FCC SAR EVALUATION REPORT

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

Product Name : Wireless Locator Device

Trademark : WANWAYTECH

Model Name : GP30

Family Model : N/A

FCC ID : 2AWBA-GP30

Report No. : S24092506001001

Prepared for

SHANGHAI WANWAY DIGITAL TECHNOLOGY CO., LTD
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Prepared by

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TEST RESULT CERTIFICATION

Applicant's name:	SHANGHAI WANWAY DIGITAL TECHNOLOGY CO., LTD
Address:	FLOOR 23 NO. 1999 WENCHUAN ROAD BAOSHAN DISTRICT SHANGHAI, China
Manufacturer's Name:	SHANGHAI WANWAY DIGITAL TECHNOLOGY CO., LTD
Address:	FLOOR 23 NO. 1999 WENCHUAN ROAD BAOSHAN DISTRICT SHANGHAI, China

Product description

Product name:	Wireless Locator Device
Trademark:	WANWAYTECH
Model Name:	GP30
Family Model:	N/A
Standards:	FCC 47 CFR Part 2(2.1093) ANSI/IEEE C95.1-1992 IEEE Std 1528-2013 Published RF exposure KDB procedures

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in IEEE Std 1528-2013 and KDB 865664 D01. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in FCC 47 CFR Part 2(2.1093) and ANSI/IEEE C95.1-1992. The test results in this report apply only to the tested sample of the stated device/equipment. Other similar device/equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

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Test Sample Number S240925060001

Date of Test

Date (s) of performance of tests:	Oct. 10, 2024 ~ Oct. 17, 2024
Date of Issue:	Oct. 29, 2024
Test Result:	**Pass**

Prepared By (Test Engineer): Owen Xiao
(Owen Xiao)

Approved By (Lab Manager): Alex
(Alex Li)

※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Oct. 29, 2024	Owen Xiao

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
TRUNK LIMIT
1.6 W/kg
APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for GP30 are as follows.

Max SAR Value(W/kg)	
RF Exposure Conditions	1-g Body (Separation distance of 0mm)
	1.436
Max Simultaneous Tx	1.453

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

1.3. EUT Description

Device Information			
Product Name	Wireless Locator Device		
Trade Name	WANWAYTECH		
Model Name	GP30		
Family Model	N/A		
Model Difference	N/A		
FCC ID	2AWBA-GP30		
Device Phase	Identical Prototype		
Exposure Category	General population / Uncontrolled environment		
Antenna	PIFA Antenna		
Battery	DC 3.8V, 800mAh, 3.04Wh		
Hardware version	SDK:GP30_PET_V1.02_240611		
Software version	APP:GP30_Sep 24 2024_16:49:28		
Device Operating Configurations			
Supporting Mode(s)	LTE Band 2/4/5/41/66, Bluetooth		
Test Modulation	LTE(QPSK/16QAM), Bluetooth(GFSK, π/4-DQPSK, 8DPSK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	LTE Band 2	1850-1910	1930-1990
	LTE Band 4	1710-1755	2110-2155
	LTE Band 5	824-849	869-894
	LTE Band 7	2500-2570	2620-2690

	LTE Band 41	2496-2690	
	LTE Band 66	1710-1780	2110-2200
	Bluetooth	2402-2480	
	3, tested with power control all Max.(LTE Band 2)		
	3, tested with power control all Max.(LTE Band 4)		
	3, tested with power control all Max.(LTE Band 5)		
	3, tested with power control all Max.(LTE Band 7)		
	3, tested with power control all Max.(LTE Band 41)		
	3, tested with power control all Max.(LTE Band 66)		

Test specification(s)

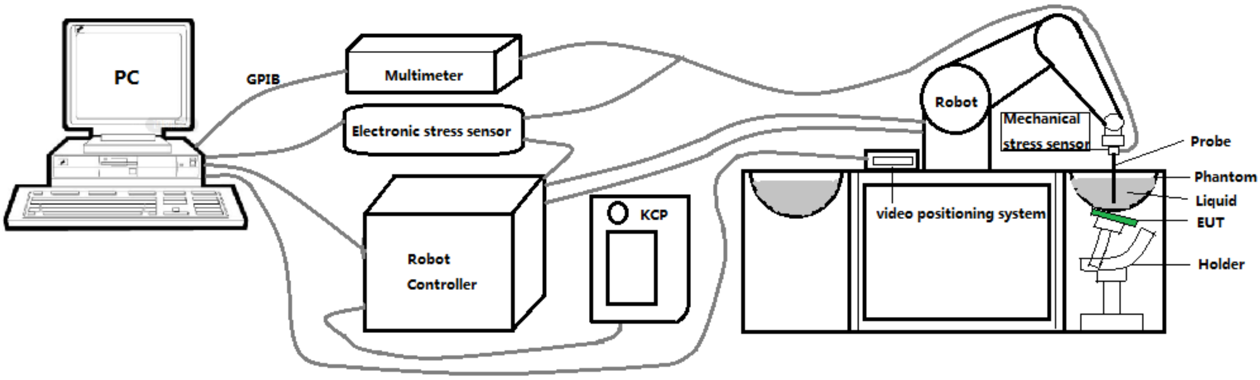
FCC 47 CFR Part 2(2.1093)
ANSI/IEEE C95.1-1992
IEEE Std 1528-2013
KDB 865664 D01 SAR measurement 100 MHz to 6 GHz
KDB 865664 D02 RF Exposure Reporting
KDB 447498 D01 General RF Exposure Guidance
KDB 941225 D05 SAR for LTE Devices

1.4. Ambient Condition

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

2. SAR Measurement System

2.1. SATIMO SAR Measurement Set-up Diagram



These measurements were performed with the automated near-field scanning system OPENSAR from SATIMO. The system is based on a high precision robot (working range: 901 mm), which positions the probes with a positional repeatability of better than ±0.03 mm. The SAR measurements were conducted with dosimetric probe (manufactured by SATIMO), designed in the classical triangular configuration and optimized for dosimetric evaluation.

The first step of the field measurement is the evaluation of the voltages induced on the probe by the device under test. Probe diode detectors are nonlinear. Below the diode compression point, the output voltage is proportional to the square of the applied E-field; above the diode compression point, it is linear to the applied E-field. The compression point depends on the diode, and a calibration procedure is necessary for each sensor of the probe.

The Keithley multimeter reads the voltage of each sensor and send these three values to the PC. The corresponding E field value is calculated using the probe calibration factors, which are stored in the working directory. This evaluation includes linearization of the diode characteristics. The field calculation is done separately for each sensor. Each component of the E field is displayed on the "Dipole Area Scan Interface" and the total E field is displayed on the "3D Interface"

2.2. Robot

The SATIMO SAR system uses the high precision robots from KUKA. For the 6-axis controller system, the robot controller version (KUKA) from KUKA is used. The KUKA robot series have many features that are important for our application:

- High precision (repeatability ±0.03 mm)
- High reliability (industrial design)
- Jerk-free straight movements
- Low ELF interference (the closed metallic construction shields against motor control fields)

2.3. E-Field Probe

This E-field detection probe is composed of three orthogonal dipoles linked to special Schottky diodes with low detection thresholds. The probe allows the measurement of electric fields in liquids such as the one defined in the IEEE and CENELEC standards.

For the measurements the Specific Dosimetric E-Field Probe SN 08/16 EPGO287 with following specifications is used

- Dynamic range: 0.01-100 W/kg
- Tip Diameter : 2.5 mm
- Distance between probe tip and sensor center: 1 mm
- Distance between sensor center and the inner phantom surface: 2 mm (repeatability better than ±1 mm).
- Probe linearity: ±0.08 dB
- Axial isotropy: ±0.01 dB
- Hemispherical Isotropy: ±0.01 dB
- Calibration range: 650MHz to 5900MHz for head & body simulating liquid.
- Lower detection limit: 8mW/kg

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

2.3.1. E-Field Probe Calibration

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

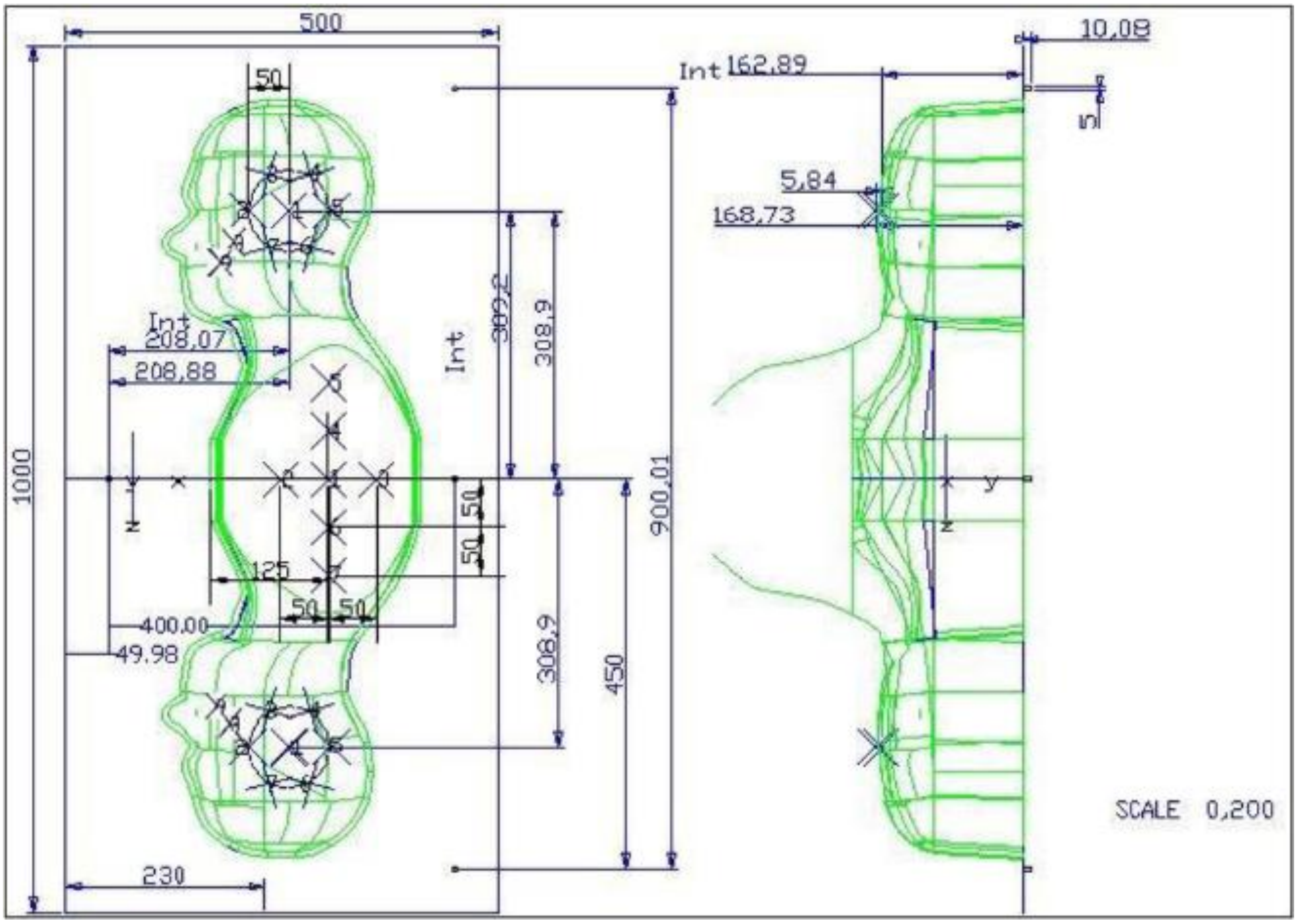
2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119

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

2.4.1. Technical Data

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

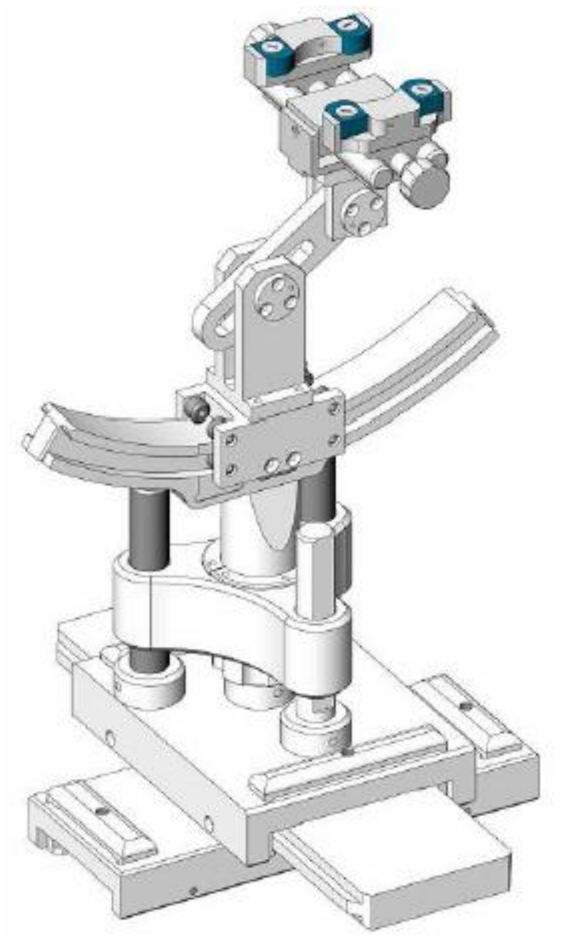


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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

2.5. Device Holder

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



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

2.6. Test Equipment List

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

Devices used during the test described are marked ☒

	Manufacturer	Name of Equipment	Type/Model	Serial Number	Calibration	
					Last Cal.	Due Date
☒	MVG	E FIELD PROBE	SSE2	4024-EPGO-442	Oct.4.2024	Oct.3.2025
☐	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Feb. 21, 2024	Feb. 20, 2027
☒	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Feb. 21, 2024	Feb. 20, 2027
☐	MVG	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	NCR	NCR
☒	MVG	Power Amplifier	N.A	AMPLISAR_28/14_003	NCR	NCR
☒	KEITHLEY	Millivoltmeter	2000	4072790	NCR	NCR
☐	R&S	Universal radio communication tester	CMU200	117858	Apr. 26, 2024	Apr. 25, 2025
☐	R&S	Wideband radio communication	CMW500	103917	Apr. 26, 2024	Apr. 25, 2025

		tester				
☒	HP	Network Analyzer	8753D	3410J01136	Apr. 26, 2024	Apr. 25, 2025
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power meter	E4419B	MY45102538	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	MY41495644	Apr. 25, 2024	Apr. 24, 2025
☒	Agilent	Power sensor	E9301A	US39212148	Apr. 25, 2024	Apr. 24, 2025
☒	MCLI/USA	Directional Coupler	CB11-20	0D2L51502	Jul. 04, 2023	Jul. 03, 2024
☒	N/A	Thermometer	N/A	LES-085	Mar. 27, 2023	Mar. 26, 2026
☒	MVG	SAM Phantom	SSM2	SN 16/15 SAM119	NCR	NCR
☒	MVG	Device Holder	SMPPD	SN 16/15 MSH100	NCR	NCR

Measurement Software

Manufacturer	Software Name	Software Version
SATIMO	OpenSAR	V4_02_31

3. SAR Measurement Procedures

The measurement procedures are as follows:

<Conducted power measurement>

(a) For WWAN power measurement, use base station simulator to configure EUT WWAN transmission in conducted connection with RF cable, at maximum power in each supported wireless interface and frequency band.

(b) Read the WWAN RF power level from the base station simulator.

(c) For WLAN/Bluetooth power measurement, use engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power in each supported wireless interface and frequency band.

(d) Connect EUT RF port through RF cable to the power meter, and measure WLAN/Bluetooth output power.

<SAR measurement>

(a) Use base station simulator to configure EUT WWAN transmission in radiated connection, and engineering software to configure EUT WLAN/Bluetooth continuously transmission, at maximum RF power, in the highest power channel.

(b) Place the EUT in the positions as Appendix A demonstrates.

(c) Set scan area, grid size and other setting on the OPENSAR software.

(d) Measure SAR results for the highest power channel on each testing position.

