

CE SAR EVALUATION REPORT

**In accordance with the requirements of
EN50360, EN50566, EN62209-1/-2, EN62479 and COUNCIL
RECOMMENDATION 1999/519/EC**

Product Name : Smart phone

Trademark : Blackview

Model Name : BL9000

Family Model : BL9000 Pro

Report No. : S23101207203001

Prepared for

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TEST RESULT CERTIFICATION

Applicant's name.....: DOKE COMMUNICATION (HK) LIMITED
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Product description

Product name.....: Smart phone
Trademark.....: Blackview
Model and/or type reference : BL9000
Family Model.....: BL9000 Pro
EN 50360:2017;
EN 50566:2017;

Standards.....: EN 62209-1:2016;
EN 62209-2:2010;
EN 62479:2010;

This device described above has been tested by Shenzhen NTEK. In accordance with the measurement methods and procedures specified in EN62209. Testing has shown that this device is capable of compliance with localized specific absorption rate (SAR) specified in COUNCIL 1999/519/EC. 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 S231012072002

Date of Test

Date (s) of performance of tests Oct. 16, 2023 ~ Oct. 28, 2023

Date of Issue..... Dec. 10, 2023

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

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※ ※ Revision History ※ ※

REV.	DESCRIPTION	ISSUED DATE	REMARK
Rev.1.0	Initial Test Report Release	Dec. 10, 2023	Jack Li

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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	10.0	20.0

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

Whole-Body	Partial-Body	Hands, Wrists, Feet and Ankles
0.08	2.0	4.0

NOTE: **Whole-Body SAR** is averaged over the entire body, **partial-body SAR** is averaged over any 10 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

2.0 W/kg AND MEMBER LIMIT 4.0 W/kg

APPLIED TO THIS EUT

1.2. Statement of Compliance

The maximum results of Specific Absorption Rate (SAR) found during testing for BL9000 are as follows.

RF Exposure Conditions	Max SAR Value(W/kg)		
	10-g Head	10-g Body & Hotspot (Separation distance of 5mm)	10-g Member DAS (See note ³) (Separation distance of 0mm)
	0.464	0.719	1.477
Max Simultaneous Tx	1.243	1.808	3.985

NOTE: 1. The Max Simultaneous Tx is calculated based on the same configuration and test position.

2. This device is in compliance with Specific Absorption Rate (SAR) for general population / uncontrolled exposure limits (2.0 W/kg for head and body, 4.0 W/kg for member) specified in COUNCIL RECOMMENDATION 1999/519/EC, and had been tested in accordance with the measurement methods and procedures specified in EN 62209-1:2016 & EN 62209-2:2010.

3. The member DAS, It is only an assessment required by the ANFR (Sell to France).

1.3. EUT Description

Device Information	
Product Name	Smart phone
Trademark	Blackview
Model Name	BL9000
Family Model	BL9000 Pro
Model Difference	All models are the same circuit and RF module, except the back shell.
Device Phase	Identical Prototype
Exposure Category	General population / Uncontrolled environment
Antenna Type	PIFA Antenna
Battery Information	DC 7.82V, 4400mAh
Hardware version	V1300MB-A3
Software version	BL9000_EEA_V1300_V1.0
Device Operating Configurations	
Supporting Mode(s)	GSM 900/1800, WCDMA Band 1/8, LTE Band 1/3/7/8/20/28/34/38/40/41, NR SA n1/n3/n7/n8/n20/n28/n38/n40/n41/n77/n78, WLAN 2.4G/5G, Bluetooth, GPS,FM,NFC
Test Modulation	GSM(GMSK/8PSK), WCDMA(QPSK), LTE(QPSK/16-QAM), NR(DFT-s-OFDM:PI/2 BPSK/QPSK/16-QAM/64QAM/256QAM CP-OFDM:QPSK/16-QAM/64QAM/256QAM),WLAN(DSSS/OFDM), Bluetooth(GFSK, $\pi/4$ -DQPSK, 8DPSK) ,

	GPS(BPSK),FM(FM),NFC(ASK)		
Device Class	B		
Operating Frequency Range(s)	Band	Tx (MHz)	Rx (MHz)
	GSM 900	880-915	925-960
	GSM 1800	1710-1785	1805-1880
	WCDMA Band 1	1920-1980	2110-2170
	WCDMA Band 8	880-915	925-960
	LTE Band 1	1920-1980	2110-2170
	LTE Band 3	1710-1785	1805-1880
	LTE Band 7	2500-2570	2620-2690
	LTE Band 8	880- 915	925– 960
	LTE Band 20	832-862	791-821
	LTE Band 28	703-748	758-803
	LTE Band 34	2010-2025	
	LTE Band 38	2570-2620	
	LTE Band 40	2300-2400	
	LTE Band 41	2535-2655	
	NR n1	1920-1980	2110-2170
	NR n3	1710-1785	1805-1880
	NR n7	2500-2570	2620-2690
	NR n8	880-915	925-960
	NR n20	832-862	791-821
	NR n28	703-748	758-803
	NR n38	2570-2620	
	NR n40	2300-2400	
	NR n41	2496-2690	
	NR n77	3300-4200	
	NR n78	3300-3800	
	WLAN 2.4G	2412-2472	
	WLAN 5.2G	5180-5240	
	WLAN 5.8G	5745-5825	
	Bluetooth	2402-2480	
	NFC	13.56	
	FM	N/A	87.5-108
	GPS	N/A	1575.42
GPRS Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4
	Max Total Timeslot		5
EGPRS Multislot Class(12)	Max Number of Timeslots in Uplink		4
	Max Number of Timeslots in Downlink		4

	Max Total Timeslot	5
Power Class	4, tested with power level 5(GSM 900)	
	1, tested with power level 0(GSM 1800)	
	3, tested with power control "all 1"(WCDMA Band 1)	
	3, tested with power control "all 1"(WCDMA Band 8)	
	3, tested with power control all Max.(LTE Band 1)	
	3, tested with power control all Max.(LTE Band 3)	
	3, tested with power control all Max.(LTE Band 7)	
	3, tested with power control all Max.(LTE Band 8)	
	3, tested with power control all Max.(LTE Band 20)	
	3, tested with power control all Max.(LTE Band 28)	
	3, tested with power control all Max.(LTE Band 34)	
	3, tested with power control all Max.(LTE Band 38)	
	3, tested with power control all Max.(LTE Band 40)	
	3, tested with power control all Max.(LTE Band 41)	
	3, tested with power control all Max.(NR SA 1)	
	3, tested with power control all Max.(NR SA 3)	
	3, tested with power control all Max.(NR SA 7)	
	3, tested with power control all Max.(NR SA 8)	
	3, tested with power control all Max.(NR SA 20)	
	3, tested with power control all Max.(NR SA 28)	
	3, tested with power control all Max.(NR SA 38)	
	3, tested with power control all Max.(NR SA 40)	
	3, tested with power control all Max.(NR SA 41)	
	3, tested with power control all Max.(NR SA 77)	
	3, tested with power control all Max.(NR SA 78)	

1.4. Test specification(s)

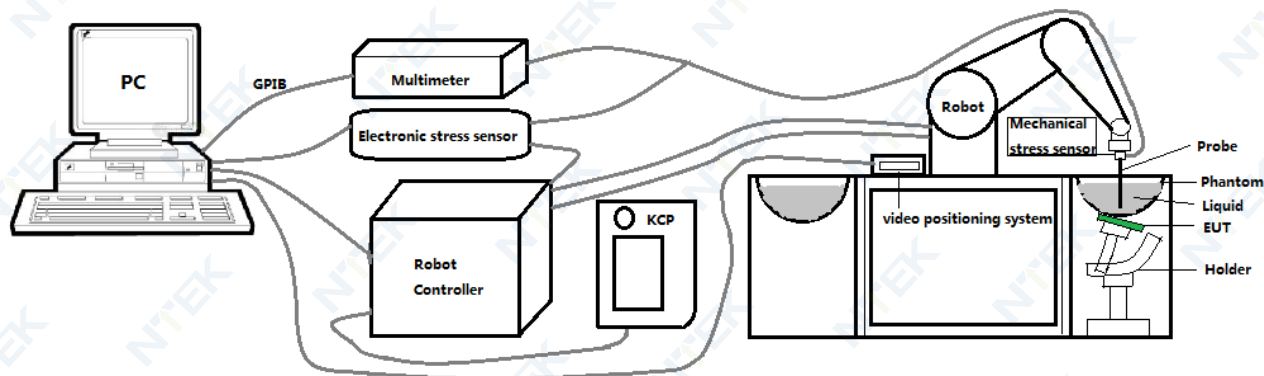
EN 50360:2017	Product standard to demonstrate the compliance of wireless communication devices, with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 300 MHz to 6 GHz: devices used next to the ear
EN 50566:2017	Product standard to demonstrate the compliance of wireless communication devices with the basic restrictions and exposure limit values related to human exposure to electromagnetic fields in the frequency range from 30 MHz to 6 GHz: hand-held and body mounted devices in close proximity to the human body
EN 62209-1:2016	Measurement procedure for the assessment of specific absorption rate of human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices - Part 1: Devices used next to the ear (Frequency range of 300 MHz to 6 GHz)
EN 62209-2:2010	Human exposure to radio frequency fields from hand-held and body-mounted wireless communication devices – Human models, instrumentation, and procedures –Part 2: Procedure to determine the Specific Absorption Rate (SAR) in the head and body for 30MHz to 6GHz Handheld and Body-Mounted Devices used in close proximity to the body
EN 62479:2010	Assessment of the compliance of low-power electronic and electrical equipment with the restrictions related to human exposure to electromagnetic fields(10 MHz to 300 GHz)

1.5. 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 3423-EPGO-426 with following specifications is used



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

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

2.3.1. E-Field Probe Calibration

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

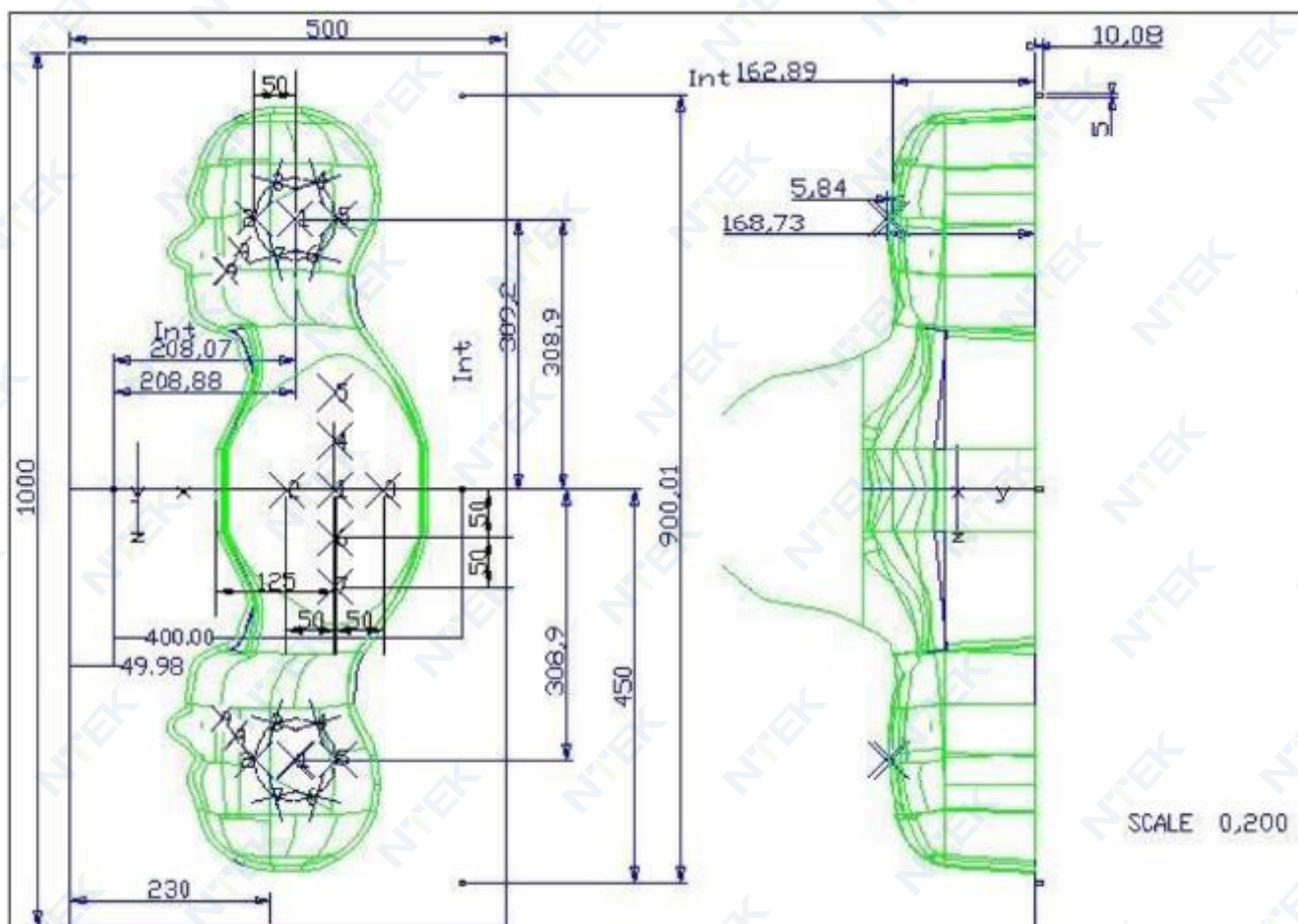
2.4. SAM phantoms

Photo of SAM phantom SN 16/15 SAM119



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

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

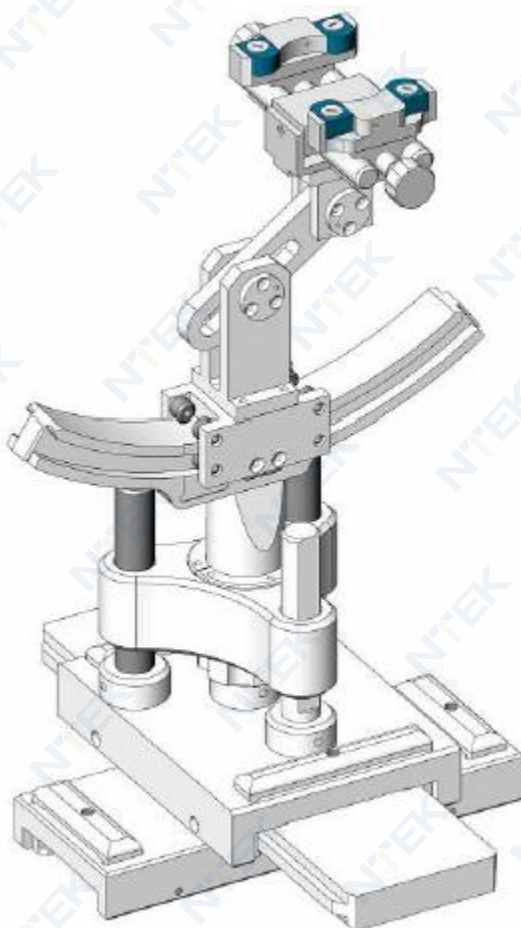


Serial Number	Left Head(mm)		Right Head(mm)		Flat Part(mm)	
SN 16/15 SAM119	2	2.02	2	2.08	1	2.09
	3	2.05	3	2.06	2	2.06
	4	2.07	4	2.07	3	2.08
	5	2.08	5	2.08	4	2.10
	6	2.05	6	2.07	5	2.10
	7	2.05	7	2.05	6	2.07
	8	2.07	8	2.06	7	2.07
	9	2.08	9	2.06	-	-

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	3423-EPGO-426	Sep. 18, 2023	Sep. 17, 2024
☒	MVG	750 MHz Dipole	SID750	SN 03/15 DIP 0G750-355	Mar. 01, 2021	Feb. 28, 2024
☐	MVG	835 MHz Dipole	SID835	SN 03/15 DIP 0G835-347	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	900 MHz Dipole	SID900	SN 03/15 DIP 0G900-348	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	1800 MHz Dipole	SID1800	SN 03/15 DIP 1G800-349	Mar. 01, 2021	Feb. 28, 2024
☐	MVG	1900 MHz Dipole	SID1900	SN 03/15 DIP 1G900-350	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	2000 MHz Dipole	SID2000	SN 03/15 DIP 2G000-351	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	2300 MHz Dipole	SID2300	SN 03/16 DIP 2G300-358	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	2450 MHz Dipole	SID2450	SN 03/15 DIP 2G450-352	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	2600 MHz Dipole	SID2600	SN 03/15 DIP 2G600-356	Mar. 01, 2021	Feb. 28, 2024
☒	MVG	3500 MHz Dipole	SID3500	SN 09/12 DIP 3G500-360	Oct. 15, 2022	Oct. 14, 2025
☒	MVG	3700 MHz Dipole	SID3700	SN 09/12 DIP 3G/700-361	Oct. 15 2022	Oct. 14 2025
☒	MVG	5000 MHz Dipole	SWG5500	SN 13/14 WGA 33	Mar. 01, 2021	Feb. 28, 2024
☒	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	CMU200	117858	May. 29, 2023	May. 28, 2024

		tester				
☒	R&S	Wideband radio communication tester	CMW500	103917	May. 29, 2023	May. 28, 2024
☒	HP	Network Analyzer	8753D	3410J01136	May. 29, 2023	May. 28, 2024
☒	Agilent	MXG Vector Signal Generator	N5182A	MY47070317	May. 29, 2023	May. 28, 2024
☒	Agilent	Power meter	E4419B	MY45102538	May. 29, 2023	May. 28, 2024
☒	Agilent	Power sensor	E9301A	MY41495644	May. 29, 2023	May. 28, 2024
☒	Agilent	Power sensor	E9301A	US39212148	May. 29, 2023	May. 28, 2024
☒	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

3. SAR Measurement Procedures

The measurement procedures are as follows:

- (a) Use base station simulator (if applicable) or engineering software to transmit RF power continuously (continuous Tx) in the middle channel.
- (b) Keep EUT to radiate maximum output power or 100% duty factor (if applicable)
- (c) Measure output power through RF cable and power meter.
- (d) Place the EUT in the positions as setup photos demonstrates.
- (e) Set scan area, grid size and other setting on the OPENSAR software.
- (f) Measure SAR transmitting at the middle channel for all applicable exposure positions.
- (g) Identify the exposure position and device configuration resulting the highest SAR
- (h) Measure SAR at the lowest and highest channels at the worst exposure position and device configuration.

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).

3.3. Description of interpolation/extrapolation scheme

The local SAR inside the phantom is measured using small dipole sensing elements inside a probe body. The probe tip must not be in contact with the phantom surface in order to minimise measurements errors, but the highest local SAR will occur at the surface of the phantom.

An extrapolation is using to determinate this highest local SAR values. The extrapolation is based on a fourth-order least-square polynomial fit of measured data. The local SAR value is then extrapolated from the liquid surface with a 1 mm step.

The measurements have to be performed over a limited time (due to the duration of the battery) so the step of measurement is high. It could vary between 5 and 8 mm. To obtain an accurate assessment of the maximum SAR averaged over 10 grams and 1 gram requires a very fine resolution in the three dimensional scanned data array.

3.4. Volumetric Scan

The volumetric scan consists to a full 3D scan over a specific area. This 3D scan is useful form multi Tx SAR measurement. Indeed, it is possible with OpenSAR to add, point by point, several volumetric scan to calculate the SAR value of the combined measurement as it is define in the standard IEEE1528 and IEC62209.

3.5. Power Drift

All SAR testing is under the EUT install full charged battery and transmit maximum output power. In OpenSAR measurement software, the power reference measurement and power drift measurement procedures are used for monitoring the power drift of EUT during SAR test. Both these procedures measure the field at a specified reference position before and after the SAR testing. The software will calculate the field difference in V/m. If the power drifts more than $\pm 5\%$, the SAR will be retested.

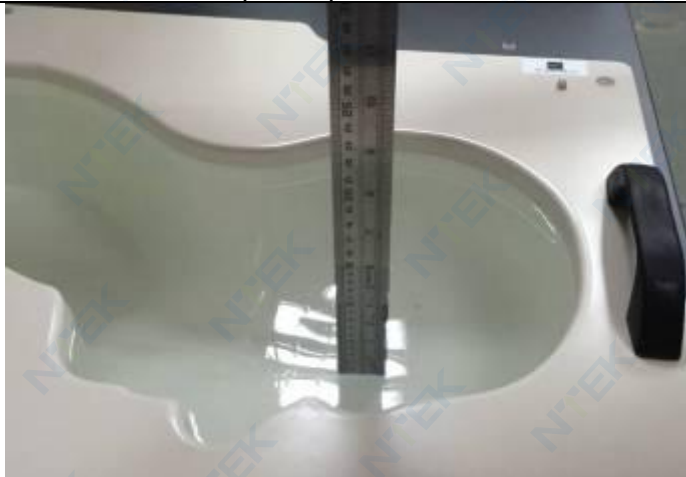
4. System Verification Procedure

4.1. Tissue Verification

The following tissue formulations are provided for reference only as some of the parameters have not been thoroughly verified. The composition of ingredients may be modified accordingly to achieve the desired target tissue parameters required for routine SAR evaluation.

Ingredients (% of weight)	Head Tissue								
Frequency Band (MHz)	750	835	900	1800	1900	2000	2450	2600	5000
Water	34.40	34.40	34.40	55.36	55.36	71.88	71.88	71.88	65.53
NaCl	0.79	0.79	0.79	0.35	0.35	0.16	0.16	0.16	0.00
1,2-Propanediol	64.81	64.81	64.81	0.00	0.00	0.00	0.00	0.00	0.00
Triton X-100	0.00	0.00	0.00	30.45	30.45	19.97	19.97	19.97	17.24
DGBE	0.00	0.00	0.00	13.84	13.84	7.99	7.99	7.99	0.00

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

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 if the dielectric parameters are within the tolerances of the specified target values. The measured conductivity and relative permittivity should be within $\pm 5\%$ of the target values.

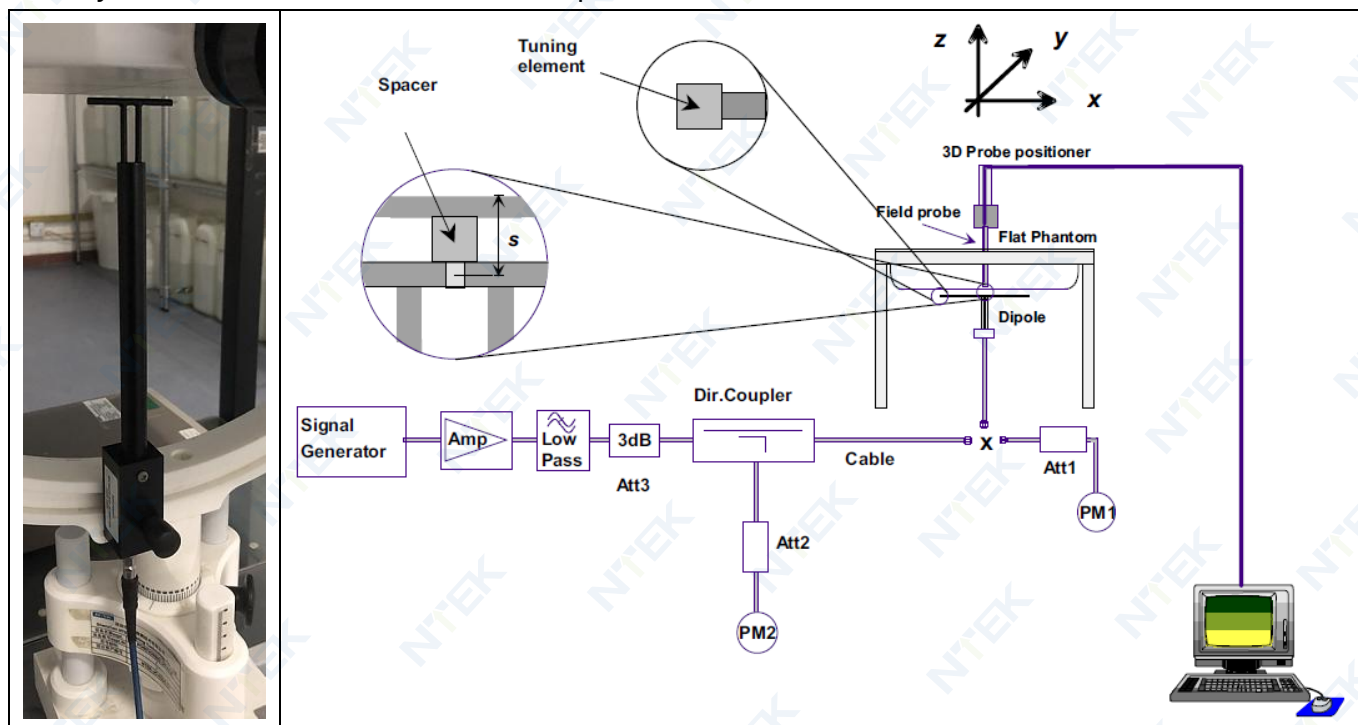
Tissue Type	Measured Frequency (MHz)	Target Tissue		Measured Tissue		Liquid Temp.	Test Date
		$\epsilon_r (\pm 5\%)$	σ (S/m) ($\pm 5\%$)	ϵ_r	σ (S/m)		
Head 750	750	41.96 (39.86~44.06)	0.89 (0.85~0.93)	42.33	0.93	21.5 °C	Oct. 26, 2023
Head 900	900	41.50 (39.43~43.58)	0.97 (0.92~1.02)	42.15	1.00	21.6 °C	Oct. 17, 2023
Head 1800	1800	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.37	1.37	21.7 °C	Oct. 18, 2023
Head 2000	2000	40.00 (38.00~42.00)	1.40 (1.33~1.47)	39.00	1.43	21.6 °C	Oct. 27, 2023
Head 2300	2300	39.47 (37.50~41.44)	1.66 (1.58~1.74)	39.84	1.63	21.7 °C	Oct. 25, 2023
Head 2450	2450	39.20 (37.24~41.16)	1.80 (1.71~1.89)	38.73	1.80	21.5 °C	Oct. 28, 2023
Head 2600	2600	39.01 (37.06~40.96)	1.96 (1.86~2.06)	38.72	1.93	21.4 °C	Oct. 16, 2023
Head 3500	3500	37.93 (36.04~39.82)	2.91 (2.77~3.05)	38.21	2.80	21.7 °C	Oct. 19, 2023
Head 3700	3700	37.70 (35.82~39.59)	3.12 (2.97~3.27)	37.55	3.06	21.8 °C	Oct. 20, 2023
Head 5200	5200	36.00 (34.20~37.80)	4.66 (4.43~4.89)	35.78	4.57	21.5 °C	Oct. 21, 2023
Head 5800	5800	35.30 (33.54~37.07)	5.27 (5.01~5.53)	35.18	5.14	21.9 °C	Oct. 22, 2023

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 $\pm 10\%$. Below table shows the target SAR and measured SAR after normalized to 1W input power. The table below indicates the system performance verification can meet the variation criterion and the plots can be referred to Appendix B of this report.

System Verification	Target SAR (1W) ($\pm 10\%$)		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)		
750MHz	8.53 (7.68~9.38)	5.56 (5.01~6.11)	8.00	5.23	21.5 °C	Oct. 26, 2023
900MHz	11.08 (9.98~12.18)	6.81 (6.13~7.49)	11.67	6.46	21.6 °C	Oct. 17, 2023
1800MHz	37.96 (34.17~41.75)	19.81 (17.83~21.79)	36.62	20.83	21.7 °C	Oct. 18, 2023
2000MHz	41.26 (37.14~45.38)	20.52 (18.47~22.57)	38.37	20.87	21.6 °C	Oct. 27, 2023
2300MHz	50.65 (45.59~55.71)	23.55 (21.20~25.90)	47.43	24.75	21.7 °C	Oct. 25, 2023
2450MHz	53.69 (48.33~59.05)	23.94 (21.55~26.33)	49.32	26.01	21.5 °C	Oct. 28, 2023
2600MHz	55.83 (50.25~61.41)	24.19 (21.78~26.60)	55.69	22.92	21.4 °C	Oct. 16, 2023
3500MHz	67.18 (60.47~73.89)	24.50 (22.05~26.95)	60.99	23.38	21.7 °C	Oct. 19, 2023
3700MHz	66.30 (59.67~72.93)	24.16 (22.96~26.57)	62.85	25.24	21.8 °C	Oct. 20, 2023
5200MHz	162.34 (146.11~178.57)	55.42 (49.88~60.96)	151.44	58.26	21.5 °C	Oct. 21, 2023
5800MHz	178.89 (161.01~196.77)	59.32 (53.39~65.25)	176.71	56.33	21.9 °C	Oct. 22, 2023

5. SAR Measurement Uncertainty

The following measurement uncertainty levels have been estimated for tests performed on the EUT as specified in IEEE 1528: 2003. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.

Uncertainty Component	Tol. (±%)	Prob. Dist.	Div.	Ci (1 g)	Ci (10 g)	1 g Ui (±%)	10 g Ui (±%)	Vi
Measurement System□								
Probe Calibration	5.8	N	1	1	1	5.80	5.80	∞
Axial Isotropy	3.5	R	√3	0.97	0.97	1.98	1.98	∞
Hemispherical Isotropy	5.9	R	√3	0.28	0.28	0.96	0.96	∞
Boundary Effect	1	R	√3	1	1	0.58	0.58	∞
Linearity	4.7	R	√3	1	1	2.71	2.71	∞
System Detection Limits	1	R	√3	1	1	0.58	0.58	∞
Modulation response	3	N	1	1	1	3.00	3.00	∞
Readout Electronics	0.5	N	1	1	1	0.50	0.50	∞
Response Time	0	R	√3	1	1	0.00	0.00	∞
Integration Time	1.4	R	√3	1	1	0.81	0.81	∞
RF Ambient Conditions - Noise	3	R	√3	1	1	1.73	1.73	∞
RF Ambient Conditions - Reflections	3	R	√3	1	1	1.73	1.73	∞
Probe Positioner Mechanical Tolerance	1.4	R	√3	1	1	0.81	0.81	∞
Probe Positioning with respect to Phantom Shell	1.4	R	√3	1	1	0.81	0.81	∞
Extrapolation, interpolation and Integration Algorithms for Max. SAR Evaluation	2.3	R	√3	1	1	1.33	1.33	∞
Test sample Related								
Test Sample Positioning	2.6	N	1	1	1	2.60	2.60	11
Device Holder Uncertainty	3	N	1	1	1	3.00	3.00	7
Output Power Variation - SAR drift measurement	5	R	√3	1	1	2.89	2.89	∞
SAR scaling	2	R	√3	1	1	1.15	1.15	∞
Phantom and Tissue Parameters□								
Phantom Uncertainty (shape and thickness tolerances)	4	R	√3	1	1	2.31	2.31	∞
Uncertainty in SAR correction for deviation (in permittivity and conductivity)	2	N	1	1	0.84	2.00	1.68	∞
Liquid Conductivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid conductivity - measurement uncertainty	1.59	N	1	0.23	0.26	0.37	0.41	99

Liquid permittivity (temperature uncertainty)	2.5	N	1	0.78	0.71	1.95	1.78	∞
Liquid permittivity - measurement uncertainty	1.65	N	1	0.23	0.26	0.38	0.43	99
Combined Standard Uncertainty		RSS				10.19	10.02	
Expanded Uncertainty (95% Confidence interval)		k				20.38	20.04	

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.

- 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.

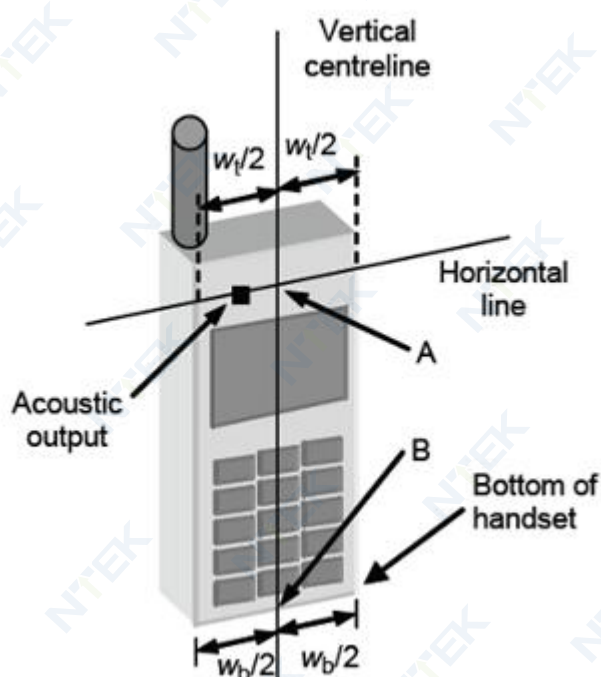


Fig 6.2.1 Handset vertical and horizontal reference lines—"fixed case"

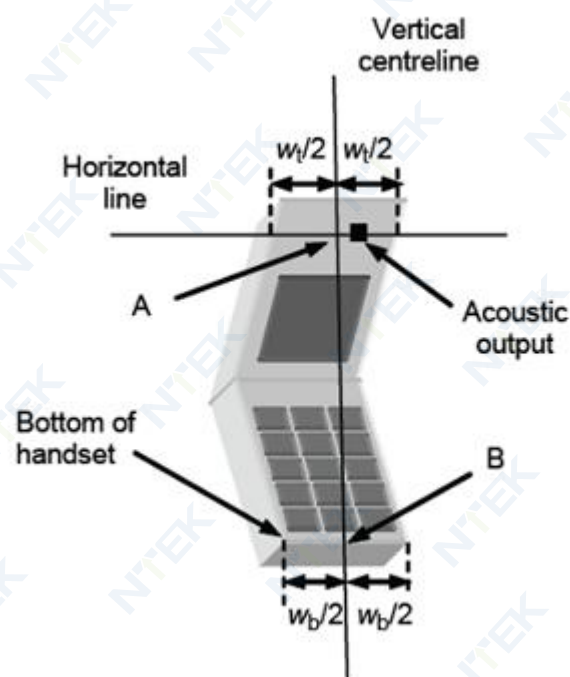


Fig 6.2.2 Handset vertical and horizontal reference lines—"clam-shell case"

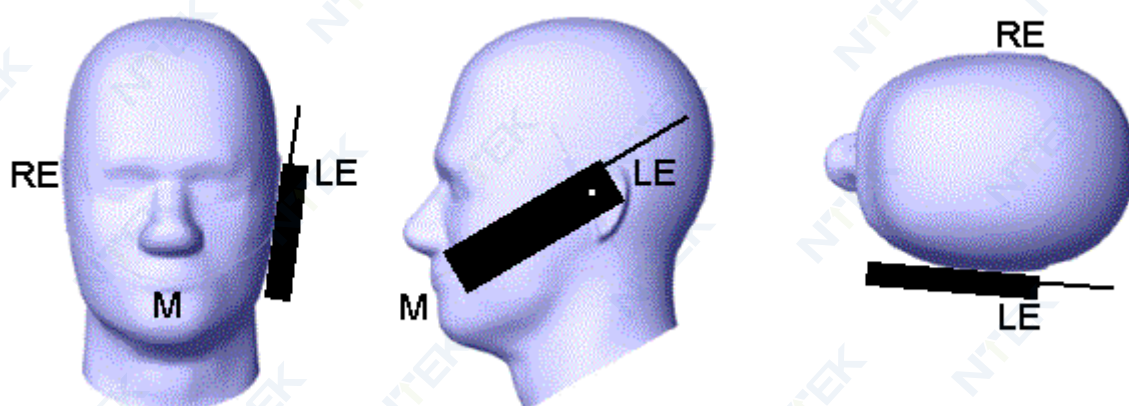


Fig 6.2.3 cheek or touch position. The reference points for the right ear (RE), left ear (LE), and mouth (M), which establish the Reference Plane for handset positioning, are indicated.

