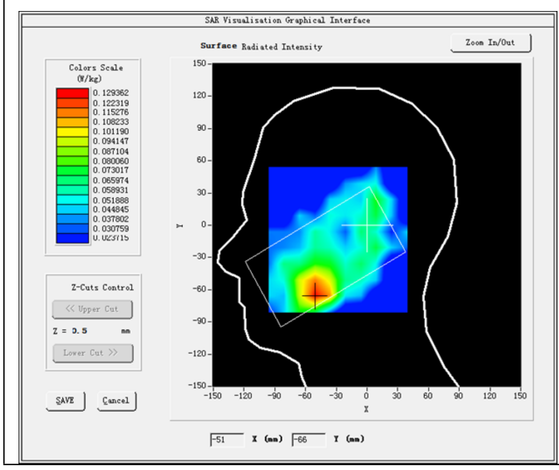
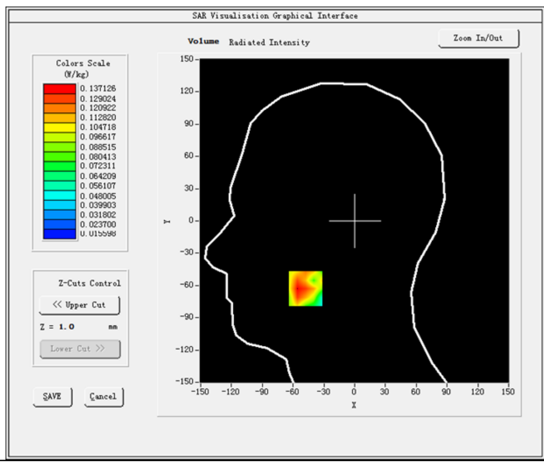
Date of measurement: 3/12/2024

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 5
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	1.66

B. SAR Measurement Results

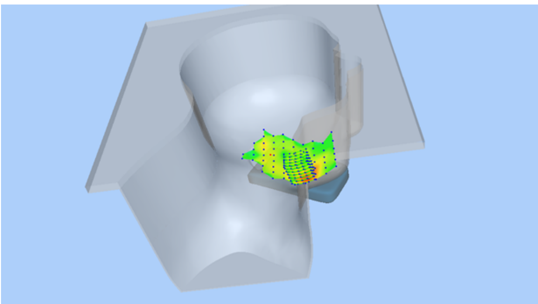
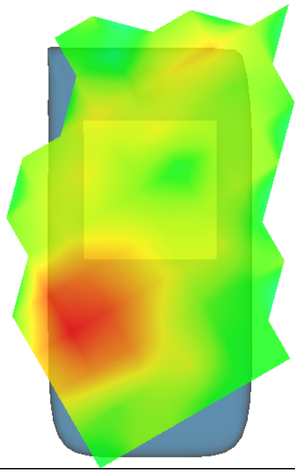
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.500000
Relative permittivity (imaginary part)	19.400000
Conductivity (S/m)	0.901561
Variation (%)	4.470000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-48.00, Y=-63.00

SAR Peak: 0.24 W/kg

SAR 10g (W/Kg)	0.088539
SAR 1g (W/Kg)	0.125898

3D screen shot	Hot spot position
	

MEASUREMENT 2

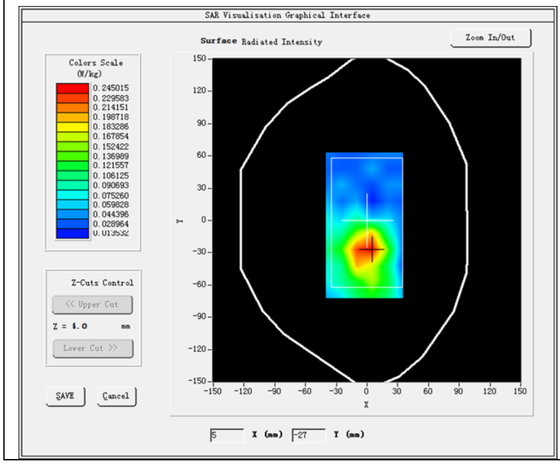
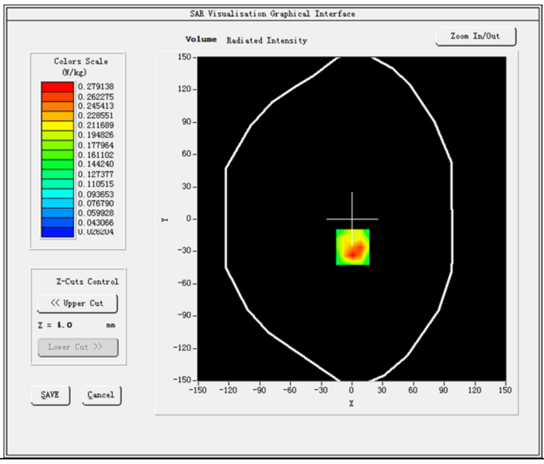
Date of measurement: 3/12/2024