(e) Find out the largest SAR result on these testing positions of each band.

(f) Measure SAR results for other channels in worst SAR testing position if the reported SAR of highest power channel is larger than 0.8 W/kg.

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

(a) Power reference measurement

(b) Area scan

(c) Zoom scan

(d) Power drift measurement

3.1. Power Reference

The Power Reference Measurement and Power Drift Measurements are for monitoring the power drift of the device under test in the batch process. The minimum distance of probe sensors to surface determines the closest measurement point to phantom surface. This distance cannot be smaller than the distance of sensor calibration points to probe tip as defined in the probe properties.

3.2. Area scan & Zoom scan

The area scan is a 2D scan to find the hot spot location on the DUT. The zoom scan is a 3D scan above the hot spot to calculate the 1g and 10g SAR value.

Measurement of the SAR distribution with a grid of 8 to 16 mm * 8 to 16 mm and a constant distance to the inner surface of the phantom. Since the sensors cannot directly measure at the inner phantom surface, the values between the sensors and the inner phantom surface are extrapolated. With these values the area of the maximum SAR is calculated by an interpolation scheme. Around this point, a cube of 30 * 30 *30 mm or 32 * 32 * 32 mm is assessed by measuring 5 or 8 * 5 or 8 * 4 or 5 mm. With these data, the peak spatial-average SAR value can be calculated.

From the scanned SAR distribution, identify the position of the maximum SAR value, in addition identify the positions of any local maxima with SAR values within 2 dB of the maximum value that will not be within the zoom scan of other peaks; additional peaks shall be measured only when the primary peak is within 2 dB of the SAR compliance limit (e.g., 1 W/kg for 1,6 W/kg 1 g limit, or 1,26 W/kg for 2 W/kg, 10 g limit).

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

			≤ 3 GHz	> 3 GHz
Maximum distance from closest measurement point (geometric center of probe sensors) to phantom surface			5 ± 1 mm	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.

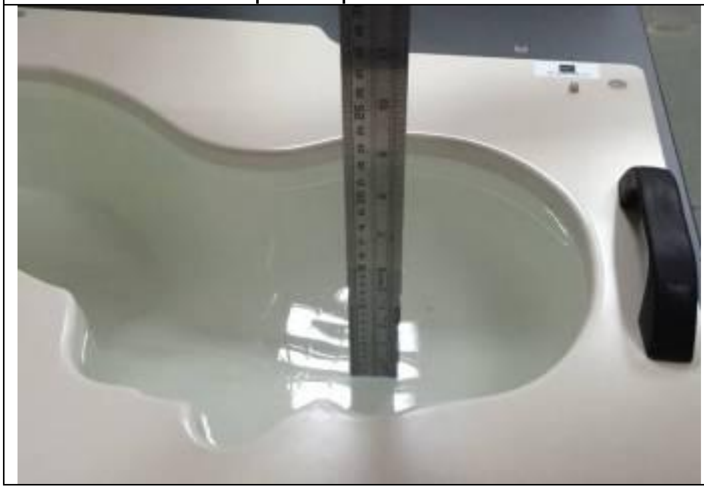
4. System Verification Procedure

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
Ingredients (% of weight)	Body Tissue									
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5200	5800
Water	50.30	50.30	50.30	69.91	69.91	71.88	71.88	71.88	79.54	79.54
NaCl	0.60	0.60	0.60	0.13	0.13	0.16	0.16	0.16	0.00	0.00
1,2-Propanediol	49.10	49.10	49.10	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	9.99	9.99	19.97	19.97	19.97	11.24	11.24
DGBE	0.00	0.00	0.00	19.97	19.97	7.99	7.99	7.99	9.22	9.22

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

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

4.1.1. Tissue Dielectric Parameter Check Results

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

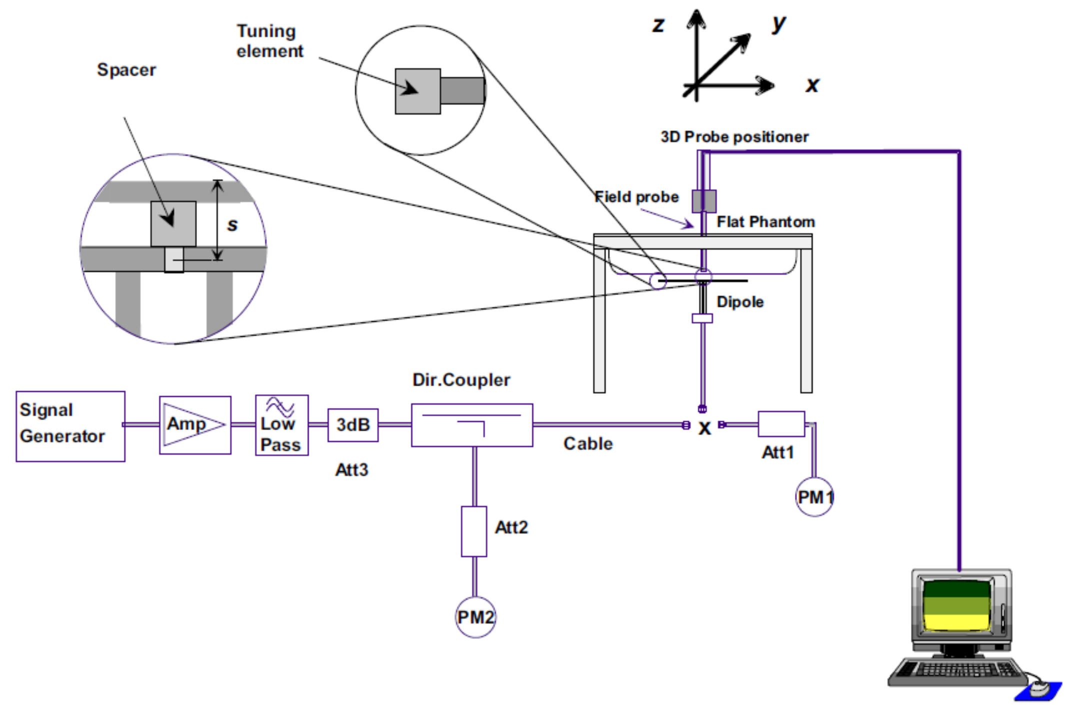
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		εr (±5%)	σ (S/m) (±5%)	εr	σ (S/m)		
Head 850	835	41.50 (39.43~43.58)	0.90 (0.86~0.95)	41.96	0.91	21.5 °C	Oct. 15, 2024
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.38	1.38	21.7 °C	Oct. 10, 2024
Head 1900	1900	40.00 (38.00~42.00)	1.40 (1.33~1.47)	38.57	1.46	21.5 °C	Oct. 16, 2024
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	38.91	2.02	21.4 °C	Oct. 17, 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.To adjust this power a power meter is used. The power sensor is connected to the cable before the system verification to measure the power at this point and do adjustments at the signal generator. At the outputs of the directional coupler both return loss as well as forward power are controlled during the system verification to make sure that emitted power at the dipole is kept constant. This can also be checked by the power drift measurement after the test (result on plot).

The system verification is shown as below picture:



4.2.1. System Verification Results

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

System Verification	Target SAR (1W) (±10%)		Measured SAR			Measured SAR (Normalized to 1W)		Liquid Temp.	Test Date
	1-g (W/Kg)	10-g (W/Kg)	Input Power	1-g (W/Kg)	10-g (W/Kg)	1-g (W/Kg)	10-g (W/Kg)		
835MHz	9.84 (8.86~10.82)	6.22 (5.60~6.84)	18dBm	0.574	0.376	9.10	5.96	21.2 °C	Oct. 15, 2024
1800MHz	37.96 (34.17~41.75)	19.81 (17.83~21.79)	18dBm	2.480	1.280	39.30	20.28	21.3 °C	Oct. 10, 2024
1900MHz	40.37 (36.34~44.40)	20.48 (18.44~22.52)	18dBm	2.527	1.243	40.05	19.70	21.7 °C	Oct. 16, 2024
2600MHz	55.83 (50.25~61.41)	24.19 (21.78~26.60)	18dBm	3.452	1.557	54.70	24.67	21.1 °C	Oct. 17, 2024

5. SAR Measurement variability and uncertainty

5.1. SAR measurement variability

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

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

5.2. SAR measurement uncertainty

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

6. RF Exposure Positions

6.1. Ear and handset reference point

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

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

6.2. Definition of the cheek position

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

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

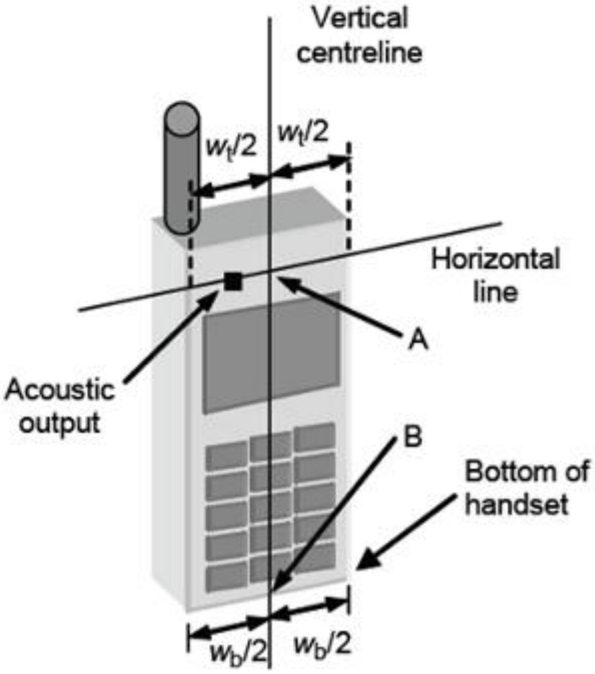


Fig 6.2.1 Handset vertical and horizontal reference lines—"fixed case

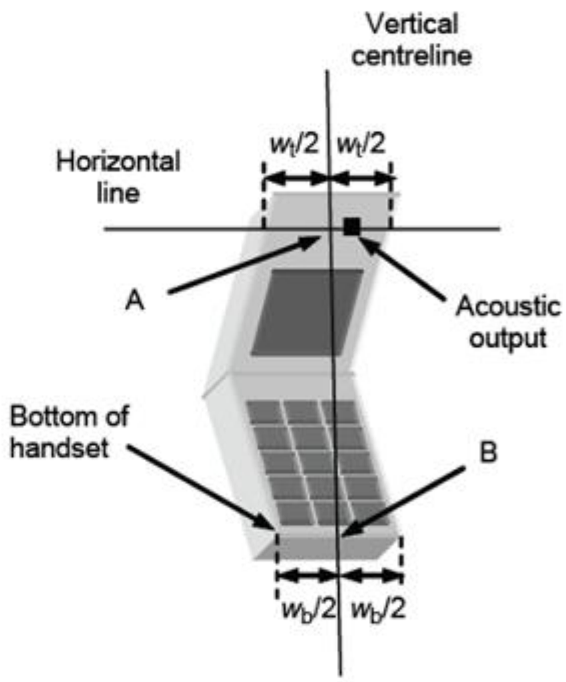


Fig 6.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

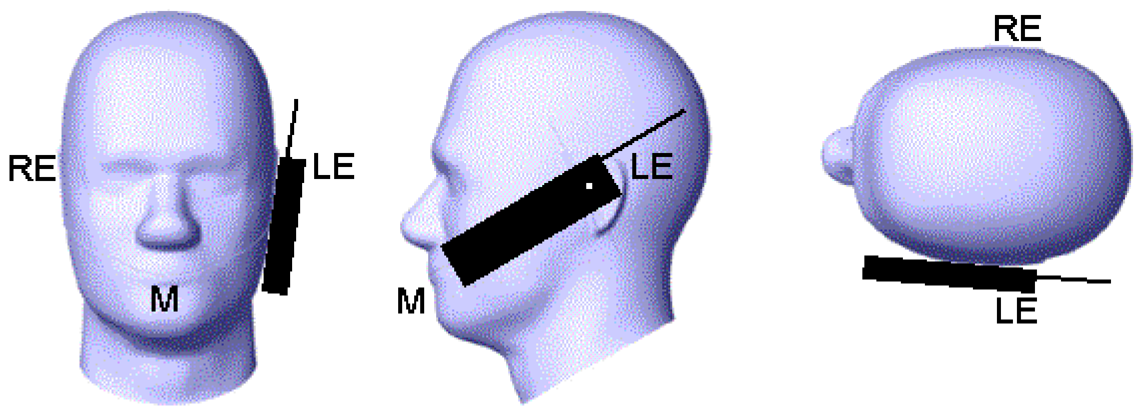


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

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

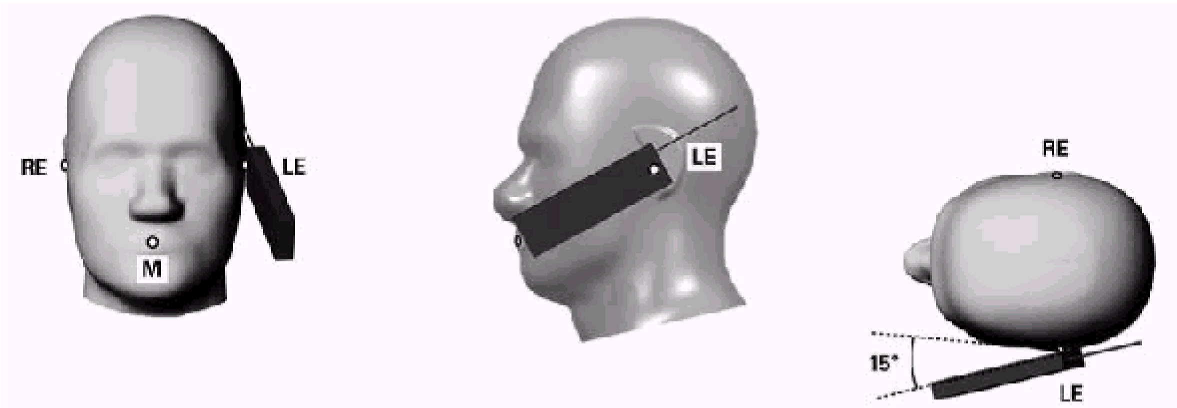


Figure 6.3.1 – Tilt position of the wireless device on the left side of SAM

6.4. Tablet PC host platform exposure conditions

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

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

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

7. RF Output Power

7.1. LTE Conducted Power

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18607/1850.7	18900/1880	19193/1909.3
LTE Band 2	1.4MHz	QPSK	1	0	24.50	23.34	24.05	24.11
			1	2	24.50	23.17	23.68	23.84
			1	5	24.50	23.09	23.89	23.59
			3	0	24.00	23.19	23.94	23.78
			3	1	24.00	23.26	23.88	23.64
			3	2	24.00	23.27	23.94	23.62
			6	0	23.00	22.28	22.89	22.58
		16QAM	1	0	23.50	22.40	23.22	23.02
			1	2	23.50	22.42	23.21	22.87
			1	5	23.50	22.58	23.17	22.68
			3	0	23.50	22.27	22.97	22.69
			3	1	23.50	22.43	23.00	22.75
			3	2	23.50	22.47	23.04	22.67
			6	0	22.50	21.37	22.12	21.80
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18615/1851.5	18900/1880	19185/1908.5
LTE Band 2	3MHz	QPSK	1	0	24.50	23.53	24.12	24.25
			1	7	24.50	23.50	24.03	23.83
			1	14	24.50	23.24	23.73	23.23
			8	0	23.50	22.38	23.11	22.92
			8	4	23.50	22.44	23.08	22.82
			8	7	23.50	22.38	22.97	22.56
			15	0	23.50	22.41	23.09	22.73
		16QAM	1	0	23.50	22.51	23.29	23.38
			1	7	23.50	22.76	23.30	22.93
			1	14	23.50	22.40	23.02	22.55
			8	0	22.50	21.49	22.13	22.02
			8	4	22.50	21.67	22.09	21.93
			8	7	22.50	21.63	22.03	21.73
			15	0	22.50	21.49	22.08	21.87