6.3. Definition of the tilt position

- While maintaining the orientation of the handset, retract the handset parallel to the reference plane

far enough away from the phantom to enable a rotation of the device by 15 degree.

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



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

6.4. Body-worn device

A typical example of a body-worn device is a mobile phone, wireless enabled PDA or other battery operated wireless device with the ability to transmit while mounted on a person's body using a carry accessory approved by the wireless device manufacturer. The device shall be positioned as intended at the distance to the outer surface of the phantom that corresponds to the specified distance (See figure 6.1). Adjust the distance between the device surface and the flat phantom to 5mm.

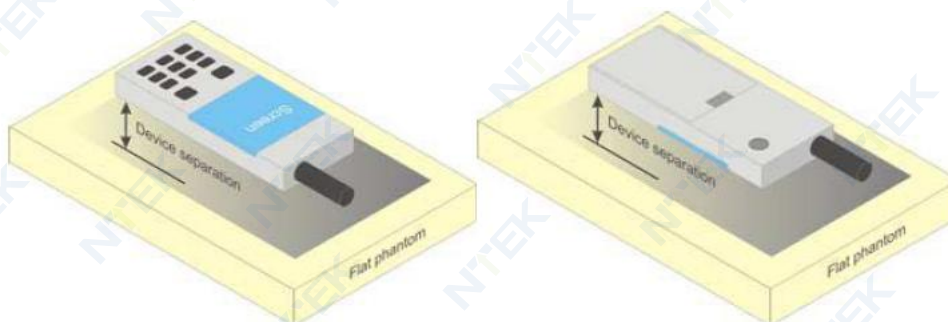


Figure 6.1 – Test positions for Body-worn device

7. RF Output Power

7.1. GSM Conducted Power

Band GSM900	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	975	38	124	Tune-up	975	38	124
Frequency (MHz)		880.2	897.6	914.8		880.2	897.6	914.8
GSM (GMSK)	34.00	33.47	33.66	33.73	24.97	24.44	24.63	24.70
GPRS(GMSK,1 Tx slot)	34.00	33.44	33.62	33.69	24.97	24.41	24.59	24.66
GPRS(GMSK,2 Tx slot)	33.50	32.79	33.01	33.05	27.48	26.77	26.99	27.03
GPRS(GMSK,3 Tx slot)	31.50	31.25	31.38	31.46	27.24	26.99	27.12	27.20
GPRS(GMSK,4 Tx slot)	30.50	30.01	30.13	30.21	27.49	27.00	27.12	27.20
EGPRS(8PSK,1 Tx slot)	28.50	27.96	28.14	28.21	19.47	18.93	19.11	19.18
EGPRS(8PSK,2 Tx slot)	28.00	27.47	27.61	27.65	21.98	21.45	21.59	21.63
EGPRS(8PSK,3 Tx slot)	25.00	24.77	24.90	24.96	20.74	20.51	20.64	20.70
EGPRS(8PSK,4 Tx slot)	24.00	23.41	23.52	23.57	20.99	20.40	20.51	20.56

Band GSM1800	Burst-Averaged output Power (dBm)				Frame-Averaged output Power (dBm)			
Tx Channel	Tune-up	512	698	885	Tune-up	512	698	885
Frequency (MHz)		1710.2	1747.4	1784.8		1710.2	1747.4	1784.8
GSM (GMSK)	31.50	31.27	31.25	31.47	22.47	22.24	22.22	22.44
GPRS(GMSK,1 Tx slot)	31.50	31.34	31.28	31.48	22.47	22.31	22.25	22.45
GPRS(GMSK,2 Tx slot)	31.00	30.74	30.74	30.87	24.98	24.72	24.72	24.85
GPRS(GMSK,3 Tx slot)	29.00	28.93	28.92	28.99	24.74	24.67	24.66	24.73
GPRS(GMSK,4 Tx slot)	28.00	27.91	27.89	27.89	24.99	24.90	24.88	24.88
EGPRS(8PSK,1 Tx slot)	29.00	28.63	28.22	28.08	19.97	19.60	19.19	19.05
EGPRS(8PSK,2 Tx slot)	28.50	28.09	27.66	27.59	22.48	22.07	21.64	21.57
EGPRS(8PSK,3 Tx slot)	27.50	27.14	26.73	26.66	23.24	22.88	22.47	22.40
EGPRS(8PSK,4 Tx slot)	27.00	26.60	26.16	26.05	23.99	23.59	23.15	23.04

Note: The frame-averaged power is linearly scaled the maximum burst averaged power over 8 time slots. The calculated method are shown as below:

Frame-averaged power = Maximum burst averaged power (1 Tx Slot) - 9.03 dB

Frame-averaged power = Maximum burst averaged power (2 Tx Slots) - 6.02 dB

Frame-averaged power = Maximum burst averaged power (3 Tx Slots) - 4.26 dB

Frame-averaged power = Maximum burst averaged power (4 Tx Slots) - 3.01 dB

7.2. WCDMA Conducted Power

WCDMA Band1	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	9612	9750	9888
Frequency (MHz)		1922.4	1950	1977.6
RMC12.2K	26.00	25.65	25.44	25.03
HSDPA Sub 1	25.50	25.10	24.72	24.24
HSDPA Sub 2	24.50	24.25	24.19	23.56
HSDPA Sub 3	24.00	23.54	22.92	23.09
HSDPA Sub 4	23.50	23.37	23.32	22.37
HSUPA Sub 1	25.00	24.78	24.47	24.00
HSUPA Sub 2	25.50	25.02	24.51	24.10
HSUPA Sub 3	24.00	23.87	23.12	22.78
HSUPA Sub 4	25.50	25.03	24.71	24.22
HSUPA Sub 5	24.50	24.49	24.08	23.40
WCDMA Band 8	Burst-Averaged output Power (dBm)			
Tx Channel	Tune-up (dBm)	2712	2788	2863
Frequency (MHz)		882.4	897.6	912.6
RMC12.2K	24.50	24.11	24.17	24.10
HSDPA Sub 1	23.50	23.33	23.37	23.29
HSDPA Sub 2	23.00	22.90	22.88	22.74
HSDPA Sub 3	22.00	21.65	21.85	21.79
HSDPA Sub 4	22.50	22.20	21.61	21.22
HSUPA Sub 1	23.50	22.23	23.21	23.15
HSUPA Sub 2	23.50	23.28	23.35	23.14
HSUPA Sub 3	22.50	21.44	22.22	22.19
HSUPA Sub 4	23.50	23.30	23.37	23.27
HSUPA Sub 5	23.00	21.90	22.43	22.56

7.3. LTE Conducted Power

Band	Bandwidth (MHz)	UL Channel	RB Size	RB Position	Modulation	Tune-up	Power (dBm)
Band1	5	18025	1	#0	QPSK	25.00	24.78
Band1	5	18025	8	#0	QPSK	25.00	24.78
Band1	5	18025	25	#0	QPSK	25.00	23.73
Band1	5	18300	1	#0	QPSK	25.00	24.33
Band1	5	18300	8	#0	QPSK	25.00	24.27
Band1	5	18300	25	#0	QPSK	25.00	23.22
Band1	5	18575	1	#0	QPSK	25.00	23.60
Band1	5	18575	8	#0	QPSK	25.00	23.61
Band1	5	18575	25	#0	QPSK	25.00	22.52
Band1	20	18100	1	#0	QPSK	25.00	24.66
Band1	20	18100	18	#0	QPSK	25.00	24.63
Band1	20	18100	100	#0	QPSK	25.00	23.56
Band1	20	18300	1	#0	QPSK	25.00	24.31
Band1	20	18300	18	#0	QPSK	25.00	24.34
Band1	20	18300	100	#0	QPSK	25.00	23.28
Band1	20	18500	1	#0	QPSK	25.00	23.83
Band1	20	18500	18	#0	QPSK	25.00	23.80
Band1	20	18500	100	#0	QPSK	25.00	22.59
Band20	5	24175	1	#0	QPSK	23.50	23.28
Band20	5	24175	8	#0	QPSK	23.50	23.27
Band20	5	24175	25	#0	QPSK	23.50	22.24
Band20	5	24300	1	#0	QPSK	23.50	23.17
Band20	5	24300	8	#0	QPSK	23.50	23.18
Band20	5	24300	25	#0	QPSK	23.50	22.13
Band20	5	24425	1	#0	QPSK	23.50	23.38
Band20	5	24425	8	#0	QPSK	23.50	23.42
Band20	5	24425	25	#0	QPSK	23.50	22.39
Band20	20	24250	1	#0	QPSK	23.50	23.18
Band20	20	24250	18	#0	QPSK	23.50	23.25
Band20	20	24250	100	#0	QPSK	23.50	22.16
Band20	20	24300	1	#0	QPSK	23.50	23.27
Band20	20	24300	18	#0	QPSK	23.50	23.17
Band20	20	24300	100	#0	QPSK	23.50	22.06
Band20	20	24350	1	#0	QPSK	23.50	23.12

Band20	20	24350	18	#0	QPSK	23.50	23.11
Band20	20	24350	100	#0	QPSK	23.50	22.30
Band28	3	27225	1	#0	QPSK	23.50	23.28
Band28	3	27225	4	#0	QPSK	23.50	23.27
Band28	3	27225	15	#0	QPSK	23.50	22.20
Band28	3	27360	1	#0	QPSK	23.50	23.30
Band28	3	27360	4	#0	QPSK	23.50	23.31
Band28	3	27360	15	#0	QPSK	23.50	22.29
Band28	3	27495	1	#0	QPSK	23.50	23.41
Band28	3	27495	4	#0	QPSK	23.50	23.40
Band28	3	27495	15	#0	QPSK	23.50	22.42
Band28	5	27235	1	#0	QPSK	23.50	23.32
Band28	5	27235	8	#0	QPSK	23.50	23.29
Band28	5	27235	25	#0	QPSK	23.50	22.20
Band28	5	27385	1	#0	QPSK	23.50	23.41
Band28	5	27385	8	#0	QPSK	23.50	23.42
Band28	5	27385	25	#0	QPSK	23.50	22.39
Band28	5	27635	1	#0	QPSK	23.50	23.31
Band28	5	27635	8	#0	QPSK	23.50	23.34
Band28	5	27635	25	#0	QPSK	23.50	22.26
Band28	20	27310	1	#0	QPSK	23.50	23.23
Band28	20	27310	18	#0	QPSK	23.50	23.19
Band28	20	27310	100	#0	QPSK	23.50	22.14
Band28	20	27460	1	#0	QPSK	23.50	23.33
Band28	20	27460	18	#0	QPSK	23.50	23.36
Band28	20	27460	100	#0	QPSK	23.50	22.41
Band28	20	27560	1	#0	QPSK	23.50	23.45
Band28	20	27560	18	#0	QPSK	23.50	23.44
Band28	20	27560	100	#0	QPSK	23.50	22.26
Band3	1.4	19207	1	#0	QPSK	24.00	23.84
Band3	1.4	19207	5	#0	QPSK	24.00	23.88
Band3	1.4	19207	6	#0	QPSK	24.00	22.82
Band3	1.4	19575	1	#0	QPSK	24.00	22.88
Band3	1.4	19575	5	#0	QPSK	24.00	22.86
Band3	1.4	19575	6	#0	QPSK	24.00	21.85
Band3	1.4	19943	1	#0	QPSK	24.00	23.00
Band3	1.4	19943	5	#0	QPSK	24.00	23.09
Band3	1.4	19943	6	#0	QPSK	24.00	22.06
Band3	5	19225	1	#0	QPSK	24.00	23.89

Band3	5	19225	8	#0	QPSK	24.00	23.85
Band3	5	19225	25	#0	QPSK	24.00	22.81
Band3	5	19575	1	#0	QPSK	24.00	22.95
Band3	5	19575	8	#0	QPSK	24.00	22.97
Band3	5	19575	25	#0	QPSK	24.00	21.88
Band3	5	19925	1	#0	QPSK	24.00	23.00
Band3	5	19925	8	#0	QPSK	24.00	23.01
Band3	5	19925	25	#0	QPSK	24.00	22.07
Band3	20	19300	1	#0	QPSK	24.00	23.72
Band3	20	19300	18	#0	QPSK	24.00	23.65
Band3	20	19300	100	#0	QPSK	24.00	22.47
Band3	20	19575	1	#0	QPSK	24.00	22.93
Band3	20	19575	18	#0	QPSK	24.00	22.93
Band3	20	19575	100	#0	QPSK	24.00	21.85
Band3	20	19850	1	#0	QPSK	24.00	22.77
Band3	20	19850	18	#0	QPSK	24.00	22.71
Band3	20	19850	100	#0	QPSK	24.00	21.78
Band34	5	36225	1	#0	QPSK	24.50	22.41
Band34	5	36225	8	#0	QPSK	24.50	22.69
Band34	5	36225	25	#0	QPSK	24.50	21.93
Band34	5	36275	1	#0	QPSK	24.50	24.12
Band34	5	36275	8	#0	QPSK	24.50	23.38
Band34	5	36275	25	#0	QPSK	24.50	22.56
Band34	5	36325	1	#0	QPSK	24.50	22.42
Band34	5	36325	8	#0	QPSK	24.50	23.03
Band34	5	36325	25	#0	QPSK	24.50	22.25
Band34	15	36275	1	#0	QPSK	24.50	22.65
Band34	15	36275	16	#0	QPSK	24.50	22.94
Band34	15	36275	75	#0	QPSK	24.50	23.00
Band38	5	37775	1	#0	QPSK	24.50	24.30
Band38	5	37775	8	#0	QPSK	24.50	24.25
Band38	5	37775	25	#0	QPSK	24.50	23.13
Band38	5	38000	1	#0	QPSK	24.50	24.38
Band38	5	38000	8	#0	QPSK	24.50	24.40
Band38	5	38000	25	#0	QPSK	24.50	23.32
Band38	5	38225	1	#0	QPSK	24.50	22.63
Band38	5	38225	8	#0	QPSK	24.50	23.46
Band38	5	38225	25	#0	QPSK	24.50	21.93
Band38	20	37850	1	#0	QPSK	24.50	23.26

Band38	20	37850	18	#0	QPSK	24.50	22.95
Band38	20	37850	100	#0	QPSK	24.50	23.06
Band38	20	38000	1	#0	QPSK	24.50	24.13
Band38	20	38000	18	#0	QPSK	24.50	24.13
Band38	20	38000	100	#0	QPSK	24.50	23.22
Band38	20	38150	1	#0	QPSK	24.50	24.22
Band38	20	38150	18	#0	QPSK	24.50	24.14
Band38	20	38150	100	#0	QPSK	24.50	23.00
Band40	5	38675	1	#0	QPSK	22.50	22.28
Band40	5	38675	8	#0	QPSK	22.50	22.29
Band40	5	38675	25	#0	QPSK	22.50	21.23
Band40	5	39150	1	#0	QPSK	22.50	22.08
Band40	5	39150	8	#0	QPSK	22.50	22.10
Band40	5	39150	25	#0	QPSK	22.50	21.06
Band40	5	39625	1	#0	QPSK	22.50	22.27
Band40	5	39625	8	#0	QPSK	22.50	22.29
Band40	5	39625	25	#0	QPSK	22.50	21.12
Band40	20	38750	1	#0	QPSK	22.50	22.21
Band40	20	38750	18	#0	QPSK	22.50	22.22
Band40	20	38750	100	#0	QPSK	22.50	21.19
Band40	20	39150	1	#0	QPSK	22.50	21.82
Band40	20	39150	18	#0	QPSK	22.50	21.84
Band40	20	39150	100	#0	QPSK	22.50	21.06
Band40	20	39550	1	#0	QPSK	22.50	22.43
Band40	20	39550	18	#0	QPSK	22.50	22.49
Band40	20	39550	100	#0	QPSK	22.50	21.44
Band41	5	39675	1	#0	QPSK	25.00	23.36
Band41	5	39675	8	#0	QPSK	25.00	23.35
Band41	5	39675	25	#0	QPSK	25.00	22.29
Band41	5	40620	1	#0	QPSK	25.00	24.78
Band41	5	40620	8	#0	QPSK	25.00	24.80
Band41	5	40620	25	#0	QPSK	25.00	23.77
Band41	5	41565	1	#0	QPSK	25.00	24.50
Band41	5	41565	8	#0	QPSK	25.00	24.45
Band41	5	41565	25	#0	QPSK	25.00	23.38
Band41	20	39750	1	#0	QPSK	25.00	23.22
Band41	20	39750	18	#0	QPSK	25.00	23.16
Band41	20	39750	100	#0	QPSK	25.00	22.28
Band41	20	40620	1	#0	QPSK	25.00	24.42

Band41	20	40620	18	#0	QPSK	25.00	24.47
Band41	20	40620	100	#0	QPSK	25.00	23.67
Band41	20	41490	1	#0	QPSK	25.00	24.44
Band41	20	41490	18	#0	QPSK	25.00	24.38
Band41	20	41490	100	#0	QPSK	25.00	23.39
Band7	5	20775	1	#0	QPSK	24.50	23.30
Band7	5	20775	8	#0	QPSK	24.50	23.30
Band7	5	20775	25	#0	QPSK	24.50	22.33
Band7	5	21100	1	#0	QPSK	24.50	23.53
Band7	5	21100	8	#0	QPSK	24.50	23.55
Band7	5	21100	25	#0	QPSK	24.50	22.61
Band7	5	21425	1	#0	QPSK	24.50	24.27
Band7	5	21425	8	#0	QPSK	24.50	24.30
Band7	5	21425	25	#0	QPSK	24.50	23.32
Band7	20	20850	1	#0	QPSK	24.50	23.20
Band7	20	20850	18	#0	QPSK	24.50	23.14
Band7	20	20850	100	#0	QPSK	24.50	22.24
Band7	20	21100	1	#0	QPSK	24.50	23.22
Band7	20	21100	18	#0	QPSK	24.50	23.27
Band7	20	21100	100	#0	QPSK	24.50	22.51
Band7	20	21350	1	#0	QPSK	24.50	23.65
Band7	20	21350	18	#0	QPSK	24.50	23.67
Band7	20	21350	100	#0	QPSK	24.50	22.98
Band8	1.4	21457	1	#0	QPSK	23.50	23.13
Band8	1.4	21457	5	#0	QPSK	23.50	23.17
Band8	1.4	21457	6	#0	QPSK	23.50	22.16
Band8	1.4	21625	1	#0	QPSK	23.50	23.27
Band8	1.4	21625	5	#0	QPSK	23.50	23.27
Band8	1.4	21625	6	#0	QPSK	23.50	22.27
Band8	1.4	21793	1	#0	QPSK	23.50	23.23
Band8	1.4	21793	5	#0	QPSK	23.50	23.32
Band8	1.4	21793	6	#0	QPSK	23.50	22.30
Band8	5	21475	1	#0	QPSK	23.50	23.17
Band8	5	21475	8	#0	QPSK	23.50	23.22
Band8	5	21475	25	#0	QPSK	23.50	22.20
Band8	5	21625	1	#0	QPSK	23.50	23.33
Band8	5	21625	8	#0	QPSK	23.50	23.36
Band8	5	21625	25	#0	QPSK	23.50	22.25
Band8	5	21775	1	#0	QPSK	23.50	23.27

Band8	5	21775	8	#0	QPSK	23.50	23.31
Band8	5	21775	25	#0	QPSK	23.50	22.25
Band8	10	21500	1	#0	QPSK	23.50	23.16
Band8	10	21500	12	#0	QPSK	23.50	23.21
Band8	10	21500	50	#0	QPSK	23.50	22.39
Band8	10	21625	1	#0	QPSK	23.50	23.33
Band8	10	21625	12	#0	QPSK	23.50	23.31
Band8	10	21625	50	#0	QPSK	23.50	22.28
Band8	10	21750	1	#0	QPSK	23.50	23.22
Band8	10	21750	12	#0	QPSK	23.50	23.20
Band8	10	21750	50	#0	QPSK	23.50	22.18

7.4. NR Output Power

Band	SCS (kHz)	Bandwidth (MHz)	UL Channel	RB Allocation	Modulation	Tune-up	Power (dBm)
n1	30	20	390000	25@12	DFT_BPSK	23.00	22.63
n1	30	20	390000	1@1	DFT_BPSK	23.00	22.00
n1	30	20	390000	1@49	DFT_BPSK	23.00	22.58
n1	30	20	390000	25@12	DFT_QPSK	23.00	22.69
n1	30	20	390000	1@1	DFT_QPSK	23.00	22.67
n1	30	20	390000	1@49	DFT_QPSK	23.00	22.41
n3	30	10	343000	12@6	DFT_BPSK	24.50	24.24
n3	30	10	343000	1@1	DFT_BPSK	24.50	24.34
n3	30	10	343000	1@22	DFT_BPSK	24.50	24.01
n3	30	10	343000	12@6	DFT_QPSK	24.50	24.38
n3	30	10	343000	1@1	DFT_QPSK	24.50	24.43
n3	30	10	343000	1@22	DFT_QPSK	24.50	24.38
n3	30	10	349500	12@6	DFT_BPSK	24.50	23.68
n3	30	10	349500	1@1	DFT_BPSK	24.50	23.77
n3	30	10	349500	1@22	DFT_BPSK	24.50	23.14
n3	30	10	349500	12@6	DFT_QPSK	24.50	23.68
n3	30	10	349500	1@1	DFT_QPSK	24.50	23.59
n3	30	10	349500	1@22	DFT_QPSK	24.50	23.47
n3	30	10	356000	12@6	DFT_BPSK	24.50	22.79
n3	30	10	356000	1@1	DFT_BPSK	24.50	23.13
n3	30	10	356000	1@22	DFT_BPSK	24.50	22.84
n3	30	10	356000	12@6	DFT_QPSK	24.50	23.01
n3	30	10	356000	1@1	DFT_QPSK	24.50	22.99

n3	30	10	356000	1@22	DFT_QPSK	24.50	23.30
n3	30	20	344000	25@12	DFT_BPSK	24.50	24.39
n3	30	20	344000	1@1	DFT_BPSK	24.50	24.21
n3	30	20	344000	1@49	DFT_BPSK	24.50	23.83
n3	30	20	344000	25@12	DFT_QPSK	24.50	24.46
n3	30	20	344000	1@1	DFT_QPSK	24.50	24.07
n3	30	20	344000	1@49	DFT_QPSK	24.50	23.68
n3	30	20	349500	25@12	DFT_BPSK	24.50	23.53
n3	30	20	349500	1@1	DFT_BPSK	24.50	23.83
n3	30	20	349500	1@49	DFT_BPSK	24.50	22.87
n3	30	20	349500	25@12	DFT_QPSK	24.50	23.59
n3	30	20	349500	1@1	DFT_QPSK	24.50	23.81
n3	30	20	349500	1@49	DFT_QPSK	24.50	23.12
n3	30	20	355000	25@12	DFT_BPSK	24.50	23.06
n3	30	20	355000	1@1	DFT_BPSK	24.50	22.99
n3	30	20	355000	1@49	DFT_BPSK	24.50	22.56
n3	30	20	355000	25@12	DFT_QPSK	24.50	22.95
n3	30	20	355000	1@1	DFT_QPSK	24.50	22.87
n3	30	20	355000	1@49	DFT_QPSK	24.50	23.19
n3	30	30	345000	36@18	DFT_BPSK	24.50	24.17
n3	30	30	345000	1@1	DFT_BPSK	24.50	24.13
n3	30	30	345000	1@76	DFT_BPSK	24.50	23.59
n3	30	30	345000	36@18	DFT_QPSK	24.50	24.24
n3	30	30	345000	1@1	DFT_QPSK	24.50	24.40
n3	30	30	345000	1@76	DFT_QPSK	24.50	23.72
n3	30	30	349500	36@18	DFT_BPSK	24.50	23.55
n3	30	30	349500	1@1	DFT_BPSK	24.50	23.69
n3	30	30	349500	1@76	DFT_BPSK	24.50	22.94
n3	30	30	349500	36@18	DFT_QPSK	24.50	23.61
n3	30	30	349500	1@1	DFT_QPSK	24.50	23.62
n3	30	30	349500	1@76	DFT_QPSK	24.50	23.04
n3	30	30	354000	36@18	DFT_BPSK	24.50	23.19
n3	30	30	354000	1@1	DFT_BPSK	24.50	22.89
n3	30	30	354000	1@76	DFT_BPSK	24.50	22.41
n3	30	30	354000	36@18	DFT_QPSK	24.50	22.91
n3	30	30	354000	1@1	DFT_QPSK	24.50	23.22
n3	30	30	354000	1@76	DFT_QPSK	24.50	22.97
n7	15	5	500500	12@6	DFT_BPSK	25.00	24.38
n7	15	5	500500	1@1	DFT_BPSK	25.00	24.47

n7	15	5	500500	1@23	DFT_BPSK	25.00	24.55
n7	15	5	500500	12@6	DFT_QPSK	25.00	24.39
n7	15	5	500500	1@1	DFT_QPSK	25.00	24.63
n7	15	5	500500	1@23	DFT_QPSK	25.00	24.68
n7	15	5	507000	12@6	DFT_BPSK	25.00	24.43
n7	15	5	507000	1@1	DFT_BPSK	25.00	24.48
n7	15	5	507000	1@23	DFT_BPSK	25.00	24.47
n7	15	5	507000	12@6	DFT_QPSK	25.00	24.46
n7	15	5	507000	1@1	DFT_QPSK	25.00	24.60
n7	15	5	507000	1@23	DFT_QPSK	25.00	24.55
n7	15	5	513500	12@6	DFT_BPSK	25.00	24.39
n7	15	5	513500	1@1	DFT_BPSK	25.00	24.46
n7	15	5	513500	1@23	DFT_BPSK	25.00	24.50
n7	15	5	513500	12@6	DFT_QPSK	25.00	24.47
n7	15	5	513500	1@1	DFT_QPSK	25.00	24.54
n7	15	5	513500	1@23	DFT_QPSK	25.00	24.57
n7	15	15	501500	36@18	DFT_BPSK	25.00	24.39
n7	15	15	501500	1@1	DFT_BPSK	25.00	24.29
n7	15	15	501500	1@77	DFT_BPSK	25.00	24.30
n7	15	15	501500	36@18	DFT_QPSK	25.00	24.44
n7	15	15	501500	1@1	DFT_QPSK	25.00	24.40
n7	15	15	501500	1@77	DFT_QPSK	25.00	24.47
n7	15	15	507000	36@18	DFT_BPSK	25.00	24.42
n7	15	15	507000	1@1	DFT_BPSK	25.00	24.33
n7	15	15	507000	1@77	DFT_BPSK	25.00	24.33
n7	15	15	507000	36@18	DFT_QPSK	25.00	24.46
n7	15	15	507000	1@1	DFT_QPSK	25.00	24.42
n7	15	15	507000	1@77	DFT_QPSK	25.00	24.41
n7	15	15	512500	36@18	DFT_BPSK	25.00	24.40
n7	15	15	512500	1@1	DFT_BPSK	25.00	24.15
n7	15	15	512500	1@77	DFT_BPSK	25.00	24.40
n7	15	15	512500	36@18	DFT_QPSK	25.00	24.40
n7	15	15	512500	1@1	DFT_QPSK	25.00	24.23
n7	15	15	512500	1@77	DFT_QPSK	25.00	24.52
n7	15	20	502000	50@25	DFT_BPSK	25.00	24.44
n7	15	20	502000	1@1	DFT_BPSK	25.00	24.30
n7	15	20	502000	1@104	DFT_BPSK	25.00	24.44
n7	15	20	502000	50@25	DFT_QPSK	25.00	24.44
n7	15	20	502000	1@1	DFT_QPSK	25.00	24.60

n7	15	20	502000	1@104	DFT_QPSK	25.00	24.56
n7	15	20	507000	50@25	DFT_BPSK	25.00	24.41
n7	15	20	507000	1@1	DFT_BPSK	25.00	24.44
n7	15	20	507000	1@104	DFT_BPSK	25.00	24.35
n7	15	20	507000	50@25	DFT_QPSK	25.00	24.44
n7	15	20	507000	1@1	DFT_QPSK	25.00	24.53
n7	15	20	507000	1@104	DFT_QPSK	25.00	24.43
n7	15	20	512000	50@25	DFT_BPSK	25.00	24.35
n7	15	20	512000	1@1	DFT_BPSK	25.00	24.33
n7	15	20	512000	1@104	DFT_BPSK	25.00	24.54
n7	15	20	512000	50@25	DFT_QPSK	25.00	24.39
n7	15	20	512000	1@1	DFT_QPSK	25.00	24.40
n7	15	20	512000	1@104	DFT_QPSK	25.00	24.73
n20	30	10	167400	12@6	DFT_BPSK	24.50	23.13
n20	30	10	167400	1@1	DFT_BPSK	24.50	23.27
n20	30	10	167400	1@22	DFT_BPSK	24.50	23.51
n20	30	10	167400	12@6	DFT_QPSK	24.50	23.20
n20	30	10	167400	1@1	DFT_QPSK	24.50	23.30
n20	30	10	167400	1@22	DFT_QPSK	24.50	23.45
n20	30	10	169400	12@6	DFT_BPSK	24.50	24.01
n20	30	10	169400	1@1	DFT_BPSK	24.50	23.73
n20	30	10	169400	1@22	DFT_BPSK	24.50	23.99
n20	30	10	169400	12@6	DFT_QPSK	24.50	23.89
n20	30	10	169400	1@1	DFT_QPSK	24.50	23.89
n20	30	10	169400	1@22	DFT_QPSK	24.50	23.84
n20	30	10	171400	12@6	DFT_BPSK	24.50	23.63
n20	30	10	171400	1@1	DFT_BPSK	24.50	23.90
n20	30	10	171400	1@22	DFT_BPSK	24.50	23.35
n20	30	10	171400	12@6	DFT_QPSK	24.50	23.57
n20	30	10	171400	1@1	DFT_QPSK	24.50	23.99
n20	30	10	171400	1@22	DFT_QPSK	24.50	23.46
n20	30	15	167900	18@9	DFT_BPSK	24.50	23.29
n20	30	15	167900	1@1	DFT_BPSK	24.50	22.97
n20	30	15	167900	1@36	DFT_BPSK	24.50	23.77
n20	30	15	167900	18@9	DFT_QPSK	24.50	23.32
n20	30	15	167900	1@1	DFT_QPSK	24.50	23.21
n20	30	15	167900	1@36	DFT_QPSK	24.50	23.62
n20	30	15	169400	18@9	DFT_BPSK	24.50	23.67
n20	30	15	169400	1@1	DFT_BPSK	24.50	23.44

n20	30	15	169400	1@36	DFT_BPSK	24.50	23.65
n20	30	15	169400	18@9	DFT_QPSK	24.50	23.68
n20	30	15	169400	1@1	DFT_QPSK	24.50	23.46
n20	30	15	169400	1@36	DFT_QPSK	24.50	23.76
n20	30	15	170900	18@9	DFT_BPSK	24.50	23.70
n20	30	15	170900	1@1	DFT_BPSK	24.50	23.94
n20	30	15	170900	1@36	DFT_BPSK	24.50	23.55
n20	30	15	170900	18@9	DFT_QPSK	24.50	23.70
n20	30	15	170900	1@1	DFT_QPSK	24.50	23.70
n20	30	15	170900	1@36	DFT_QPSK	24.50	23.35
n20	30	20	168400	25@12	DFT_BPSK	24.50	23.61
n20	30	20	168400	1@1	DFT_BPSK	24.50	23.19
n20	30	20	168400	1@49	DFT_BPSK	24.50	23.67
n20	30	20	168400	25@12	DFT_QPSK	24.50	23.48
n20	30	20	168400	1@1	DFT_QPSK	24.50	23.15
n20	30	20	168400	1@49	DFT_QPSK	24.50	23.68
n20	30	20	169400	25@12	DFT_BPSK	24.50	23.94
n20	30	20	169400	1@1	DFT_BPSK	24.50	23.16
n20	30	20	169400	1@49	DFT_BPSK	24.50	23.77
n20	30	20	169400	25@12	DFT_QPSK	24.50	23.94
n20	30	20	169400	1@1	DFT_QPSK	24.50	23.40
n20	30	20	169400	1@49	DFT_QPSK	24.50	23.58
n20	30	20	170400	25@12	DFT_BPSK	24.50	23.99
n20	30	20	170400	1@1	DFT_BPSK	24.50	23.45
n20	30	20	170400	1@49	DFT_BPSK	24.50	23.57
n20	30	20	170400	25@12	DFT_QPSK	24.50	23.97
n20	30	20	170400	1@1	DFT_QPSK	24.50	23.50
n20	30	20	170400	1@49	DFT_QPSK	24.50	23.55
n28	30	10	141600	12@6	DFT_BPSK	24.50	23.64
n28	30	10	141600	1@1	DFT_BPSK	24.50	23.88
n28	30	10	141600	1@22	DFT_BPSK	24.50	23.62
n28	30	10	141600	12@6	DFT_QPSK	24.50	23.91
n28	30	10	141600	1@1	DFT_QPSK	24.50	23.90
n28	30	10	141600	1@22	DFT_QPSK	24.50	23.53
n28	30	10	145100	12@6	DFT_BPSK	24.50	23.62
n28	30	10	145100	1@1	DFT_BPSK	24.50	23.97
n28	30	10	145100	1@22	DFT_BPSK	24.50	23.41
n28	30	10	145100	12@6	DFT_QPSK	24.50	23.62
n28	30	10	145100	1@1	DFT_QPSK	24.50	23.92