A. Experimental conditions.

Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 5
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	1.66

B. SAR Measurement Results

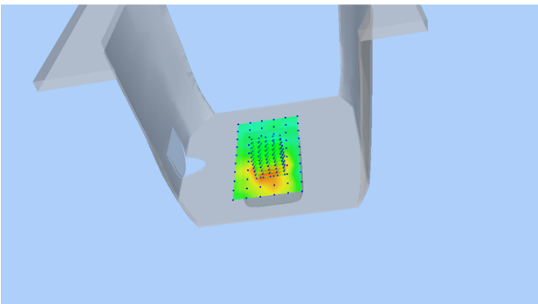
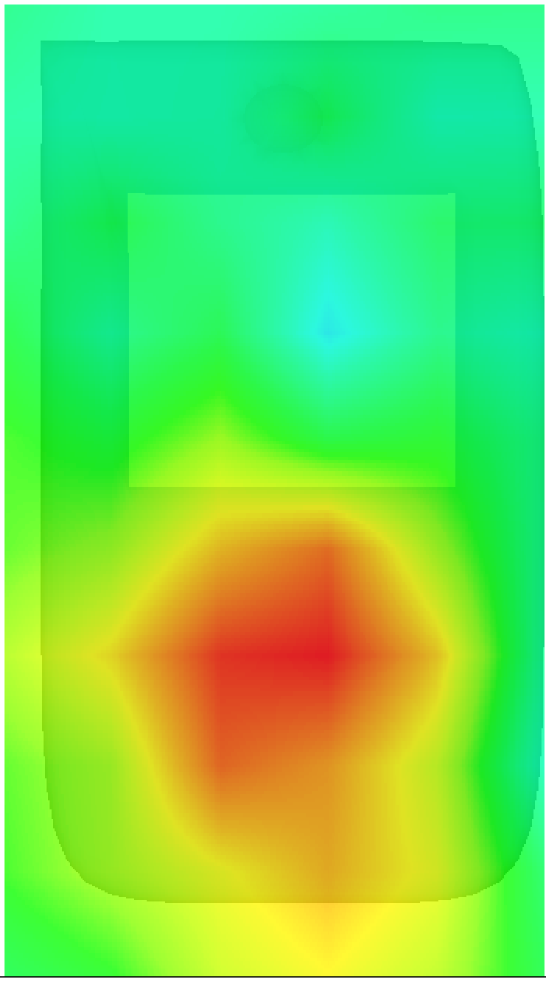
Frequency (MHz)	836.500000
Relative permittivity (real part)	41.500000
Relative permittivity (imaginary part)	19.400000
Conductivity (S/m)	0.901561
Variation (%)	1.690001