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18625/1852.5	18900/1880	19175/1907.5
LTE Band 2	5MHz	QPSK	1	0	25.00	23.91	24.33	24.52
			1	12	25.00	23.48	23.90	24.09
			1	24	25.00	23.48	23.92	23.63
			12	0	23.50	22.39	23.08	23.39
			12	6	23.50	22.38	23.08	23.25
			12	11	23.50	22.37	22.88	22.95
			25	0	23.50	22.40	23.04	23.17
		16QAM	1	0	24.00	22.88	23.42	23.64
			1	12	24.00	22.56	23.29	23.37
			1	24	24.00	22.68	23.15	22.85
			12	0	22.50	21.50	22.09	22.31
			12	6	22.50	21.49	21.95	22.27
			12	11	22.50	21.49	21.87	21.90
			25	0	22.50	21.56	22.04	22.26
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18650/1855	18900/1880	19150/1905
LTE Band 2	10MHz	QPSK	1	0	25.00	24.54	24.31	23.70
			1	24	25.00	23.71	23.91	23.80
			1	49	25.00	23.99	23.59	23.21
			25	0	23.50	22.70	23.18	22.63
			25	12	23.50	22.62	22.97	22.75
			25	24	23.50	22.64	22.79	22.53
			50	0	23.00	22.64	22.99	22.62
		16QAM	1	0	23.50	23.27	23.48	22.52
			1	24	23.50	22.84	23.10	22.81
			1	49	23.50	23.03	22.97	22.17
			25	0	22.50	21.67	22.26	21.50
			25	12	22.50	21.65	22.07	21.64
			25	24	22.50	21.71	21.76	21.43
			50	0	22.00	21.56	21.25	21.21
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18675/1857.5	18900/1880	19125/1902.5
LTE Band 2	15MHz	QPSK	1	0	24.50	23.74	24.03	22.92
			1	37	24.50	23.59	23.79	23.79
			1	74	24.50	23.99	23.22	22.89

			36	0	23.50	22.41	23.19	22.05
			36	18	23.50	22.71	23.05	22.70
			36	37	23.50	22.95	22.67	22.61
			75	0	23.00	22.71	22.98	22.42
		16QAM	1	0	23.50	22.74	23.12	21.58
			1	37	23.50	22.92	23.12	22.91
			1	74	23.50	23.28	22.33	21.94
			36	0	23.50	23.26	23.18	22.56
			36	18	23.50	23.34	23.20	22.59
			36	37	23.50	23.31	23.23	22.59
			75	0	23.50	23.23	23.12	22.41

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		18700/1860	18900/1880	19100/1900
LTE Band 2	20MHz	QPSK	1	0	24.50	23.00	23.81	22.51
			1	49	24.50	23.14	23.97	23.53
			1	99	24.50	24.25	23.15	22.82
			50	0	23.50	21.82	23.05	21.60
			50	24	23.50	22.20	23.05	22.38
			50	49	23.50	22.73	22.54	22.58
			100	0	23.00	22.27	22.88	22.15
		16QAM	1	0	24.00	22.13	23.03	22.39
			1	49	24.00	22.43	23.13	22.65
			1	99	24.00	23.53	22.25	22.30
			50	0	23.50	23.18	23.11	22.45
			50	24	23.50	23.19	23.05	22.46
			50	49	23.50	23.12	23.06	22.47
			100	0	23.50	23.08	23.02	22.28

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19957/1710.7	20175/1732.5	20393/1754.3
LTE Band 4	1.4MHz	QPSK	1	0	24.00	23.67	23.73	23.42
			1	2	24.00	23.61	23.57	23.28
			1	5	24.00	23.48	23.45	23.19
			3	0	24.00	23.48	23.46	23.23
			3	1	24.00	23.51	23.47	23.25
			3	2	24.00	23.47	23.45	23.25
			6	0	22.50	22.45	22.45	22.12
		16QAM	1	0	23.50	22.83	22.86	22.35

			1	2	23.50	22.89	23.02	22.52
			1	5	23.50	22.84	22.85	22.42
			3	0	23.00	22.58	22.71	22.20
			3	1	23.00	22.64	22.81	22.31
			3	2	23.00	22.63	22.78	22.28
			6	0	22.00	21.62	21.70	21.38

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19965/1711.5	20175/1732.5	20385/1753.5
LTE Band 4	3MHz	QPSK	1	0	24.00	23.44	23.51	23.39
			1	7	24.00	23.47	23.54	23.28
			1	14	24.00	23.22	23.31	23.16
			8	0	23.00	22.45	22.45	22.21
			8	4	23.00	22.55	22.57	22.30
			8	7	23.00	22.59	22.50	22.24
			15	0	23.00	22.62	22.51	22.28
		16QAM	1	0	23.00	22.71	22.62	22.37
			1	7	23.00	22.85	22.97	22.54
			1	14	23.00	22.54	22.82	22.22
			8	0	22.00	21.61	21.72	21.32
			8	4	22.00	21.74	21.87	21.38
			8	7	22.00	21.55	21.77	21.35
			15	0	22.00	21.54	21.67	21.34

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		19975/1712.5	20175/1732.5	20375/1752.5
LTE Band 4	5MHz	QPSK	1	0	24.00	23.89	23.81	23.56
			1	12	24.00	23.57	23.56	23.31
			1	24	24.00	23.61	23.64	23.40
			12	0	23.00	22.65	22.51	22.20
			12	6	23.00	22.65	22.57	22.39
			12	11	23.00	22.66	22.65	22.42
			25	0	23.00	22.67	22.62	22.32
		16QAM	1	0	23.50	22.99	22.91	22.72
			1	12	23.50	22.87	23.03	22.45
			1	24	23.50	23.00	23.08	22.65
			12	0	22.00	21.72	21.72	21.37
			12	6	22.00	21.74	21.82	21.45
			12	11	22.00	21.77	21.80	21.49
			25	0	22.00	21.67	21.77	21.49

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20000/1715	20175/1732.5	20350/1750
LTE Band 4	10MHz	QPSK	1	0	24.00	23.89	23.79	23.54
			1	24	24.00	23.44	23.60	23.34
			1	49	24.00	23.31	23.74	23.47
			25	0	23.00	22.40	22.52	22.26
			25	12	23.00	22.39	22.62	22.33
			25	24	23.00	22.33	22.72	22.41
			50	0	23.00	22.40	22.67	22.37
		16QAM	1	0	23.00	22.86	22.79	22.52
			1	24	23.00	22.61	22.94	22.50
			1	49	23.00	22.53	23.00	22.65
			25	0	22.00	21.49	21.73	21.41
			25	12	22.00	21.48	21.75	21.49
			25	24	22.00	21.45	21.83	21.59
			50	0	22.00	21.36	21.68	21.39
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20025/1717.5	20175/1732.5	20325/1747.5
LTE Band 4	15MHz	QPSK	1	0	24.00	23.58	23.39	23.40
			1	37	24.00	23.31	23.80	23.92
			1	74	24.00	22.77	23.65	23.66
			36	0	23.00	22.27	22.64	22.57
			36	18	23.00	22.25	22.78	22.93
			36	37	23.00	22.03	22.81	22.81
			75	0	23.00	22.19	22.69	22.80
		16QAM	1	0	23.50	22.50	22.51	22.55
			1	37	23.50	22.43	22.86	23.12
			1	74	23.50	22.02	22.84	22.80
			36	0	23.50	22.68	22.99	23.05
			36	18	23.50	22.69	22.99	23.06
			36	37	23.50	22.71	22.98	23.01
			75	0	23.50	22.54	22.74	23.06
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20050/1720	20175/1732.5	20300/1745
LTE Band 4	20MHz	QPSK	1	0	24.00	23.67	23.50	23.22
			1	49	24.00	23.30	23.76	23.75
			1	99	24.00	22.98	23.88	23.82

			50	0	23.00	22.36	22.76	22.28
			50	24	23.00	22.23	22.87	22.70
			50	49	23.00	21.98	22.85	22.80
			100	0	23.00	22.14	22.86	22.65
		16QAM	1	0	23.50	22.67	22.76	22.27
			1	49	23.50	22.44	23.17	22.72
			1	99	23.50	22.17	23.16	22.92
			50	0	23.50	22.70	23.29	22.91
			50	24	23.50	22.72	23.26	23.01
			50	49	23.50	22.73	23.23	23.00
			100	0	23.50	22.23	23.15	22.78

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20407/824.7	20525/836.5	20643/848.3
LTE Band 5	1.4MHz	QPSK	1	0	23.50	23.06	23.25	23.18
			1	2	23.50	23.06	23.20	23.02
			1	5	23.50	22.96	23.16	22.85
			3	0	23.50	22.98	23.13	23.00
			3	1	23.50	23.01	23.29	22.96
			3	2	23.50	22.98	23.27	22.91
			6	0	22.50	22.09	22.29	22.00
		16QAM	1	0	23.00	22.22	22.39	22.38
			1	2	23.00	22.35	22.51	22.15
			1	5	23.00	22.19	22.48	22.13
			3	0	22.50	22.04	22.20	22.15
			3	1	22.50	22.09	22.31	21.96
			3	2	22.50	22.06	22.32	22.10
			6	0	21.50	21.16	21.32	21.30
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20415/825.5	20525/836.5	20635/847.5
LTE Band 5	3MHz	QPSK	1	0	23.50	22.95	23.24	23.33
			1	7	23.50	23.09	23.23	23.16
			1	14	23.50	22.81	23.11	22.77
			8	0	22.50	22.14	22.27	22.27
			8	4	22.50	22.20	22.34	22.23
			8	7	22.50	22.11	22.33	22.11
			15	0	22.50	22.14	22.29	22.18
		16QAM	1	0	23.00	22.26	22.44	22.39

			1	7	23.00	22.35	22.52	22.43
			1	14	23.00	22.19	22.37	22.23
			8	0	21.50	21.23	21.31	21.43
			8	4	21.50	21.30	21.40	21.39
			8	7	21.50	21.21	21.42	21.27
			15	0	21.50	21.22	21.33	21.32

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	23.28	23.33	23.57
			1	12	24.00	23.04	23.23	23.13
			1	24	24.00	22.98	23.36	22.96
			12	0	22.50	22.23	22.37	22.36
			12	6	22.50	22.18	22.33	22.20
			12	11	22.50	22.12	22.43	22.09
			25	0	22.50	22.20	22.41	22.23
		16QAM	1	0	23.00	22.55	22.46	22.66
			1	12	23.00	22.33	22.48	22.39
			1	24	23.00	22.31	22.65	22.17
			12	0	21.50	21.25	21.32	21.44
			12	6	21.50	21.23	21.34	21.31
			12	11	21.50	21.15	21.46	21.23
			25	0	21.50	21.26	21.42	21.36

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	23.85	23.75	23.36
			1	24	24.00	23.53	23.11	23.35
			1	49	24.00	23.46	23.39	22.95
			25	0	23.00	22.82	22.50	22.32
			25	12	23.00	22.64	22.32	22.42
			25	24	23.00	22.58	22.45	22.34
			50	0	23.00	22.69	22.51	22.34
		16QAM	1	0	23.50	23.04	23.03	22.51
			1	24	23.50	22.80	22.43	22.67
			1	49	23.50	22.81	22.80	22.24
			25	0	22.00	21.91	21.53	21.44
			25	12	22.00	21.73	21.35	21.55
			25	24	22.00	21.69	21.49	21.46
			50	0	23.50	23.29	23.19	22.71

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20775/2502.5	21100/2535	21425/2567.5
LTE Band 7	5MHz	QPSK	1	0	24.00	23.89	23.26	23.86
			1	12	24.00	23.49	23.61	23.18
			1	24	24.00	23.47	23.79	23.83
			12	0	24.00	22.53	22.78	23.59
			12	6	24.00	22.51	22.73	23.31
			12	11	24.00	22.41	22.68	23.18
			25	0	23.50	22.48	22.85	23.38
		16QAM	1	0	24.00	22.92	23.36	23.88
			1	12	24.00	22.66	22.86	23.42
			1	24	24.00	22.63	23.06	23.08
			12	0	22.50	21.57	21.82	22.42
			12	6	22.50	21.59	21.68	22.19
			12	11	22.50	21.53	21.76	22.09
			25	0	22.50	21.64	21.81	22.29
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20800/2505	21100/2535	21400/2565
LTE Band 7	10MHz	QPSK	1	0	24.00	23.88	23.61	23.57
			1	24	24.00	23.14	23.48	23.13
			1	49	24.00	22.98	23.77	23.49
			25	0	24.00	22.33	23.09	23.60
			25	12	24.00	22.16	22.86	23.28
			25	24	24.00	22.01	22.83	23.07
			50	0	23.50	22.35	23.04	23.35
		16QAM	1	0	24.00	22.90	23.74	23.59
			1	24	24.00	22.46	22.87	23.29
			1	49	24.00	22.26	23.04	22.87
			25	0	23.00	21.42	21.95	22.66
			25	12	23.00	21.29	21.76	22.28
			25	24	23.00	21.15	21.74	22.23
			50	0	24.00	23.10	23.91	23.73
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20825/2507.5	21100/2535	21375/2562.5
LTE Band 7	15MHz	QPSK	1	0	24.00	23.64	23.10	23.62
			1	37	24.00	22.90	23.76	23.30
			1	74	24.00	22.96	23.49	23.49

			36	0	24.00	22.26	23.17	23.47
			36	18	24.00	22.17	22.91	23.51
			36	37	24.00	22.06	22.71	23.30
			75	0	23.50	22.20	22.92	23.39
		16QAM	1	0	24.00	22.80	23.19	22.93
			1	37	24.00	22.26	22.80	23.73
			1	74	24.00	22.21	22.50	22.74
			36	0	23.50	22.78	23.39	23.25
			36	18	23.50	22.81	23.36	23.14
			36	37	23.50	22.82	23.35	23.11
			75	0	24.00	22.25	22.32	23.80
Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		20850/2510	21100/2535	21350/2560
LTE Band 7	20MHz	QPSK	1	0	24.50	23.80	23.98	23.45
			1	49	24.50	23.25	23.59	24.01
			1	99	24.50	23.22	23.26	23.43
			50	0	23.50	22.18	23.12	22.96
			50	24	23.50	22.22	22.91	23.12
			50	49	23.50	22.08	22.60	23.09
			100	0	23.50	22.11	22.91	23.02
		16QAM	1	0	23.50	22.82	23.20	22.34
			1	49	23.50	22.43	22.63	23.20
			1	99	23.50	22.16	22.25	22.62
			50	0	23.50	22.87	23.31	22.96
			50	24	23.50	22.93	23.22	22.87
			50	49	23.50	22.91	23.18	22.84
			100	0	23.50	22.74	23.09	22.62

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)				
			RB Size	RB Offset		39675/2498.5	40148/2546	40620/2593	41093/2640	41565/2687.5
LTE Band 41	5MHz	QPSK	1	0	24.50	24.16	24.12	24.40	24.36	24.38
			1	12	24.50	24.08	23.63	24.10	24.22	24.17
			1	24	24.50	24.39	23.85	24.21	24.15	24.24
			12	0	24.50	22.89	22.64	23.23	24.21	23.17
			12	6	24.50	22.99	22.49	23.20	24.03	23.12
			12	11	24.50	23.14	23.01	23.11	23.84	23.05
			25	0	23.50	23.00	22.87	23.19	23.25	23.18

Band	Band Width	Modulation	RB Size	RB Offset	Tune-up (dBm)					
		16QAM	1	0	24.00	23.21	23.11	23.52	23.41	23.42
			1	12	24.00	23.11	23.25	23.34	23.51	23.25
			1	24	24.00	23.39	23.31	23.25	23.36	23.34
			12	0	22.50	21.98	22.15	22.19	22.28	22.29
			12	6	22.50	22.07	22.03	22.14	22.21	22.25
			12	11	22.50	22.19	21.87	22.18	22.16	22.27
			25	0	22.50	22.05	22.13	22.25	22.35	22.32