n28	30	10	145100	1@22	DFT_QPSK	24.50	23.83
n28	30	10	148600	12@6	DFT_BPSK	24.50	23.86
n28	30	10	148600	1@1	DFT_BPSK	24.50	23.39
n28	30	10	148600	1@22	DFT_BPSK	24.50	23.64
n28	30	10	148600	12@6	DFT_QPSK	24.50	23.66
n28	30	10	148600	1@1	DFT_QPSK	24.50	23.76
n28	30	10	148600	1@22	DFT_QPSK	24.50	24.19
n28	30	15	142100	18@9	DFT_BPSK	24.50	23.90
n28	30	15	142100	1@1	DFT_BPSK	24.50	23.69
n28	30	15	142100	1@36	DFT_BPSK	24.50	23.91
n28	30	15	142100	18@9	DFT_QPSK	24.50	23.97
n28	30	15	142100	1@1	DFT_QPSK	24.50	23.73
n28	30	15	142100	1@36	DFT_QPSK	24.50	24.00
n28	30	15	145100	18@9	DFT_BPSK	24.50	23.61
n28	30	15	145100	1@1	DFT_BPSK	24.50	23.92
n28	30	15	145100	1@36	DFT_BPSK	24.50	23.79
n28	30	15	145100	18@9	DFT_QPSK	24.50	23.86
n28	30	15	145100	1@1	DFT_QPSK	24.50	24.02
n28	30	15	145100	1@36	DFT_QPSK	24.50	23.58
n28	30	15	148100	18@9	DFT_BPSK	24.50	23.51
n28	30	15	148100	1@1	DFT_BPSK	24.50	23.38
n28	30	15	148100	1@36	DFT_BPSK	24.50	23.63
n28	30	15	148100	18@9	DFT_QPSK	24.50	23.81
n28	30	15	148100	1@1	DFT_QPSK	24.50	23.45
n28	30	15	148100	1@36	DFT_QPSK	24.50	23.96
n28	30	20	142600	25@12	DFT_BPSK	24.50	23.84
n28	30	20	142600	1@1	DFT_BPSK	24.50	23.63
n28	30	20	142600	1@49	DFT_BPSK	24.50	23.69
n28	30	20	142600	25@12	DFT_QPSK	24.50	24.06
n28	30	20	142600	1@1	DFT_QPSK	24.50	23.78
n28	30	20	142600	1@49	DFT_QPSK	24.50	23.89
n28	30	20	145100	25@12	DFT_BPSK	24.50	23.60
n28	30	20	145100	1@1	DFT_BPSK	24.50	23.69
n28	30	20	145100	1@49	DFT_BPSK	24.50	23.29
n28	30	20	145100	25@12	DFT_QPSK	24.50	23.65
n28	30	20	145100	1@1	DFT_QPSK	24.50	23.84
n28	30	20	145100	1@49	DFT_QPSK	24.50	23.62
n28	30	20	147600	25@12	DFT_BPSK	24.50	23.70
n28	30	20	147600	1@1	DFT_BPSK	24.50	23.61

n28	30	20	147600	1@49	DFT_BPSK	24.50	23.60
n28	30	20	147600	25@12	DFT_QPSK	24.50	23.55
n28	30	20	147600	1@1	DFT_QPSK	24.50	23.59
n28	30	20	147600	1@49	DFT_QPSK	24.50	24.12
n8	30	10	177000	12@6	DFT_BPSK	24.50	24.16
n8	30	10	177000	1@1	DFT_BPSK	24.50	23.89
n8	30	10	177000	1@22	DFT_BPSK	24.50	23.75
n8	30	10	177000	12@6	DFT_QPSK	24.50	23.99
n8	30	10	177000	1@1	DFT_QPSK	24.50	24.35
n8	30	10	177000	1@22	DFT_QPSK	24.50	24.40
n8	30	10	179500	12@6	DFT_BPSK	24.50	23.53
n8	30	10	179500	1@1	DFT_BPSK	24.50	23.63
n8	30	10	179500	1@22	DFT_BPSK	24.50	23.27
n8	30	10	179500	12@6	DFT_QPSK	24.50	23.62
n8	30	10	179500	1@1	DFT_QPSK	24.50	23.63
n8	30	10	179500	1@22	DFT_QPSK	24.50	23.24
n8	30	10	182000	12@6	DFT_BPSK	24.50	23.71
n8	30	10	182000	1@1	DFT_BPSK	24.50	23.36
n8	30	10	182000	1@22	DFT_BPSK	24.50	23.96
n8	30	10	182000	12@6	DFT_QPSK	24.50	23.97
n8	30	10	182000	1@1	DFT_QPSK	24.50	23.39
n8	30	10	182000	1@22	DFT_QPSK	24.50	23.73
n8	30	15	177500	18@9	DFT_BPSK	24.50	23.41
n8	30	15	177500	1@1	DFT_BPSK	24.50	23.67
n8	30	15	177500	1@36	DFT_BPSK	24.50	22.90
n8	30	15	177500	18@9	DFT_QPSK	24.50	22.68
n8	30	15	177500	1@1	DFT_QPSK	24.50	22.96
n8	30	15	177500	1@36	DFT_QPSK	24.50	22.15
n8	30	15	179500	18@9	DFT_BPSK	24.50	23.43
n8	30	15	179500	1@1	DFT_BPSK	24.50	23.53
n8	30	15	179500	1@36	DFT_BPSK	24.50	23.32
n8	30	15	179500	18@9	DFT_QPSK	24.50	23.31
n8	30	15	179500	1@1	DFT_QPSK	24.50	23.83
n8	30	15	179500	1@36	DFT_QPSK	24.50	23.59
n8	30	15	181500	18@9	DFT_BPSK	24.50	23.70
n8	30	15	181500	1@1	DFT_BPSK	24.50	23.41
n8	30	15	181500	1@36	DFT_BPSK	24.50	23.79
n8	30	15	181500	18@9	DFT_QPSK	24.50	23.83
n8	30	15	181500	1@1	DFT_QPSK	24.50	23.43

n8	30	15	181500	1@36	DFT_QPSK	24.50	23.82
n8	30	20	178000	25@12	DFT_BPSK	24.50	23.89
n8	30	20	178000	1@1	DFT_BPSK	24.50	24.00
n8	30	20	178000	1@49	DFT_BPSK	24.50	23.34
n8	30	20	178000	25@12	DFT_QPSK	24.50	23.91
n8	30	20	178000	1@1	DFT_QPSK	24.50	23.76
n8	30	20	178000	1@49	DFT_QPSK	24.50	23.36
n8	30	20	179500	25@12	DFT_BPSK	24.50	23.60
n8	30	20	179500	1@1	DFT_BPSK	24.50	23.73
n8	30	20	179500	1@49	DFT_BPSK	24.50	23.38
n8	30	20	179500	25@12	DFT_QPSK	24.50	23.39
n8	30	20	179500	1@1	DFT_QPSK	24.50	23.71
n8	30	20	179500	1@49	DFT_QPSK	24.50	23.45
n8	30	20	181000	25@12	DFT_BPSK	24.50	23.71
n8	30	20	181000	1@1	DFT_BPSK	24.50	23.17
n8	30	20	181000	1@49	DFT_BPSK	24.50	23.74
n8	30	20	181000	25@12	DFT_QPSK	24.50	23.48
n8	30	20	181000	1@1	DFT_QPSK	24.50	23.18
n8	30	20	181000	1@49	DFT_QPSK	24.50	23.96
n38	30	10	515000	12@6	DFT_BPSK	25.50	24.70
n38	30	10	515000	1@1	DFT_BPSK	25.50	24.42
n38	30	10	515000	1@22	DFT_BPSK	25.50	24.81
n38	30	10	515000	12@6	DFT_QPSK	25.50	24.71
n38	30	10	515000	1@1	DFT_QPSK	25.50	24.70
n38	30	10	515000	1@22	DFT_QPSK	25.50	25.11
n38	30	10	519000	12@6	DFT_BPSK	25.50	24.77
n38	30	10	519000	1@1	DFT_BPSK	25.50	24.68
n38	30	10	519000	1@22	DFT_BPSK	25.50	24.59
n38	30	10	519000	12@6	DFT_QPSK	25.50	24.76
n38	30	10	519000	1@1	DFT_QPSK	25.50	24.86
n38	30	10	519000	1@22	DFT_QPSK	25.50	24.70
n38	30	10	523000	12@6	DFT_BPSK	25.50	24.93
n38	30	10	523000	1@1	DFT_BPSK	25.50	24.73
n38	30	10	523000	1@22	DFT_BPSK	25.50	24.74
n38	30	10	523000	12@6	DFT_QPSK	25.50	24.91
n38	30	10	523000	1@1	DFT_QPSK	25.50	24.86
n38	30	10	523000	1@22	DFT_QPSK	25.50	24.85
n38	30	15	515500	18@9	DFT_BPSK	25.50	24.78
n38	30	15	515500	1@1	DFT_BPSK	25.50	24.36

n38	30	15	515500	1@36	DFT_BPSK	25.50	24.86
n38	30	15	515500	18@9	DFT_QPSK	25.50	24.75
n38	30	15	515500	1@1	DFT_QPSK	25.50	24.48
n38	30	15	515500	1@36	DFT_QPSK	25.50	25.03
n38	30	15	519000	18@9	DFT_BPSK	25.50	24.72
n38	30	15	519000	1@1	DFT_BPSK	25.50	24.77
n38	30	15	519000	1@36	DFT_BPSK	25.50	24.58
n38	30	15	519000	18@9	DFT_QPSK	25.50	24.73
n38	30	15	519000	1@1	DFT_QPSK	25.50	24.94
n38	30	15	519000	1@36	DFT_QPSK	25.50	24.68
n38	30	15	522500	18@9	DFT_BPSK	25.50	24.86
n38	30	15	522500	1@1	DFT_BPSK	25.50	24.58
n38	30	15	522500	1@36	DFT_BPSK	25.50	24.72
n38	30	15	522500	18@9	DFT_QPSK	25.50	24.82
n38	30	15	522500	1@1	DFT_QPSK	25.50	24.68
n38	30	15	522500	1@36	DFT_QPSK	25.50	24.81
n38	30	20	516000	25@12	DFT_BPSK	25.50	24.93
n38	30	20	516000	1@1	DFT_BPSK	25.50	24.31
n38	30	20	516000	1@49	DFT_BPSK	25.50	24.77
n38	30	20	516000	25@12	DFT_QPSK	25.50	24.94
n38	30	20	516000	1@1	DFT_QPSK	25.50	24.48
n38	30	20	516000	1@49	DFT_QPSK	25.50	24.99
n38	30	20	519000	25@12	DFT_BPSK	25.50	24.77
n38	30	20	519000	1@1	DFT_BPSK	25.50	24.73
n38	30	20	519000	1@49	DFT_BPSK	25.50	24.53
n38	30	20	519000	25@12	DFT_QPSK	25.50	24.82
n38	30	20	519000	1@1	DFT_QPSK	25.50	24.98
n38	30	20	519000	1@49	DFT_QPSK	25.50	24.68
n38	30	20	522000	25@12	DFT_BPSK	25.50	24.87
n38	30	20	522000	1@1	DFT_BPSK	25.50	24.47
n38	30	20	522000	1@49	DFT_BPSK	25.50	24.69
n38	30	20	522000	25@12	DFT_QPSK	25.50	24.91
n38	30	20	522000	1@1	DFT_QPSK	25.50	24.61
n38	30	20	522000	1@49	DFT_QPSK	25.50	24.89
n40	30	10	461000	12@6	DFT_BPSK	22.00	21.46
n40	30	10	461000	1@1	DFT_BPSK	22.00	21.26
n40	30	10	461000	1@22	DFT_BPSK	22.00	21.24
n40	30	10	461000	12@6	DFT_QPSK	22.00	21.54
n40	30	10	461000	1@1	DFT_QPSK	22.00	21.61

n40	30	10	461000	1@22	DFT_QPSK	22.00	21.34
n40	30	10	470000	12@6	DFT_BPSK	22.00	21.53
n40	30	10	470000	1@1	DFT_BPSK	22.00	21.41
n40	30	10	470000	1@22	DFT_BPSK	22.00	21.32
n40	30	10	470000	12@6	DFT_QPSK	22.00	21.60
n40	30	10	470000	1@1	DFT_QPSK	22.00	21.61
n40	30	10	470000	1@22	DFT_QPSK	22.00	21.40
n40	30	10	479000	12@6	DFT_BPSK	22.00	21.54
n40	30	10	479000	1@1	DFT_BPSK	22.00	21.38
n40	30	10	479000	1@22	DFT_BPSK	22.00	21.29
n40	30	10	479000	12@6	DFT_QPSK	22.00	21.69
n40	30	10	479000	1@1	DFT_QPSK	22.00	21.50
n40	30	10	479000	1@22	DFT_QPSK	22.00	21.38
n40	30	30	463000	36@18	DFT_BPSK	22.00	21.17
n40	30	30	463000	1@1	DFT_BPSK	22.00	20.94
n40	30	30	463000	1@76	DFT_BPSK	22.00	20.83
n40	30	30	463000	36@18	DFT_QPSK	22.00	21.22
n40	30	30	463000	1@1	DFT_QPSK	22.00	20.90
n40	30	30	463000	1@76	DFT_QPSK	22.00	20.80
n40	30	30	470000	36@18	DFT_BPSK	22.00	21.26
n40	30	30	470000	1@1	DFT_BPSK	22.00	21.09
n40	30	30	470000	1@76	DFT_BPSK	22.00	20.98
n40	30	30	470000	36@18	DFT_QPSK	22.00	21.29
n40	30	30	470000	1@1	DFT_QPSK	22.00	21.24
n40	30	30	470000	1@76	DFT_QPSK	22.00	21.16
n40	30	30	477000	36@18	DFT_BPSK	22.00	21.57
n40	30	30	477000	1@1	DFT_BPSK	22.00	21.21
n40	30	30	477000	1@76	DFT_BPSK	22.00	21.16
n40	30	30	477000	36@18	DFT_QPSK	22.00	21.63
n40	30	30	477000	1@1	DFT_QPSK	22.00	21.47
n40	30	30	477000	1@76	DFT_QPSK	22.00	21.29
n40	30	80	468000	108@54	DFT_BPSK	22.00	21.54
n40	30	80	468000	1@1	DFT_BPSK	22.00	20.88
n40	30	80	468000	1@215	DFT_BPSK	22.00	20.79
n40	30	80	468000	108@54	DFT_QPSK	22.00	21.53
n40	30	80	468000	1@1	DFT_QPSK	22.00	21.00
n40	30	80	468000	1@215	DFT_QPSK	22.00	20.88
n40	30	80	470000	108@54	DFT_BPSK	22.00	21.62
n40	30	80	470000	1@1	DFT_BPSK	22.00	20.96

n40	30	80	470000	1@215	DFT_BPSK	22.00	20.95
n40	30	80	470000	108@54	DFT_QPSK	22.00	21.68
n40	30	80	470000	1@1	DFT_QPSK	22.00	21.07
n40	30	80	470000	1@215	DFT_QPSK	22.00	21.23
n40	30	80	472000	108@54	DFT_BPSK	22.00	20.94
n40	30	80	472000	1@1	DFT_BPSK	22.00	20.94
n40	30	80	472000	1@215	DFT_BPSK	22.00	20.99
n40	30	80	472000	108@54	DFT_QPSK	22.00	21.68
n40	30	80	472000	1@1	DFT_QPSK	22.00	21.02
n40	30	80	472000	1@215	DFT_QPSK	22.00	21.10
n41	30	10	500202	12@6	DFT_BPSK	21.50	20.85
n41	30	10	500202	1@1	DFT_BPSK	21.50	20.80
n41	30	10	500202	1@22	DFT_BPSK	21.50	20.89
n41	30	10	500202	12@6	DFT_QPSK	21.50	20.83
n41	30	10	500202	1@1	DFT_QPSK	21.50	20.77
n41	30	10	500202	1@22	DFT_QPSK	21.50	20.89
n41	30	10	518598	12@6	DFT_BPSK	21.50	20.89
n41	30	10	518598	1@1	DFT_BPSK	21.50	20.81
n41	30	10	518598	1@22	DFT_BPSK	21.50	20.93
n41	30	10	518598	12@6	DFT_QPSK	21.50	20.93
n41	30	10	518598	1@1	DFT_QPSK	21.50	20.80
n41	30	10	518598	1@22	DFT_QPSK	21.50	20.93
n41	30	10	537000	12@6	DFT_BPSK	21.50	20.56
n41	30	10	537000	1@1	DFT_BPSK	21.50	20.57
n41	30	10	537000	1@22	DFT_BPSK	21.50	20.55
n41	30	10	537000	12@6	DFT_QPSK	21.50	20.60
n41	30	10	537000	1@1	DFT_QPSK	21.50	20.51
n41	30	10	537000	1@22	DFT_QPSK	21.50	20.55
n41	30	50	504204	64@32	DFT_BPSK	21.50	20.72
n41	30	50	504204	1@1	DFT_BPSK	21.50	20.58
n41	30	50	504204	1@131	DFT_BPSK	21.50	20.57
n41	30	50	504204	64@32	DFT_QPSK	21.50	20.76
n41	30	50	504204	1@1	DFT_QPSK	21.50	20.61
n41	30	50	504204	1@131	DFT_QPSK	21.50	20.60
n41	30	50	518598	64@32	DFT_BPSK	21.50	20.88
n41	30	50	518598	1@1	DFT_BPSK	21.50	20.72
n41	30	50	518598	1@131	DFT_BPSK	21.50	21.13
n41	30	50	518598	64@32	DFT_QPSK	21.50	20.90
n41	30	50	518598	1@1	DFT_QPSK	21.50	20.65

n41	30	50	518598	1@131	DFT_QPSK	21.50	21.10
n41	30	50	532998	64@32	DFT_BPSK	21.50	20.79
n41	30	50	532998	1@1	DFT_BPSK	21.50	20.66
n41	30	50	532998	1@131	DFT_BPSK	21.50	20.54
n41	30	50	532998	64@32	DFT_QPSK	21.50	20.77
n41	30	50	532998	1@1	DFT_QPSK	21.50	20.66
n41	30	50	532998	1@131	DFT_QPSK	21.50	20.56
n41	30	100	509202	135@67	DFT_BPSK	21.50	20.69
n41	30	100	509202	1@1	DFT_BPSK	21.50	19.91
n41	30	100	509202	1@271	DFT_BPSK	21.50	20.20
n41	30	100	509202	135@67	DFT_QPSK	21.50	20.67
n41	30	100	509202	1@1	DFT_QPSK	21.50	19.79
n41	30	100	509202	1@271	DFT_QPSK	21.50	20.17
n41	30	100	518598	135@67	DFT_BPSK	21.50	20.83
n41	30	100	518598	1@1	DFT_BPSK	21.50	19.76
n41	30	100	518598	1@271	DFT_BPSK	21.50	20.50
n41	30	100	518598	135@67	DFT_QPSK	21.50	20.86
n41	30	100	518598	1@1	DFT_QPSK	21.50	19.68
n41	30	100	518598	1@271	DFT_QPSK	21.50	20.52
n41	30	100	528000	135@67	DFT_BPSK	21.50	20.89
n41	30	100	528000	1@1	DFT_BPSK	21.50	19.76
n41	30	100	528000	1@271	DFT_BPSK	21.50	20.14
n41	30	100	528000	135@67	DFT_QPSK	21.50	20.88
n41	30	100	528000	1@1	DFT_QPSK	21.50	19.75
n41	30	100	528000	1@271	DFT_QPSK	21.50	20.13
n77	30	10	620334	12@6	DFT_BPSK	22.00	20.79
n77	30	10	620334	1@1	DFT_BPSK	22.00	20.68
n77	30	10	620334	1@22	DFT_BPSK	22.00	20.81
n77	30	10	620334	12@6	DFT_QPSK	22.00	20.76
n77	30	10	620334	1@1	DFT_QPSK	22.00	20.64
n77	30	10	620334	1@22	DFT_QPSK	22.00	20.80
n77	30	10	650000	12@6	DFT_BPSK	22.00	21.29
n77	30	10	650000	1@1	DFT_BPSK	22.00	21.27
n77	30	10	650000	1@22	DFT_BPSK	22.00	21.28
n77	30	10	650000	12@6	DFT_QPSK	22.00	21.32
n77	30	10	650000	1@1	DFT_QPSK	22.00	21.18
n77	30	10	650000	1@22	DFT_QPSK	22.00	21.21
n77	30	10	679666	12@6	DFT_BPSK	22.00	21.83
n77	30	10	679666	1@1	DFT_BPSK	22.00	21.67

n77	30	10	679666	1@22	DFT_BPSK	22.00	21.79
n77	30	10	679666	12@6	DFT_QPSK	22.00	21.84
n77	30	10	679666	1@1	DFT_QPSK	22.00	21.73
n77	30	10	679666	1@22	DFT_QPSK	22.00	21.81
n77	30	50	621668	64@32	DFT_BPSK	22.00	21.05
n77	30	50	621668	1@1	DFT_BPSK	22.00	20.58
n77	30	50	621668	1@131	DFT_BPSK	22.00	21.35
n77	30	50	621668	64@32	DFT_QPSK	22.00	21.06
n77	30	50	621668	1@1	DFT_QPSK	22.00	20.56
n77	30	50	621668	1@131	DFT_QPSK	22.00	21.42
n77	30	50	650000	64@32	DFT_BPSK	22.00	21.29
n77	30	50	650000	1@1	DFT_BPSK	22.00	21.01
n77	30	50	650000	1@131	DFT_BPSK	22.00	21.24
n77	30	50	650000	64@32	DFT_QPSK	22.00	21.31
n77	30	50	650000	1@1	DFT_QPSK	22.00	20.92
n77	30	50	650000	1@131	DFT_QPSK	22.00	21.20
n77	30	50	678332	64@32	DFT_BPSK	22.00	21.74
n77	30	50	678332	1@1	DFT_BPSK	22.00	21.46
n77	30	50	678332	1@131	DFT_BPSK	22.00	21.68
n77	30	50	678332	64@32	DFT_QPSK	22.00	21.81
n77	30	50	678332	1@1	DFT_QPSK	22.00	21.42
n77	30	50	678332	1@131	DFT_QPSK	22.00	21.66
n77	30	100	623334	135@67	DFT_BPSK	22.00	21.37
n77	30	100	623334	1@1	DFT_BPSK	22.00	19.82
n77	30	100	623334	1@271	DFT_BPSK	22.00	20.76
n77	30	100	623334	135@67	DFT_QPSK	22.00	21.44
n77	30	100	623334	1@1	DFT_QPSK	22.00	19.71
n77	30	100	623334	1@271	DFT_QPSK	22.00	20.79
n77	30	100	650000	135@67	DFT_BPSK	22.00	21.78
n77	30	100	650000	1@1	DFT_BPSK	22.00	20.22
n77	30	100	650000	1@271	DFT_BPSK	22.00	21.17
n77	30	100	650000	135@67	DFT_QPSK	22.00	21.81
n77	30	100	650000	1@1	DFT_QPSK	22.00	20.09
n77	30	100	650000	1@271	DFT_QPSK	22.00	21.18
n77	30	100	676666	135@67	DFT_BPSK	22.00	21.44
n77	30	100	676666	1@1	DFT_BPSK	22.00	20.51
n77	30	100	676666	1@271	DFT_BPSK	22.00	20.90
n77	30	100	676666	135@67	DFT_QPSK	22.00	21.48
n77	30	100	676666	1@1	DFT_QPSK	22.00	20.43

n77	30	100	676666	1@271	DFT_QPSK	22.00	20.84
n78	30	20	620668	25@12	DFT_BPSK	21.50	20.46
n78	30	20	620668	1@1	DFT_BPSK	21.50	20.26
n78	30	20	620668	1@49	DFT_BPSK	21.50	20.46
n78	30	20	620668	25@12	DFT_QPSK	21.50	20.49
n78	30	20	620668	1@1	DFT_QPSK	21.50	20.18
n78	30	20	620668	1@49	DFT_QPSK	21.50	20.45
n78	30	20	636666	25@12	DFT_BPSK	21.50	21.05
n78	30	20	636666	1@1	DFT_BPSK	21.50	20.73
n78	30	20	636666	1@49	DFT_BPSK	21.50	21.08
n78	30	20	636666	25@12	DFT_QPSK	21.50	21.08
n78	30	20	636666	1@1	DFT_QPSK	21.50	20.67
n78	30	20	636666	1@49	DFT_QPSK	21.50	21.08
n78	30	20	652666	25@12	DFT_BPSK	21.50	21.02
n78	30	20	652666	1@1	DFT_BPSK	21.50	20.82
n78	30	20	652666	1@49	DFT_BPSK	21.50	21.15
n78	30	20	652666	25@12	DFT_QPSK	21.50	21.06
n78	30	20	652666	1@1	DFT_QPSK	21.50	20.71
n78	30	20	652666	1@49	DFT_QPSK	21.50	21.04
n78	30	50	621668	64@32	DFT_BPSK	21.50	20.64
n78	30	50	621668	1@1	DFT_BPSK	21.50	20.17
n78	30	50	621668	1@131	DFT_BPSK	21.50	20.90
n78	30	50	621668	64@32	DFT_QPSK	21.50	20.69
n78	30	50	621668	1@1	DFT_QPSK	21.50	20.07
n78	30	50	621668	1@131	DFT_QPSK	21.50	20.90
n78	30	50	636666	64@32	DFT_BPSK	21.50	20.98
n78	30	50	636666	1@1	DFT_BPSK	21.50	20.69
n78	30	50	636666	1@131	DFT_BPSK	21.50	21.08
n78	30	50	636666	64@32	DFT_QPSK	21.50	20.98
n78	30	50	636666	1@1	DFT_QPSK	21.50	20.61
n78	30	50	636666	1@131	DFT_QPSK	21.50	21.04
n78	30	50	651666	64@32	DFT_BPSK	21.50	20.98
n78	30	50	651666	1@1	DFT_BPSK	21.50	20.57
n78	30	50	651666	1@131	DFT_BPSK	21.50	21.13
n78	30	50	651666	64@32	DFT_QPSK	21.50	20.97
n78	30	50	651666	1@1	DFT_QPSK	21.50	20.51
n78	30	50	651666	1@131	DFT_QPSK	21.50	21.00
n78	30	100	623334	135@67	DFT_BPSK	21.50	20.95
n78	30	100	623334	1@1	DFT_BPSK	21.50	19.41

n78	30	100	623334	1@271	DFT_BPSK	21.50	20.46
n78	30	100	623334	135@67	DFT_QPSK	21.50	20.93
n78	30	100	623334	1@1	DFT_QPSK	21.50	19.34
n78	30	100	623334	1@271	DFT_QPSK	21.50	20.47
n78	30	100	636666	135@67	DFT_BPSK	21.50	20.92
n78	30	100	636666	1@1	DFT_BPSK	21.50	19.75
n78	30	100	636666	1@271	DFT_BPSK	21.50	20.57
n78	30	100	636666	135@67	DFT_QPSK	21.50	20.95
n78	30	100	636666	1@1	DFT_QPSK	21.50	19.68
n78	30	100	636666	1@271	DFT_QPSK	21.50	20.51
n78	30	100	650000	135@67	DFT_BPSK	21.50	20.84
n78	30	100	650000	1@1	DFT_BPSK	21.50	19.75
n78	30	100	650000	1@271	DFT_BPSK	21.50	20.42
n78	30	100	650000	135@67	DFT_QPSK	21.50	20.81
n78	30	100	650000	1@1	DFT_QPSK	21.50	19.62
n78	30	100	650000	1@271	DFT_QPSK	21.50	20.38

7.5. WLAN & Bluetooth Output Power

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)
				ANT1		ANT2		MIMO
802.11b	1	2412	15.50	15.22	15.00	14.44	--	--
	7	2442	15.50	14.99	15.00	14.55	--	--
	13	2472	15.50	15.20	15.00	14.55	--	--
802.11g	1	2412	13.50	12.77	13.50	12.88	--	--
	7	2442	13.50	13.14	13.50	13.23	--	--
	13	2472	13.50	13.28	13.50	12.64	--	--
802.11n (HT20)	1	2412	11.50	10.81	11.50	10.95	14.50	14.04
	7	2442	11.50	11.08	11.50	11.37	14.50	14.47
	13	2472	11.50	11.33	11.50	10.70	14.50	13.28
802.11n (HT40)	3	2422	11.00	10.30	10.50	10.17	14.50	13.81
	7	2442	11.00	10.48	10.50	10.48	14.50	14.36
	11	2462	11.00	10.60	10.50	10.45	14.50	13.91
802.11AX20	1	2412	12.00	10.99	12.00	11.01	14.50	14.02
	7	2442	12.00	11.40	12.00	11.52	14.50	13.78
	13	2472	12.00	11.51	12.00	10.83	14.50	13.43
802.11AX 40	3	2422	11.00	10.42	11.00	10.47	14.50	13.49
	7	2442	11.00	10.60	11.00	10.66	14.50	14.03

	11	2462	11.00	10.74	11.00	10.59	14.50	13.71
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NOTE: Power measurement results of WLAN 2.4G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)
				ANT1		ANT2		MIMO
802.11a	36	5180	12.00	11.77	13.00	12.54	--	--
	40	5200	12.00	11.36	13.00	12.33	--	--
	48	5240	12.00	11.26	13.00	12.10	--	--
802.11n HT20	36	5180	12.00	11.71	12.50	12.38	17.00	16.52
	40	5200	12.00	10.90	12.50	11.81	--	--
	48	5240	12.00	11.45	12.50	11.89	--	--
802.11n HT40	38	5190	13.00	12.79	13.00	12.56	17.00	16.57
	46	5230	13.00	12.52	13.00	11.99	--	--
802.11ac VHT20	36	5180	13.00	12.61	12.50	12.36	16.50	16.46
	40	5200	13.00	12.07	12.50	11.62	--	--
	48	5240	13.00	11.89	12.50	11.78	--	--
802.11ac VHT40	38	5190	13.00	12.79	13.00	12.60	16.50	16.28
	46	5230	13.00	12.53	13.00	11.75	--	--
802.11ac VHT80	42	5210	13.00	12.75	12.50	12.43	16.50	16.31
802.11ax 20	36	5180	13.00	12.79	13.00	12.59	16.00	15.66
	40	5200	13.00	11.98	13.00	11.86	--	--
	48	5240	13.00	11.86	13.00	12.07	--	--
802.11ax 40	38	5190	13.50	13.02	13.00	12.78	17.00	16.51
	46	5230	13.50	12.14	13.00	11.82	--	--
802.11ax 80	42	5210	13.50	13.13	13.00	12.74	17.00	16.59

NOTE: Power measurement results of WLAN 5.2G.

Mode	Channel	Frequency (MHz)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)	Tune-up	Output Power (dBm)
				ANT1		ANT2		MIMO
802.11a	149	5745	11.50	10.98	11.50	11.21	--	--
	157	5785	11.50	11.42	11.50	11.21	--	--
	165	5825	11.50	11.46	11.50	10.50	--	--
802.11n	149	5745	11.50	10.98	11.50	10.13	12.50	11.88

HT20	157	5785	11.50	11.38	11.50	11.18	12.50	12.21
	165	5825	11.50	11.34	11.50	11.33	12.50	11.28
802.11n	151	5755	11.50	11.08	11.50	11.13	12.50	12.14
HT40	159	5795	11.50	11.46	11.50	11.30	12.50	12.34
802.11ac VHT20	149	5745	11.50	11.01	11.50	11.00	12.50	11.89
	157	5785	11.50	11.30	11.50	11.15	12.50	12.31
	165	5825	11.50	11.32	11.50	11.33	12.50	12.35
802.11ac VHT40	151	5755	11.50	11.26	11.50	11.13	12.50	12.24
	159	5795	11.50	11.47	11.50	11.28	12.50	12.35
802.11ac VHT80	155	5775	11.50	11.09	11.00	10.88	12.50	12.06
802.11ax 20	149	5745	11.50	11.01	12.00	11.15	13.00	12.11
	157	5785	11.50	11.40	12.00	11.30	13.00	12.45
	165	5825	11.50	11.44	12.00	11.55	13.00	12.50
802.11ax 40	151	5755	12.00	11.32	11.50	11.30	12.50	12.29
	159	5795	12.00	11.61	11.50	11.43	12.50	12.48
802.11ax 80	155	5775	11.50	11.35	11.50	11.17	12.50	12.37

NOTE: Power measurement results of WLAN 5.8G.