SURFACE SAR	VOLUME SAR
	

Maximum location: X=1.00, Y=-26.00

SAR Peak: 0.45 W/kg

SAR 10g (W/Kg)	0.159155
SAR 1g (W/Kg)	0.272141

3D screen shot	Hot spot position
	

MEASUREMENT 3

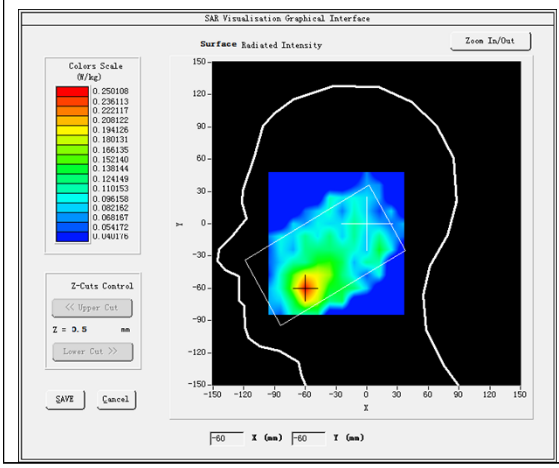
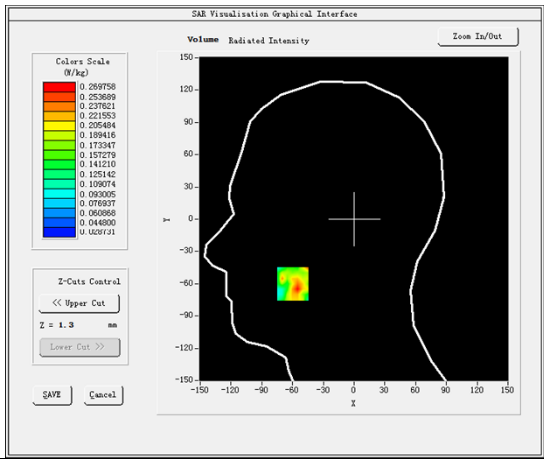
Date of measurement: 5/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 38
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.35

B. SAR Measurement Results

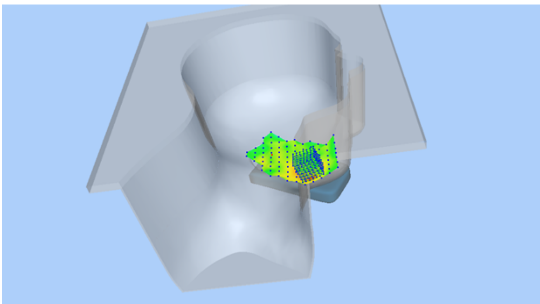
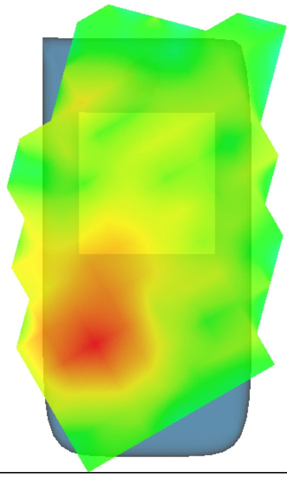
Frequency (MHz)	2595.000000
Relative permittivity (real part)	39.006668
Relative permittivity (imaginary part)	13.558333
Conductivity (S/m)	1.954660
Variation (%)	3.790001

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-60.00, Y=-60.00

SAR Peak: 0.46 W/kg

SAR 10g (W/Kg)	0.162212
SAR 1g (W/Kg)	0.239771

3D screen shot	Hot spot position
	

MEASUREMENT 4

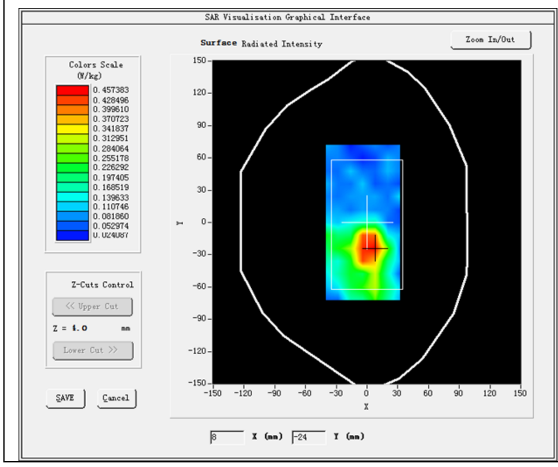
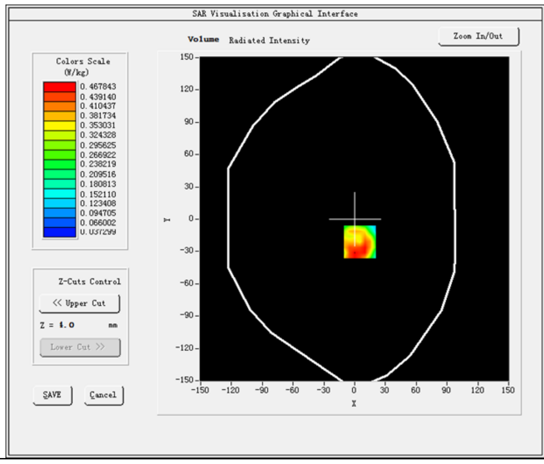
Date of measurement: 5/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 38
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.35