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)				
			RB Size	RB Offset		39700/ 2501	40160/ 2547	40620/ 2593	41080/ 2639	41540/ 2685
LTE Band 41	10MHz	QPSK	1	0	24.50	23.83	23.15	24.24	23.41	24.28
			1	24	24.50	23.80	23.62	23.91	23.26	24.01
			1	49	24.50	24.08	23.41	23.87	23.42	24.05
			25	0	23.50	22.73	23.25	23.00	23.11	23.20
			25	12	23.50	22.94	23.05	22.87	22.46	23.01
			25	24	23.50	22.96	23.36	22.84	23.21	22.96
			50	0	23.50	22.87	23.15	22.96	23.05	23.06
		16QAM	1	0	24.00	22.94	22.71	23.36	23.21	23.54
			1	24	24.00	23.01	23.06	23.09	23.16	23.21
			1	49	24.00	23.31	23.23	23.07	23.05	23.15
			25	0	22.50	21.67	21.63	22.18	22.05	22.23
			25	12	22.50	21.88	21.16	22.07	21.51	22.16
			25	24	22.50	22.03	21.34	22.04	21.63	22.12
			50	0	23.50	22.13	21.65	22.32	21.42	23.37

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)				
			RB Size	RB Offset		39725/ 2503.5	40173/ 2548	40620/ 2593	41068/ 2638	41515/ 2682.5
LTE Band 41	15MHz	QPSK	1	0	24.00	23.37	23.21	23.71	23.65	23.62
			1	37	24.00	23.87	23.62	23.90	23.48	23.82
			1	74	24.00	23.80	23.36	23.51	23.19	23.40
			36	0	23.50	22.74	22.54	23.01	23.47	23.05
			36	18	23.50	22.92	23.13	22.94	23.06	23.00
			36	37	23.50	22.96	21.84	22.78	23.25	22.83
			75	0	23.50	22.85	22.26	22.88	23.17	22.77
		16QAM	1	0	23.50	22.65	22.68	23.08	22.47	23.05
			1	37	23.50	23.08	22.19	23.03	23.14	23.09
			1	74	23.50	23.01	22.64	22.64	22.25	22.62
			36	0	24.00	23.63	23.16	23.69	23.25	23.58

			36	18	24.00	23.60	23.62	23.67	23.21	23.56
			36	37	24.00	23.59	23.27	23.67	23.61	23.64
			75	0	24.00	23.52	22.71	23.48	23.36	23.41

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)				
			RB Size	RB Offset		39750/ 2506	40185/ 2549.5	40620/ 2593	41055/ 2636.5	41490/ 2680
LTE Band 41	20MHz	QPSK	1	0	24.50	23.35	23.69	23.83	23.61	24.02
			1	49	24.50	23.67	23.45	23.72	23.48	23.73
			1	99	24.50	23.53	23.47	23.31	23.52	23.28
			50	0	23.00	22.64	22.53	22.93	22.64	22.85
			50	24	23.00	22.75	22.48	22.87	22.57	22.92
			50	49	23.00	22.76	22.32	22.60	22.49	22.65
			100	0	23.00	22.63	22.41	22.78	22.17	22.79
		16QAM	1	0	23.50	22.50	22.47	23.09	23.06	23.09
			1	49	23.50	22.96	22.32	22.97	23.15	23.02
			1	99	23.50	22.78	22.49	22.58	23.24	22.49
			50	0	24.00	23.53	23.23	23.54	23.31	23.60
			50	24	24.00	23.39	23.12	23.53	23.05	23.58
			50	49	24.00	23.49	23.09	23.63	23.41	23.57
			100	0	23.50	23.15	23.11	23.36	23.02	23.23

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		131979/1710.7	132322/1745	132665/1779.3
LTE Band 66	1.4MHz	QPSK	1	0	18.00	16.72	17.6	17.79
			1	2	18.00	16.7	17.3	17.58
			1	5	18.00	16.6	17.21	17.42
			3	0	18.00	16.56	17.36	17.51
			3	1	18.00	16.6	17.34	17.5
			3	2	18.00	16.73	17.31	17.44
			6	0	17.00	15.68	16.34	16.66
		16QAM	1	0	17.50	15.93	16.71	17.04
			1	2	17.50	16.06	16.7	17.05
			1	5	17.50	16.03	16.65	16.86
			3	0	17.00	15.61	16.38	16.75
			3	1	17.00	15.73	16.41	16.67
			3	2	17.00	15.73	16.4	16.67
			6	0	15.50	14.91	15.13	15.42

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		131987/1711.5	132322/1745	132657/1778.5
LTE Band 66	3MHz	QPSK	1	0	18.00	16.73	17.28	17.93
			1	7	18.00	16.86	17.33	17.73
			1	14	18.00	16.84	17.11	17.35
			8	0	17.00	15.73	16.29	16.76
			8	4	17.00	15.89	16.36	16.76
			8	7	17.00	15.83	16.32	16.76
			15	0	17.00	15.8	16.29	16.69
		16QAM	1	0	17.50	15.76	16.5	17.03
			1	7	17.50	16.19	16.66	17.02
			1	14	17.50	16.11	16.47	16.68
			8	0	16.00	14.83	15.06	15.47
			8	4	16.00	14.99	15.32	15.67
			8	7	16.00	14.97	15.27	15.58
			15	0	16.00	14.88	15.31	15.65

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		131997/1712.5	132322/1745	132647/1777.5
LTE Band 66	5MHz	QPSK	1	0	19.00	17.21	17.68	18.68
			1	12	19.00	17.01	17.42	17.95
			1	24	19.00	17.56	17.6	17.85
			12	0	17.50	15.95	16.51	17.21
			12	6	17.50	16.06	16.48	17.02
			12	11	17.50	16.25	16.55	16.91
			25	0	17.50	16.1	16.54	17.06
		16QAM	1	0	18.00	16.28	16.84	17.73
			1	12	18.00	16.34	16.77	17.17
			1	24	18.00	16.69	16.96	17.16
			12	0	16.00	15.12	15.19	15.73
			12	6	16.00	15.23	15.32	15.76
			12	11	16.00	15.43	15.38	15.73
			25	0	16.00	15.29	15.45	15.88

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		132022/1715	132322/1745	132622/1775

Band	Band Width	Modulation	RB Size	RB Offset	Tune-up (dBm)			
LTE Band 66	10MHz	QPSK	1	0	19.50	17.12	17.74	19.18
			1	24	19.50	17.35	17.36	18.36
			1	49	19.50	18.13	17.67	17.82
			25	0	18.00	16.07	16.47	17.5
			25	12	18.00	16.38	16.49	17.31
			25	24	18.00	16.72	16.61	17.05
			50	0	17.50	16.41	16.57	17.31
		16QAM	1	0	18.50	16.24	16.91	18.03
			1	24	18.50	16.67	16.63	17.51
			1	49	18.50	17.49	17.04	17.03
			25	0	16.50	15.23	15.28	16.18
			25	12	16.50	15.55	15.33	16.16
			25	24	16.50	15.89	15.38	15.93
			50	0	16.00	15.36	15.41	15.61

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		132047/1717.5	132322/1745	132597/1772.5
LTE Band 66	15MHz	QPSK	1	0	18.50	16.8	17.49	18.45
			1	37	18.50	17.72	17.41	18.48
			1	74	18.50	18.06	17.49	17.54
			36	0	18.00	16.48	16.33	17.38
			36	18	18.00	16.98	16.45	17.51
			36	37	18.00	17.25	16.49	17.12
			75	0	17.50	16.9	16.41	17.35
		16QAM	1	0	18.00	16.17	16.62	17.64
			1	37	18.00	17.1	16.73	17.69
			1	74	18.00	17.44	16.82	16.68
			36	0	18.00	17.02	16.94	17.64
			36	18	18.00	17.04	16.97	17.65
			36	37	18.00	17.08	16.98	17.64
			75	0	17.00	16.88	16.57	16.49

Band	Band Width	Modulation	RB Configuration		Tune-up (dBm)	Channel/Frequency(MHz)		
			RB Size	RB Offset		132072/1720	132322/1745	132572/1770
LTE Band 66	20MHz	QPSK	1	0	18.50	16.94	17.82	18.36
			1	49	18.50	18.01	17.34	18.74
			1	99	18.50	18.07	17.84	17.59
			50	0	18.00	16.77	16.45	17.47

			50	24	18.00	17.25	16.56	17.62
			50	49	18.00	17.52	16.65	17.23
			100	0	17.50	17.25	16.54	17.37
		16QAM	1	0	18.00	16.54	16.88	17.3
			1	49	18.00	17.69	16.75	17.94
			1	99	18.00	17.7	17.03	16.72
			50	0	18.00	17.15	17.2	17.56
			50	24	18.00	17.12	17.21	17.54
			50	49	18.00	17.16	17.24	17.58
			100	0	17.50	17.02	17.12	17.31

7.2. WLAN & Bluetooth Output Power

7.2.1. Output Power Results Of Bluetooth

BLE	Output Power (dBm)				
	Data Rates	Tune-up (dBm)	Channe		
			0CH	19CH	39CH
	1M	-4	-4.06	-4.1	-4.1
	2M	-4	-4.08	-4.1	-4.1

8. Stand-alone SAR test exclusion

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

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

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

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

Mode	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	Calculation Result	SAR Exclusion threshold	SAR test exclusion
Bluetooth	-4	0.398	5	2.480	0.125	3.0	Yes

NOTE: Standalone SAR test exclusion for Bluetooth.

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

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

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

Mode	Position	P_{max} (dBm)	P_{max} (mW)	Distance (mm)	f (GHz)	x	Estimated SAR (W/Kg)
Bluetooth	Body	-4	0.398	5	2.48	7.5	0.017

NOTE: Estimated SAR calculation for Bluetooth

9. SAR Results

9.1. SAR measurement results

9.1.1. SAR measurement Result of LTE Band 2

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	18900/1880	20M QPSK(1,49)	0.701	0.393	-0.49	23.97	24.50	0.792	2024/10/16	
Back Side	18900/1880	20M QPSK(1,49)	1.271	0.646	-1.26	23.97	24.50	1.436	2024/10/16	1#
Left Side	18900/1880	20M QPSK(1,49)	0.157	0.085	2.89	23.97	24.50	0.177	2024/10/16	
Right Side	18900/1880	20M QPSK(1,49)	0.360	0.198	-0.86	23.97	24.50	0.407	2024/10/16	
Top Side	18900/1880	20M QPSK(1,49)	0.238	0.128	2.18	23.97	24.50	0.269	2024/10/16	
Bottom Side	18900/1880	20M QPSK(1,49)	0.410	0.194	-3.09	23.97	24.50	0.463	2024/10/16	
Back Side	18700/1860	20M QPSK(1,49)	1.021	0.587	-0.48	23.14	24.50	1.396	2024/10/16	
50%RB										
Front Side	18900/1880	20M QPSK(50.24)	0.645	0.358	2.41	23.05	23.50	0.715	2024/10/16	
Back Side	18900/1880	20M QPSK(50.24)	1.12	0.461	-1.18	23.05	23.50	1.242	2024/10/16	
Left Side	18900/1880	20M QPSK(50.24)	0.135	0.076	0.86	23.05	23.50	0.150	2024/10/16	
Right Side	18900/1880	20M QPSK(50.24)	0.323	0.188	-1.58	23.05	23.50	0.358	2024/10/16	
Top Side	18900/1880	20M QPSK(50.24)	0.219	0.109	4.85	23.05	23.50	0.243	2024/10/16	
Bottom Side	18900/1880	20M QPSK(50.24)	0.354	0.171	3.83	23.05	23.50	0.393	2024/10/16	
Back Side	18900/1880	20M QPSK(50.24)	0.851	0.445	-2.9	22.20	23.50	1.148	2024/10/16	

NOTE: Body SAR test results of LTE Band 2

9.1.2. SAR measurement Result of LTE Band 4

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	20175/1732.5	20M QPSK(1,99)	0.488	0.228	-2.15	23.88	24.00	0.502	2024/10/10	
Back Side	20175/1732.5	20M QPSK(1,99)	0.597	0.287	0.29	0.00	0.00	0.597	2024/10/10	2#
Left Side	20175/1732.5	20M QPSK(1,99)	0.060	0.028	-0.76	0.00	0.00	0.060	2024/10/10	
Right Side	20175/1732.5	20M QPSK(1,99)	0.378	0.178	-1.64	0.00	0.00	0.378	2024/10/10	
Top Side	20175/1732.5	20M QPSK(1,99)	0.115	0.071	2.21	0.00	0.00	0.115	2024/10/10	
Bottom Side	20175/1732.5	20M QPSK(1,99)	0.315	0.147	2.21	0.00	0.00	0.315	2024/10/10	
50%RB										
Front Side	20175/1732.5	20M QPSK(50,24)	0.442	0.197	-3.26	22.87	23.00	0.455	2024/10/10	
Back Side	20175/1732.5	20M QPSK(50,24)	0.53	0.264	-0.23	22.87	23.00	0.546	2024/10/10	
Left Side	20175/1732.5	20M QPSK(50,24)	0.056	0.026	1.48	22.87	23.00	0.058	2024/10/10	
Right Side	20175/1732.5	20M QPSK(50,24)	0.349	0.152	2.57	22.87	23.00	0.360	2024/10/10	
Top Side	20175/1732.5	20M QPSK(50,24)	0.087	0.048	2.27	22.87	23.00	0.090	2024/10/10	
Bottom Side	20175/1732.5	20M QPSK(50,24)	0.281	0.13	-1.37	22.87	23.00	0.290	2024/10/10	

NOTE: Body SAR test results of LTE Band 4

9.1.3. SAR measurement Result of LTE Band 5

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	20525/836.5	20M QPSK(1,0)	0.137	0.084	-1.45	23.75	24.00	0.145	2024/10/15	
Back Side	20525/836.5	20M QPSK(1,0)	0.590	0.361	-4.04	23.75	24.00	0.625	2024/10/15	3#
Left Side	20525/836.5	20M QPSK(1,0)	0.047	0.026	2.69	23.75	24.00	0.050	2024/10/15	
Right Side	20525/836.5	20M QPSK(1,0)	0.187	0.123	-0.58	23.75	24.00	0.198	2024/10/15	
Bottom Side	20525/836.5	20M QPSK(1,0)	0.105	0.067	2.33	23.75	24.00	0.111	2024/10/15	
Top Side	20525/836.5	20M QPSK(1,0)	0.086	0.055	2.70	23.75	24.00	0.091	2024/10/15	
50%RB										
Front Side	20525/836.5	10M QPSK(25,0)	0.118	0.076	1.13	22.50	23.00	0.132	2024/10/15	
Back Side	20525/836.5	10M QPSK(25,0)	0.502	0.323	-3.68	22.50	23.00	0.563	2024/10/15	
Left Side	20525/836.5	10M QPSK(25,0)	0.044	0.022	-4.16	22.50	23.00	0.049	2024/10/15	
Right Side	20525/836.5	10M QPSK(25,0)	0.165	0.115	0.3	22.50	23.00	0.185	2024/10/15	
Bottom Side	20525/836.5	10M QPSK(25,0)	0.097	0.058	-0.94	22.50	23.00	0.109	2024/10/15	
Top Side	20525/836.5	10M QPSK(25,0)	0.075	0.047	3.77	22.50	23.00	0.084	2024/10/15	

NOTE: Body SAR test results of LTE Band 5

9.1.4. SAR measurement Result of LTE Band 7

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						

1RB										
Front Side	21100/2535	20M QPSK(1,0)	0.424	0.158	2.63	23.98	24.50	0.478	2024/10/17	
Back Side	21100/2535	20M QPSK(1,0)	0.500	0.194	1.87	23.98	24.50	0.564	2024/10/17	4#
Left Side	21100/2535	20M QPSK(1,0)	0.083	0.031	-1.90	23.98	24.50	0.094	2024/10/17	
Right Side	21100/2535	20M QPSK(1,0)	0.493	0.189	-3.16	23.98	24.50	0.556	2024/10/17	
Top Side	21100/2535	20M QPSK(1,0)	0.092	0.033	-3.98	23.98	24.50	0.104	2024/10/17	
Bottom Side	21100/2535	20M QPSK(1,0)	0.189	0.072	-3.02	23.98	24.50	0.213	2024/10/17	
50%RB										
Front Side	21100/2535	20M QPSK(50,0)	0.384	0.137	3.23	23.12	23.50	0.419	2024/10/17	
Back Side	21100/2535	20M QPSK(50,0)	0.427	0.173	-1.75	23.12	23.50	0.466	2024/10/17	
Left Side	21100/2535	20M QPSK(50,0)	0.076	0.027	3.7	23.12	23.50	0.083	2024/10/17	
Right Side	21100/2535	20M QPSK(50,0)	0.422	0.167	2.67	23.12	23.50	0.461	2024/10/17	
Top Side	21100/2535	20M QPSK(50,0)	0.084	0.03	2.72	23.12	23.50	0.092	2024/10/17	
Bottom Side	21100/2535	20M QPSK(50,0)	0.166	0.063	-0.01	23.12	23.50	0.181	2024/10/17	