BR+EDR	Data Rates	Tune - up(dBm)	Output Power (dBm)
	GFSK DH5	8.00	7.36
	Pi/4 DQPSK DH5	5.00	4.60
	8DPSK DH5	5.00	4.58

BLE	Channel	Tune - up(dBm)	Output Power (dBm)	
			1M	2M
	0CH	4.00	3.50	3.91
	19CH	4.00	3.28	3.18
	39CH	3.00	2.55	2.77

NOTE: Power measurement results of Bluetooth. Refer to EN 62479, the available power of this EUT is 8.00dBm (6.31mW), the power is less than the low-power exclusion level defined in 4.2 (P max: 20mW), So Bluetooth stand-alone SAR is not required

7.6. NFC Assessment

NFC	Frequency (MHz)	H-Field(dBuA/m)@3m	Output Power (dBm)	Output Power (mW)	Limits (mW)
	13.56MHz	26.34	0.02	1.0	20

NOTE: Refer to EN 62479, the available power of this EUT is 0.02dBm (1.00mW), the power is less

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	38/897.6	GPRS(GMSK 4TS)	0	0.148	0.111	1.56	30.13	30.50	0.121	2023/10/17
Left Tilt 15 Degree	38/897.6	GPRS(GMSK 4TS)	0	0.084	0.061	-3.66	30.13	30.50	0.066	2023/10/17
Right Cheek	38/897.6	GPRS(GMSK 4TS)	0	0.139	0.104	2.15	30.13	30.50	0.113	2023/10/17
Right Tilt 15 Degree	38/897.6	GPRS(GMSK 4TS)	0	0.064	0.046	0.90	30.13	30.50	0.050	2023/10/17
Extremity										
Front Side	38/897.6	GPRS(GMSK 4TS)	0	1.542	0.768	1.07	30.13	30.50	0.836	2023/10/17
Back Side	38/897.6	GPRS(GMSK 4TS)	0	2.448	1.284	-2.99	30.13	30.50	1.398	2023/10/17
Left Side	38/897.6	GPRS(GMSK 4TS)	0	1.297	0.680	-2.77	30.13	30.50	0.740	2023/10/17
Right Side	38/897.6	GPRS(GMSK 4TS)	0	1.297	0.653	3.88	30.13	30.50	0.711	2023/10/17
Top Side	38/897.6	GPRS(GMSK 4TS)	0	0.343	0.171	-2.42	30.13	30.50	0.186	2023/10/17
Bottom Side	38/897.6	GPRS(GMSK 4TS)	0	1.542	0.801	0.03	30.13	30.50	0.872	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										

Back Side	38/897.6	GPRS(GMSK 4TS)	5	1.297	0.660	2.65	30.13	30.50	0.719	2023/10/17
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9.1.2. SAR measurement Result of GSM1800

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	698/1747.4	GPRS(GMSK 4TS)	0	0.041	0.030	1.18	27.89	28.00	0.031	2023/10/18
Left Tilt 15 Degree	698/1747.4	GPRS(GMSK 4TS)	0	0.024	0.017	-3.96	27.89	28.00	0.017	2023/10/18
Right Cheek	698/1747.4	GPRS(GMSK 4TS)	0	0.035	0.026	2.96	27.89	28.00	0.027	2023/10/18
Right Tilt 15 Degree	698/1747.4	GPRS(GMSK 4TS)	0	0.019	0.017	4.29	27.89	28.00	0.017	2023/10/18
Extremity										
Front Side	698/1747.4	GPRS(GMSK 4TS)	0	1.784	0.566	3.97	27.89	28.00	0.581	2023/10/18
Back Side	698/1747.4	GPRS(GMSK 4TS)	0	2.788	0.922	-0.92	27.89	28.00	0.946	2023/10/18
Left Side	698/1747.4	GPRS(GMSK 4TS)	0	1.478	0.464	-1.87	27.89	28.00	0.476	2023/10/18
Right Side	698/1747.4	GPRS(GMSK 4TS)	0	1.506	0.493	-0.52	27.89	28.00	0.506	2023/10/18
Top Side	698/1747.4	GPRS(GMSK 4TS)	0	0.307	0.099	-3.98	27.89	28.00	0.102	2023/10/18
Bottom Side	698/1747.4	GPRS(GMSK 4TS)	0	1.701	0.557	-3.51	27.89	28.00	0.571	2023/10/18
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	698/1747.4	GPRS(GMSK 4TS)	5	1.701	0.557	0.50	27.89	28.00	0.571	2023/10/18

9.1.3. SAR measurement Result of WCDMA Band 1

Test Position	Test channel	Test Mode	Separation distance	SAR Value (W/kg)	Power Drift	Conducted power	Tune-up power	Scaled SAR	Date
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	/Freq.		(mm)	1g	10g	(±5%)	(dBm)	(dBm)	10g (W/Kg)	
Head										
Left Cheek	9750/1950	RMC12.2K	0	0.106	0.069	1.64	25.44	26.00	0.078	2023/10/27
Left Tilt 15 Degree	9750/1950	RMC12.2K	0	0.060	0.038	-0.94	25.44	26.00	0.043	2023/10/27
Right Cheek	9750/1950	RMC12.2K	0	0.099	0.064	2.70	25.44	26.00	0.073	2023/10/27
Right Tilt 15 Degree	9750/1950	RMC12.2K	0	0.049	0.031	-1.55	25.44	26.00	0.035	2023/10/27
Extremity										
Front Side	9750/1950	RMC12.2K	0	0.804	0.424	1.59	25.44	26.00	0.482	2023/10/27
Back Side	9750/1950	RMC12.2K	0	1.276	0.687	0.65	25.44	26.00	0.782	2023/10/27
Left Side	9750/1950	RMC12.2K	0	0.651	0.343	2.92	25.44	26.00	0.390	2023/10/27
Right Side	9750/1950	RMC12.2K	0	0.651	0.336	-1.62	25.44	26.00	0.382	2023/10/27
Top Side	9750/1950	RMC12.2K	0	0.153	0.081	-1.12	25.44	26.00	0.092	2023/10/27
Bottom Side	9750/1950	RMC12.2K	0	0.791	0.409	0.99	25.44	26.00	0.465	2023/10/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	9750/1950	RMC12.2K	5	0.778	0.398	-3.07	25.44	26.00	0.453	2023/10/27

9.1.4. SAR measurement Result of WCDMA Band 8

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	2788/897.6	RMC12.2K	0	0.089	0.071	1.44	24.17	24.50	0.077	2023/10/17
Left Tilt	2788/897.6	RMC12.2K	0	0.051	0.039	2.79	24.17	24.50	0.042	2023/10/17

15 Degree										
Right Cheek	2788/897.6	RMC12.2K	0	0.084	0.064	-4.57	24.17	24.50	0.069	2023/10/17
Right Tilt 15 Degree	2788/897.6	RMC12.2K	0	0.040	0.030	-4.43	24.17	24.50	0.032	2023/10/17
Extremity										
Front Side	2788/897.6	RMC12.2K	0	0.921	0.487	-2.73	24.17	24.50	0.525	2023/10/17
Back Side	2788/897.6	RMC12.2K	0	1.485	0.818	-4.15	24.17	24.50	0.883	2023/10/17
Left Side	2788/897.6	RMC12.2K	0	0.757	0.417	-0.82	24.17	24.50	0.450	2023/10/17
Right Side	2788/897.6	RMC12.2K	0	0.757	0.417	-0.84	24.17	24.50	0.450	2023/10/17
Top Side	2788/897.6	RMC12.2K	0	0.178	0.093	0.71	24.17	24.50	0.100	2023/10/17
Bottom Side	2788/897.6	RMC12.2K	0	0.891	0.471	-2.53	24.17	24.50	0.508	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	2788/897.6	RMC12.2K	5	0.950	0.508	2.69	24.17	24.50	0.548	2023/10/17

9.1.5. SAR measurement Result of LTE Band 1

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	18300/1950	20M QPSK(1,0)	0	0.098	0.064	2.10	24.31	25.00	0.075	2023/10/27
Left Tilt 15 Degree	18300/1950	20M QPSK(1,0)	0	0.052	0.034	2.22	24.31	25.00	0.040	2023/10/27
Right Cheek	18300/1950	20M QPSK(1,0)	0	0.088	0.057	-2.25	24.31	25.00	0.067	2023/10/27
Right Tilt 15	18300/1950	20M QPSK(1,0)	0	0.044	0.028	-2.34	24.31	25.00	0.033	2023/10/27

Degree										
Extremity										
Front Side	18300/1950	20M QPSK(1,0)	0	0.840	0.445	-0.94	24.31	25.00	0.522	2023/10/27
Back Side	18300/1950	20M QPSK(1,0)	0	1.292	0.706	-0.37	24.31	25.00	0.828	2023/10/27
Left Side	18300/1950	20M QPSK(1,0)	0	0.711	0.373	1.39	24.31	25.00	0.437	2023/10/27
Right Side	18300/1950	20M QPSK(1,0)	0	0.646	0.346	2.86	24.31	25.00	0.406	2023/10/27
Top Side	18300/1950	20M QPSK(1,0)	0	0.181	0.097	-0.89	24.31	25.00	0.114	2023/10/27
Bottom Side	18300/1950	20M QPSK(1,0)	0	0.775	0.415	-3.75	24.31	25.00	0.486	2023/10/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	18300/1950	20M QPSK(1,0)	5	0.775	0.423	-1.78	24.31	25.00	0.496	2023/10/27

9.1.6. SAR measurement Result of LTE Band 3

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	19575/1747.5	20M QPSK(1,0)	0	0.038	0.029	2.64	22.93	24.00	0.037	2023/10/18
Left Tilt 15 Degree	19575/1747.5	20M QPSK(1,0)	0	0.020	0.018	2.24	22.93	24.00	0.023	2023/10/18
Right Cheek	19575/1747.5	20M QPSK(1,0)	0	0.033	0.025	-1.97	22.93	24.00	0.032	2023/10/18
Right Tilt 15 Degree	19575/1747.5	20M QPSK(1,0)	0	0.016	0.014	-2.94	22.93	24.00	0.018	2023/10/18
Extremity										
Front Side	19575/1747.5	20M QPSK(1,0)	0	0.698	0.373	-0.49	22.93	24.00	0.477	2023/10/18
Back Side	19575/1747.5	20M QPSK(1,0)	0	1.144	0.643	-0.17	22.93	24.00	0.823	2023/10/18

Left Side	19575/1747.5	20M QPSK(1,0)	0	0.583	0.321	-1.29	22.93	24.00	0.411	2023/10/18
Right Side	19575/1747.5	20M QPSK(1,0)	0	0.595	0.328	-1.31	22.93	24.00	0.420	2023/10/18
Top Side	19575/1747.5	20M QPSK(1,0)	0	0.160	0.089	3.09	22.93	24.00	0.114	2023/10/18
Bottom Side	19575/1747.5	20M QPSK(1,0)	0	0.698	0.381	2.78	22.93	24.00	0.487	2023/10/18
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	19575/1747.5	20M QPSK(1,0)	5	0.732	0.395	-1.67	22.93	24.00	0.505	2023/10/18

9.1.7. SAR measurement Result of LTE Band 7

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	21100/2535	20M QPSK(1,0)	0	0.057	0.037	3.55	23.22	24.50	0.050	2023/10/16
Left Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0	0.033	0.021	-0.37	23.22	24.50	0.028	2023/10/16
Right Cheek	21100/2535	20M QPSK(1,0)	0	0.053	0.034	1.87	23.22	24.50	0.046	2023/10/16
Right Tilt 15 Degree	21100/2535	20M QPSK(1,0)	0	0.025	0.016	-4.87	23.22	24.50	0.021	2023/10/16
Extremity										
Front Side	21100/2535	20M QPSK(1,0)	0	0.514	0.230	0.27	23.22	24.50	0.309	2023/10/16
Back Side	21100/2535	20M QPSK(1,0)	0	0.857	0.384	0.51	23.22	24.50	0.516	2023/10/16
Left Side	21100/2535	20M QPSK(1,0)	0	0.429	0.183	-3.56	23.22	24.50	0.246	2023/10/16
Right Side	21100/2535	20M QPSK(1,0)	0	0.463	0.203	0.26	23.22	24.50	0.273	2023/10/16
Top Side	21100/2535	20M QPSK(1,0)	0	0.094	0.042	-1.21	23.22	24.50	0.056	2023/10/16
Bottom	21100/2535	20M	0	0.514	0.223	-2.87	23.22	24.50	0.299	2023/10/16

Side		QPSK(1,0)								
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	21100/2535	20M QPSK(1,0)	5	0.523	0.225	-2.96	23.22	24.50	0.302	2023/10/16

9.1.8. SAR measurement Result of LTE Band 8

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	21625/897.5	10M QPSK(1,0)	0	0.083	0.065	0.31	23.33	23.50	0.068	2023/10/17
Left Tilt 15 Degree	21625/897.5	10M QPSK(1,0)	0	0.050	0.038	-1.71	23.33	23.50	0.040	2023/10/17
Right Cheek	21625/897.5	10M QPSK(1,0)	0	0.077	0.060	-2.63	23.33	23.50	0.062	2023/10/17
Right Tilt 15 Degree	21625/897.5	10M QPSK(1,0)	0	0.037	0.028	1.76	23.33	23.50	0.029	2023/10/17
Extremity										
Front Side	21625/897.5	10M QPSK(1,0)	0	0.878	0.457	1.53	23.33	23.50	0.475	2023/10/17
Back Side	21625/897.5	10M QPSK(1,0)	0	1.394	0.763	-0.78	23.33	23.50	0.793	2023/10/17
Left Side	21625/897.5	10M QPSK(1,0)	0	0.753	0.408	-0.08	23.33	23.50	0.424	2023/10/17
Right Side	21625/897.5	10M QPSK(1,0)	0	0.725	0.377	-3.63	23.33	23.50	0.392	2023/10/17
Top Side	21625/897.5	10M QPSK(1,0)	0	0.195	0.105	3.11	23.33	23.50	0.109	2023/10/17
Bottom Side	21625/897.5	10M QPSK(1,0)	0	0.906	0.496	-1.12	23.33	23.50	0.516	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	21625/897.5	10M QPSK(1,0)	5	0.906	0.486	-0.02	23.33	23.50	0.505	2023/10/17

9.1.9. SAR measurement Result of LTE Band 20

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	24300/847	20M QPSK(1,0)	0	0.072	0.057	4.51	23.27	23.50	0.060	2023/10/17
Left Tilt 15 Degree	24300/847	20M QPSK(1,0)	0	0.041	0.032	-2.11	23.27	23.50	0.034	2023/10/17
Right Cheek	24300/847	20M QPSK(1,0)	0	0.065	0.051	4.10	23.27	23.50	0.054	2023/10/17
Right Tilt 15 Degree	24300/847	20M QPSK(1,0)	0	0.030	0.024	-3.30	23.27	23.50	0.025	2023/10/17
Extremity										
Front Side	24300/847	20M QPSK(1,0)	0	0.685	0.379	-1.11	23.27	23.50	0.400	2023/10/17
Back Side	24300/847	20M QPSK(1,0)	0	1.142	0.645	-0.22	23.27	23.50	0.680	2023/10/17
Left Side	24300/847	20M QPSK(1,0)	0	0.571	0.323	2.41	23.27	23.50	0.341	2023/10/17
Right Side	24300/847	20M QPSK(1,0)	0	0.617	0.345	-1.40	23.27	23.50	0.364	2023/10/17
Top Side	24300/847	20M QPSK(1,0)	0	0.148	0.083	2.91	23.27	23.50	0.088	2023/10/17
Bottom Side	24300/847	20M QPSK(1,0)	0	0.719	0.398	3.69	23.27	23.50	0.420	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	24300/847	20M QPSK(1,0)	5	0.742	0.419	-1.53	23.27	23.50	0.442	2023/10/17

9.1.10. SAR measurement Result of LTE Band 28

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left	27460/728	20M	0	0.089	0.073	1.54	23.33	23.50	0.076	2023/10/26

Cheek		QPSK(1,0)								
Left Tilt 15 Degree	27460/728	20M QPSK(1,0)	0	0.046	0.037	0.23	23.33	23.50	0.038	2023/10/26
Right Cheek	27460/728	20M QPSK(1,0)	0	0.082	0.064	-0.42	23.33	23.50	0.067	2023/10/26
Right Tilt 15 Degree	27460/728	20M QPSK(1,0)	0	0.043	0.034	4.12	23.33	23.50	0.035	2023/10/26
Extremity										
Front Side	27460/728	20M QPSK(1,0)	0	0.483	0.265	1.00	23.33	23.50	0.276	2023/10/26
Back Side	27460/728	20M QPSK(1,0)	0	0.805	0.465	-0.32	23.33	23.50	0.484	2023/10/26
Left Side	27460/728	20M QPSK(1,0)	0	0.443	0.246	-3.06	23.33	23.50	0.256	2023/10/26
Right Side	27460/728	20M QPSK(1,0)	0	0.403	0.228	3.65	23.33	23.50	0.237	2023/10/26
Top Side	27460/728	20M QPSK(1,0)	0	0.097	0.054	3.48	23.33	23.50	0.056	2023/10/26
Bottom Side	27460/728	20M QPSK(1,0)	0	0.507	0.278	-1.03	23.33	23.50	0.289	2023/10/26
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	27460/728	20M QPSK(1,0)	5	0.523	0.296	1.33	23.33	23.50	0.308	2023/10/26

9.1.11. SAR measurement Result of LTE Band 34

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	36275/2017.5	15M QPSK(1,0)	0	0.055	0.037	1.32	22.94	24.50	0.053	2023/10/27
Left Tilt 15 Degree	36275/2017.5	15M QPSK(1,0)	0	0.029	0.020	-3.95	22.94	24.50	0.029	2023/10/27
Right Cheek	36275/2017.5	15M QPSK(1,0)	0	0.049	0.033	-1.63	22.94	24.50	0.047	2023/10/27
Right	36275/2017.5	15M	0	0.023	0.015	0.07	22.94	24.50	0.021	2023/10/27

Tilt 15 Degree		QPSK(1,0)								
Extremity										
Front Side	36275/2017.5	15M QPSK(1,0)	0	0.290	0.145	3.87	22.94	24.50	0.208	2023/10/27
Back Side	36275/2017.5	15M QPSK(1,0)	0	0.475	0.248	0.36	22.94	24.50	0.355	2023/10/27
Left Side	36275/2017.5	15M QPSK(1,0)	0	0.252	0.126	-1.67	22.94	24.50	0.180	2023/10/27
Right Side	36275/2017.5	15M QPSK(1,0)	0	0.261	0.131	1.84	22.94	24.50	0.188	2023/10/27
Top Side	36275/2017.5	15M QPSK(1,0)	0	0.067	0.035	-0.56	22.94	24.50	0.050	2023/10/27
Bottom Side	36275/2017.5	15M QPSK(1,0)	0	0.295	0.149	-2.69	22.94	24.50	0.213	2023/10/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	36275/2017.5	15M QPSK(1,0)	5	0.299	0.155	-2.28	22.94	24.50	0.222	2023/10/27

9.1.12. SAR measurement Result of LTE Band 38

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	38000/2595	20M QPSK(1,0)	0	0.060	0.040	-2.03	24.13	24.50	0.044	2023/10/16
Left Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0	0.031	0.020	3.09	24.13	24.50	0.022	2023/10/16
Right Cheek	38000/2595	20M QPSK(1,0)	0	0.055	0.035	1.04	24.13	24.50	0.038	2023/10/16
Right Tilt 15 Degree	38000/2595	20M QPSK(1,0)	0	0.025	0.016	-1.77	24.13	24.50	0.017	2023/10/16
Extremity										
Front Side	38000/2595	20M QPSK(1,0)	0	0.827	0.342	-0.47	24.13	24.50	0.372	2023/10/16
Back Side	38000/2595	20M QPSK(1,0)	0	1.355	0.561	-0.03	24.13	24.50	0.611	2023/10/16

Left Side	38000/2595	20M QPSK(1,0)	0	0.732	0.303	-1.66	24.13	24.50	0.330	2023/10/16
Right Side	38000/2595	20M QPSK(1,0)	0	0.691	0.286	2.92	24.13	24.50	0.311	2023/10/16
Top Side	38000/2595	20M QPSK(1,0)	0	0.203	0.082	-3.43	24.13	24.50	0.089	2023/10/16
Bottom Side	38000/2595	20M QPSK(1,0)	0	0.867	0.345	-0.19	24.13	24.50	0.376	2023/10/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	38000/2595	20M QPSK(1,0)	5	0.840	0.341	3.81	24.13	24.50	0.371	2023/10/16

9.1.13. SAR measurement Result of LTE Band 40

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	39150/2350	20M QPSK(1,0)	0	0.101	0.062	-1.06	21.82	22.50	0.073	2023/10/25
Left Tilt 15 Degree	39150/2350	20M QPSK(1,0)	0	0.060	0.036	4.74	21.82	22.50	0.042	2023/10/25
Right Cheek	39150/2350	20M QPSK(1,0)	0	0.095	0.058	-3.60	21.82	22.50	0.068	2023/10/25
Right Tilt 15 Degree	39150/2350	20M QPSK(1,0)	0	0.045	0.027	0.27	21.82	22.50	0.032	2023/10/25
Extremity										
Front Side	39150/2350	20M QPSK(1,0)	0	0.587	0.299	-0.24	21.82	22.50	0.350	2023/10/25
Back Side	39150/2350	20M QPSK(1,0)	0	0.932	0.480	0.61	21.82	22.50	0.561	2023/10/25
Left Side	39150/2350	20M QPSK(1,0)	0	0.475	0.237	-3.97	21.82	22.50	0.277	2023/10/25
Right Side	39150/2350	20M QPSK(1,0)	0	0.485	0.237	-3.42	21.82	22.50	0.277	2023/10/25
Top Side	39150/2350	20M QPSK(1,0)	0	0.140	0.070	-0.10	21.82	22.50	0.082	2023/10/25
Bottom	39150/2350	20M	0	0.559	0.276	1.25	21.82	22.50	0.323	2023/10/25

Side		QPSK(1,0)								
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	39150/2350	20M QPSK(1,0)	5	0.596	0.301	3.79	21.82	22.50	0.352	2023/10/25

9.1.14. SAR measurement Result of LTE Band 41

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	40620/2593	20M QPSK(1,0)	0	0.053	0.034	-2.28	24.42	25.00	0.039	2023/10/16
Left Tilt 15 Degree	40620/2593	20M QPSK(1,0)	0	0.030	0.018	-1.17	24.42	25.00	0.021	2023/10/16
Right Cheek	40620/2593	20M QPSK(1,0)	0	0.048	0.029	1.41	24.42	25.00	0.033	2023/10/16
Right Tilt 15 Degree	40620/2593	20M QPSK(1,0)	0	0.026	0.017	-0.43	24.42	25.00	0.019	2023/10/16
Extremity										
Front Side	40620/2593	20M QPSK(1,0)	0	0.659	0.260	3.93	24.42	25.00	0.297	2023/10/16
Back Side	40620/2593	20M QPSK(1,0)	0	1.030	0.427	0.23	24.42	25.00	0.488	2023/10/16
Left Side	40620/2593	20M QPSK(1,0)	0	0.546	0.217	1.01	24.42	25.00	0.248	2023/10/16
Right Side	40620/2593	20M QPSK(1,0)	0	0.515	0.211	-1.23	24.42	25.00	0.241	2023/10/16
Top Side	40620/2593	20M QPSK(1,0)	0	0.103	0.042	-0.37	24.42	25.00	0.048	2023/10/16
Bottom Side	40620/2593	20M QPSK(1,0)	0	0.649	0.258	1.92	24.42	25.00	0.295	2023/10/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	40620/2593	20M QPSK(1,0)	5	0.670	0.269	-2.37	24.42	25.00	0.307	2023/10/16

9.1.15. SAR measurement Result of NR SA n1

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	390000/1950	30kHz 20M QPSK(1,1)	0	0.082	0.045	2.45	22.00	23.00	0.057	2023/10/27
Left Tilt 15 Degree	390000/1950	30kHz 20M QPSK(1,1)	0	0.043	0.023	0.41	22.00	23.00	0.029	2023/10/27
Right Cheek	390000/1950	30kHz 20M QPSK(1,1)	0	0.075	0.041	3.39	22.00	23.00	0.052	2023/10/27
Right Tilt 15 Degree	390000/1950	30kHz 20M QPSK(1,1)	0	0.041	0.022	-3.32	22.00	23.00	0.028	2023/10/27
Extremity										
Front Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.341	0.175	1.84	22.00	23.00	0.220	2023/10/27
Back Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.559	0.295	-0.77	22.00	23.00	0.371	2023/10/27
Left Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.280	0.146	2.69	22.00	23.00	0.184	2023/10/27
Right Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.302	0.155	2.80	22.00	23.00	0.195	2023/10/27
Top Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.078	0.040	0.54	22.00	23.00	0.050	2023/10/27
Bottom Side	390000/1950	30kHz 20M QPSK(1,1)	0	0.335	0.170	-2.63	22.00	23.00	0.214	2023/10/27
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Bottom Side	390000/1950	30kHz 20M QPSK(1,1)	5	0.352	0.186	-1.97	22.00	23.00	0.234	2023/10/27

9.1.16. SAR measurement Result of NR SA n3

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	349500/1747.5	30kHz 30M	0	0.136	0.091	-3.22	23.69	24.50	0.110	2023/10/18

		QPSK(1,1)								
Left Tilt 15 Degree	349500/1747.5	30kHz 30M QPSK(1,1)	0	0.075	0.050	4.78	23.69	24.50	0.060	2023/10/18
Right Cheek	349500/1747.5	30kHz 30M QPSK(1,1)	0	0.120	0.079	3.18	23.69	24.50	0.095	2023/10/18
Right Tilt 15 Degree	349500/1747.5	30kHz 30M QPSK(1,1)	0	0.060	0.039	-0.95	23.69	24.50	0.047	2023/10/18
Extremity										
Front Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	6.118	0.785	2.68	23.69	24.50	0.946	2023/10/18
Back Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	9.559	1.226	-1.26	23.69	24.50	1.477	2023/10/18
Left Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	4.875	0.600	-1.64	23.69	24.50	0.723	2023/10/18
Right Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	5.257	0.661	-1.00	23.69	24.50	0.797	2023/10/18
Top Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	1.051	0.132	1.71	23.69	24.50	0.159	2023/10/18
Bottom Side	349500/1747.5	30kHz 30M QPSK(1,1)	0	5.735	0.736	0.98	23.69	24.50	0.887	2023/10/18
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Bottom Side	349500/1747.5	30kHz 30M QPSK(1,1)	5	3.824	0.523	-2.28	23.69	24.50	0.630	2023/10/18

9.1.17. SAR measurement Result of NR SA n7

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

Left Cheek	507000/2535	30kHz 20M QPSK(1,1)	0	0.026	0.020	-2.01	24.44	25.00	0.023	2023/10/16
Left Tilt 15 Degree	507000/2535	30kHz 20M QPSK(1,1)	0	0.014	0.012	-3.73	24.44	25.00	0.014	2023/10/16
Right Cheek	507000/2535	30kHz 20M QPSK(1,1)	0	0.023	0.017	1.55	24.44	25.00	0.019	2023/10/16
Right Tilt 15 Degree	507000/2535	30kHz 20M QPSK(1,1)	0	0.013	0.011	3.31	24.44	25.00	0.013	2023/10/16
Extremity										
Front Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.295	0.131	3.13	24.44	25.00	0.149	2023/10/16
Back Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.469	0.220	2.01	24.44	25.00	0.250	2023/10/16
Left Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.249	0.113	0.57	24.44	25.00	0.129	2023/10/16
Right Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.258	0.116	3.76	24.44	25.00	0.132	2023/10/16
Top Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.056	0.025	1.09	24.44	25.00	0.028	2023/10/16
Bottom Side	507000/2535	30kHz 20M QPSK(1,1)	0	0.286	0.131	-3.20	24.44	25.00	0.149	2023/10/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	507000/2535	30kHz 20M QPSK(1,1)	5	0.281	0.132	-2.77	24.44	25.00	0.150	2023/10/16

9.1.18. SAR measurement Result of NR SA n8

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	179500/897.5	30kHz 20M QPSK(1,1)	0	0.042	0.034	-1.60	23.73	24.50	0.041	2023/10/17
Left Tilt 15 Degree	179500/897.5	30kHz 20M QPSK(1,1)	0	0.022	0.017	-2.72	23.73	24.50	0.020	2023/10/17
Right Cheek	179500/897.5	30kHz 20M QPSK(1,1)	0	0.039	0.030	-3.10	23.73	24.50	0.036	2023/10/17

Right Tilt 15 Degree	179500/897.5	30kHz 20M QPSK(1,1)	0	0.020	0.018	-5.00	23.73	24.50	0.021	2023/10/17
Extremity										
Front Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.355	0.193	-1.14	23.73	24.50	0.230	2023/10/17
Back Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.554	0.310	0.07	23.73	24.50	0.370	2023/10/17
Left Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.277	0.155	2.73	23.73	24.50	0.185	2023/10/17
Right Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.299	0.167	-3.59	23.73	24.50	0.199	2023/10/17
Top Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.066	0.035	2.28	23.73	24.50	0.042	2023/10/17
Bottom Side	179500/897.5	30kHz 20M QPSK(1,1)	0	0.332	0.180	2.68	23.73	24.50	0.215	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Bottom Side	179500/897.5	30kHz 20M QPSK(1,1)	5	0.360	0.193	-1.08	23.73	24.50	0.230	2023/10/17

9.1.19. SAR measurement Result of NR SA n20

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	169400/847	30kHz 20M QPSK(1,1)	0	0.043	0.036	1.31	23.16	24.50	0.049	2023/10/17
Left Tilt 15 Degree	169400/847	30kHz 20M QPSK(1,1)	0	0.025	0.021	-1.74	23.16	24.50	0.029	2023/10/17
Right Cheek	169400/847	30kHz 20M QPSK(1,1)	0	0.039	0.032	2.13	23.16	24.50	0.044	2023/10/17
Right Tilt 15 Degree	169400/847	30kHz 20M QPSK(1,1)	0	0.021	0.017	-3.41	23.16	24.50	0.023	2023/10/17
Extremity										
Front Side	169400/847	30kHz 20M QPSK(1,1)	0	0.301	0.168	-0.80	23.16	24.50	0.229	2023/10/17
Back	169400/847	30kHz 20M	0	0.486	0.280	1.73	23.16	24.50	0.381	2023/10/17

Side		QPSK(1,1)								
Left Side	169400/847	30kHz 20M QPSK(1,1)	0	0.253	0.144	3.25	23.16	24.50	0.196	2023/10/17
Right Side	169400/847	30kHz 20M QPSK(1,1)	0	0.258	0.147	3.70	23.16	24.50	0.200	2023/10/17
Top Side	169400/847	30kHz 20M QPSK(1,1)	0	0.073	0.041	-2.84	23.16	24.50	0.056	2023/10/17
Bottom Side	169400/847	30kHz 20M QPSK(1,1)	0	0.306	0.175	3.98	23.16	24.50	0.238	2023/10/17
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Bottom Side	169400/847	30kHz 20M QPSK(1,1)	5	0.311	0.176	-1.73	23.16	24.50	0.240	2023/10/17

9.1.20. SAR measurement Result of NR SA n28

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	145100/725.5	30kHz 20M QPSK(1,1)	0	0.061	0.051	-2.77	23.69	24.50	0.061	2023/10/26
Left Tilt 15 Degree	145100/725.5	30kHz 20M QPSK(1,1)	0	0.033	0.028	2.95	23.69	24.50	0.034	2023/10/26
Right Cheek	145100/725.5	30kHz 20M QPSK(1,1)	0	0.054	0.043	4.60	23.69	24.50	0.052	2023/10/26
Right Tilt 15 Degree	145100/725.5	30kHz 20M QPSK(1,1)	0	0.028	0.023	-4.05	23.69	24.50	0.028	2023/10/26
Extremity										
Front Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.333	0.187	2.31	23.69	24.50	0.225	2023/10/26
Back Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.520	0.301	-0.41	23.69	24.50	0.363	2023/10/26
Left Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.265	0.146	-1.53	23.69	24.50	0.176	2023/10/26
Right Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.286	0.164	-3.09	23.69	24.50	0.198	2023/10/26
Top Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.073	0.041	-0.50	23.69	24.50	0.049	2023/10/26

Bottom Side	145100/725.5	30kHz 20M QPSK(1,1)	0	0.317	0.182	2.20	23.69	24.50	0.219	2023/10/26
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Bottom Side	145100/725.5	30kHz 20M QPSK(1,1)	5	0.317	0.180	-3.41	23.69	24.50	0.217	2023/10/26

9.1.21. SAR measurement Result of NR SA n38

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	519000/2595	30kHz 20M QPSK(1,1)	0	0.041	0.027	2.39	24.73	25.50	0.032	2023/10/16
Left Tilt 15 Degree	519000/2595	30kHz 20M QPSK(1,1)	0	0.021	0.014	4.91	24.73	25.50	0.017	2023/10/16
Right Cheek	519000/2595	30kHz 20M QPSK(1,1)	0	0.038	0.024	-4.25	24.73	25.50	0.029	2023/10/16
Right Tilt 15 Degree	519000/2595	30kHz 20M QPSK(1,1)	0	0.020	0.018	-0.84	24.73	25.50	0.021	2023/10/16
Extremity										
Front Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.410	0.186	-2.05	24.73	25.50	0.222	2023/10/16
Back Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.672	0.305	1.50	24.73	25.50	0.364	2023/10/16
Left Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.349	0.152	1.70	24.73	25.50	0.181	2023/10/16
Right Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.349	0.158	-3.12	24.73	25.50	0.189	2023/10/16
Top Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.101	0.045	-1.31	24.73	25.50	0.054	2023/10/16
Bottom Side	519000/2595	30kHz 20M QPSK(1,1)	0	0.437	0.194	-0.77	24.73	25.50	0.232	2023/10/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	519000/2595	30kHz 20M QPSK(1,1)	5	0.417	0.180	3.72	24.73	25.50	0.215	2023/10/16

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

Left Cheek	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.041	0.028	2.24	19.76	21.50	0.042	2023/10/16
Left Tilt 15 Degree	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.023	0.015	1.02	19.76	21.50	0.022	2023/10/16
Right Cheek	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.035	0.023	0.15	19.76	21.50	0.034	2023/10/16
Right Tilt 15 Degree	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.018	0.016	2.37	19.76	21.50	0.024	2023/10/16
Extremity										
Front Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.309	0.142	3.32	19.76	21.50	0.212	2023/10/16
Back Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.507	0.236	0.41	19.76	21.50	0.352	2023/10/16
Left Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.259	0.115	2.41	19.76	21.50	0.172	2023/10/16
Right Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.264	0.122	-0.60	19.76	21.50	0.182	2023/10/16
Top Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.051	0.024	-1.76	19.76	21.50	0.036	2023/10/16
Bottom Side	518598/2592.99	30kHz 100M QPSK(1,1)	0	0.314	0.139	-0.48	19.76	21.50	0.207	2023/10/16
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	518598/2592.99	30kHz 100M QPSK(1,1)	5	0.309	0.141	1.81	19.76	21.50	0.210	2023/10/16