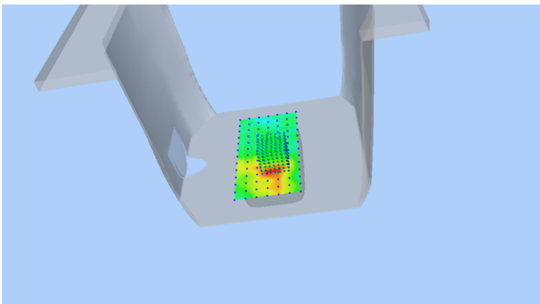
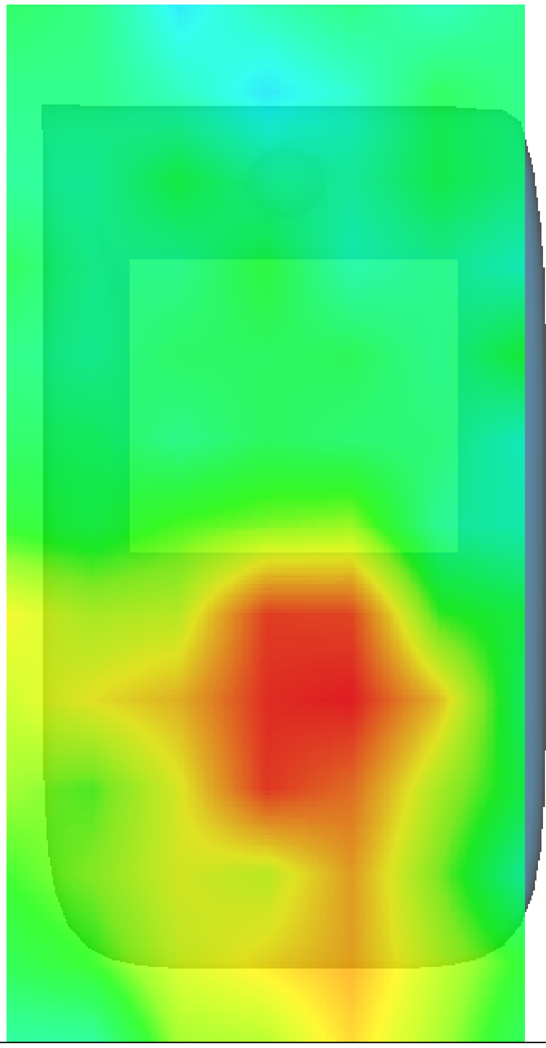
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	39.006668
Relative permittivity (imaginary part)	13.558333
Conductivity (S/m)	1.954660
Variation (%)	-1.540000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-21.00
SAR Peak: 0.77 W/kg

SAR 10g (W/Kg)	0.265562
SAR 1g (W/Kg)	0.448132

3D screen shot	Hot spot position
	

MEASUREMENT 5

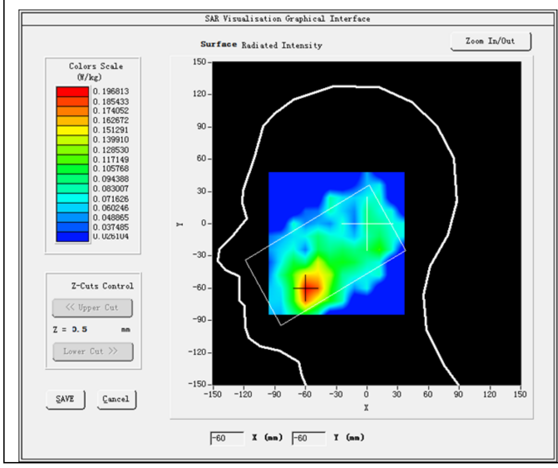
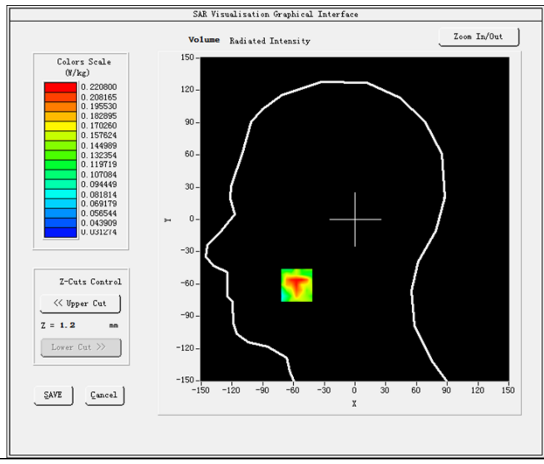
Date of measurement: 4/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Left head
Device Position	Cheek
Band	LTE band 40a
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.55