NOTE: Body SAR test results of LTE Band 7

9.1.5. SAR measurement Result of LTE Band 41

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	40620/2593	20M QPSK(1,0)	0.224	0.088	-1.03	23.83	24.50	0.261	2024/10/17	
Front Side	40185/2549.5	20M QPSK(1,0)	0.207	0.081	-0.03	23.69	24.50	0.249	2024/10/17	
Front Side	41055/2636.5	20M QPSK(1,0)	0.201	0.078	-3.78	23.61	24.50	0.247	2024/10/17	

Back Side	40620/2593	20M QPSK(1,0)	0.255	0.102	1.59	23.83	24.50	0.298	2024/10/17	5#
Back Side	40185/2549.5	20M QPSK(1,0)	0.246	0.092	1.59	23.69	24.50	0.296	2024/10/17	
Back Side	41055/2636.5	20M QPSK(1,0)	0.240	0.085	1.59	23.61	24.50	0.295	2024/10/17	
Left Side	40620/2593	20M QPSK(1,0)	0.042	0.017	-2.94	23.83	24.50	0.049	2024/10/17	
Left Side	40185/2549.5	20M QPSK(1,0)	0.035	0.014	-1.91	23.69	24.50	0.042	2024/10/17	
Left Side	41055/2636.5	20M QPSK(1,0)	0.032	0.011	-1.52	23.61	24.50	0.039	2024/10/17	
Right Side	40620/2593	20M QPSK(1,0)	0.246	0.100	3.35	23.83	24.50	0.287	2024/10/17	
Right Side	40185/2549.5	20M QPSK(1,0)	0.232	0.089	2.46	23.69	24.50	0.280	2024/10/17	
Right Side	41055/2636.5	20M QPSK(1,0)	0.228	0.078	1.24	23.61	24.50	0.280	2024/10/17	
Top Side	40620/2593	20M QPSK(1,0)	0.052	0.020	2.72	23.83	24.50	0.061	2024/10/17	
Top Side	40185/2549.5	20M QPSK(1,0)	0.046	0.017	2.88	23.69	24.50	0.055	2024/10/17	
Top Side	41055/2636.5	20M QPSK(1,0)	0.041	0.014	-2.11	23.61	24.50	0.050	2024/10/17	
Bottom Side	40620/2593	20M QPSK(1,0)	0.105	0.042	-2.39	23.83	24.50	0.123	2024/10/17	
Bottom Side	40185/2549.5	20M QPSK(1,0)	0.093	0.035	-3.14	23.69	24.50	0.112	2024/10/17	
Bottom Side	41055/2636.5	20M QPSK(1,0)	0.088	0.031	1.02	23.61	24.50	0.108	2024/10/17	
50%RB										
Front Side	40620/2593	20M QPSK(50,0)	0.197	0.078	3.58	22.93	23.00	0.200	2024/10/17	
Front Side	40185/2549.5	20M QPSK(50,0)	0.18	0.074	-4.55	22.53	23.00	0.201	2024/10/17	
Front Side	41055/2636.5	20M QPSK(50,0)	0.183	0.074	-2.55	22.64	23.00	0.199	2024/10/17	
Back Side	40620/2593	20M QPSK(50,0)	0.236	0.09	-1.39	22.93	23.00	0.240	2024/10/17	
Back	40185/2549.5	20M	0.221	0.085	-2.78	22.53	23.00	0.246	2024/10/17	

Side		QPSK(50,0)								
Back Side	41055/2636.5	20M QPSK(50,0)	0.223	0.074	1.59	22.64	23.00	0.242	2024/10/17	
Left Side	40620/2593	20M QPSK(50,0)	0.04	0.016	-4.06	22.93	23.00	0.041	2024/10/17	
Left Side	40185/2549.5	20M QPSK(50,0)	0.031	0.013	2.12	22.53	23.00	0.035	2024/10/17	
Left Side	41055/2636.5	20M QPSK(50,0)	0.029	0.01	-4.67	22.64	23.00	0.032	2024/10/17	
Right Side	40620/2593	20M QPSK(50,0)	0.23	0.087	-4.61	22.93	23.00	0.234	2024/10/17	
Right Side	40185/2549.5	20M QPSK(50,0)	0.214	0.077	-3.69	22.53	23.00	0.238	2024/10/17	
Right Side	41055/2636.5	20M QPSK(50,0)	0.206	0.068	-4.83	22.64	23.00	0.224	2024/10/17	
Top Side	40620/2593	20M QPSK(50,0)	0.048	0.018	0.8	22.93	23.00	0.049	2024/10/17	
Top Side	40185/2549.5	20M QPSK(50,0)	0.041	0.015	1.92	22.53	23.00	0.046	2024/10/17	
Top Side	41055/2636.5	20M QPSK(50,0)	0.036	0.013	-0.15	22.64	23.00	0.039	2024/10/17	
Bottom Side	40620/2593	20M QPSK(50,0)	0.089	0.037	-2.67	22.93	23.00	0.090	2024/10/17	
Bottom Side	40185/2549.5	20M QPSK(50,0)	0.083	0.033	3.55	22.53	23.00	0.092	2024/10/17	
Bottom Side	41055/2636.5	20M QPSK(50,0)	0.077	0.029	-1.36	22.64	23.00	0.084	2024/10/17	

NOTE: Body SAR test results of LTE Band 41

9.1.6. SAR measurement Result of LTE Band 66

Test Position of Body with 0mm	Test channel /Freq.	Mode	SAR Value (W/kg)		Power Drift(%)	Conducted Power (dBm)	Tune-up Power (dBm)	Scaled SAR 1-g (W/Kg)	Date	Plot
			1-g	10-g						
1RB										
Front Side	132322/1745	20M QPSK(1,99)	0.392	0.150	-0.64	17.84	18.50	0.456	2024/10/10	
Back Side	132322/1745	20M QPSK(1,99)	0.478	0.193	-0.23	17.84	18.50	0.556	2024/10/10	6#
Left	132322/1745	20M	0.052	0.020	-3.98	17.84	18.50	0.061	2024/10/10	

Side		QPSK(1,99)							
Right Side	132322/1745	20M QPSK(1,99)	0.288	0.114	2.25	17.84	18.50	0.335	2024/10/10
Top Side	132322/1745	20M QPSK(1,99)	0.046	0.021	-2.63	17.84	18.50	0.054	2024/10/10
Bottom Side	132322/1745	20M QPSK(1,99)	0.250	0.098	-1.35	17.84	18.50	0.291	2024/10/10
50%RB									
Front Side	132322/1745	20M QPSK(50,0)	0.368	0.128	3.56	16.65	18.00	0.502	2024/10/10
Back Side	132322/1745	20M QPSK(50,0)	0.435	0.169	-0.68	16.65	18.00	0.594	2024/10/10
Left Side	132322/1745	20M QPSK(50,0)	0.045	0.017	4.84	16.65	18.00	0.061	2024/10/10
Right Side	132322/1745	20M QPSK(50,0)	0.273	0.101	4.58	16.65	18.00	0.373	2024/10/10
Top Side	132322/1745	20M QPSK(50,0)	0.041	0.02	1.65	16.65	18.00	0.056	2024/10/10
Bottom Side	132322/1745	20M QPSK(50,0)	0.229	0.089	0.63	16.65	18.00	0.312	2024/10/10

NOTE: Body SAR test results of LTE Band 66

9.2. SAR Summation Scenario

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

1) Scalar SAR summation < 1.6W/kg.

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

Test Position		Scaled SAR_{MAX} WWAN	Scaled SAR_{MAX} DTS	∑1-g SAR (W/Kg)	SPLSR	Remark
Body	Front Side	0.792	0.017	0.809	N/A	N/A
	Back Side	1.436	0.017	1.453	N/A	N/A
	Left Side	0.177	0.017	0.194	N/A	N/A
	Right Side	0.556	0.017	0.573	N/A	N/A
	Top Side	0.269	0.017	0.286	N/A	N/A
	Bottom Side	0.463	0.017	0.480	N/A	N/A

10.Appendix A. Photo documentation

Refer to appendix Test Setup photo---SAR

11.Appendix B. System Check Plots

Table of contents

MEASUREMENT 1

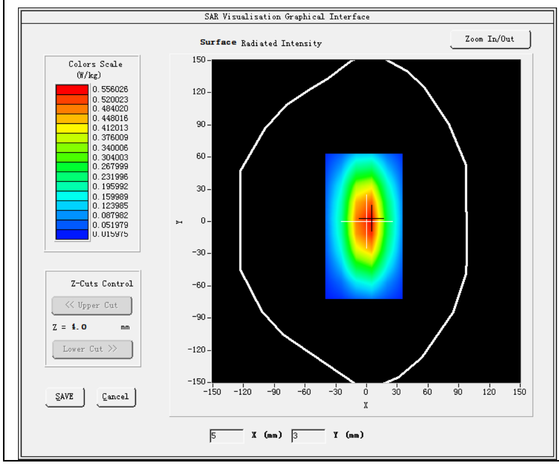
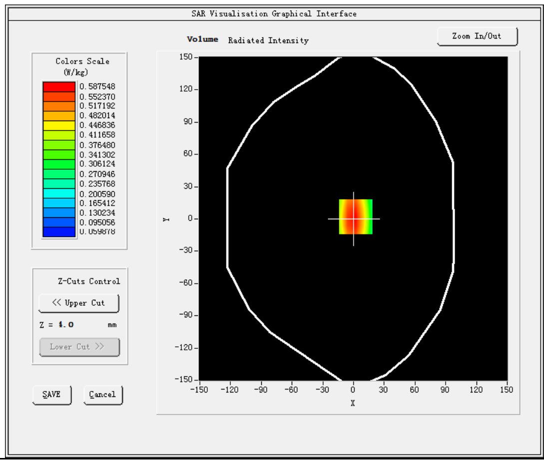
Date of measurement: 15/10/2024

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	2.34

B. SAR Measurement Results

Frequency (MHz)	835.000000
Relative permittivity (real part)	41.962568
Relative permittivity (imaginary part)	19.705231
Conductivity (S/m)	0.914104
Variation (%)	-0.910000

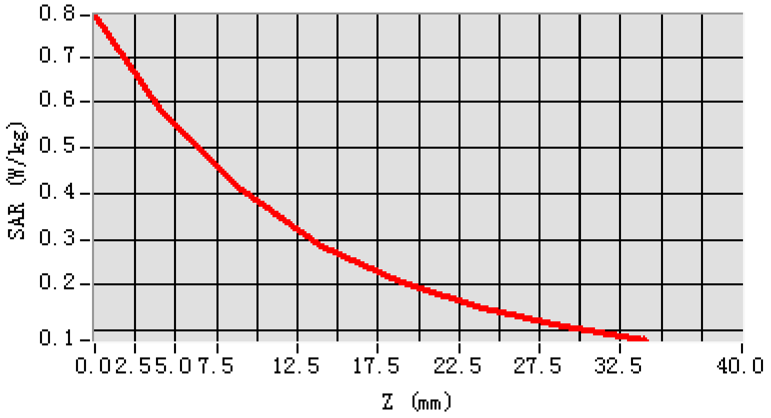
SURFACE SAR	VOLUME SAR
	

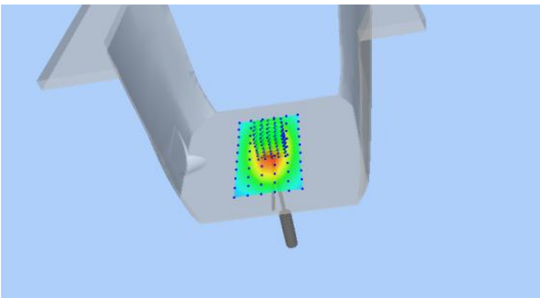
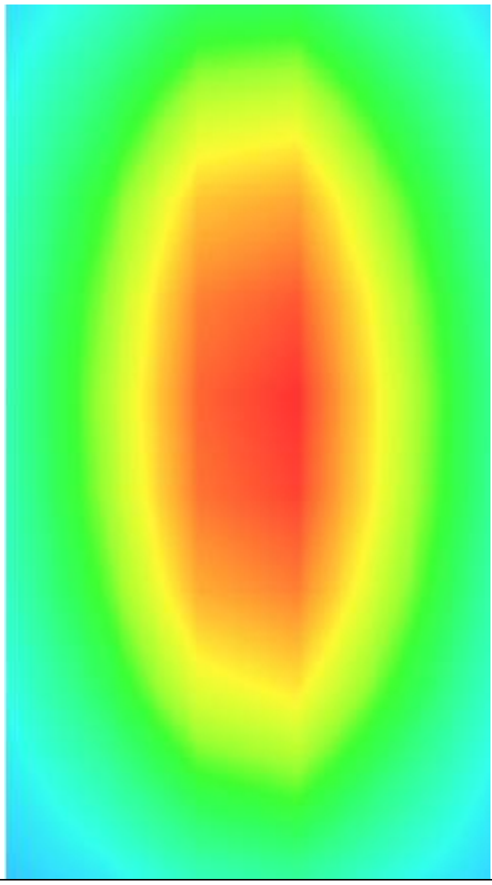
Maximum location: X=2.00, Y=2.00

SAR Peak: 0.80 W/kg

SAR 10g (W/Kg)	0.376230
SAR 1g (W/Kg)	0.574431

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.7903	0.5875	0.4073	0.2838	0.2050	0.1483	0.1091



3D screen shot	Hot spot position
	

MEASUREMENT 2

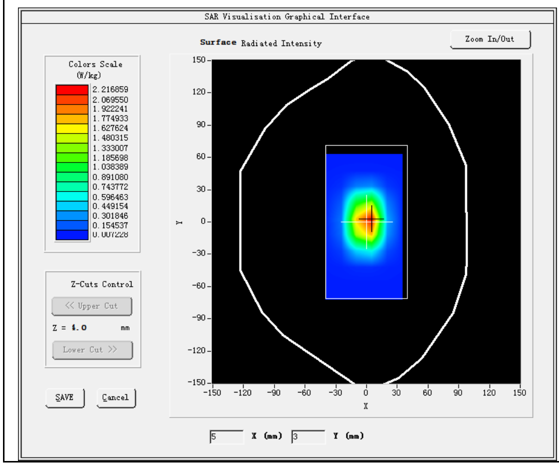
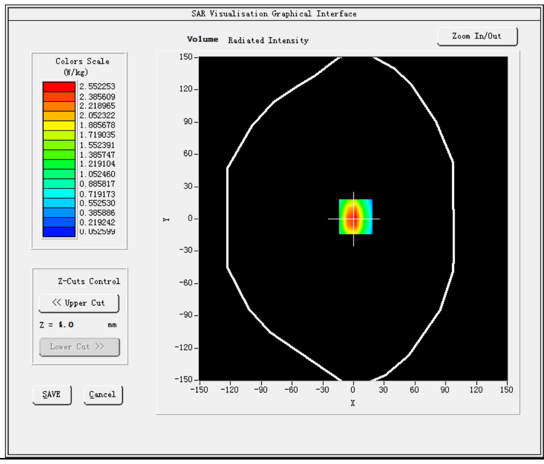
Date of measurement: 10/10/2024

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	CW1800
Channels	Middle
Signal	CW (Crest factor: 1.0)
ConvF	2.51

B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative permittivity (real part)	39.382928
Relative permittivity (imaginary part)	13.813047
Conductivity (S/m)	1.381307
Variation (%)	-0.410000