9.1.24. SAR measurement Result of NR SA n77

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

									(W/Kg)	
Head										
Left Cheek	650000/3750	30kHz 100M QPSK(1,1)	0	0.625	0.266	-0.85	20.22	22.00	0.401	2023/10/20
Left Tilt 15 Degree	650000/3750	30kHz 100M QPSK(1,1)	0	0.362	0.149	4.12	20.22	22.00	0.224	2023/10/20
Right Cheek	650000/3750	30kHz 100M QPSK(1,1)	0	0.574	0.237	3.21	20.22	22.00	0.357	2023/10/20
Right Tilt 15 Degree	650000/3750	30kHz 100M QPSK(1,1)	0	0.260	0.106	1.26	20.22	22.00	0.160	2023/10/20
Extremity										
Front Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.603	0.223	2.96	20.22	22.00	0.336	2023/10/20
Back Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.928	0.361	2.47	20.22	22.00	0.544	2023/10/20
Left Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.464	0.177	-1.62	20.22	22.00	0.267	2023/10/20
Right Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.464	0.179	1.19	20.22	22.00	0.270	2023/10/20
Top Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.102	0.038	-2.70	20.22	22.00	0.057	2023/10/20
Bottom Side	650000/3750	30kHz 100M QPSK(1,1)	0	0.557	0.206	0.42	20.22	22.00	0.310	2023/10/20
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	650000/3750	30kHz 100M QPSK(1,1)	5	0.594	0.224	-0.91	20.22	22.00	0.337	2023/10/20

9.1.25. SAR measurement Result of NR SA n78

Test	Test channel	Test Mode	Separation	SAR Value	Power	Conducted	Tune-up	Scaled	Date
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Position	/Freq.		distance (mm)	(W/kg)		Drift (±5%)	power (dBm)	power (dBm)	SAR 10g (W/Kg)	
				1g	10g					
Head										
Left Cheek	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.341	0.155	-2.42	19.75	21.50	0.232	2023/10/19
Left Tilt 15 Degree	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.198	0.089	-1.98	19.75	21.50	0.133	2023/10/19
Right Cheek	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.317	0.137	4.63	19.75	21.50	0.205	2023/10/19
Right Tilt 15 Degree	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.171	0.075	-4.95	19.75	21.50	0.112	2023/10/19
Extremity										
Front Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.465	0.185	-2.29	19.75	21.50	0.277	2023/10/19
Back Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.715	0.284	1.40	19.75	21.50	0.425	2023/10/19
Left Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.372	0.142	-2.04	19.75	21.50	0.212	2023/10/19
Right Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.358	0.141	3.73	19.75	21.50	0.211	2023/10/19
Top Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.100	0.040	-2.25	19.75	21.50	0.060	2023/10/19
Bottom Side	636666/3549.99	30kHz 100M QPSK(1,1)	0	0.465	0.177	0.06	19.75	21.50	0.265	2023/10/19
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	636666/3549.99	30kHz 100M QPSK(1,1)	5	0.450	0.177	-3.07	19.75	21.50	0.265	2023/10/19

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

Left Cheek	7/2442	802.11 b	0	0.372	0.186	-0.42	14.55	15.00	0.206	2023/10/28
Left Tilt 15 Degree	7/2442	802.11 b	0	0.218	0.106	-0.84	14.55	15.00	0.118	2023/10/28
Right Cheek	7/2442	802.11 b	0	0.345	0.167	-0.80	14.55	15.00	0.185	2023/10/28
Right Tilt 15 Degree	7/2442	802.11 b	0	0.174	0.084	-4.26	14.55	15.00	0.093	2023/10/28
Extremity										
Front Side	7/2442	802.11 b	0	0.173	0.090	0.68	14.55	15.00	0.100	2023/10/28
Back Side	7/2442	802.11 b	0	0.284	0.148	-1.13	14.55	15.00	0.164	2023/10/28
Left Side	7/2442	802.11 b	0	0.028	0.014	0.14	14.55	15.00	0.016	2023/10/28
Right Side	7/2442	802.11 b	0	0.145	0.076	3.06	14.55	15.00	0.084	2023/10/28
Top Side	7/2442	802.11 b	0	0.202	0.102	-3.57	14.55	15.00	0.113	2023/10/28
Bottom Side	7/2442	802.11 b	0	0.028	0.014	2.37	14.55	15.00	0.016	2023/10/28
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	7/2442	802.11 b	5	0.182	0.092	1.99	14.55	15.00	0.102	2023/10/28

9.1.28. SAR measurement Result of ANT1 WLAN 5.2G

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	42/5210	802.11 ax80	0	0.974	0.426	0.04	13.13	13.50	0.464	2023/10/21
Left Tilt 15 Degree	42/5210	802.11 ax80	0	0.573	0.248	2.09	13.13	13.50	0.270	2023/10/21
Right Cheek	42/5210	802.11 ax80	0	0.889	0.369	-2.26	13.13	13.50	0.402	2023/10/21

Right Tilt 15 Degree	42/5210	802.11 ax80	0	0.432	0.189	2.58	13.13	13.50	0.206	2023/10/21
Extremity										
Front Side	42/5210	802.11 ax80	0	0.963	0.366	0.24	13.13	13.50	0.399	2023/10/21
Back Side	42/5210	802.11 ax80	0	1.554	0.615	-2.37	13.13	13.50	0.670	2023/10/21
Left Side	42/5210	802.11 ax80	0	0.233	0.088	-3.97	13.13	13.50	0.096	2023/10/21
Right Side	42/5210	802.11 ax80	0	0.777	0.295	1.77	13.13	13.50	0.321	2023/10/21
Top Side	42/5210	802.11 ax80	0	1.166	0.461	-3.28	13.13	13.50	0.502	2023/10/21
Bottom Side	42/5210	802.11 ax80	0	0.171	0.064	-1.32	13.13	13.50	0.070	2023/10/21
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	42/5210	802.11 ax80	5	0.699	0.263	-0.58	13.13	13.50	0.286	2023/10/21

9.1.29. SAR measurement Result of ANT2 WLAN 5.2G

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	38/5190	802.11 ax40	0	0.423	0.168	0.18	12.78	13.00	0.177	2023/10/21
Left Tilt 15 Degree	38/5190	802.11 ax40	0	0.244	0.096	-1.57	12.78	13.00	0.101	2023/10/21
Right Cheek	38/5190	802.11 ax40	0	0.367	0.138	-4.77	12.78	13.00	0.145	2023/10/21
Right Tilt 15 Degree	38/5190	802.11 ax40	0	0.188	0.072	1.73	12.78	13.00	0.076	2023/10/21
Extremity										
Front Side	38/5190	802.11 ax40	0	0.575	0.205	0.87	12.78	13.00	0.216	2023/10/21
Back	38/5190	802.11	0	0.943	0.346	1.24	12.78	13.00	0.364	2023/10/21

Side		ax40								
Left Side	38/5190	802.11 ax40	0	0.123	0.044	2.86	12.78	13.00	0.046	2023/10/21
Right Side	38/5190	802.11 ax40	0	0.509	0.181	2.03	12.78	13.00	0.190	2023/10/21
Top Side	38/5190	802.11 ax40	0	0.698	0.251	1.34	12.78	13.00	0.264	2023/10/21
Bottom Side	38/5190	802.11 ax40	0	0.123	0.045	-2.29	12.78	13.00	0.047	2023/10/21
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	38/5190	802.11 ax40	5	0.424	0.149	2.45	12.78	13.00	0.157	2023/10/21

9.1.30. SAR measurement Result of ANT1 WLAN 5.8G

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	159/5795	802.11 ax40	0	0.792	0.314	0.36	11.61	12.00	0.344	2023/10/22
Left Tilt 15 Degree	159/5795	802.11 ax40	0	0.421	0.160	4.83	11.61	12.00	0.175	2023/10/22
Right Cheek	159/5795	802.11 ax40	0	0.685	0.261	1.77	11.61	12.00	0.286	2023/10/22
Right Tilt 15 Degree	159/5795	802.11 ax40	0	0.338	0.131	0.55	11.61	12.00	0.143	2023/10/22
Extremity										
Front Side	159/5795	802.11 ax40	0	1.000	0.385	3.78	11.61	12.00	0.421	2023/10/22
Back Side	159/5795	802.11 ax40	0	1.640	0.665	3.89	11.61	12.00	0.727	2023/10/22
Left Side	159/5795	802.11 ax40	0	0.213	0.086	-0.16	11.61	12.00	0.094	2023/10/22
Right Side	159/5795	802.11 ax40	0	0.869	0.342	3.56	11.61	12.00	0.374	2023/10/22
Top Side	159/5795	802.11 ax40	0	1.214	0.477	-1.88	11.61	12.00	0.522	2023/10/22

Bottom Side	159/5795	802.11 ax40	0	0.246	0.100	-3.36	11.61	12.00	0.109	2023/10/22
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	159/5795	802.11 ax40	5	0.689	0.271	1.60	11.61	12.00	0.296	2023/10/22

9.1.31. SAR measurement Result of ANT2 WLAN 5.8G

Test Position	Test channel /Freq.	Test Mode	Separation distance (mm)	SAR Value (W/kg)		Power Drift (±5%)	Conducted power (dBm)	Tune-up power (dBm)	Scaled SAR 10g (W/Kg)	Date
				1g	10g					
Head										
Left Cheek	157/5785	802.11 ax20	0	0.618	0.219	-1.08	11.30	12.00	0.257	2023/10/22
Left Tilt 15 Degree	157/5785	802.11 ax20	0	0.364	0.123	2.81	11.30	12.00	0.145	2023/10/22
Right Cheek	157/5785	802.11 ax20	0	0.570	0.196	4.52	11.30	12.00	0.230	2023/10/22
Right Tilt 15 Degree	157/5785	802.11 ax20	0	0.300	0.105	-2.64	11.30	12.00	0.123	2023/10/22
Extremity										
Front Side	157/5785	802.11 ax20	0	0.544	0.190	1.47	11.30	12.00	0.223	2023/10/22
Back Side	157/5785	802.11 ax20	0	0.906	0.326	-3.43	11.30	12.00	0.383	2023/10/22
Left Side	157/5785	802.11 ax20	0	0.118	0.042	3.11	11.30	12.00	0.049	2023/10/22
Right Side	157/5785	802.11 ax20	0	0.471	0.166	3.60	11.30	12.00	0.195	2023/10/22
Top Side	157/5785	802.11 ax20	0	0.661	0.235	3.82	11.30	12.00	0.276	2023/10/22
Bottom Side	157/5785	802.11 ax20	0	0.100	0.036	-2.67	11.30	12.00	0.042	2023/10/22
Body & Hotspot with 5mm (Worst-case position for 0mm)										
Back Side	157/5785	802.11 ax20	5	0.408	0.139	3.93	11.30	12.00	0.163	2023/10/22

9.2. Simultaneous Transmission Analysis

Refer to EN 62209-2:2010 Annex K, the secondary transmitter SAR test exclusion thresholds are determined by:

$$P_{\text{available}} = P_{\text{th,m}} \left(\frac{\text{SAR}_{\text{lim}} - \text{SAR}_1}{\text{SAR}_{\text{lim}}} \right)$$

$P_{\text{th,m}}$ is the threshold exclusion power level taken from Annex B of EN 62479.

Mode	P_{max} (dBm)	P_{max} (mW)	$P_{\text{th,m}}$ (mW)	SAR_{lim} (W/Kg)	SAR_1 (W/Kg)	Calculation Result (mW)	Simultaneous Transmission Exclusion
Bluetooth	8.00	6.31	20	2	1.349	6.51	YES
Bluetooth	8.00	6.31	40	4	2.875	11.25	YES
NFC	0.02	1.0	20	2	1.349	6.51	YES
NFC	0.02	1.0	40	4	2.875	11.25	YES

9.3. Exposure Conditions

Exposure Position		PCE Band	NR SA	WLAN ANT1	WLAN ANT2	Simultaneous Tx SAR(W/Kg)
		SAR(W/Kg)	SAR(W/Kg)	SAR(W/Kg)	SAR(W/Kg)	
Head	Left Cheek	0.121	0.401	0.464	0.257	1.243
	Left Tilt 15 Degree	0.066	0.224	0.270	0.145	0.705
	Right Cheek	0.113	0.357	0.402	0.230	1.102
	Right Tilt 15 Degree	0.050	0.160	0.206	0.123	0.539
Member	Front Side	0.836	0.946	0.421	0.223	2.426
	Back Side	1.398	1.477	0.727	0.383	3.985
	Left Side	0.740	0.723	0.096	0.049	1.608
	Right Side	0.711	0.797	0.374	0.195	2.077
	Top	0.186	0.159	0.522	0.276	1.143

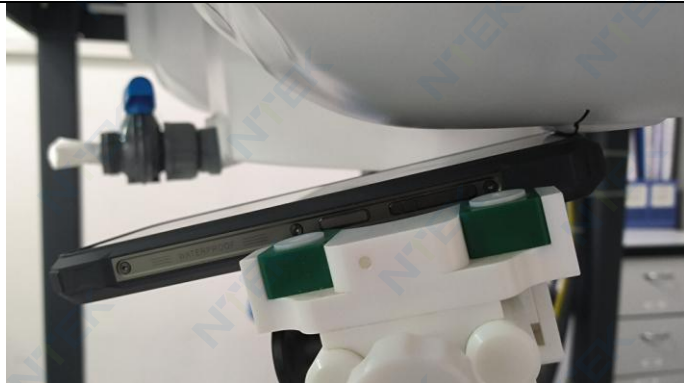
	Side					
	Bottom Side	0.872	0.887	0.109	0.047	1.915
Body&Hotspot	Back Side	0.719	0.630	0.296	0.163	1.808

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

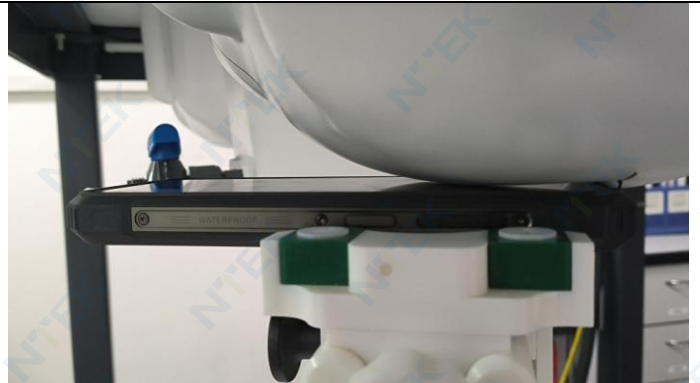
10. Appendix A. Photo documentation

Test Positions

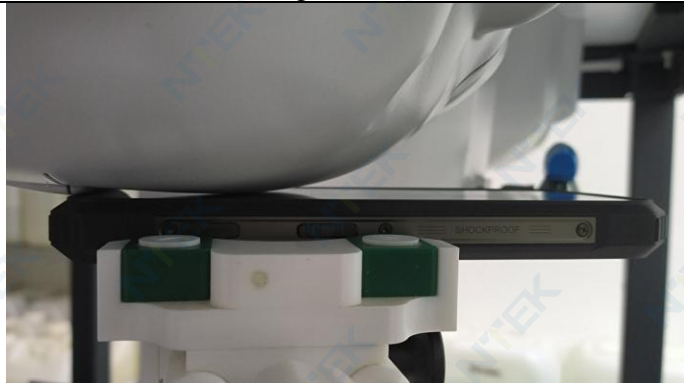
Left Cheek



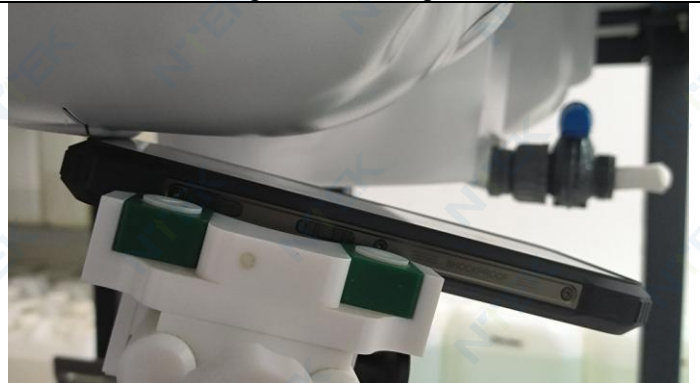
Left Tilt 15 Degree



Right Cheek



Right Tilt 15 Degree



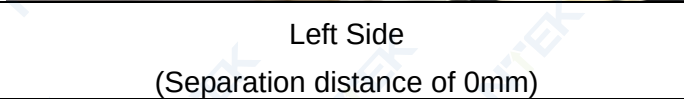
Front Side
(Separation distance of 0mm)



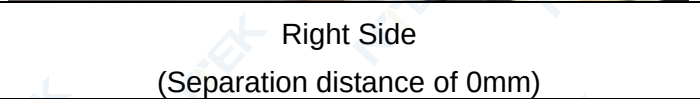
Back Side
(Separation distance of 0mm)



Left Side
(Separation distance of 0mm)



Right Side
(Separation distance of 0mm)





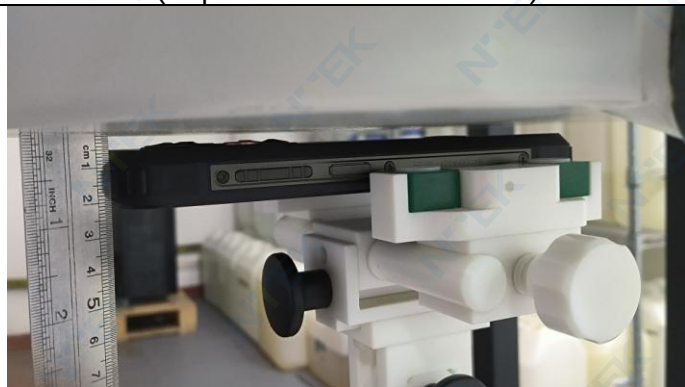
Top Side
(Separation distance of 0mm)



Bottom Side
(Separation distance of 0mm)



Back Side
(Separation distance of 5mm)



11. Appendix B. System Check Plots

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MEASUREMENT 1 System Performance Check - 750MHz
MEASUREMENT 2 System Performance Check - 900MHz
MEASUREMENT 3 System Performance Check - 1800MHz
MEASUREMENT 4 System Performance Check - 2000MHz
MEASUREMENT 5 System Performance Check - 2300MHz
MEASUREMENT 6 System Performance Check - 2450MHz
MEASUREMENT 7 System Performance Check - 2600MHz
MEASUREMENT 8 System Performance Check - 3500MHz
MEASUREMENT 9 System Performance Check - 3700MHz
MEASUREMENT 10 System Performance Check - 5200MHz
MEASUREMENT 11 System Performance Check - 5800MHz

MEASUREMENT 1

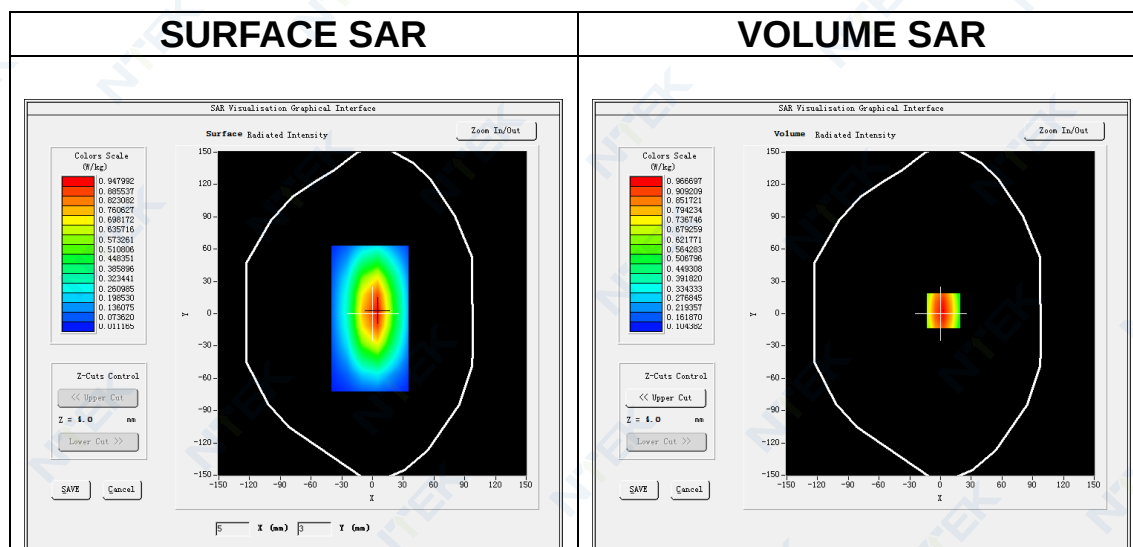
Date of measurement: 26/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW750</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

B. SAR Measurement Results

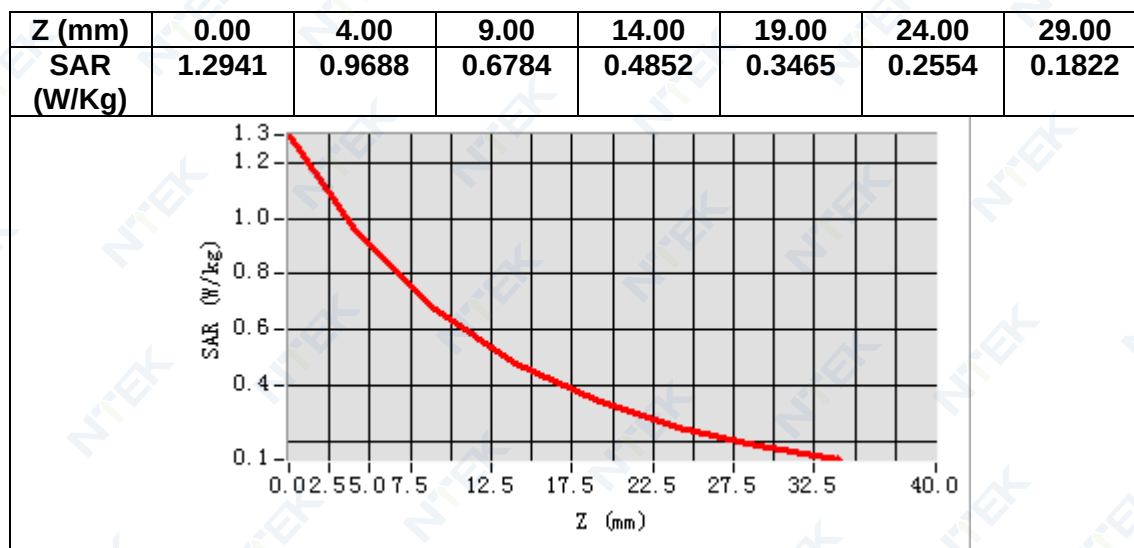
Frequency (MHz)	750.000000
Relative permittivity (real part)	42.327147
Relative permittivity (imaginary part)	22.234427
Conductivity (S/m)	0.926434
Variation (%)	2.220000



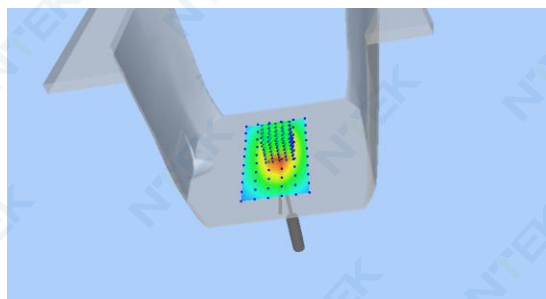
Maximum location: X=3.00, Y=3.00

SAR Peak: 1.30 W/kg

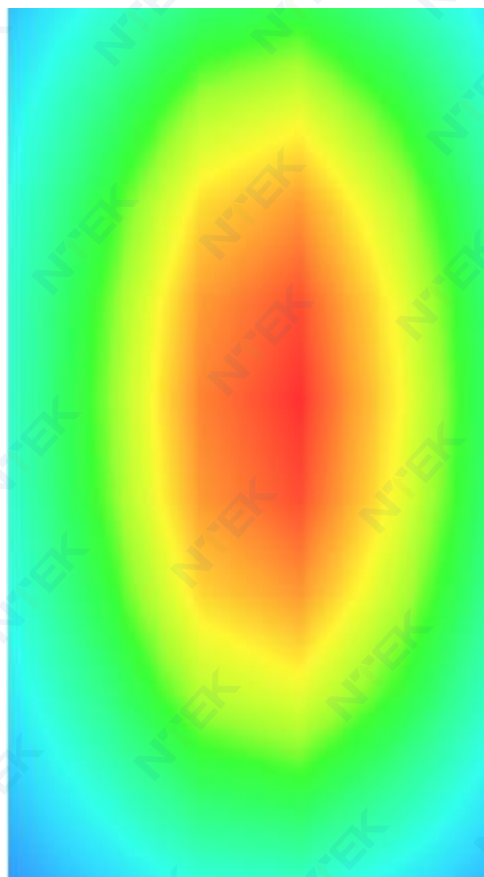
SAR 10g (W/Kg)	0.523283
SAR 1g (W/Kg)	0.800245



3D screen shot



Hot spot position



MEASUREMENT 2

Date of measurement: 17/10/2023

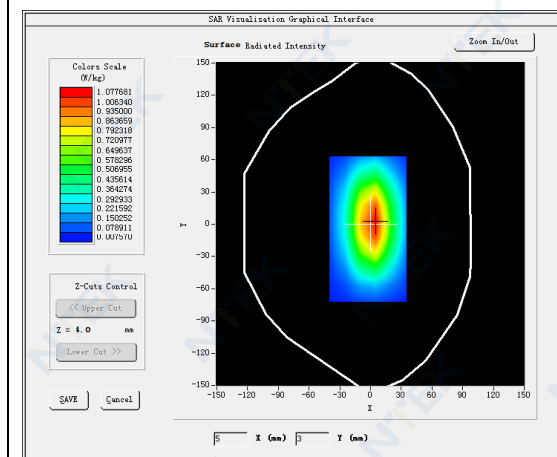
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

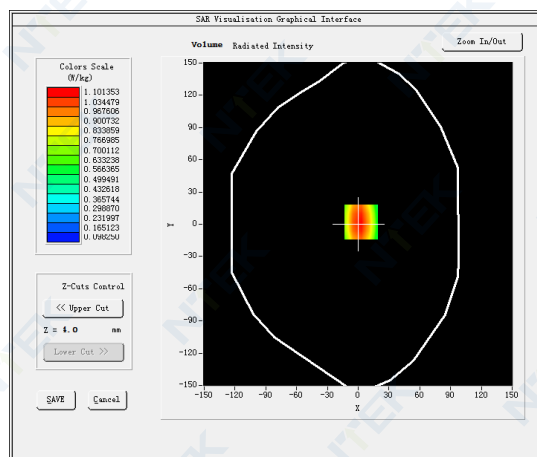
B. SAR Measurement Results

Frequency (MHz)	900.000000
Relative permittivity (real part)	42.145651
Relative permittivity (imaginary part)	19.902681
Conductivity (S/m)	0.995134
Variation (%)	-3.380000

SURFACE SAR



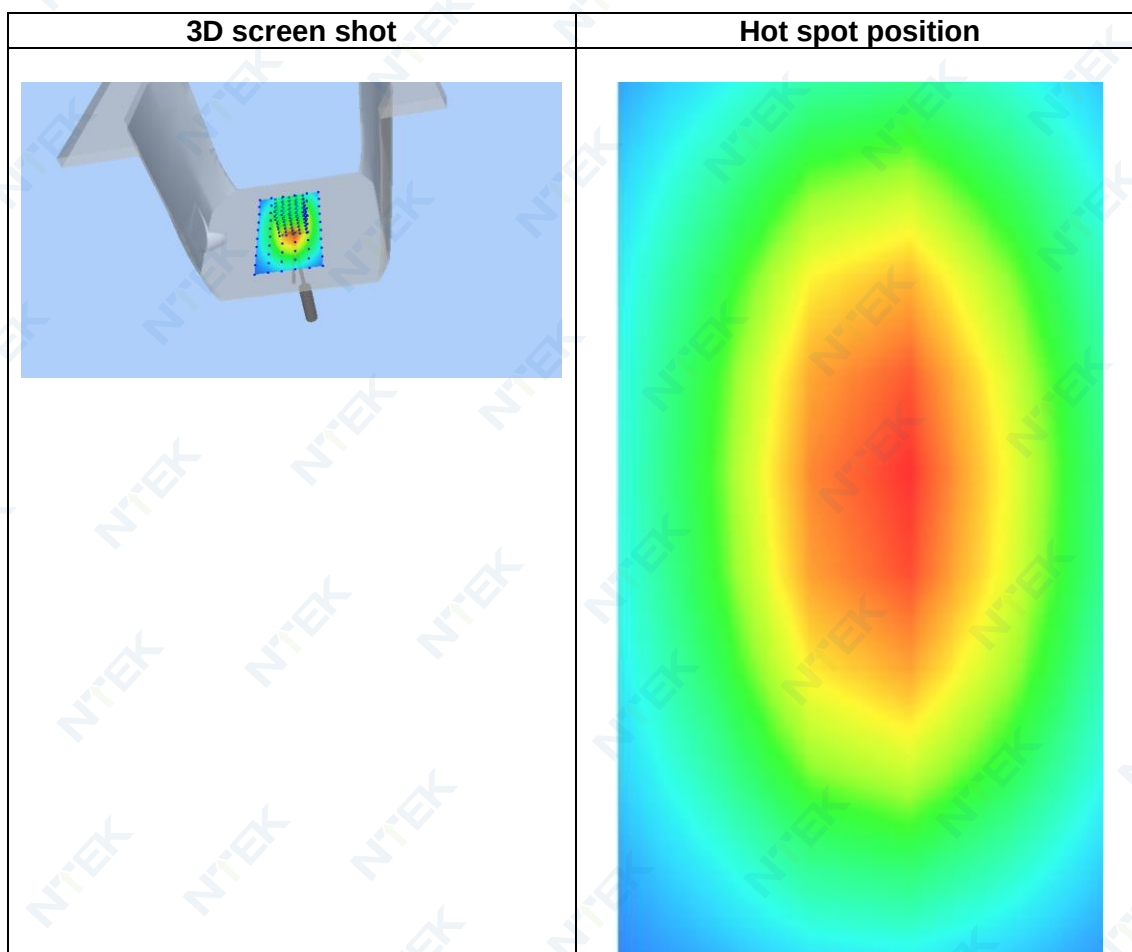
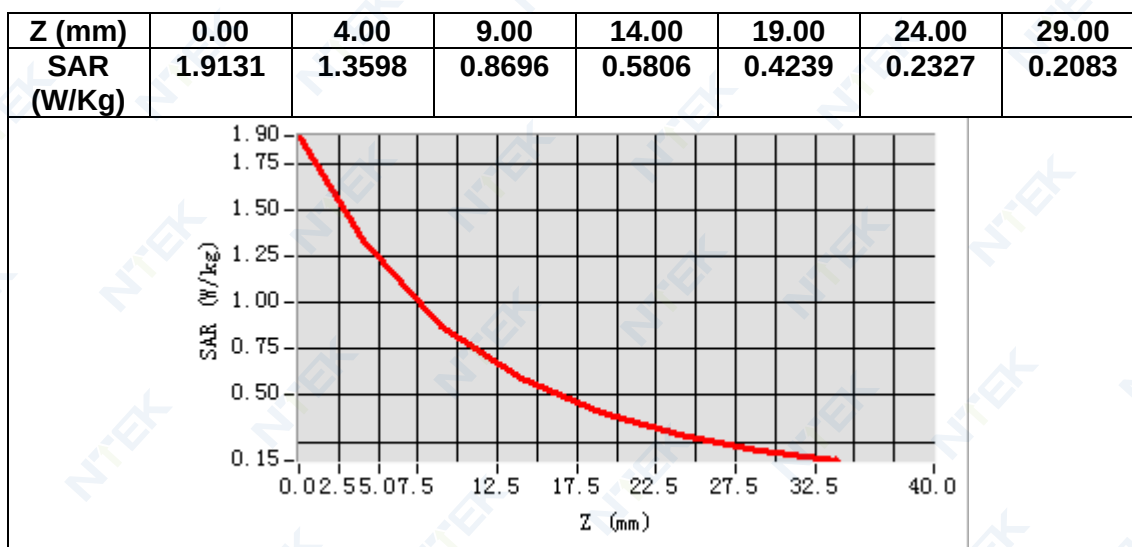
VOLUME SAR



Maximum location: X=3.00, Y=3.00

SAR Peak: 1.90 W/kg

SAR 10g (W/Kg)	0.646064
SAR 1g (W/Kg)	1.167219



MEASUREMENT 3

Date of measurement: 18/10/2023

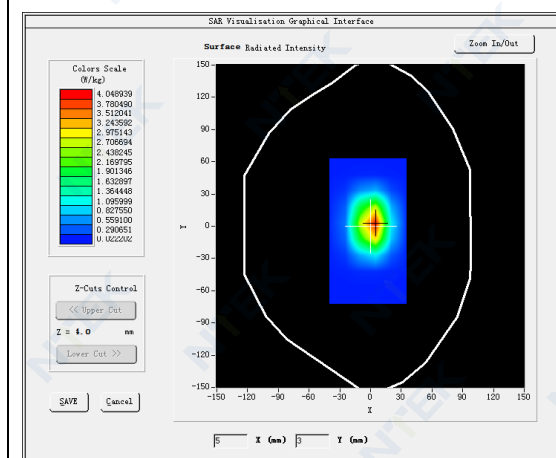
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

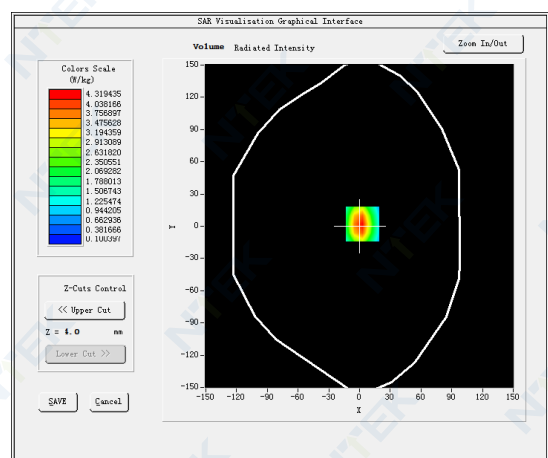
B. SAR Measurement Results

Frequency (MHz)	1800.000000
Relative permittivity (real part)	39.367644
Relative permittivity (imaginary part)	13.735842
Conductivity (S/m)	1.373584
Variation (%)	-1.360000