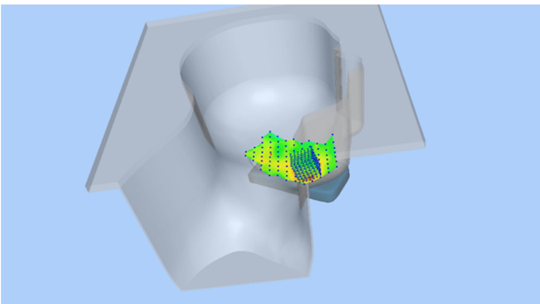
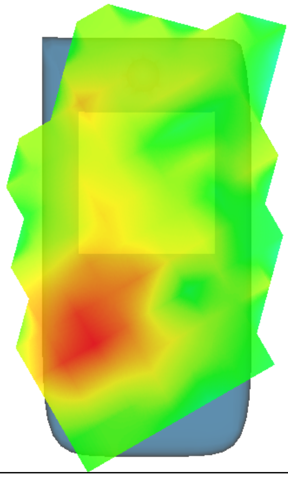
B. SAR Measurement Results

Frequency (MHz)	2310.000000
Relative permittivity (real part)	39.400002
Relative permittivity (imaginary part)	13.120000
Conductivity (S/m)	1.683733
Variation (%)	-2.920000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=-57.00, Y=-61.00
SAR Peak: 0.35 W/kg

SAR 10g (W/Kg)	0.134750
SAR 1g (W/Kg)	0.181912

3D screen shot	Hot spot position
	

MEASUREMENT 6

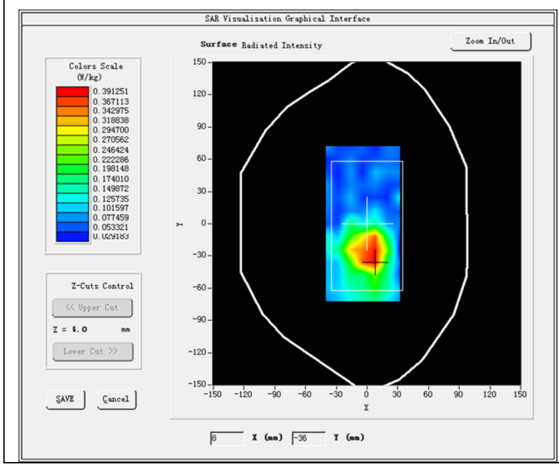
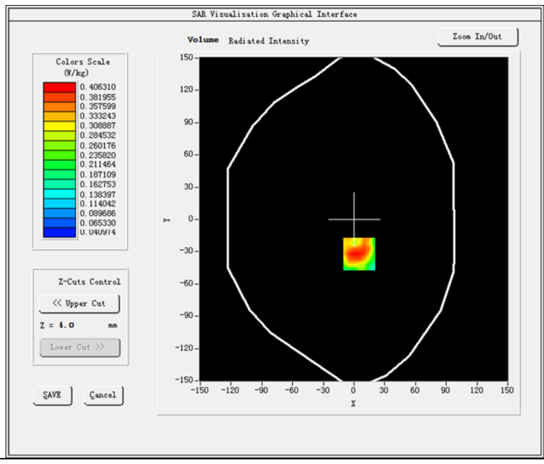
Date of measurement: 4/12/2024

A. Experimental conditions.

Area Scan	dx=12mm dy=12mm, h= 5.00 mm
ZoomScan	7x7x7,dx=5mm dy=5mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 40a
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.55