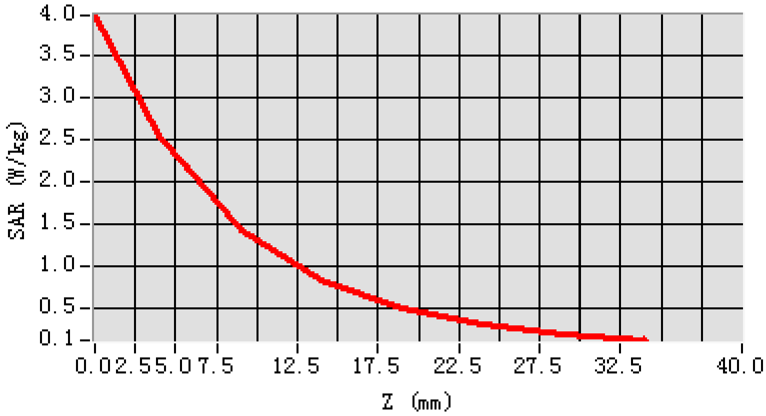
SURFACE SAR	VOLUME SAR
	

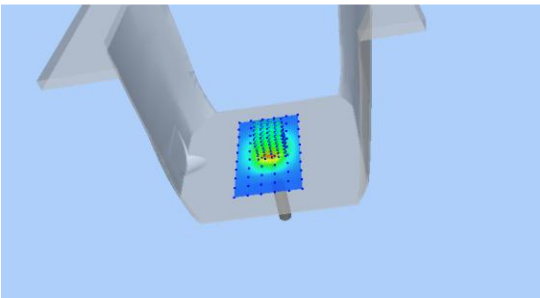
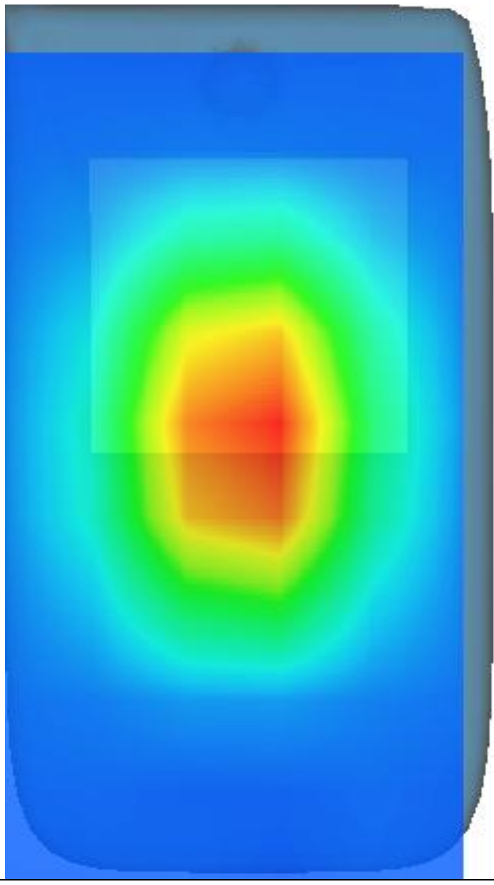
Maximum location: X=2.00, Y=2.00

SAR Peak: 4.13 W/kg

SAR 10g (W/Kg)	1.279505
SAR 1g (W/Kg)	2.479522

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	3.9811	2.5523	1.4430	0.8454	0.5129	0.3156	0.1984



3D screen shot	Hot spot position
	

MEASUREMENT 3

Date of measurement: 16/10/2024

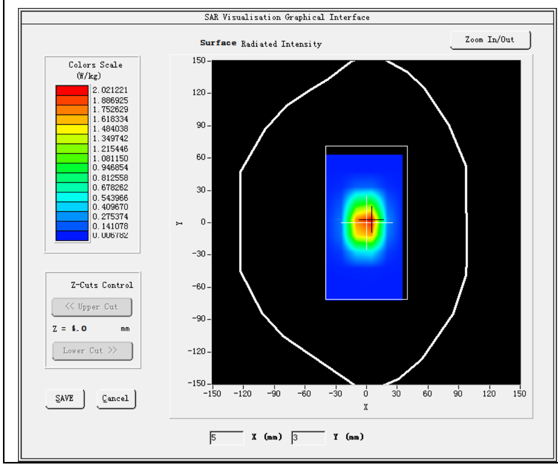
A. Experimental conditions.

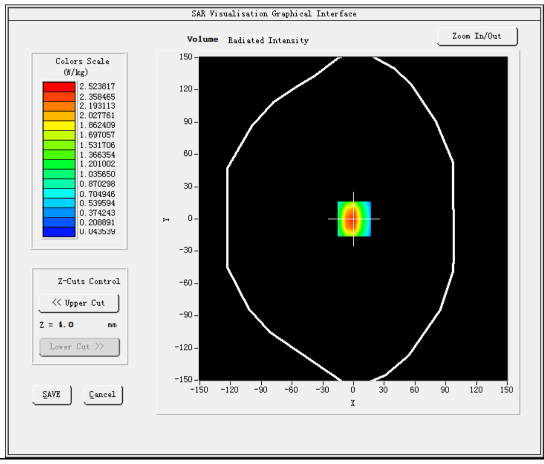
Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Dipole
Band	CW1900
Channels	Middle
Signal	CW (Crest factor: 1.0)
ConvF	2.57

B. SAR Measurement Results

Frequency (MHz)	1900.000000
Relative permittivity (real part)	38.570754
Relative permittivity (imaginary part)	13.854547
Conductivity (S/m)	1.462424
Variation (%)	-0.230000

SURFACE SAR	VOLUME SAR



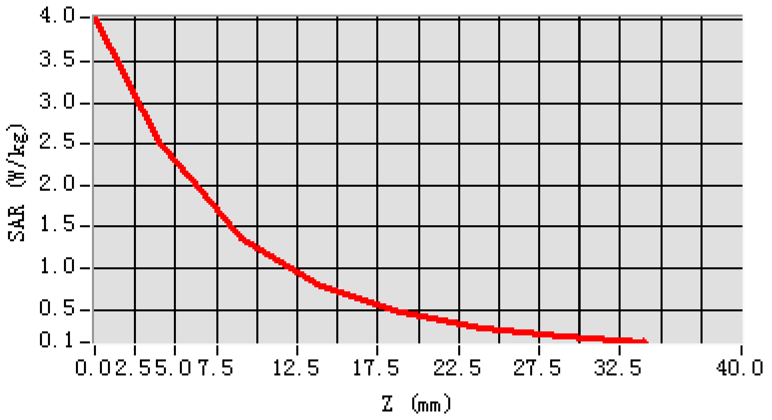


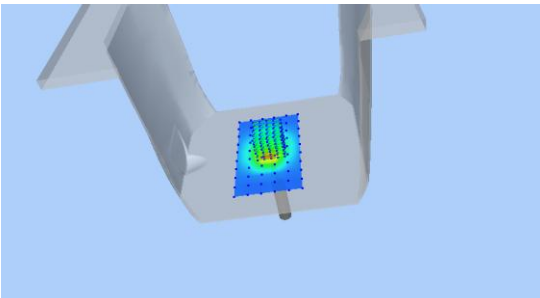
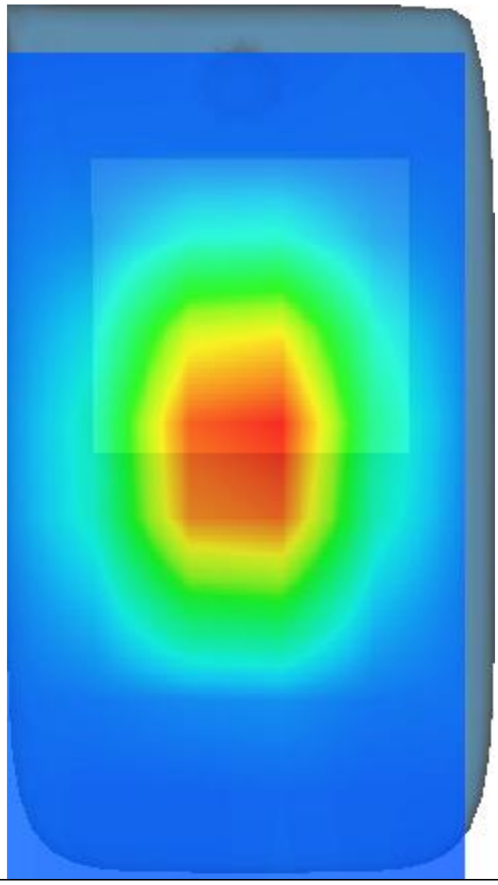
Maximum location: X=1.00, Y=0.00

SAR Peak: 4.17 W/kg

SAR 10g (W/Kg)	1.242750
SAR 1g (W/Kg)	2.526869

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	4.0353	2.5238	1.3725	0.7789	0.4559	0.2694	0.1642



3D screen shot	Hot spot position
	

MEASUREMENT 4

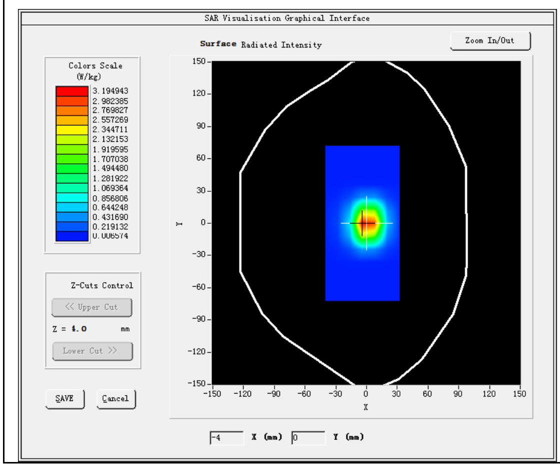
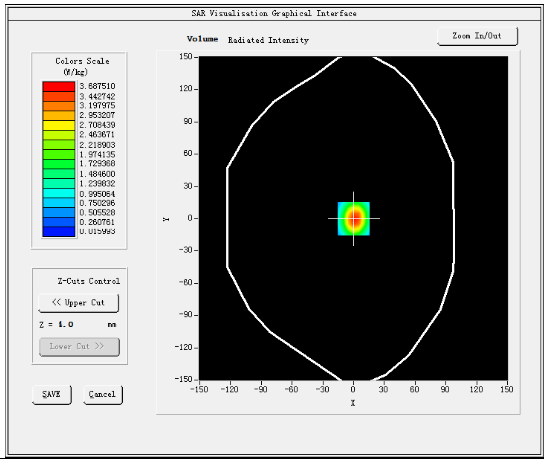
Date of measurement: 17/10/2024

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	2.51

B. SAR Measurement Results

Frequency (MHz)	2600.000000
Relative permittivity (real part)	38.910442
Relative permittivity (imaginary part)	13.999088
Conductivity (S/m)	2.02209
Variation (%)	-1.660000

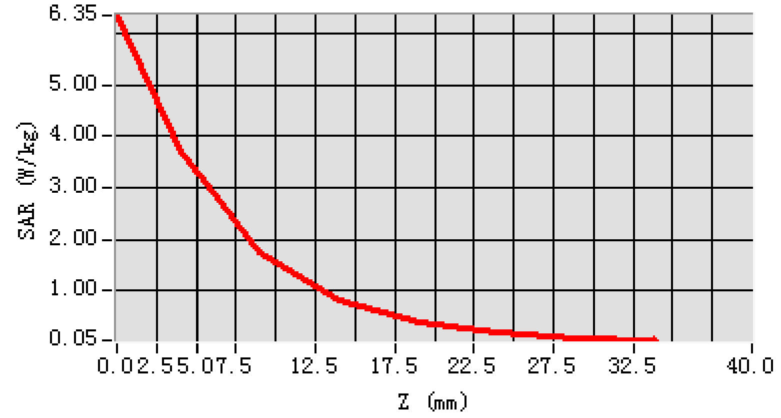
SURFACE SAR	VOLUME SAR
	

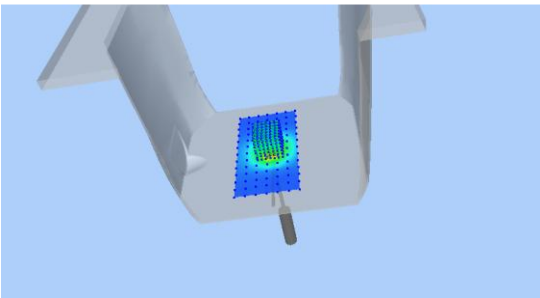
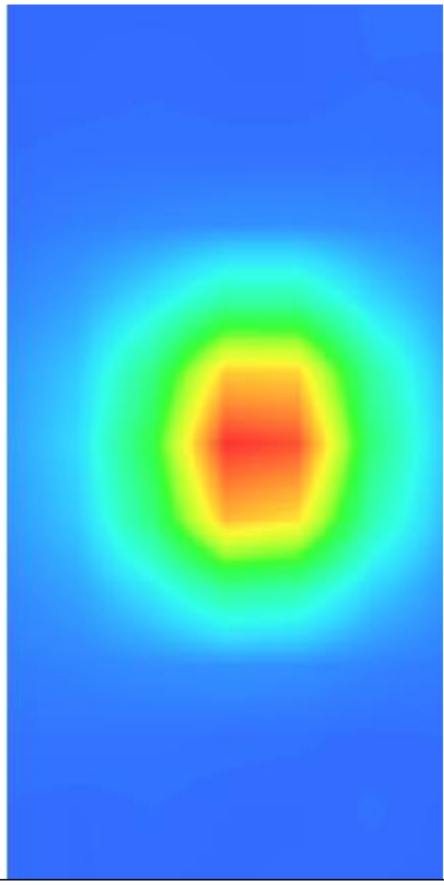
Maximum location: X=0.00, Y=0.00

SAR Peak: 6.32 W/kg

SAR 10g (W/Kg)	1.557075
SAR 1g (W/Kg)	3.451560

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	6.3521	3.6875	1.7443	0.8384	0.4003	0.1942	0.0939



3D screen shot	Hot spot position
	

12.Appendix C. Plots of High SAR Measurement

Table of contents

MEASUREMENT 1

Date of measurement: 16/10/2024

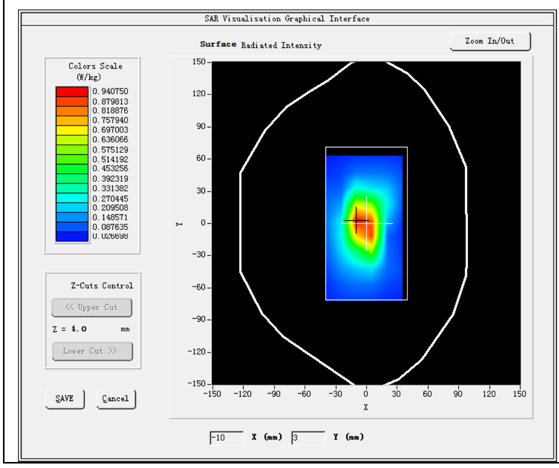
A. Experimental conditions.