SURFACE SAR



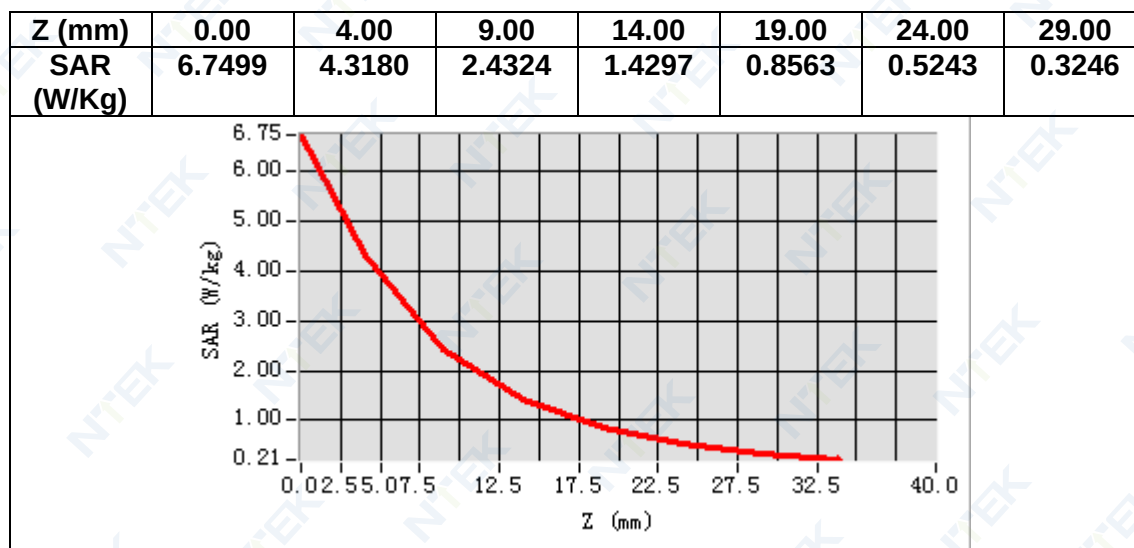
VOLUME SAR



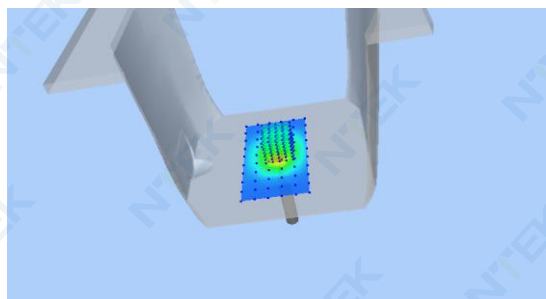
Maximum location: X=3.00, Y=2.00

SAR Peak: 6.82 W/kg

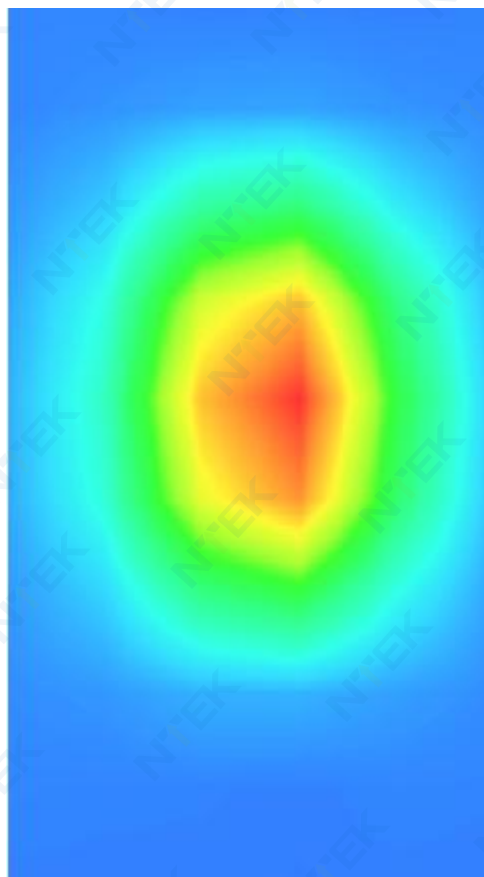
SAR 10g (W/Kg)	2.083340
SAR 1g (W/Kg)	3.662033



3D screen shot



Hot spot position



MEASUREMENT 4

Date of measurement: 27/10/2023

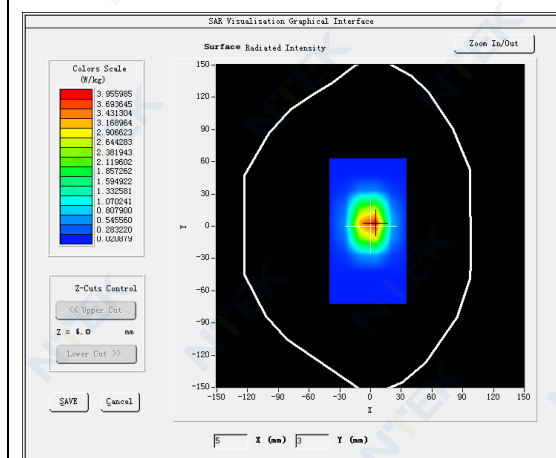
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2000</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

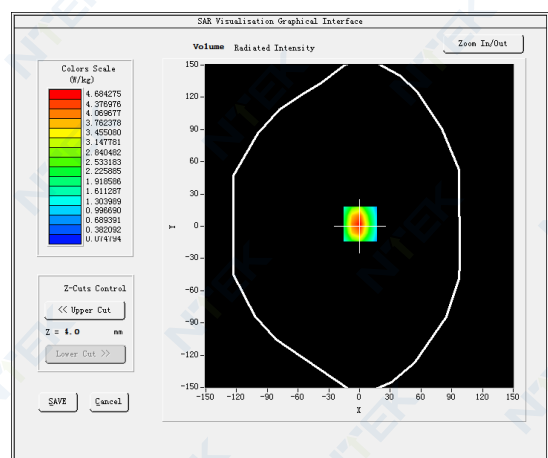
B. SAR Measurement Results

Frequency (MHz)	2000.000000
Relative permittivity (real part)	38.995879
Relative permittivity (imaginary part)	12.911656
Conductivity (S/m)	1.434628
Variation (%)	3.930000

SURFACE SAR



VOLUME SAR

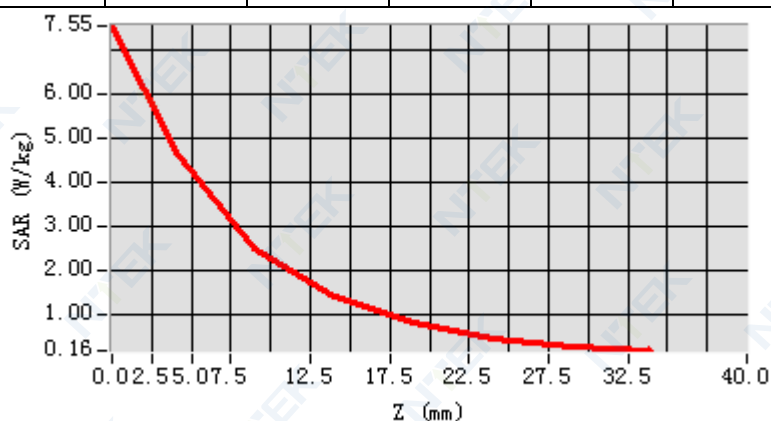


Maximum location: X=1.00, Y=2.00

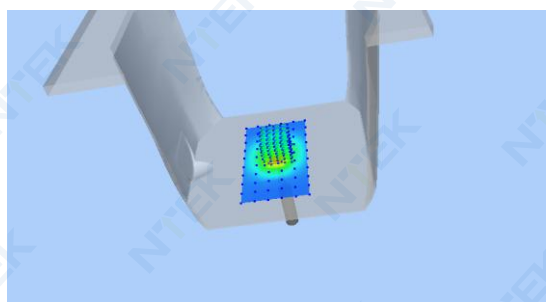
SAR Peak: 7.65 W/kg

SAR 10g (W/Kg)	2.087170
SAR 1g (W/Kg)	3.837023

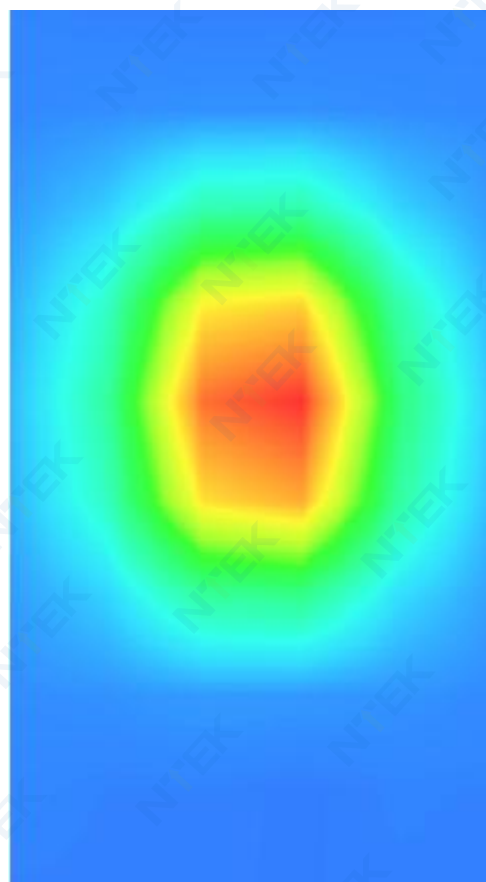
Z (mm)	0.00	4.00	9.00	14.00	19.00	24.00	29.00
SAR (W/Kg)	7.5448	4.6814	2.5083	1.3809	0.7729	0.4447	0.2647



3D screen shot



Hot spot position



MEASUREMENT 5

Date of measurement: 25/10/2023

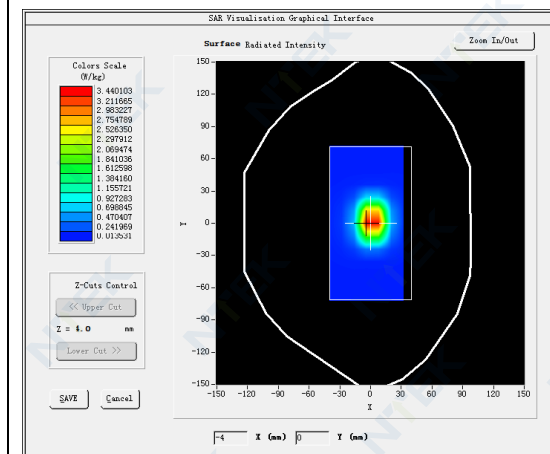
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2300</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.81</u>

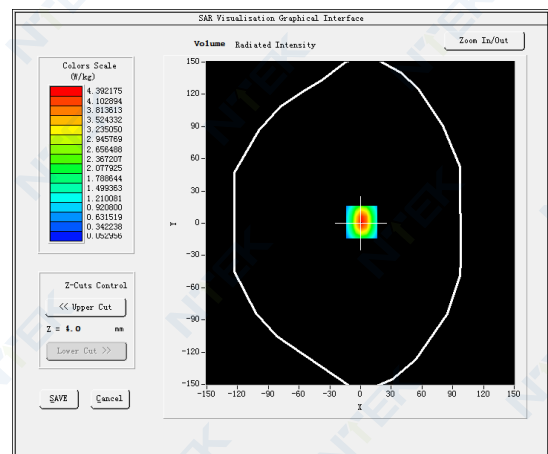
B. SAR Measurement Results

Frequency (MHz)	2300.000000
Relative permittivity (real part)	39.838315
Relative permittivity (imaginary part)	12.789993
Conductivity (S/m)	1.634277
Variation (%)	3.620000

SURFACE SAR



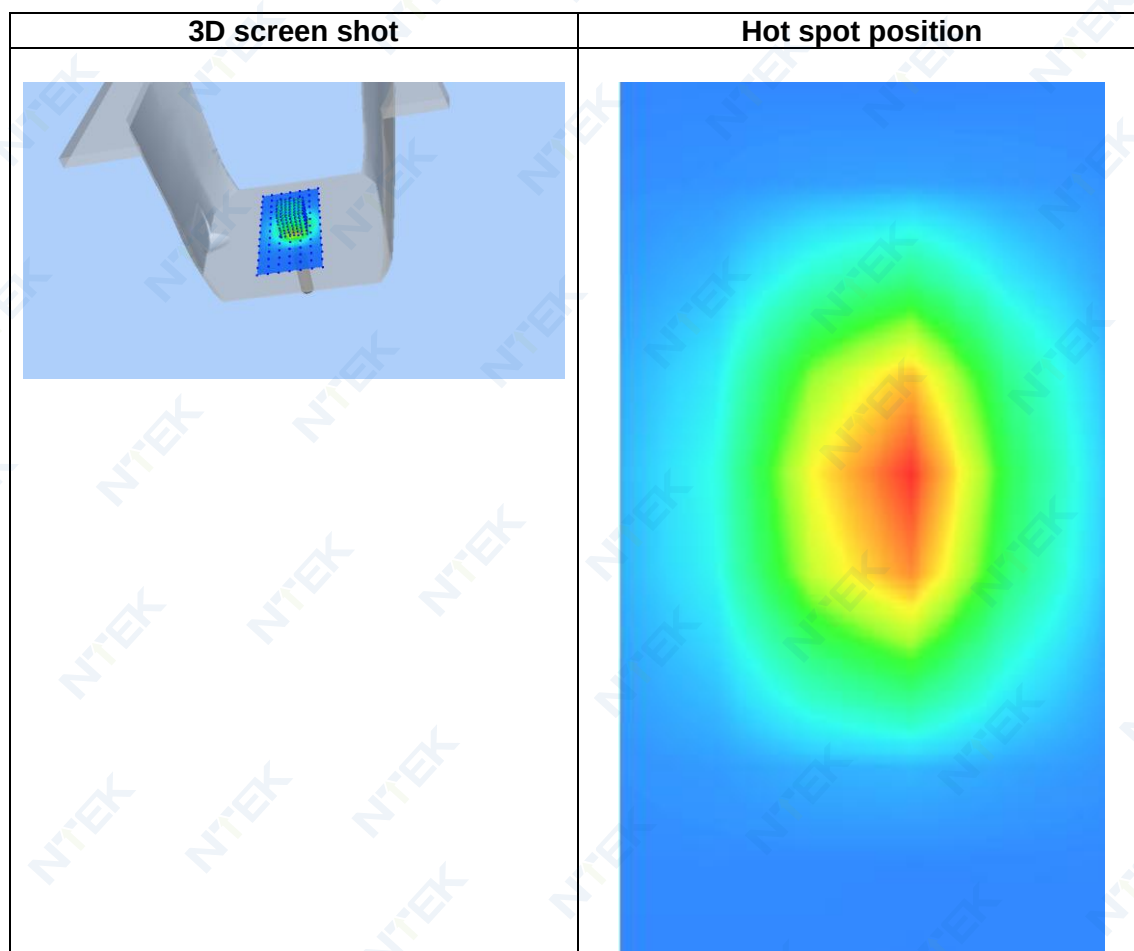
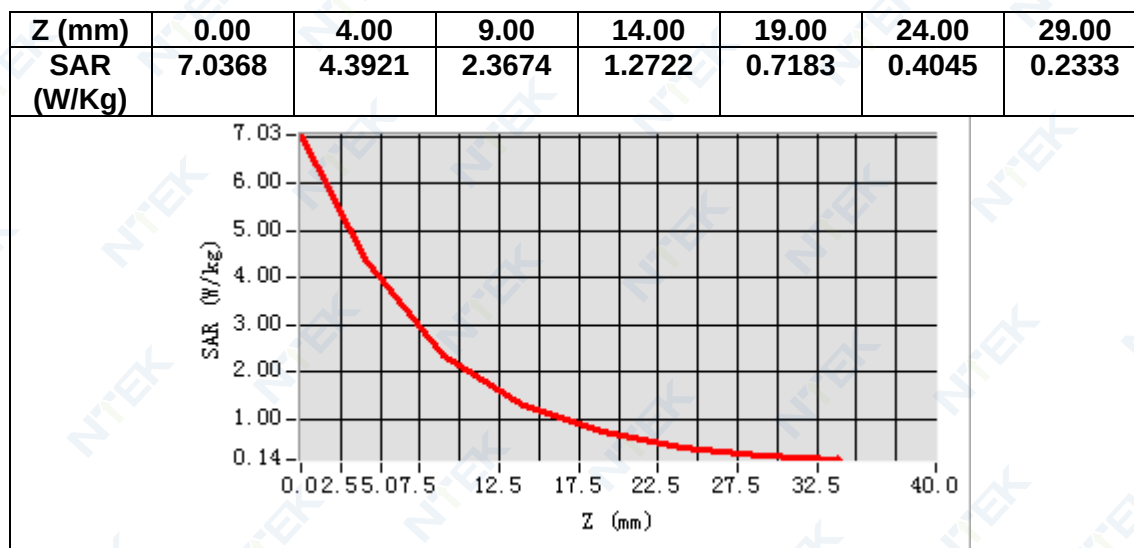
VOLUME SAR



Maximum location: X=1.00, Y=1.00

SAR Peak: 7.04 W/kg

SAR 10g (W/Kg)	2.475368
SAR 1g (W/Kg)	4.743097



MEASUREMENT 6

Date of measurement: 28/10/2023

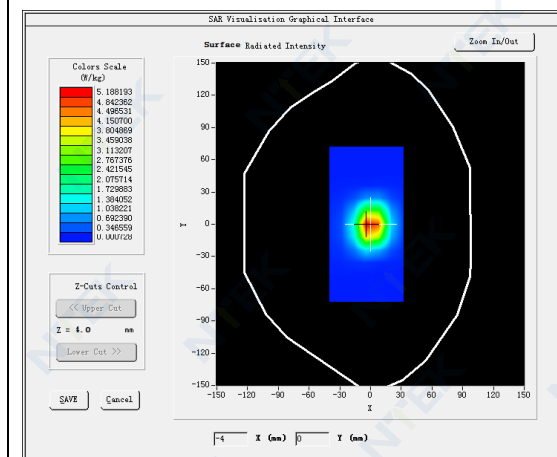
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2450</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

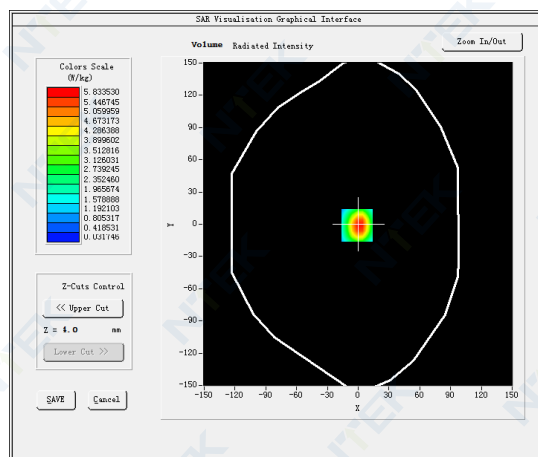
B. SAR Measurement Results

Frequency (MHz)	2450.000000
Relative permittivity (real part)	38.728633
Relative permittivity (imaginary part)	13.215610
Conductivity (S/m)	1.798791
Variation (%)	-3.440000

SURFACE SAR



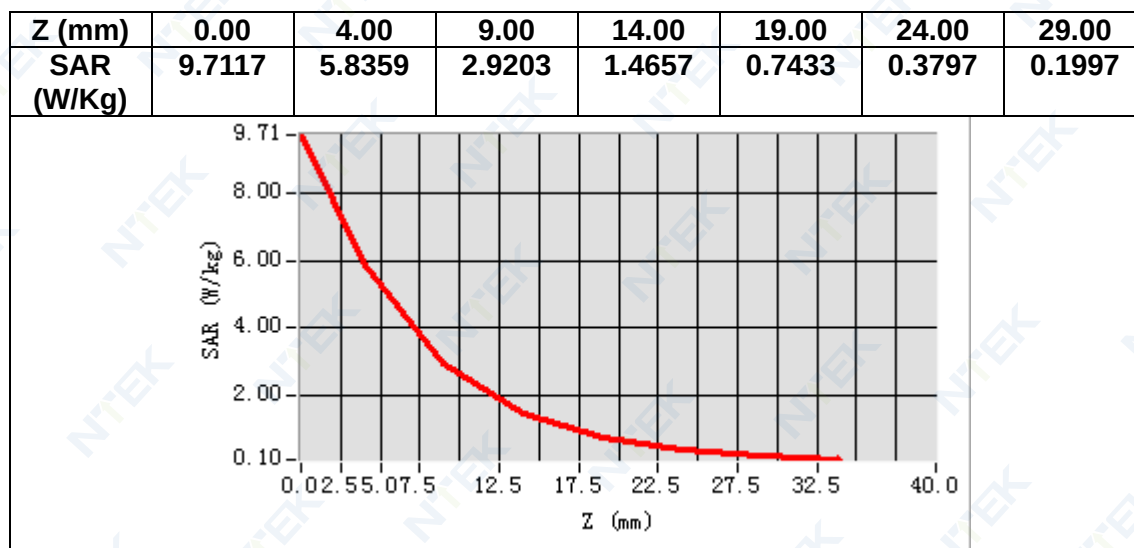
VOLUME SAR



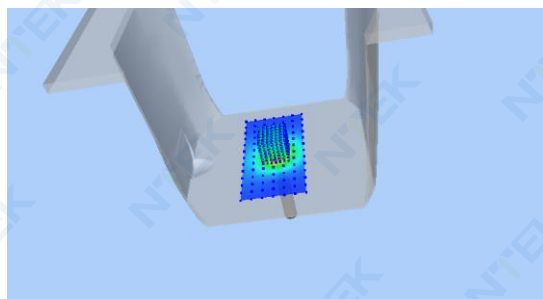
Maximum location: X=-1.00, Y=-1.00

SAR Peak: 9.83 W/kg

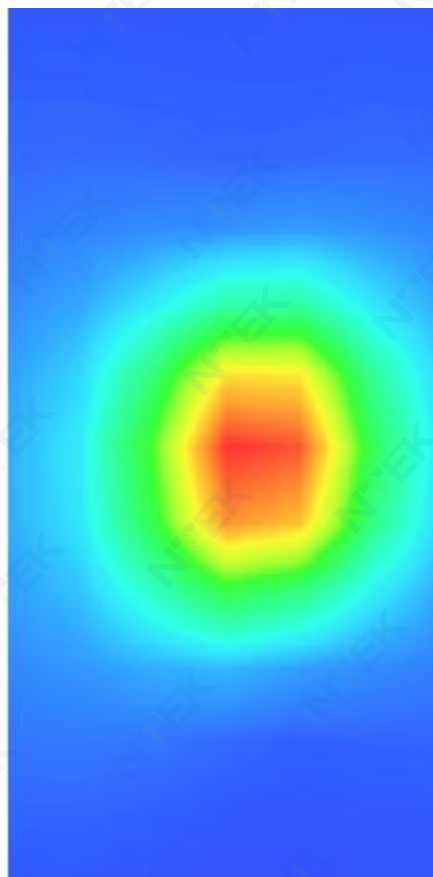
SAR 10g (W/Kg)	2.601203
SAR 1g (W/Kg)	4.932371



3D screen shot



Hot spot position



MEASUREMENT 7

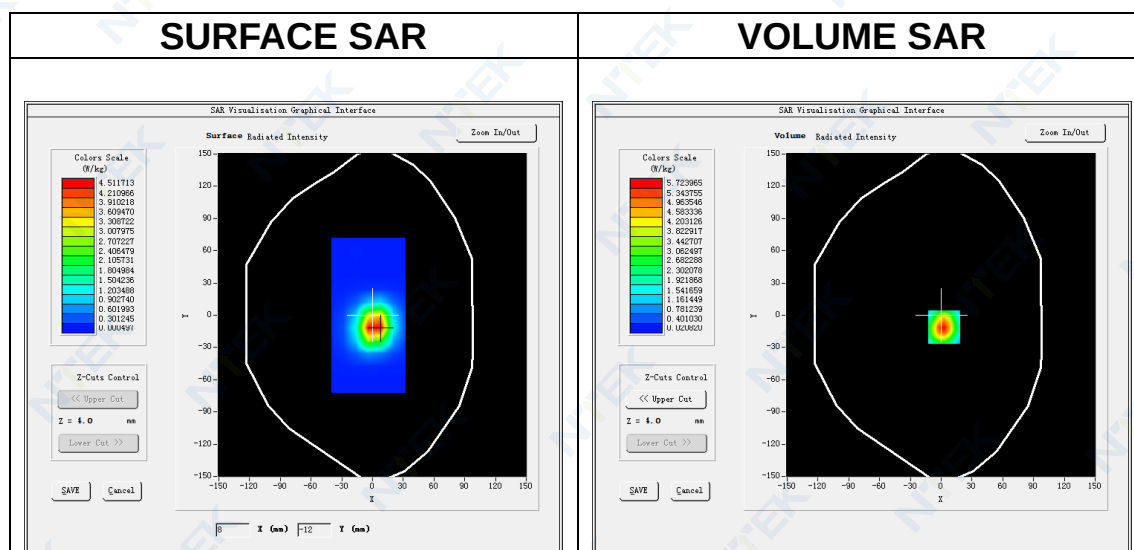
Date of measurement: 16/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW2600</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

B. SAR Measurement Results

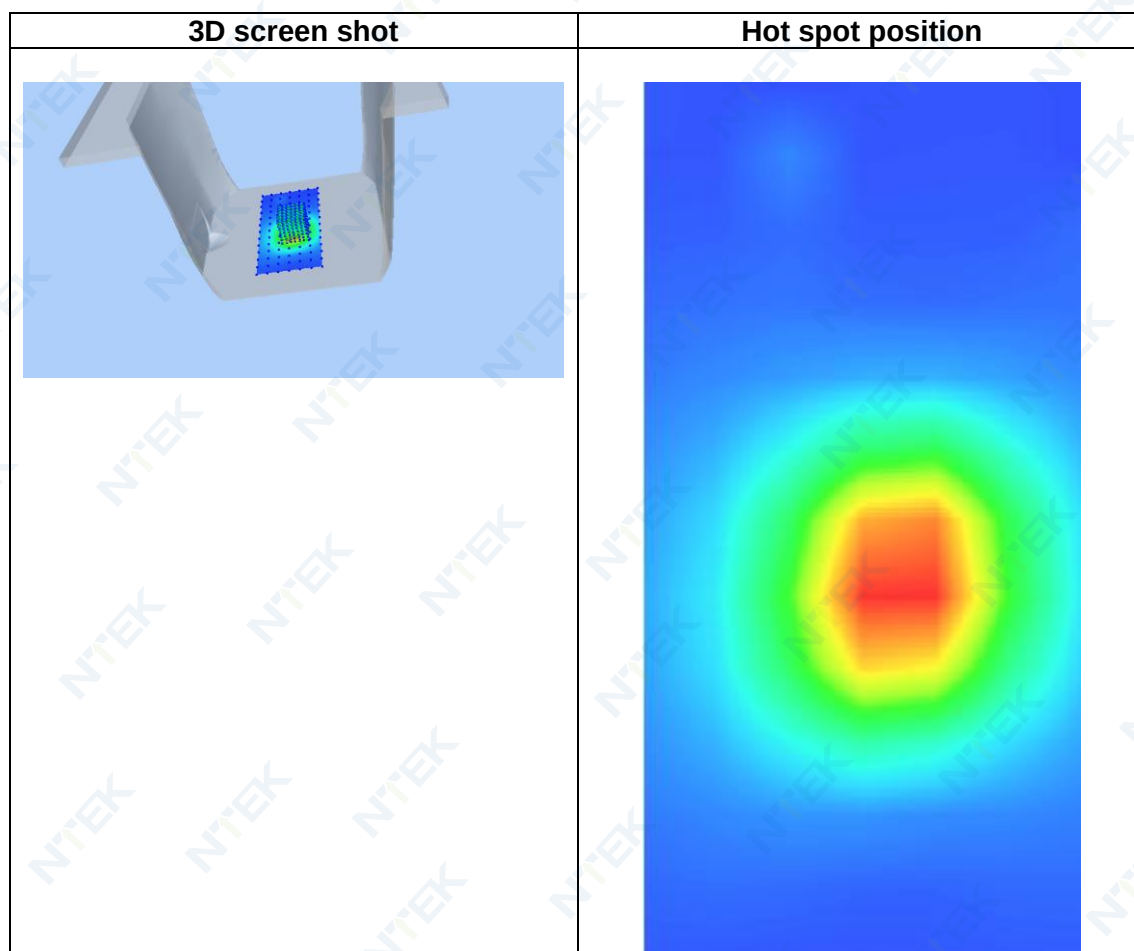
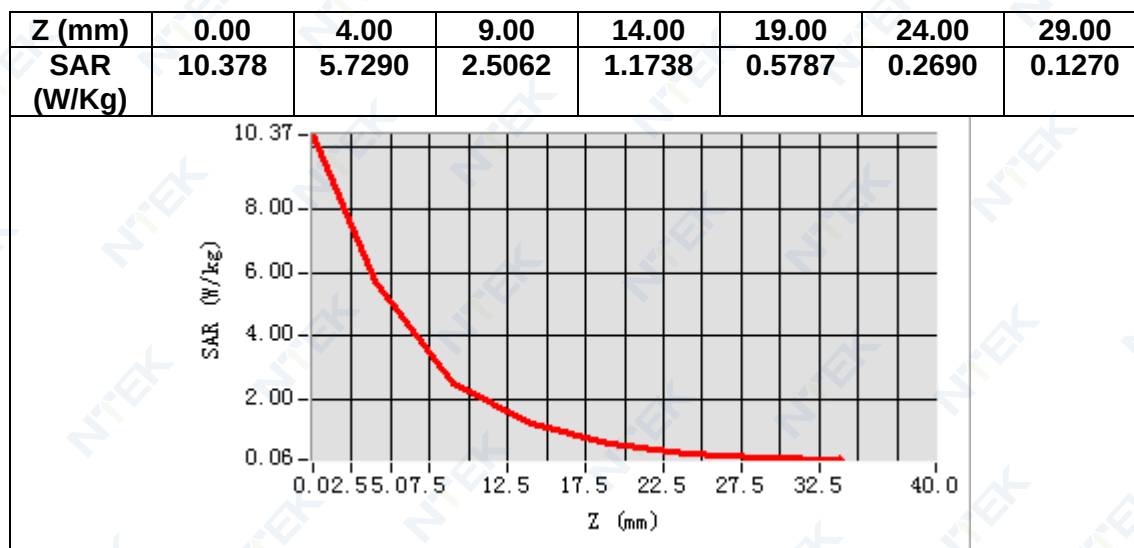
Frequency (MHz)	2600.000000
Relative permittivity (real part)	38.721593
Relative permittivity (imaginary part)	13.355072
Conductivity (S/m)	1.929066
Variation (%)	-2.420000



Maximum location: X=3.00, Y=-11.00

SAR Peak: 10.29 W/kg

SAR 10g (W/Kg)	2.292192
SAR 1g (W/Kg)	5.569195



MEASUREMENT 8

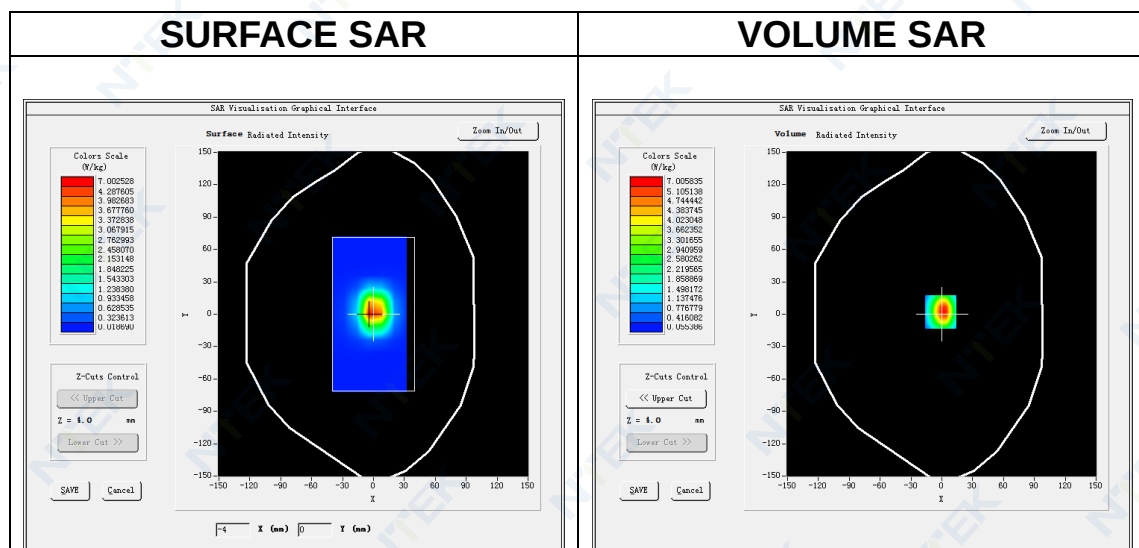
Date of measurement: 19/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW3500</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>1.85</u>