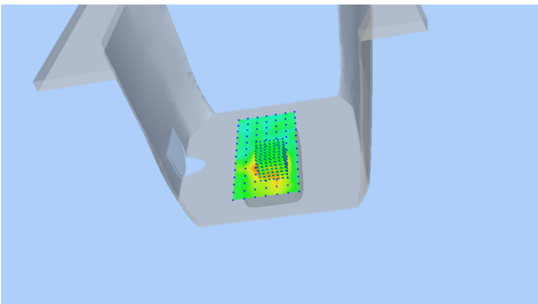
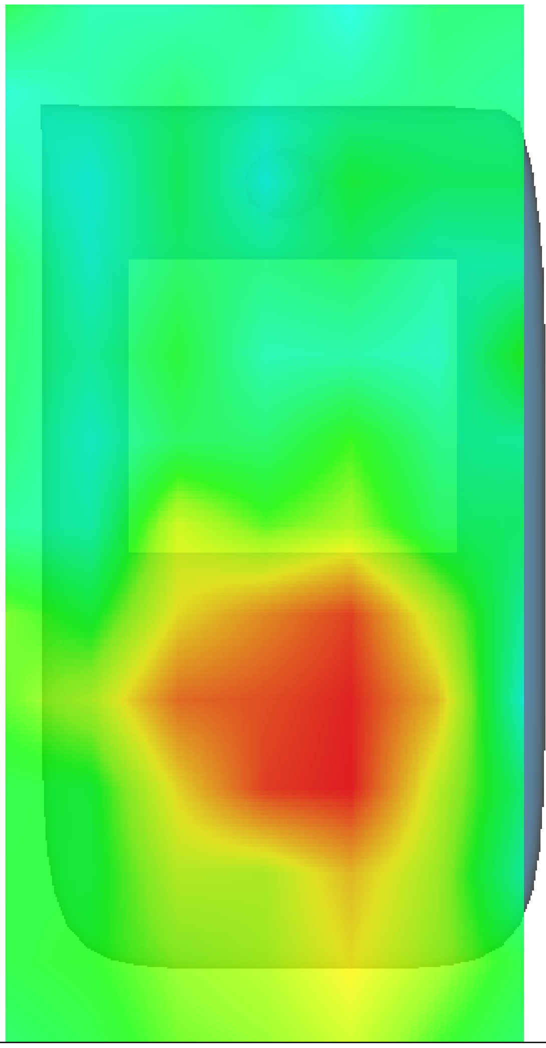
B. SAR Measurement Results

Frequency (MHz)	2310.000000
Relative permittivity (real part)	39.400002
Relative permittivity (imaginary part)	13.120000
Conductivity (S/m)	1.683733
Variation (%)	-4.740000

SURFACE SAR	VOLUME SAR
	

Maximum location: X=5.00, Y=-32.00
SAR Peak: 0.63 W/kg

SAR 10g (W/Kg)	0.236181
SAR 1g (W/Kg)	0.358847

3D screen shot	Hot spot position
	

Appendix D. Calibration Certificate

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COMOSAR E-Field Probe Calibration Report

Ref : ACR.307.3.24.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 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: 09/11/2024

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).

	Name	*Function*	*Date*	*Signature*
Prepared by :	Jérôme Le Gall	Measurement Responsible	09/10/2024	
Checked by :	Jérôme Luc	Technical Manager	09/10/2024	
Approved by :	Yann Toutain	Laboratory Director	09/11/2024	Yann TOUTAIN

	Customer Name
Distribution :	Shenzhen Asia Hongke

Issue	*Name*	*Date*	*Modifications*
A	Jérôme Luc	9/11/2024	Initial release

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1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	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:

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

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
$\boldsymbol{\delta}$	is the minimum penetration depth in millimetres of the head tissue-equivalent liquids defined in this standard, i.e., $\boldsymbol{\delta} \approx$ 14 mm at 3 GHz;
$\Delta\mathrm{SAR}_{\mathrm{be}}$	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 ($\mu V/(V/m)^2$)	Normy dipole 2 ($\mu V/(V/m)^2$)	Normz dipole 3 ($\mu V/(V/m)^2$)
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:

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