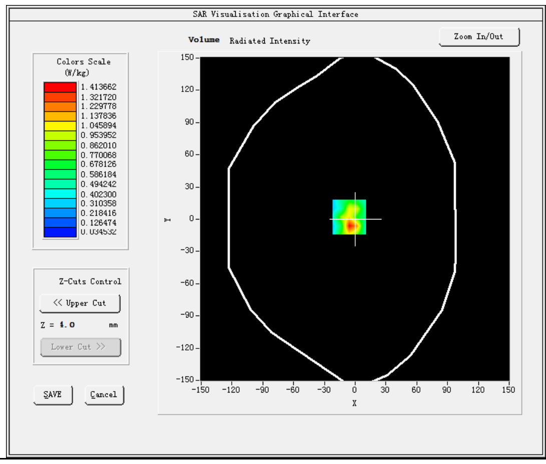
Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	LTE band 2
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.57

B. SAR Measurement Results

Frequency (MHz)	1880.000000
Relative permittivity (real part)	38.657154
Relative permittivity (imaginary part)	13.872347
Conductivity (S/m)	1.448890
Variation (%)	-1.260000

SURFACE SAR	**VOLUME SAR**

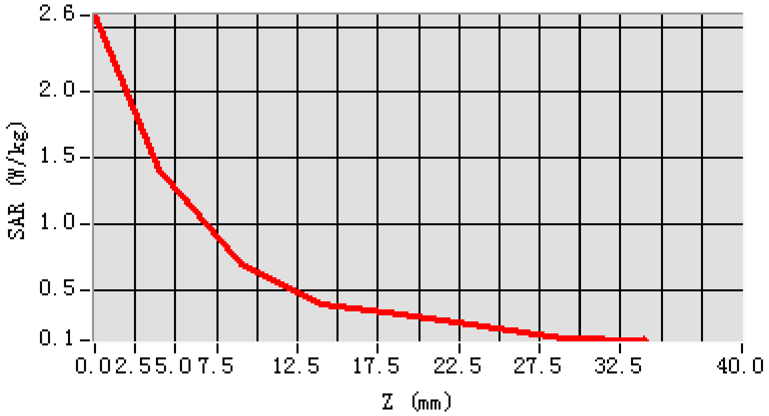


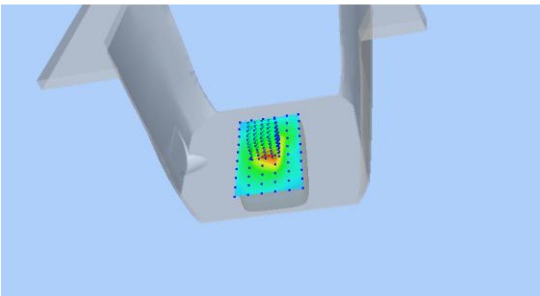
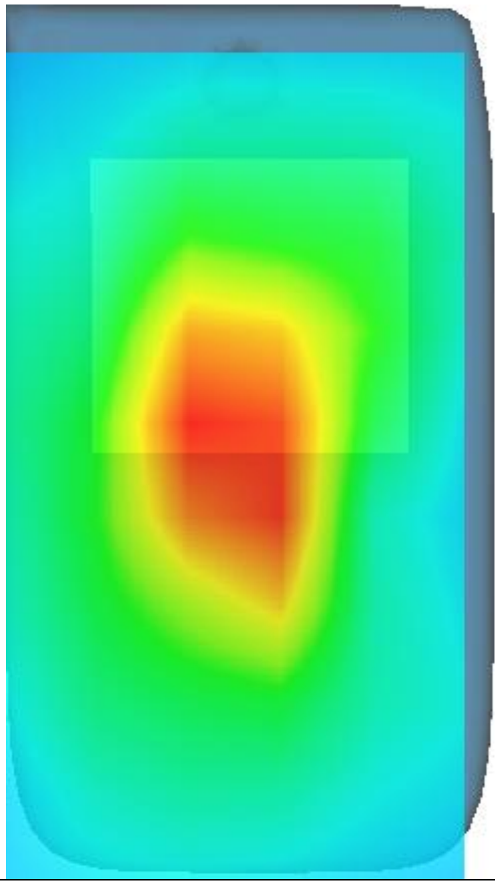


Maximum location: X=-6.00, Y=2.00
SAR Peak: 2.14 W/kg

SAR 10g (W/Kg)	0.645913
SAR 1g (W/Kg)	1.271328

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.5864	1.4137	0.6944	0.3879	0.3110	0.2271	0.1297



3D screen shot	Hot spot position
	

MEASUREMENT 2

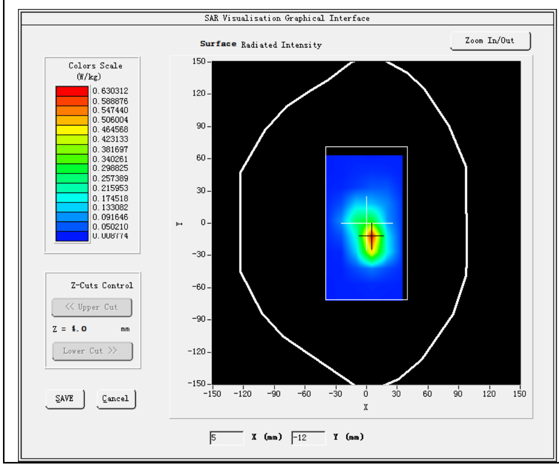
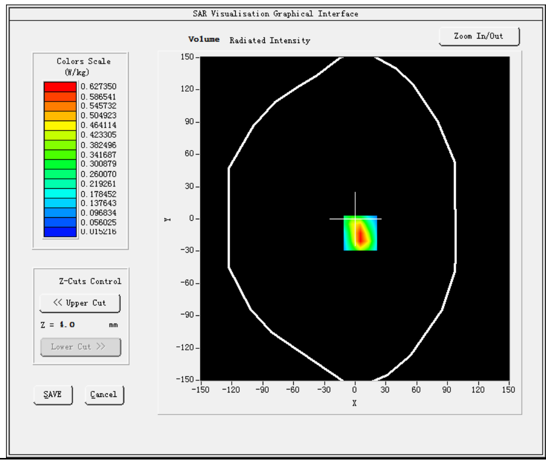
Date of measurement: 10/10/2024

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 4
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.51

B. SAR Measurement Results

Frequency (MHz)	1732.500000
Relative permittivity (real part)	39.850529
Relative permittivity (imaginary part)	13.750197
Conductivity (S/m)	1.323456
Variation (%)	0.290000

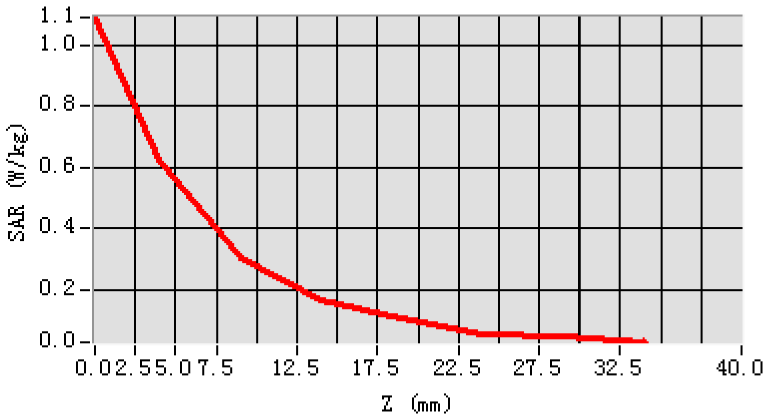
SURFACE SAR	VOLUME SAR
	

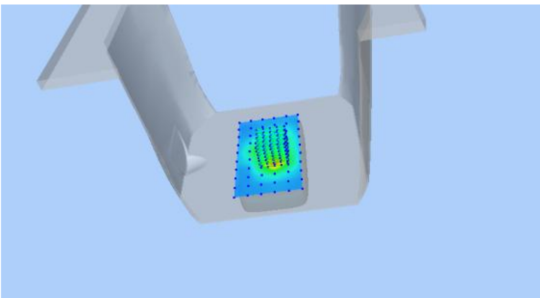
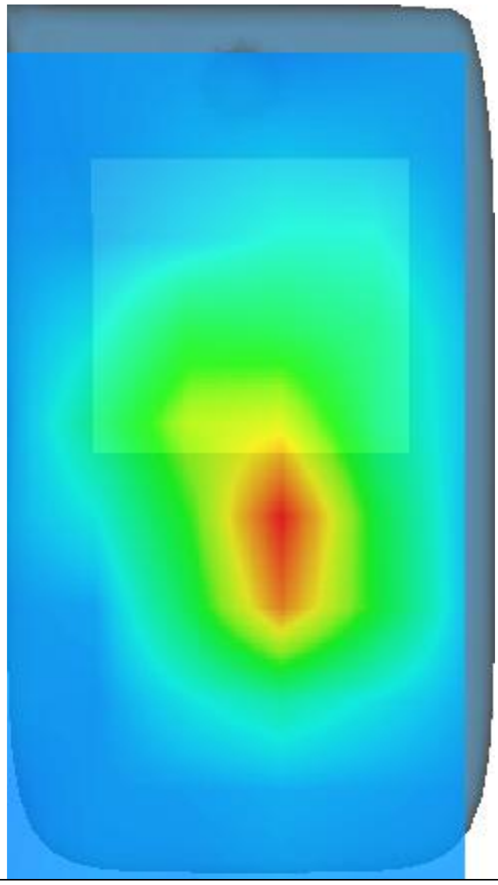
Maximum location: X=5.00, Y=-13.00

SAR Peak: 1.10 W/kg

SAR 10g (W/Kg)	0.287300
SAR 1g (W/Kg)	0.596706

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.0923	0.6273	0.3021	0.1629	0.1086	0.0546	0.0485



3D screen shot	Hot spot position
	

MEASUREMENT 3

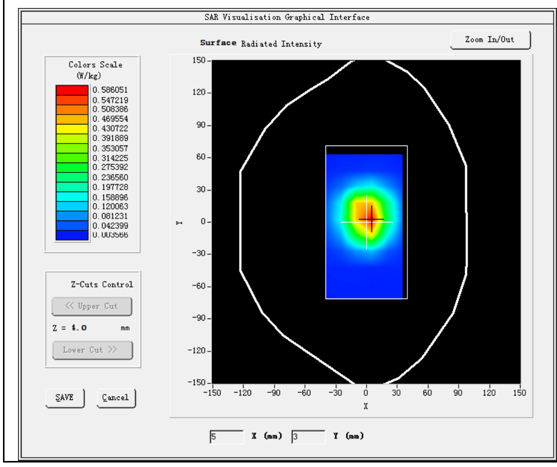
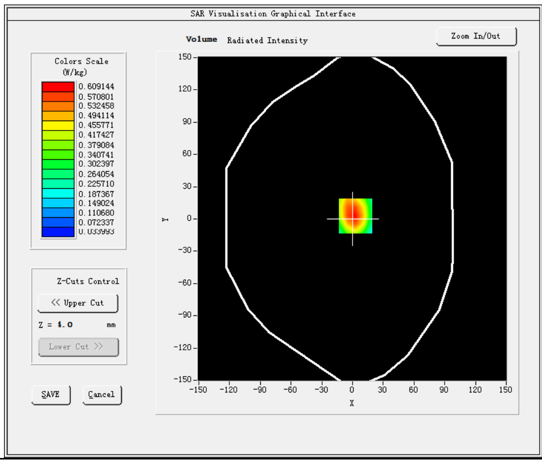
Date of measurement: 15/10/2024

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	2.34

B. SAR Measurement Results

Frequency (MHz)	836.500000
Relative permittivity (real part)	41.880817
Relative permittivity (imaginary part)	19.729731
Conductivity (S/m)	0.916884
Variation (%)	-4.040000

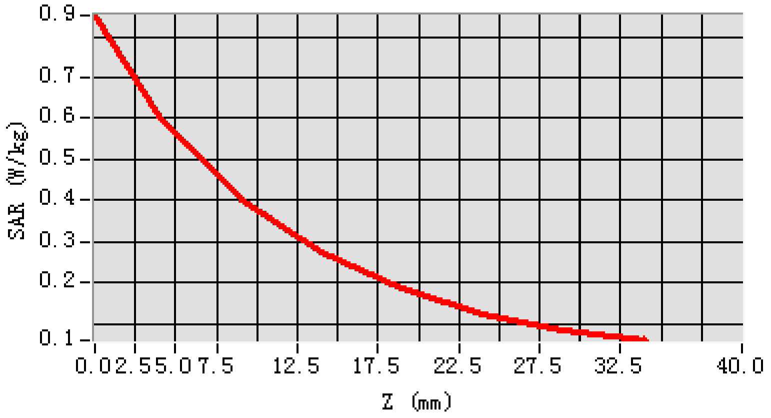
SURFACE SAR	VOLUME SAR
	

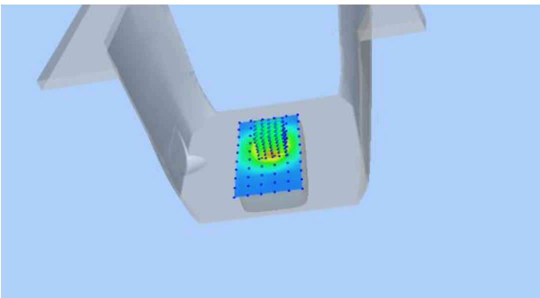
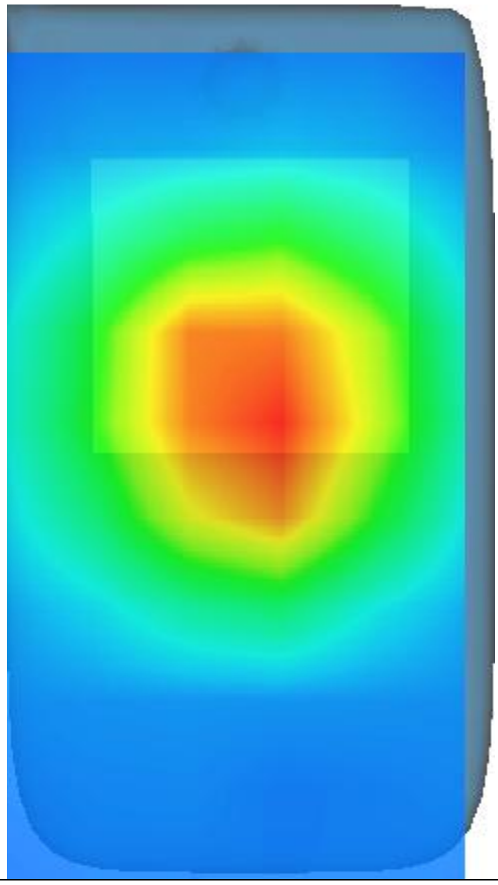
Maximum location: X=3.00, Y=3.00

SAR Peak: 0.85 W/kg

SAR 10g (W/Kg)	0.361430
SAR 1g (W/Kg)	0.590068

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.8518	0.6091	0.4018	0.2738	0.1846	0.1226	0.0832



3D screen shot	Hot spot position
	

MEASUREMENT 4

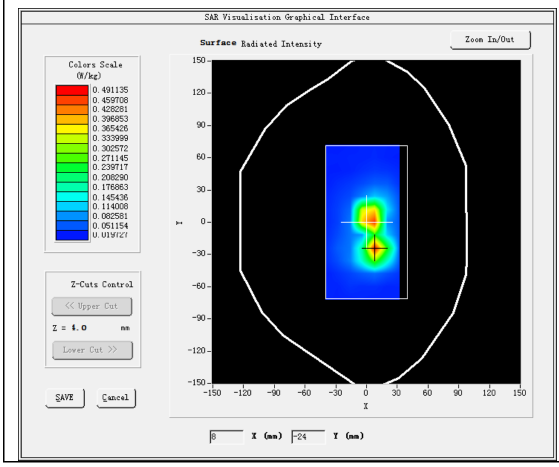
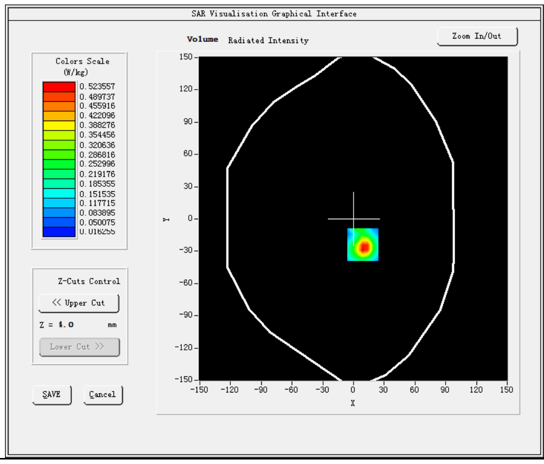
Date of measurement: 17/10/2024

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 7
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.51

B. SAR Measurement Results

Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.245743
Relative permittivity (imaginary part)	13.866988
Conductivity (S/m)	1.952934
Variation (%)	1.870000