B. SAR Measurement Results

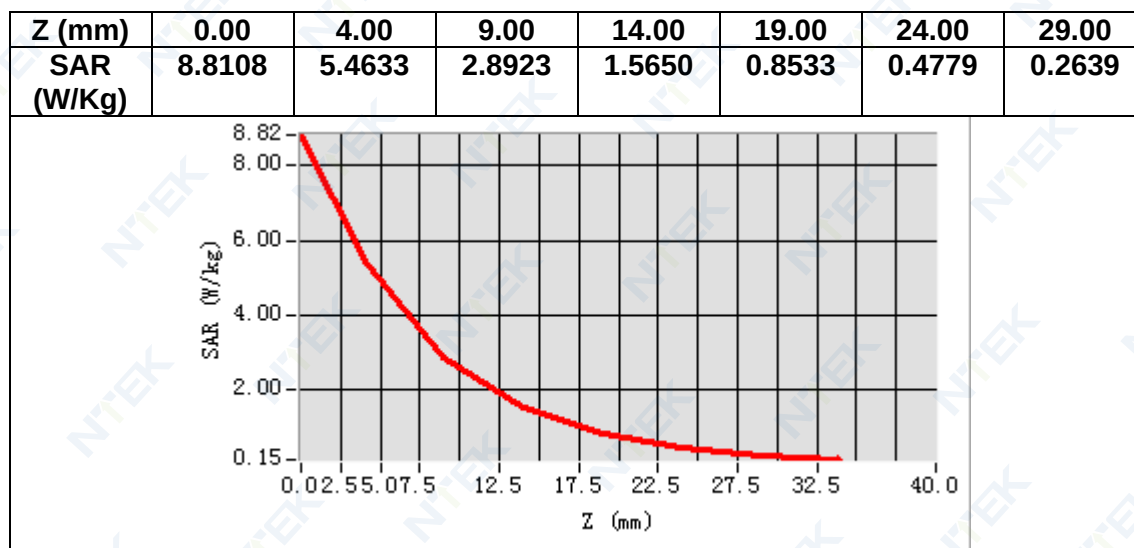
Frequency (MHz)	3500.000000
Relative permittivity (real part)	38.213495
Relative permittivity (imaginary part)	14.402188
Conductivity (S/m)	2.800425
Variation (%)	-1.130000



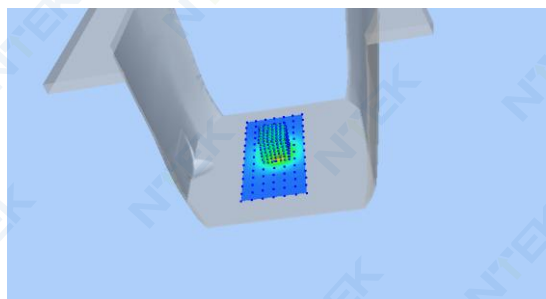
Maximum location: X=-1.00, Y=2.00

SAR Peak: 9.07 W/kg

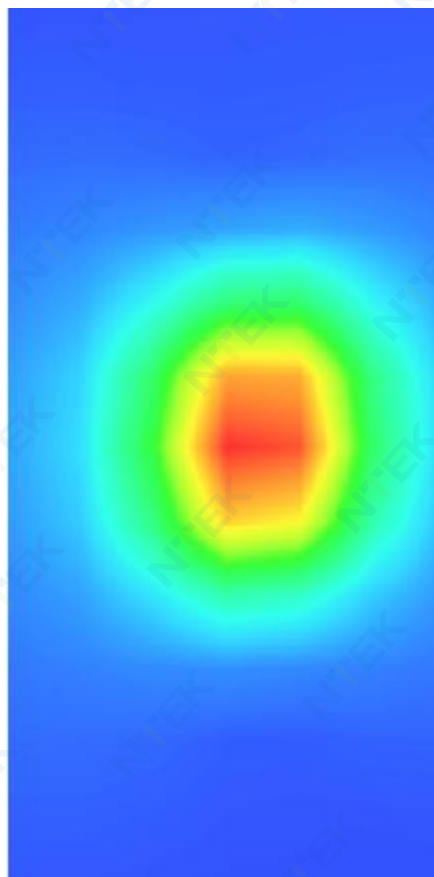
SAR 10g (W/Kg)	2.338122
SAR 1g (W/Kg)	6.099389



3D screen shot



Hot spot position



MEASUREMENT 9

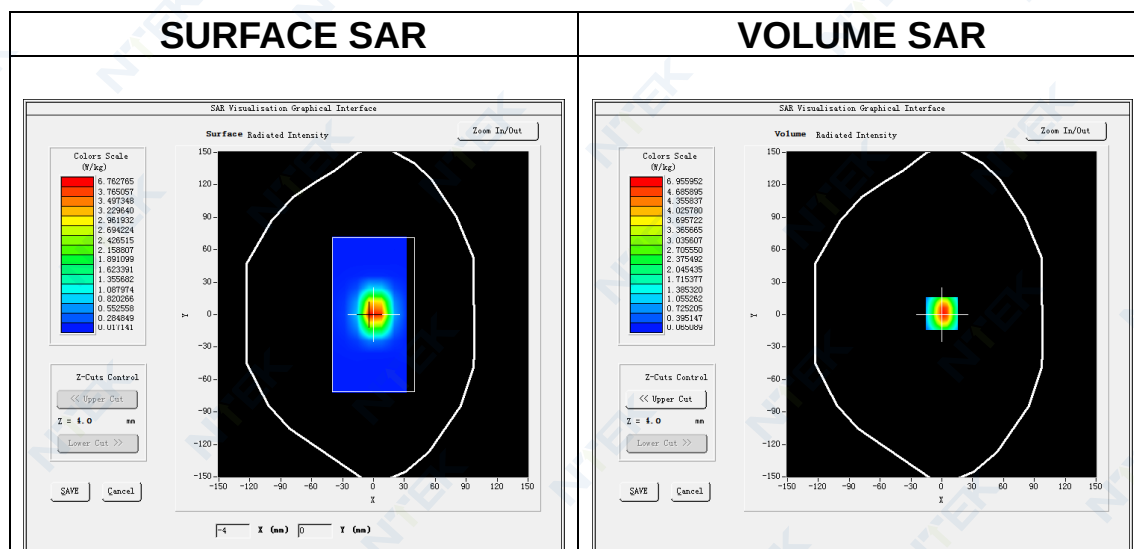
Date of measurement: 20/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7, dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW3700</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>1.79</u>

B. SAR Measurement Results

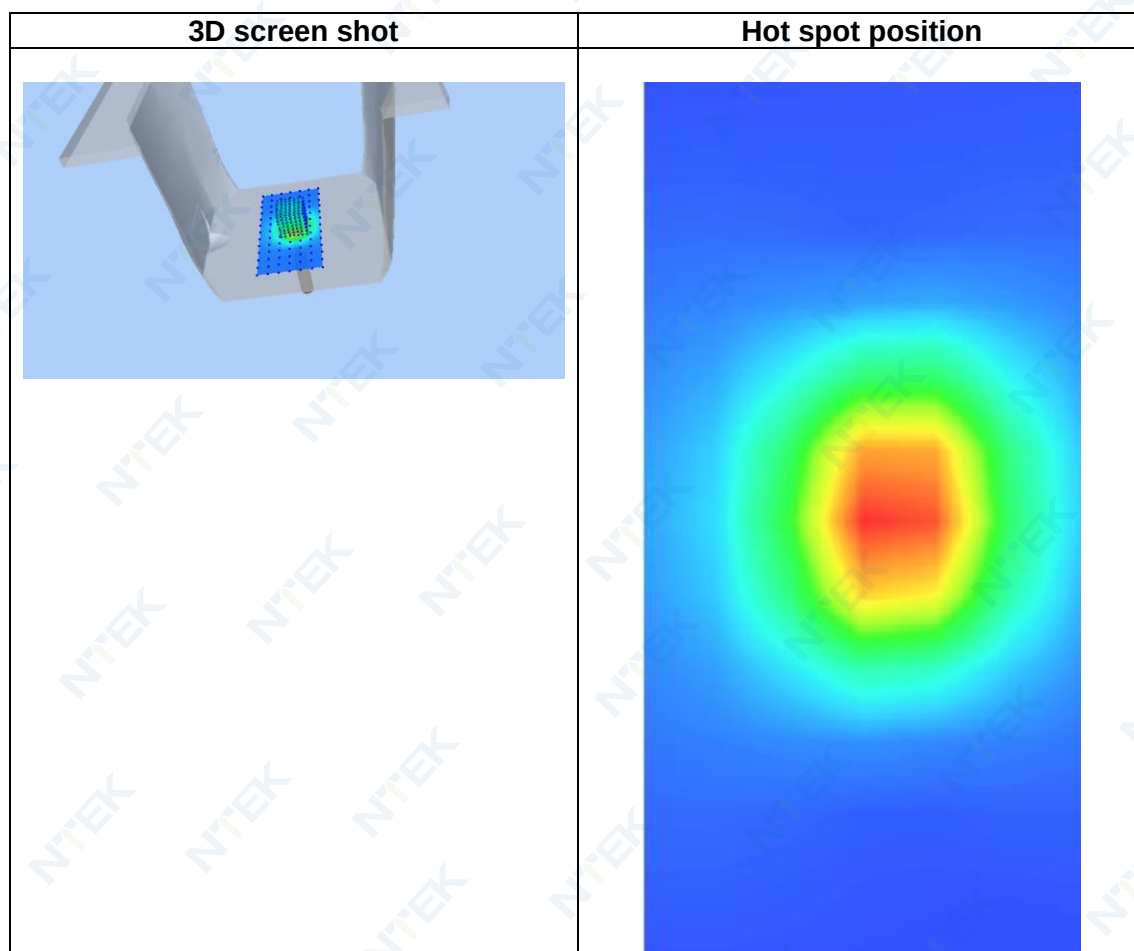
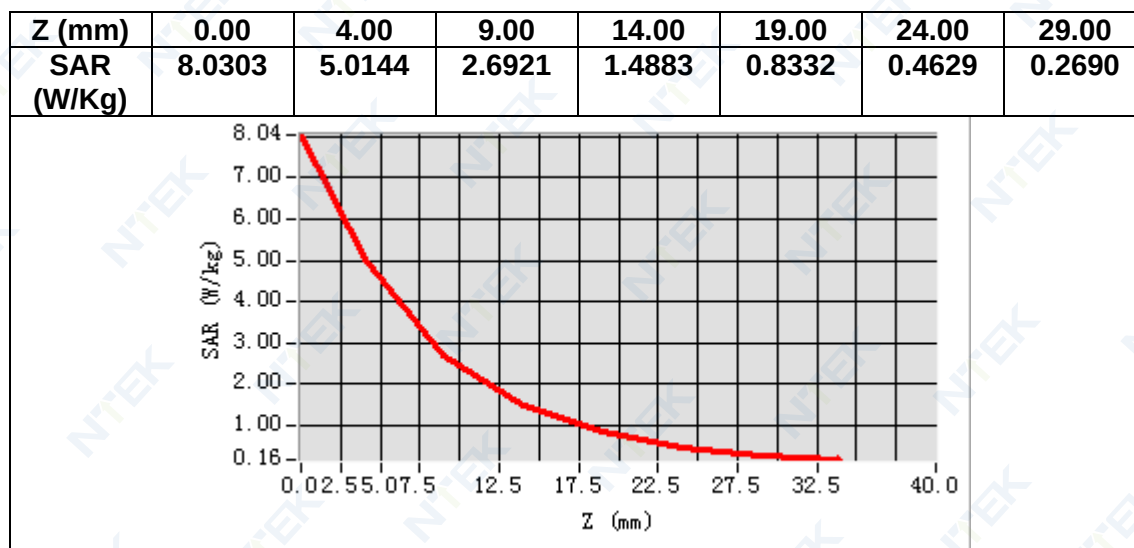
Frequency (MHz)	3700.000000
Relative permittivity (real part)	37.550326
Relative permittivity (imaginary part)	14.891240
Conductivity (S/m)	3.060977
Variation (%)	-0.740000



Maximum location: X=0.00, Y=1.00

SAR Peak: 8.14 W/kg

SAR 10g (W/Kg)	2.524101
SAR 1g (W/Kg)	6.285137



MEASUREMENT 10

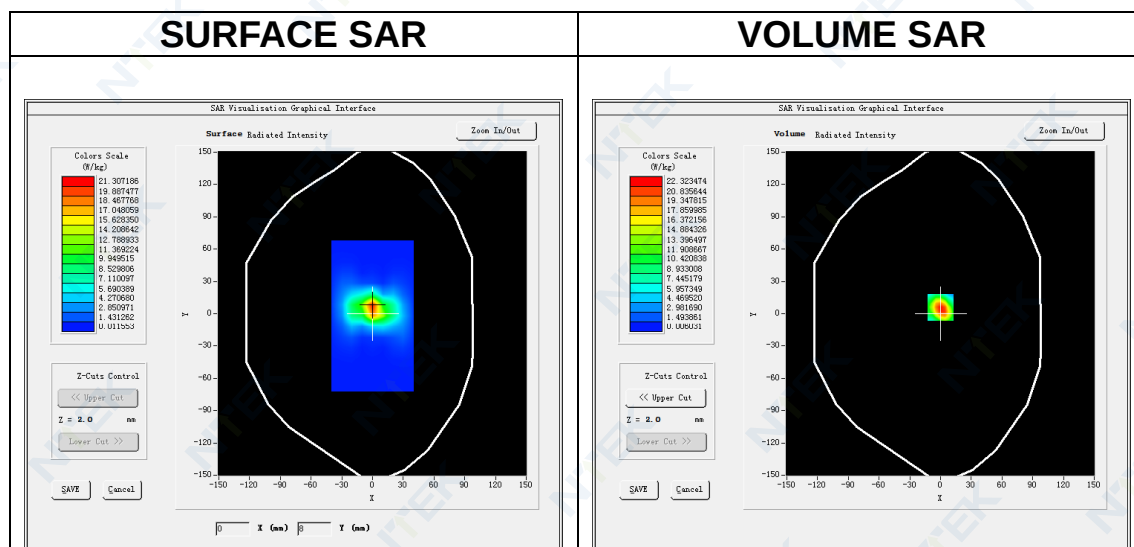
Date of measurement: 21/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW5200</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.07</u>

B. SAR Measurement Results

Frequency (MHz)	5200.000000
Relative permittivity (real part)	35.782074
Relative permittivity (imaginary part)	15.813428
Conductivity (S/m)	4.568324
Variation (%)	-1.130000

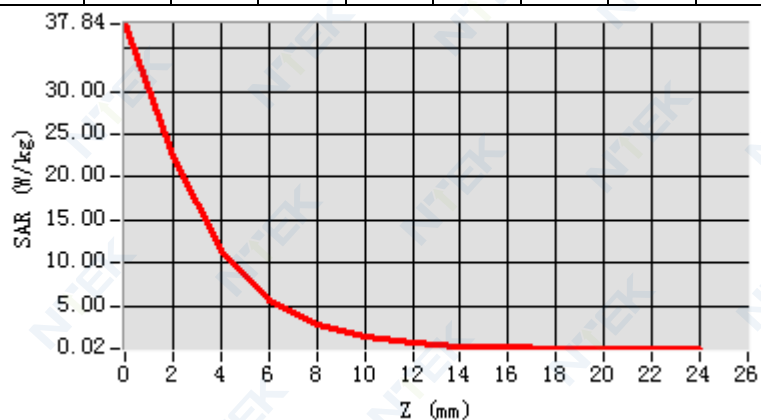


Maximum location: X=0.00, Y=6.00

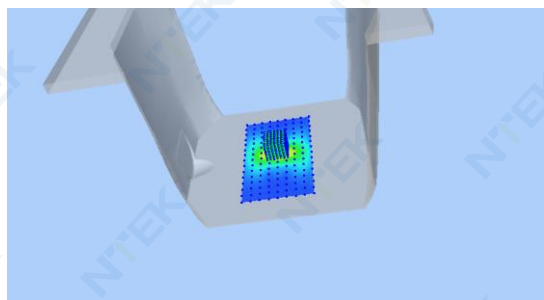
SAR Peak: 40.06 W/kg

SAR 10g (W/Kg)	5.826081
SAR 1g (W/Kg)	15.144035

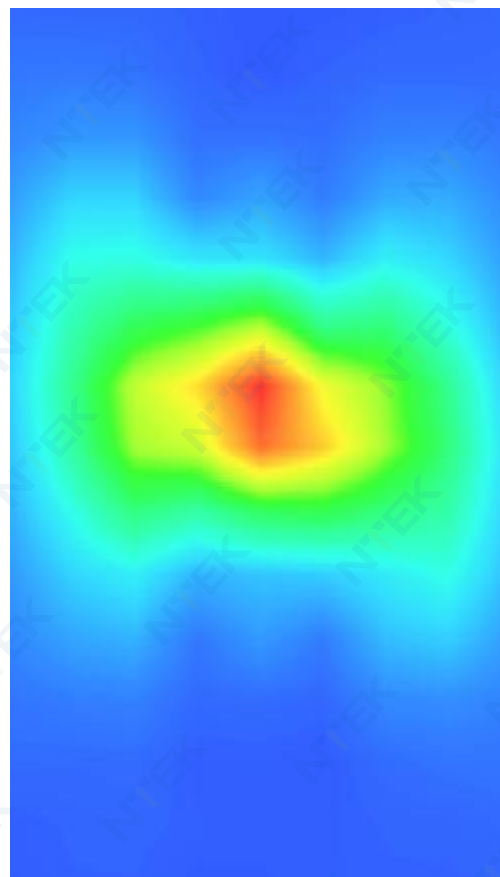
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0 0	12.0 0	14.0 0	16.0 0	18.0 0	20.0 0	22.0 0
SAR (W/ Kg)	37.8 04	22.3 29	11.3 95	5.66 42	2.82 05	1.40 89	0.71 67	0.36 54	0.18 43	0.10 96	0.05 76	0.03 20



3D screen shot



Hot spot position



MEASUREMENT 11

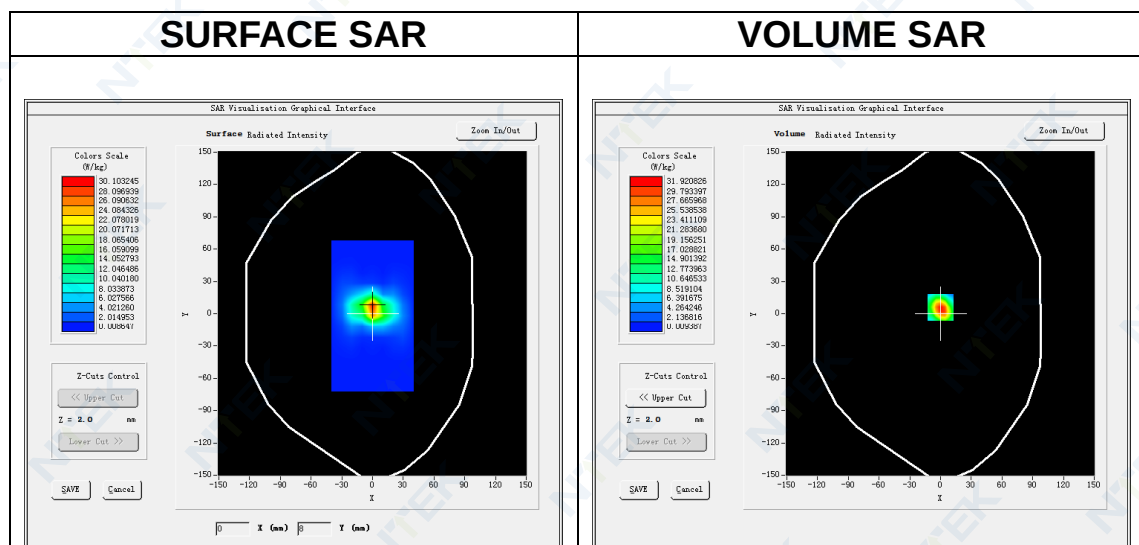
Date of measurement: 22/10/2023

A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Dipole</u>
<u>Band</u>	<u>CW5800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>CW (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.04</u>

B. SAR Measurement Results

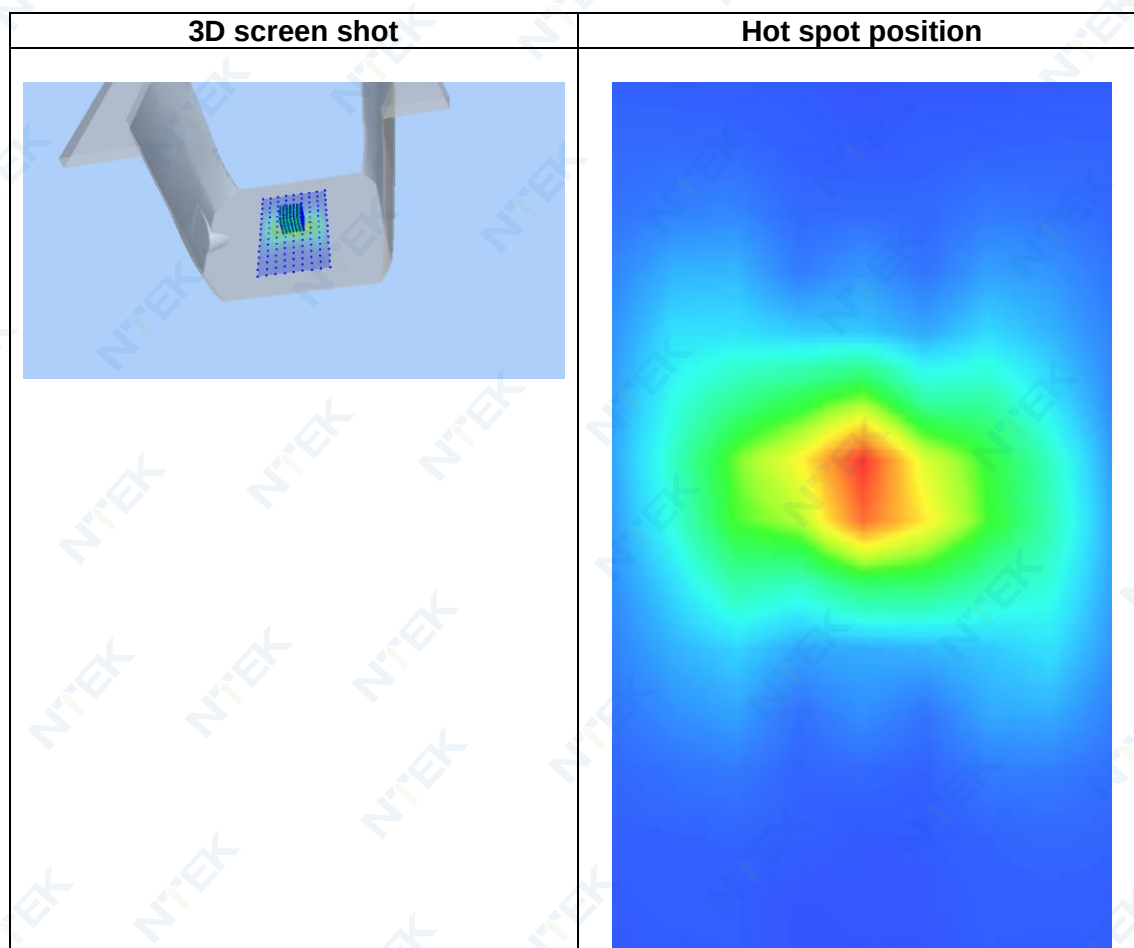
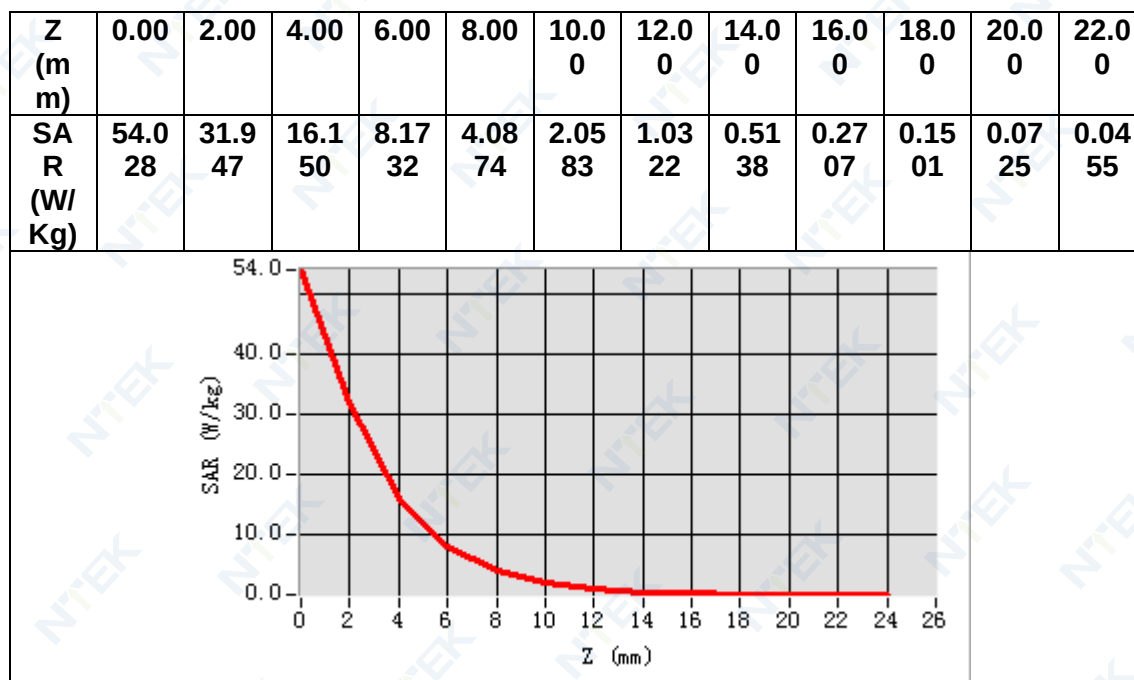
Frequency (MHz)	5800.000000
Relative permittivity (real part)	35.177374
Relative permittivity (imaginary part)	15.945406
Conductivity (S/m)	5.137964
Variation (%)	0.760000



Maximum location: X=0.00, Y=6.00

SAR Peak: 57.37 W/kg

SAR 10g (W/Kg)	5.633002
SAR 1g (W/Kg)	17.671358



12. Appendix C. Plots of High SAR Measurement

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MEASUREMENT 1

Date of measurement: 17/10/2023

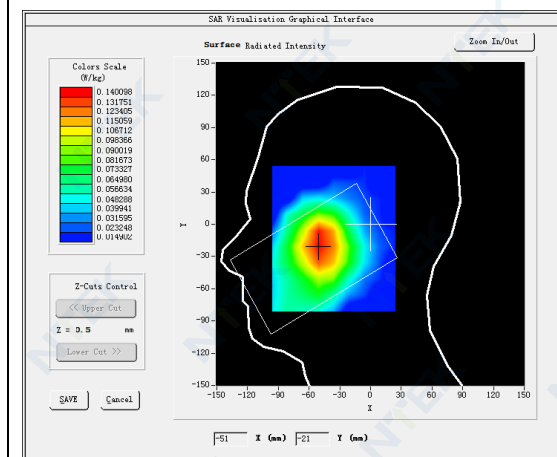
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>GSM900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.23</u>

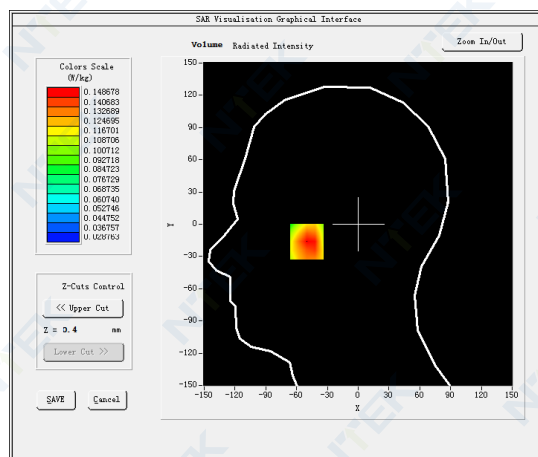
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.226009
Relative permittivity (imaginary part)	19.956501
Conductivity (S/m)	0.995164
Variation (%)	1.560000

SURFACE SAR



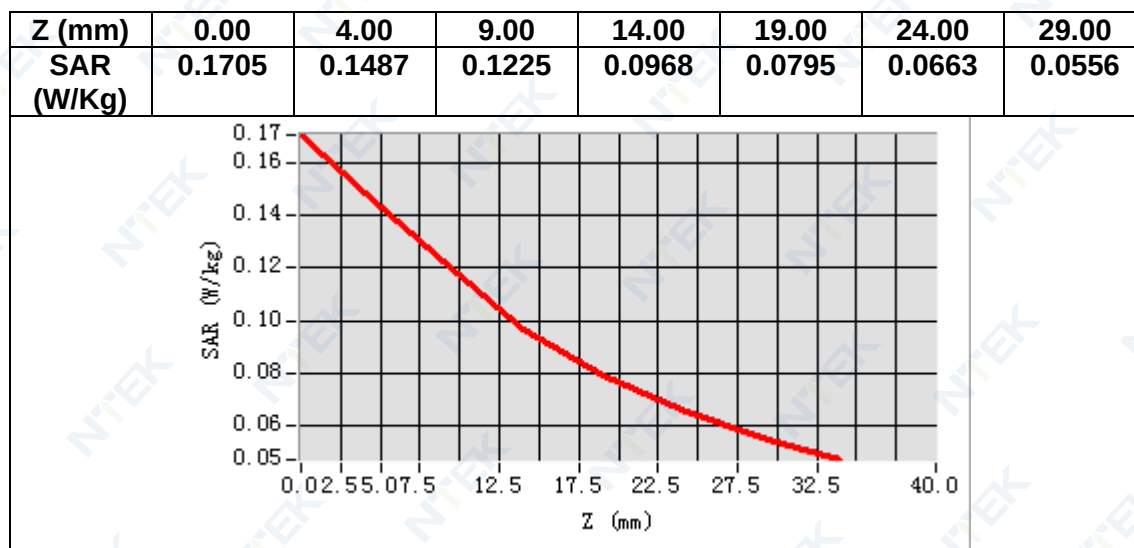
VOLUME SAR



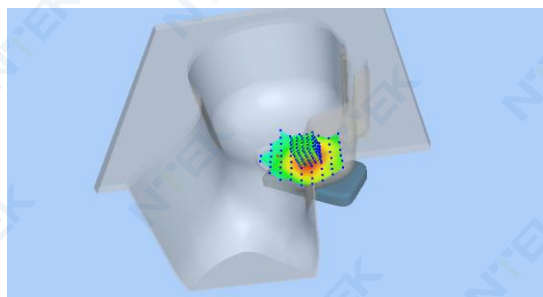
Maximum location: X=-50.00, Y=-15.00

SAR Peak: 0.19 W/kg

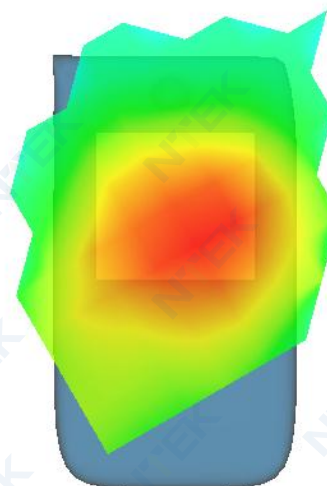
SAR 10g (W/Kg)	0.110891
SAR 1g (W/Kg)	0.147655



3D screen shot



Hot spot position



MEASUREMENT 2

Date of measurement: 17/10/2023

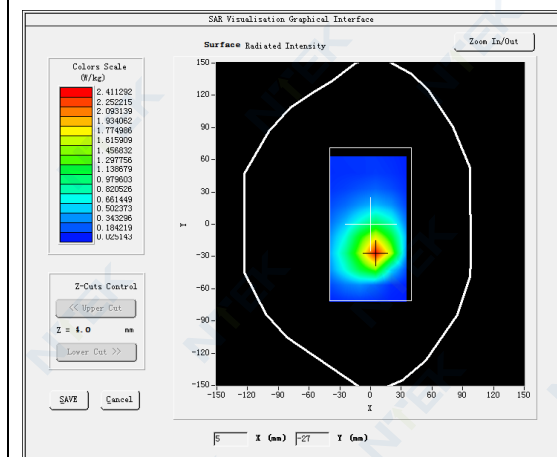
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>GSM900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.23</u>

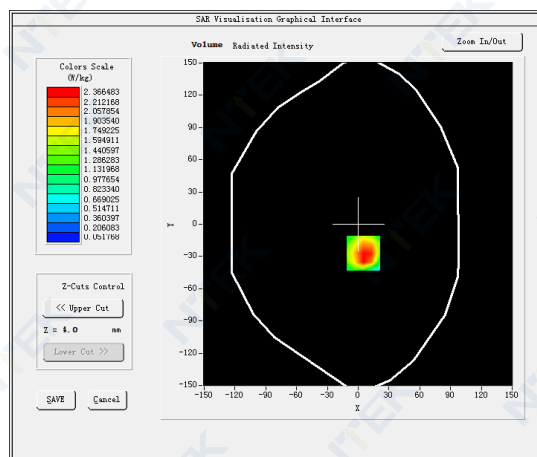
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.226009
Relative permittivity (imaginary part)	19.956501
Conductivity (S/m)	0.995164
Variation (%)	-2.990000