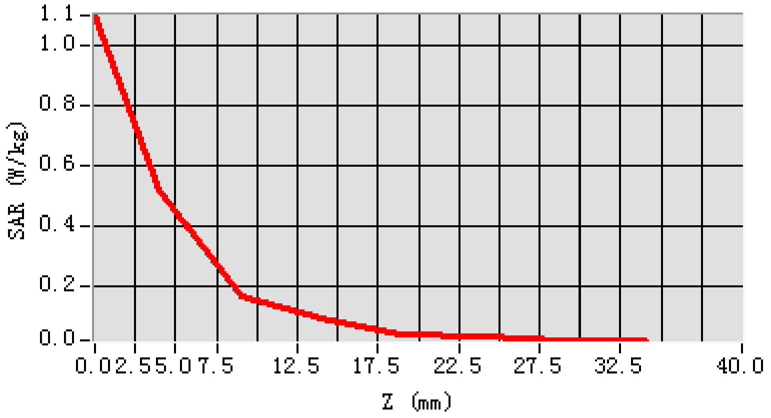
SURFACE SAR	VOLUME SAR
	

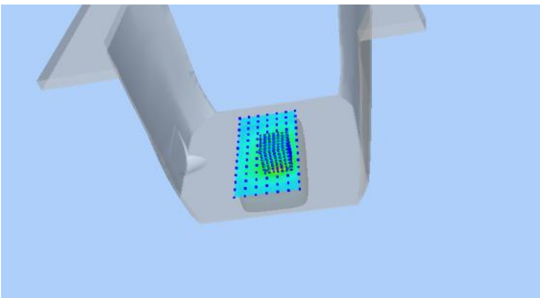
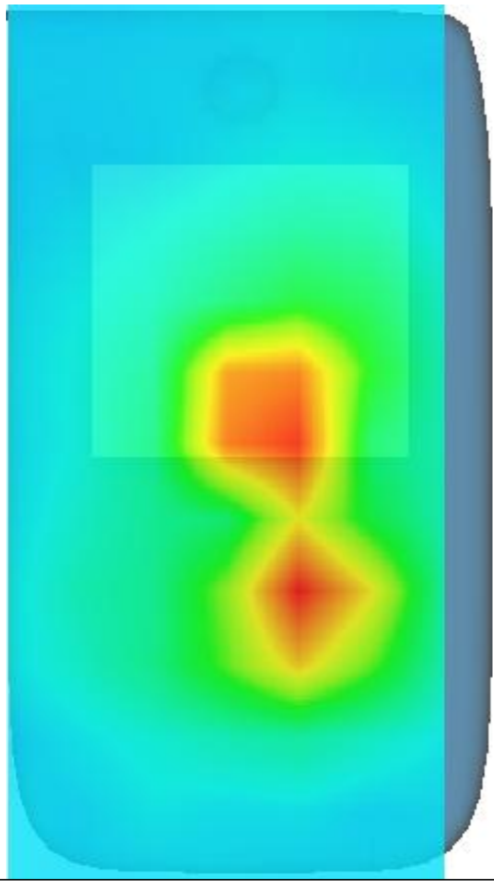
Maximum location: X=9.00, Y=-24.00

SAR Peak: 1.04 W/kg

SAR 10g (W/Kg)	0.193777
SAR 1g (W/Kg)	0.499959

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	1.0993	0.5236	0.1656	0.0917	0.0438	0.0326	0.0241



3D screen shot	Hot spot position
	

MEASUREMENT 5

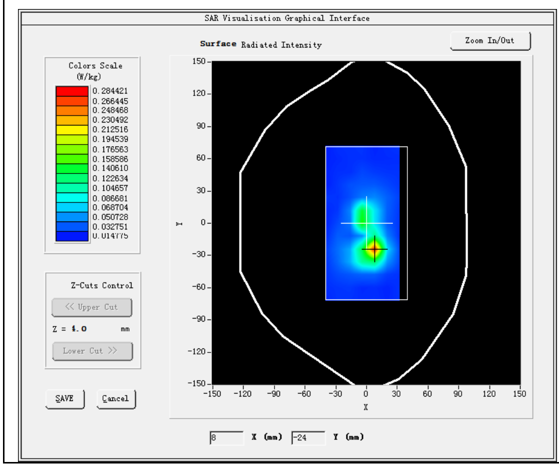
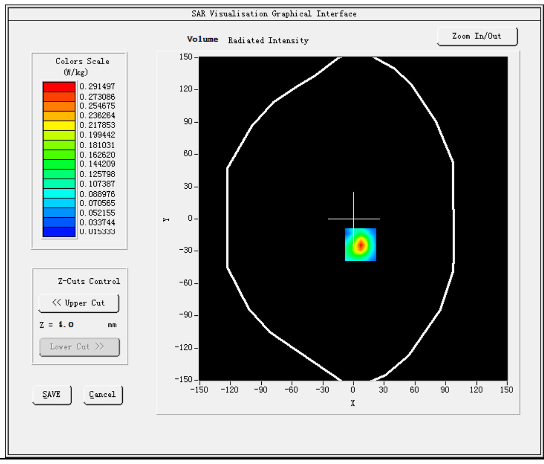
Date of measurement: 17/10/2024

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 41
Channels	Middle
Signal	LTE (Crest factor: 1.0)
ConvF	2.51

B. SAR Measurement Results

Frequency (MHz)	2593.000000
Relative permittivity (real part)	38.964241
Relative permittivity (imaginary part)	14.030588
Conductivity (S/m)	2.021184
Variation (%)	1.590000

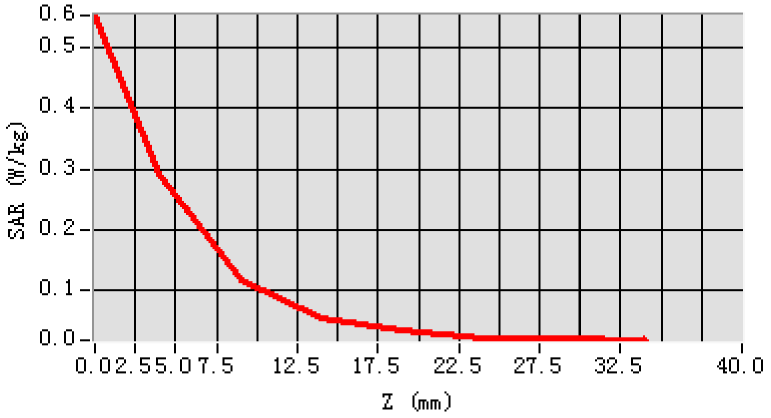
SURFACE SAR	VOLUME SAR
	

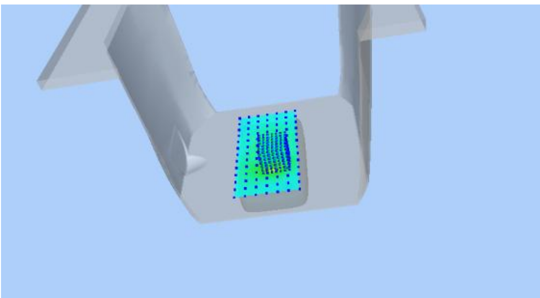
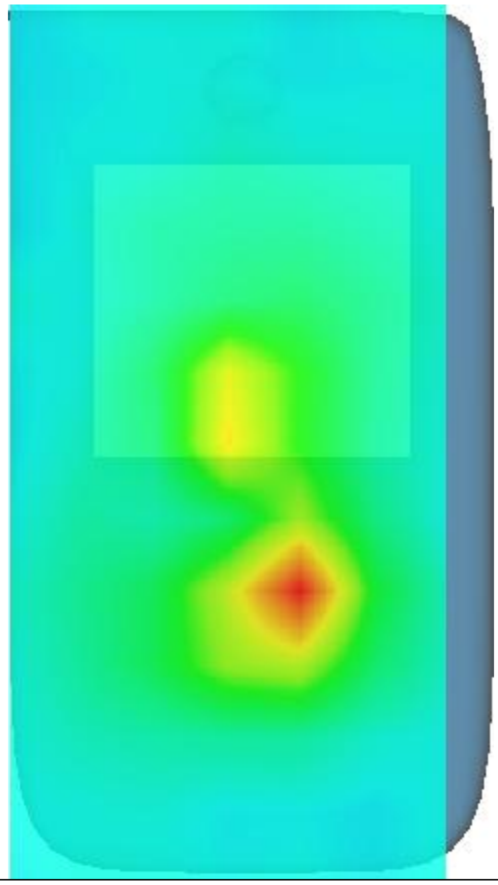
Maximum location: X=7.00, Y=-24.00

SAR Peak: 0.55 W/kg

SAR 10g (W/Kg)	0.102132
SAR 1g (W/Kg)	0.255085

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	0.5533	0.2915	0.1187	0.0567	0.0348	0.0235	0.0211



3D screen shot	Hot spot position
	

MEASUREMENT 6

Date of measurement: 10/10/2024

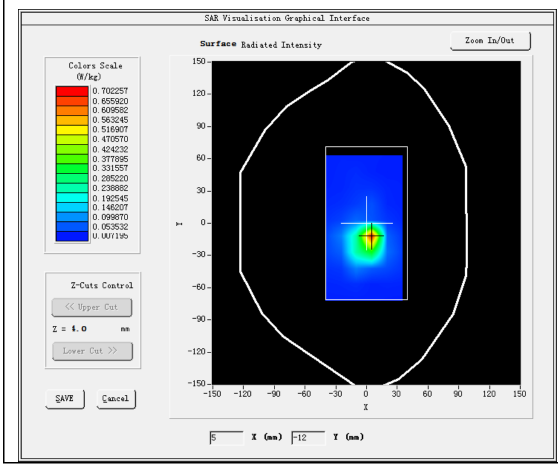
A. Experimental conditions.

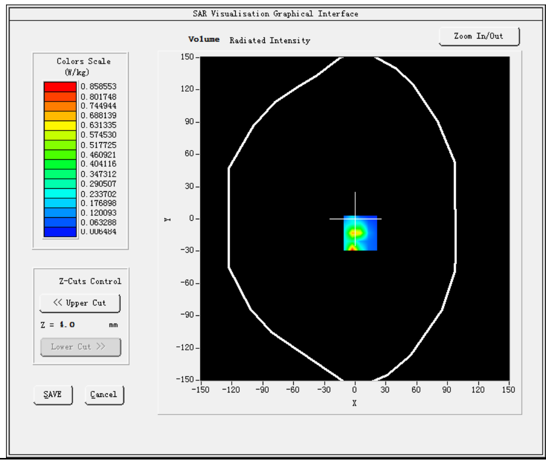
Area Scan	dx=15mm dy=15mm, h= 5.00 mm
ZoomScan	5x5x7,dx=8mm dy=8mm dz=5mm
Phantom	Validation plane
Device Position	Body
Band	FDDBand66
Channels	Middle
Signal	(Crest factor: 1.0)
ConvF	2.51

B. SAR Measurement Results

Frequency (MHz)	1745.000000
Relative permittivity (real part)	39.778728
Relative permittivity (imaginary part)	13.747747
Conductivity (S/m)	1.332768
Variation (%)	-0.230000

SURFACE SAR	VOLUME SAR



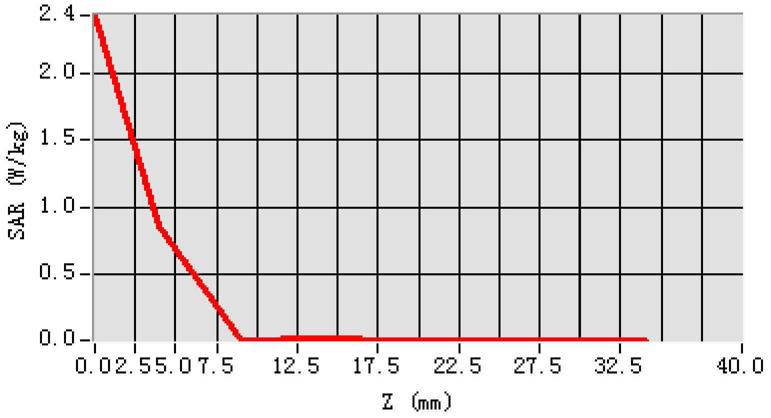


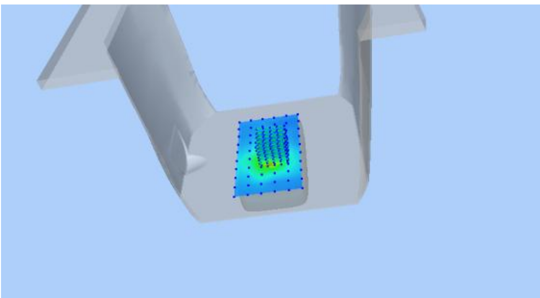
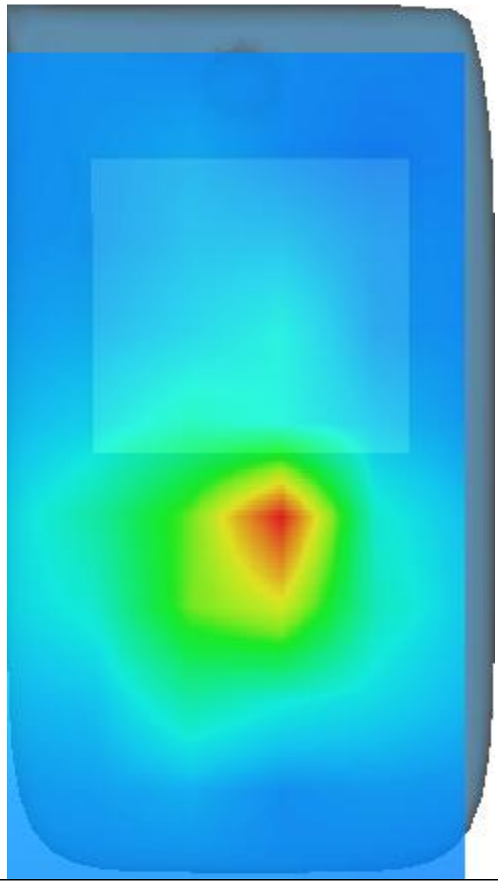
Maximum location: X=5.00, Y=-13.00

SAR Peak: 2.09 W/kg

SAR 10g (W/Kg)	0.193162
SAR 1g (W/Kg)	0.478431

Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	2.4364	0.8586	0.0120	0.0269	0.0118	0.0090	0.0089



3D screen shot	Hot spot position
	

13. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 4024-EPGO-442
835 MHz Dipole - SN 03/15 DIP 0G835-347
1800 MHz Dipole - SN 03/15 DIP 1G800-349
1900 MHz Dipole - SN 03/15 DIP 1G900-350
2600 MHz Dipole - SN 03/15 DIP 2G600-356

COMOSAR E-Field Probe Calibration Report

Ref : ACR.278.12.24.BES.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR DOSIMETRIC E-FIELD PROBE
SERIAL NO.: 4024-EPGO-442

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

Calibration date: 10/04/2024

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

Summary:

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

COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.278.12.24.BES.A

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

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

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

TABLE OF CONTENTS

1 DEVICE UNDER TEST

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

2 PRODUCT DESCRIPTION

2.1 GENERAL INFORMATION

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

Figure 1 – *MVG COMOSAR Dosimetric E field Probe*

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

3 MEASUREMENT METHOD

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

3.1 SENSITIVITY

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

3.2 LINEARITY

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

3.3 ISOTROPY

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

3.4 BOUNDARY EFFECT

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

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

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

where

$SAR_{uncertainty}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest *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;
ΔSAR_{be}	in percent of SAR is the deviation between the measured SAR value, at the distance d_{be} from the boundary, and the analytical SAR value.

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

3.5 PROBE MODULATION RESPONSE

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

4 MEASUREMENT UNCERTAINTY

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

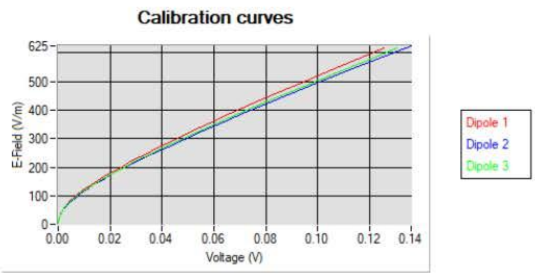
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-11% for the frequency range 150-450MHz.
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

5 CALIBRATION RESULTS

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

5.1 CALIBRATION IN AIR

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



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

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

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

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

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

5.2 CALIBRATION IN LIQUID

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

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

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

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

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

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

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

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

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

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