SURFACE SAR



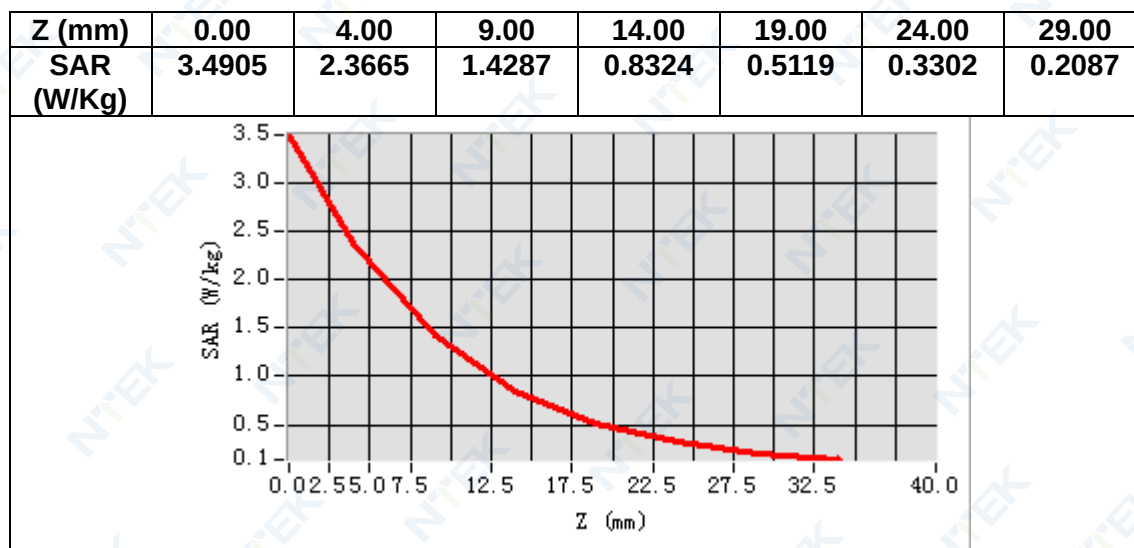
VOLUME SAR



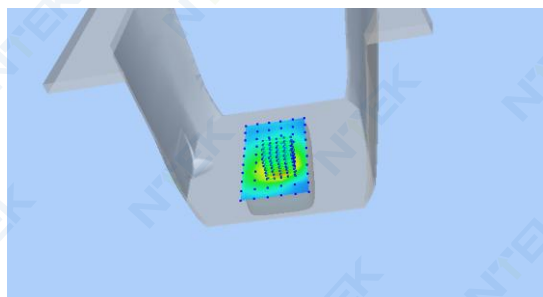
Maximum location: X=5.00, Y=-27.00

SAR Peak: 4.28 W/kg

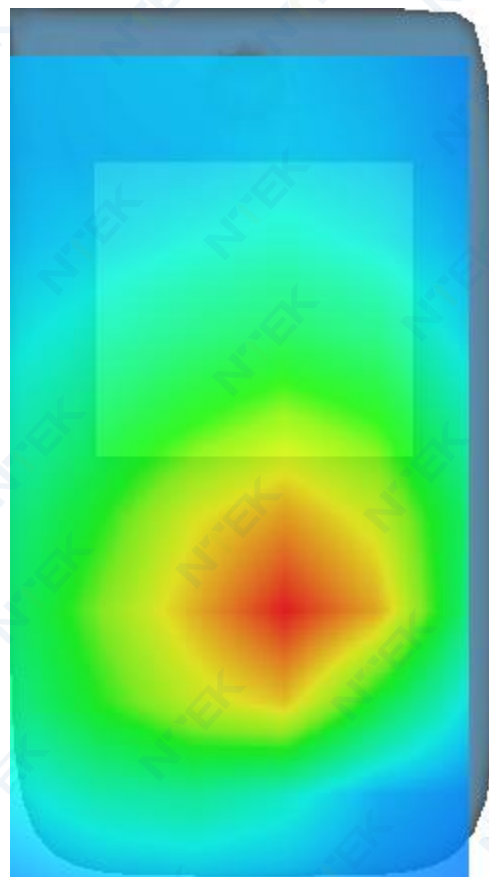
SAR 10g (W/Kg)	1.284172
SAR 1g (W/Kg)	2.447614



3D screen shot



Hot spot position



MEASUREMENT 3

Date of measurement: 18/10/2023

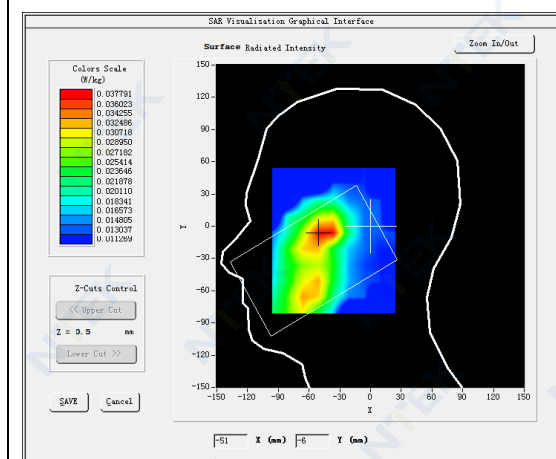
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>GSM1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.45</u>

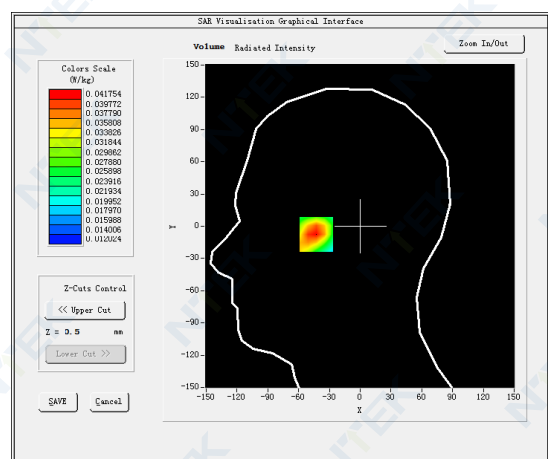
B. SAR Measurement Results

Frequency (MHz)	1747.400000
Relative permittivity (real part)	39.734425
Relative permittivity (imaginary part)	13.590782
Conductivity (S/m)	1.319363
Variation (%)	1.180000

SURFACE SAR



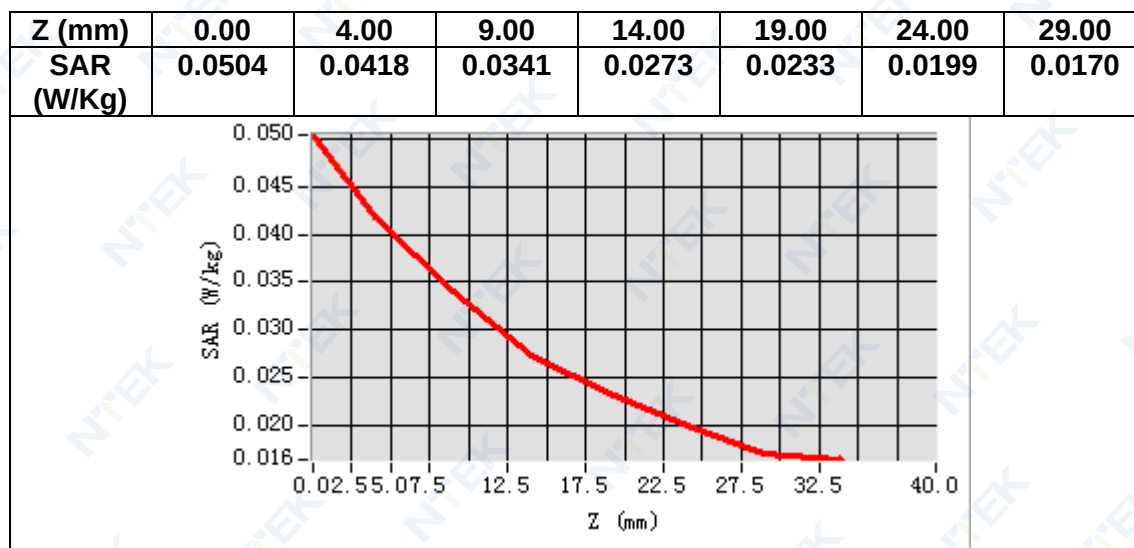
VOLUME SAR



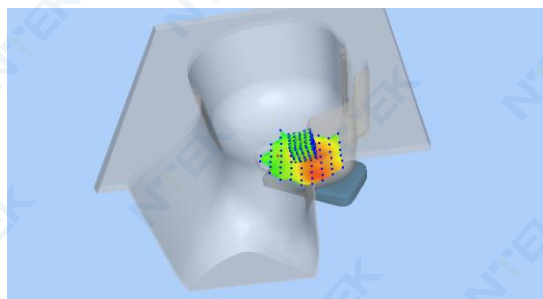
Maximum location: X=-43.00, Y=-5.00

SAR Peak: 0.05 W/kg

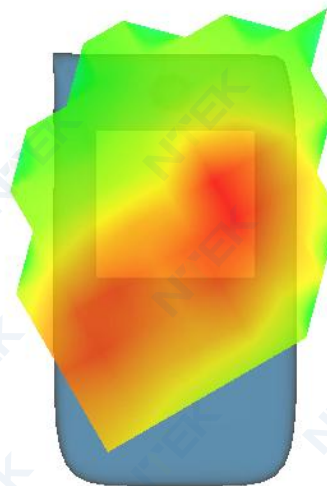
SAR 10g (W/Kg)	0.029855
SAR 1g (W/Kg)	0.040859



3D screen shot



Hot spot position



MEASUREMENT 4

Date of measurement: 18/10/2023

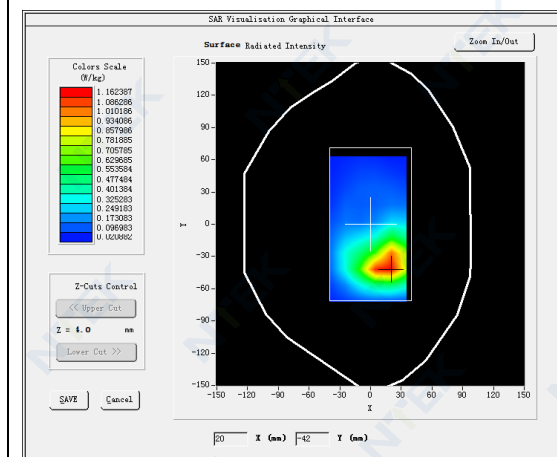
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>GSM1800</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>TDMA (Crest factor: 2.0)</u>
<u>ConvF</u>	<u>2.45</u>

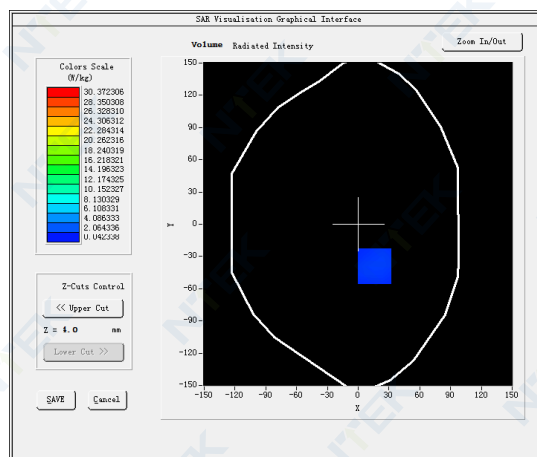
B. SAR Measurement Results

Frequency (MHz)	1747.400000
Relative permittivity (real part)	39.734425
Relative permittivity (imaginary part)	13.590782
Conductivity (S/m)	1.319363
Variation (%)	-0.920000

SURFACE SAR



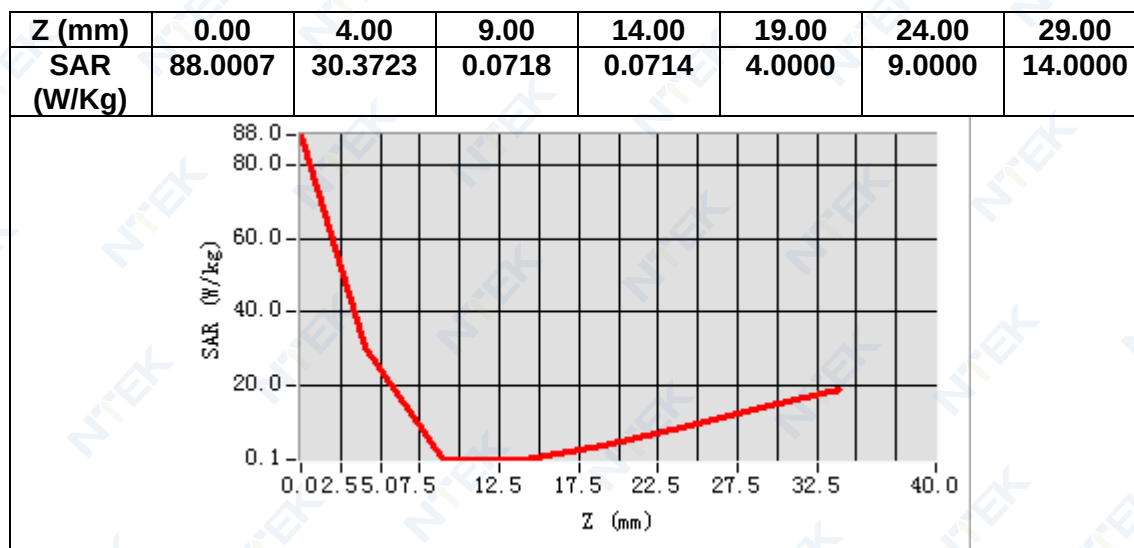
VOLUME SAR



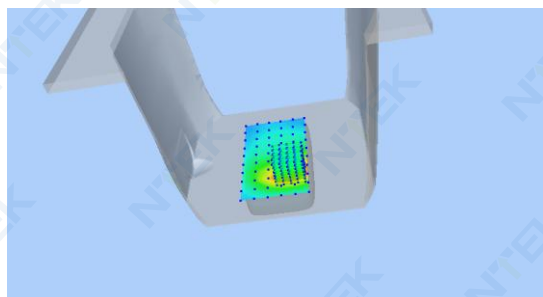
Maximum location: X=16.00, Y=-39.00

SAR Peak: 21.36 W/kg

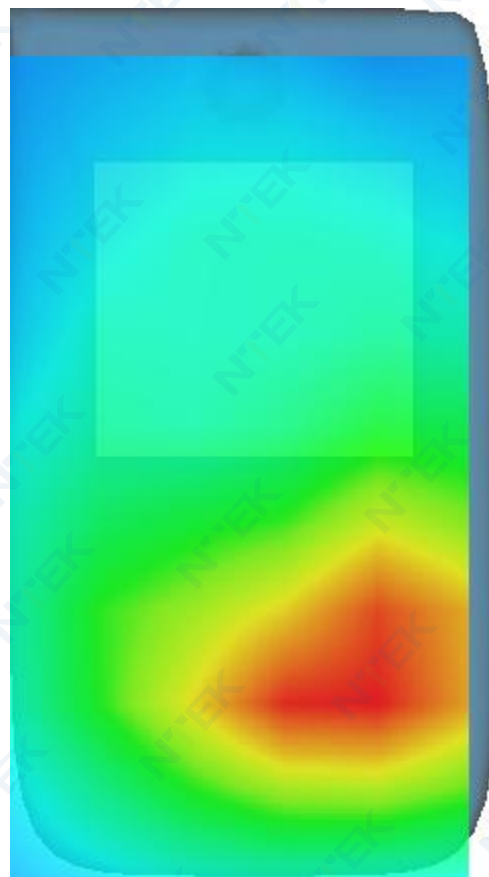
SAR 10g (W/Kg)	0.921923
SAR 1g (W/Kg)	2.788402



3D screen shot



Hot spot position



MEASUREMENT 5

Date of measurement: 27/10/2023

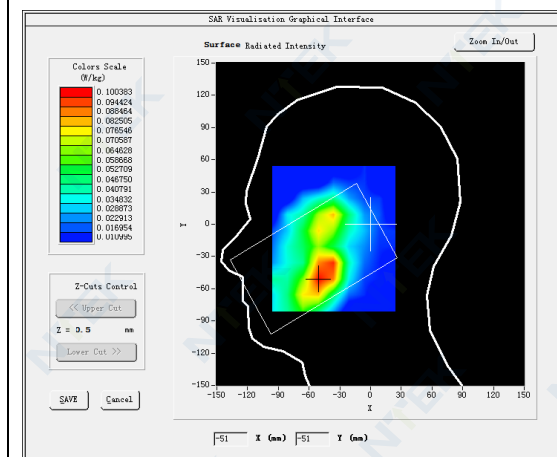
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>Band1 UMTS</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

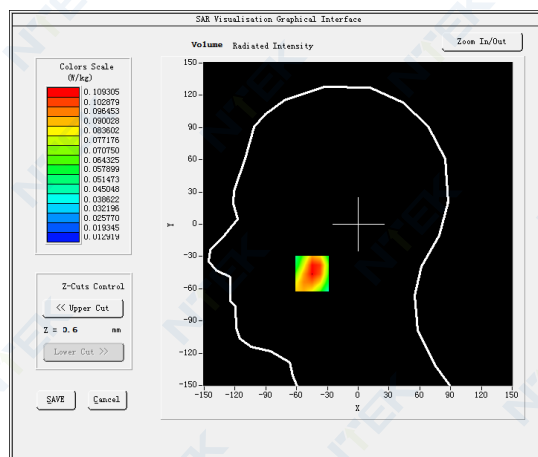
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	1.640000

SURFACE SAR



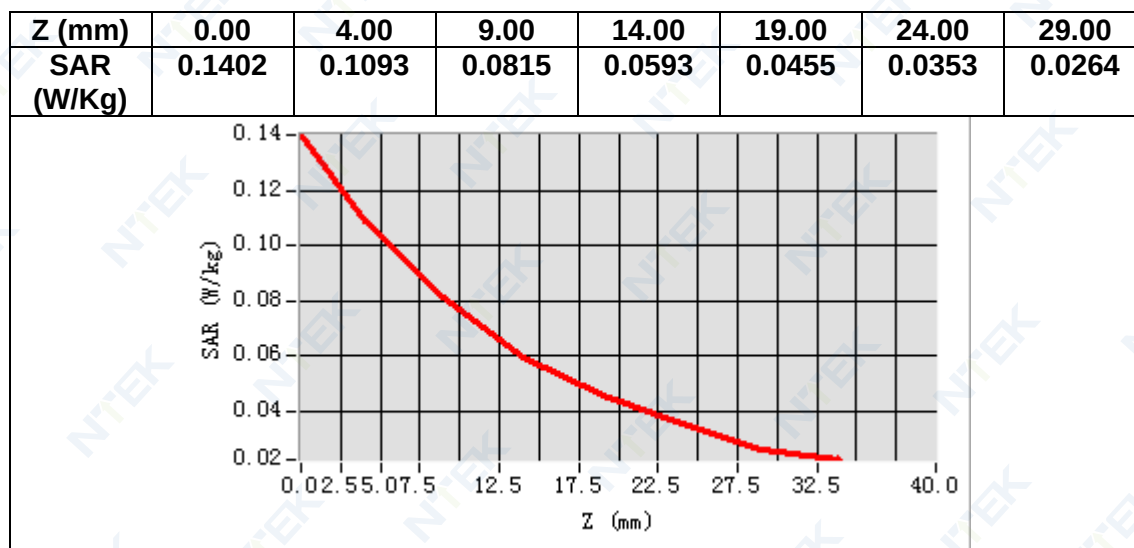
VOLUME SAR



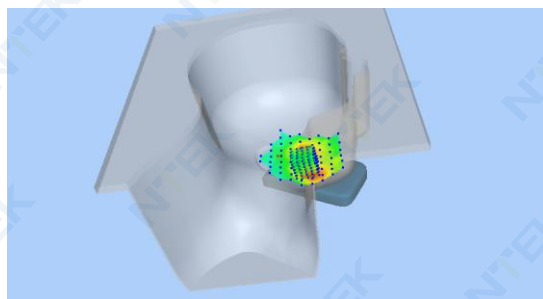
Maximum location: X=-45.00, Y=-46.00

SAR Peak: 0.14 W/kg

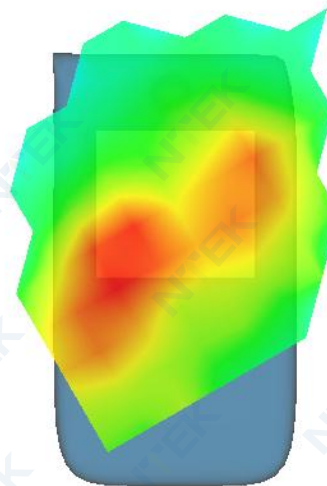
SAR 10g (W/Kg)	0.069174
SAR 1g (W/Kg)	0.105731



3D screen shot



Hot spot position



MEASUREMENT 6

Date of measurement: 27/10/2023

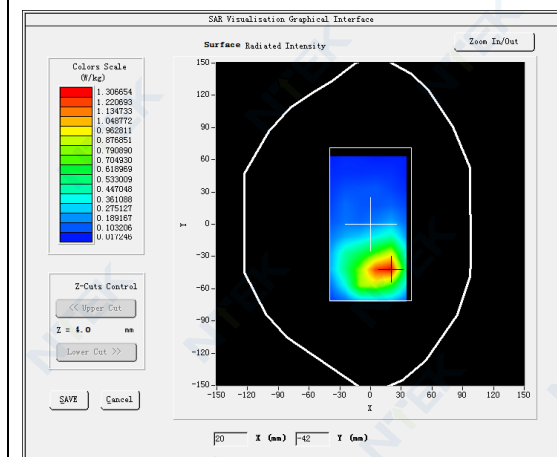
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>Band1 UMTS</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

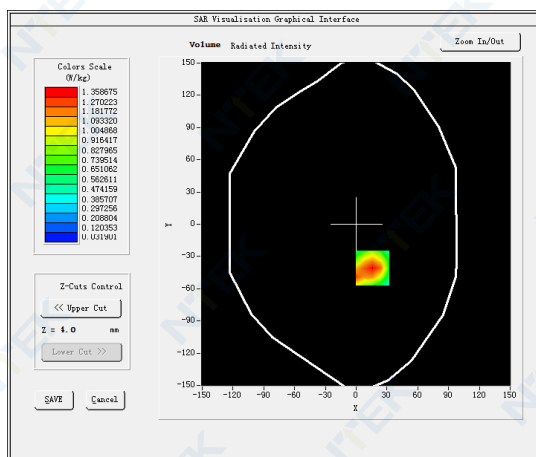
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	0.650000

SURFACE SAR



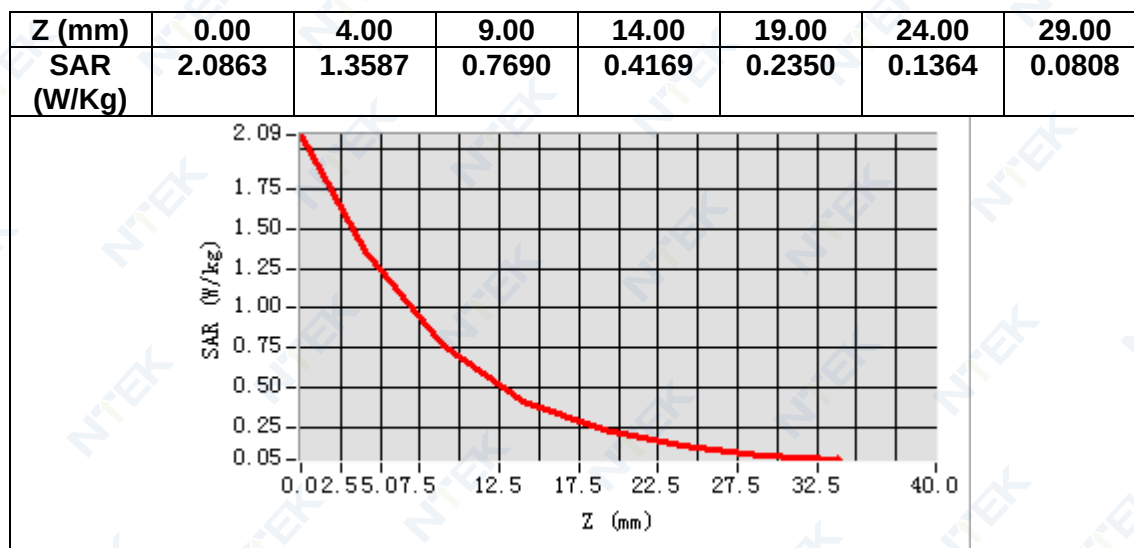
VOLUME SAR



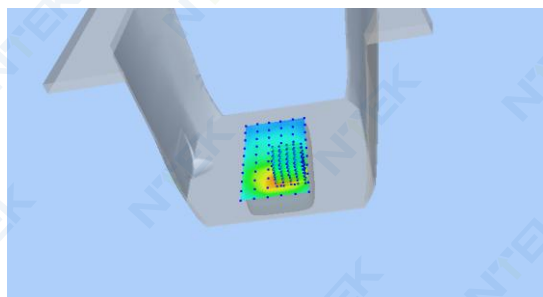
Maximum location: X=16.00, Y=-41.00

SAR Peak: 2.17 W/kg

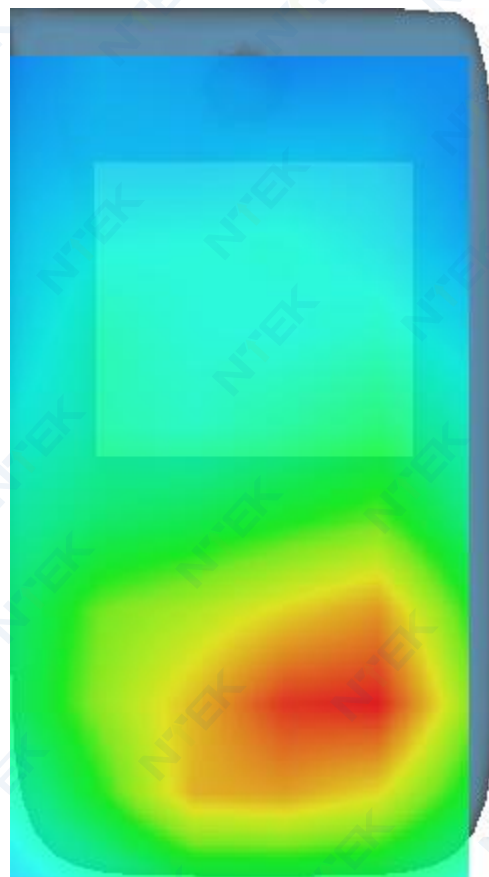
SAR 10g (W/Kg)	0.687411
SAR 1g (W/Kg)	1.276354



3D screen shot



Hot spot position



MEASUREMENT 7

Date of measurement: 17/10/2023

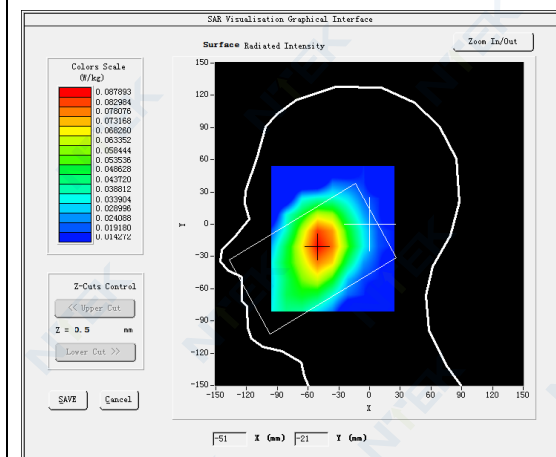
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>Band8 WCDMA900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

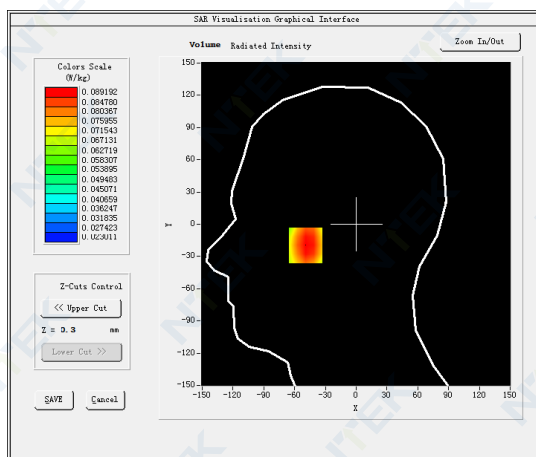
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.226009
Relative permittivity (imaginary part)	19.956501
Conductivity (S/m)	0.995164
Variation (%)	1.440000

SURFACE SAR



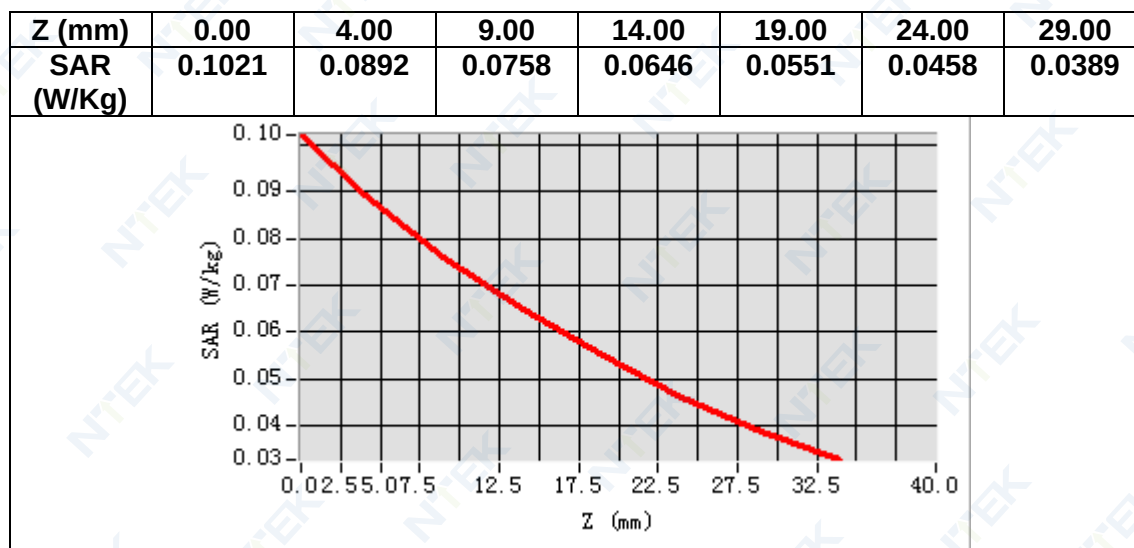
VOLUME SAR



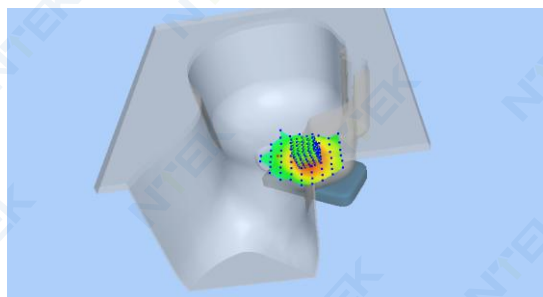
Maximum location: X=-49.00, Y=-19.00

SAR Peak: 0.11 W/kg

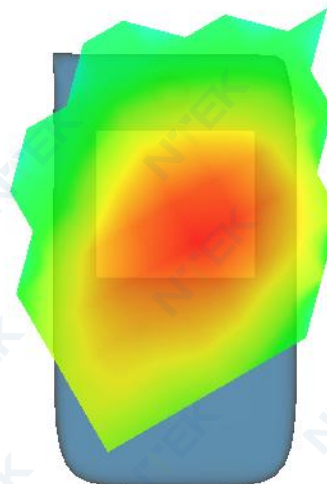
SAR 10g (W/Kg)	0.070726
SAR 1g (W/Kg)	0.089493



3D screen shot



Hot spot position



MEASUREMENT 8

Date of measurement: 17/10/2023

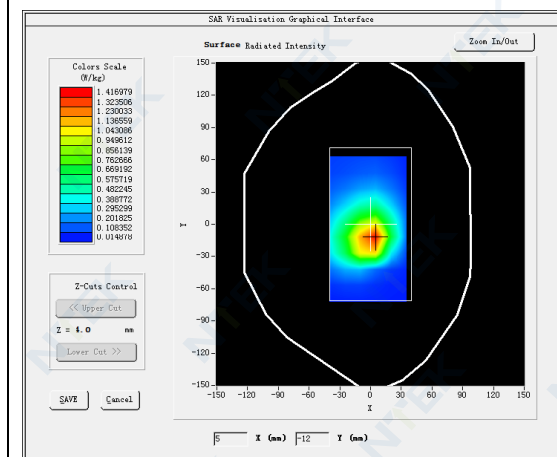
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>Band8 WCDMA900</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>WCDMA (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

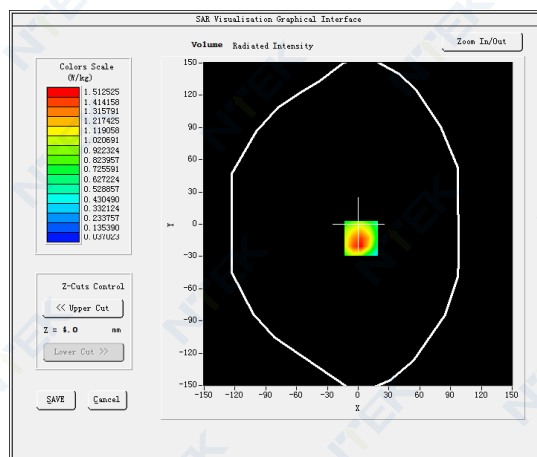
B. SAR Measurement Results

Frequency (MHz)	897.600000
Relative permittivity (real part)	42.226009
Relative permittivity (imaginary part)	19.956501
Conductivity (S/m)	0.995164
Variation (%)	-4.150000

SURFACE SAR



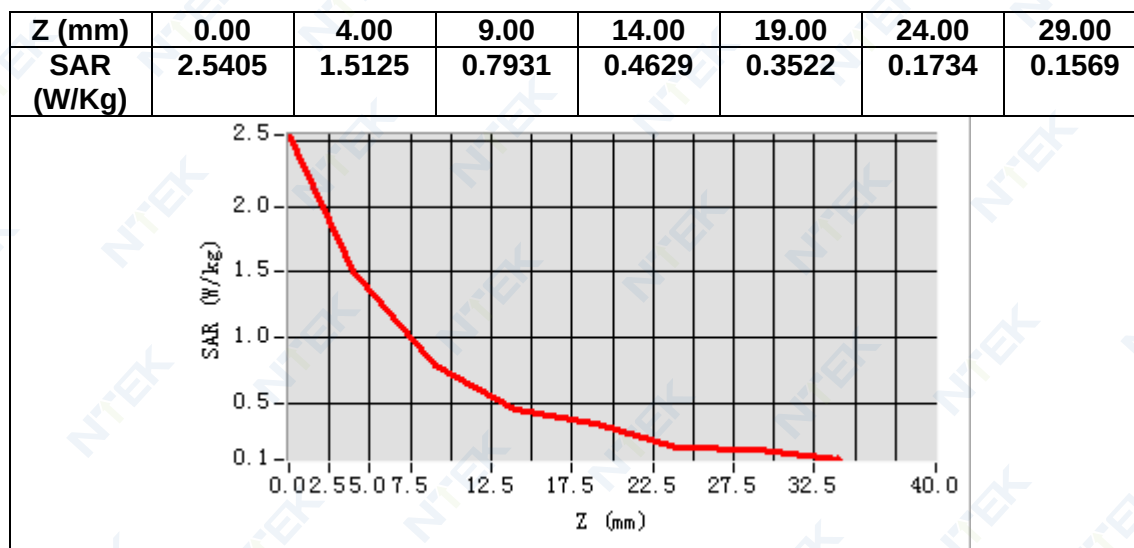
VOLUME SAR



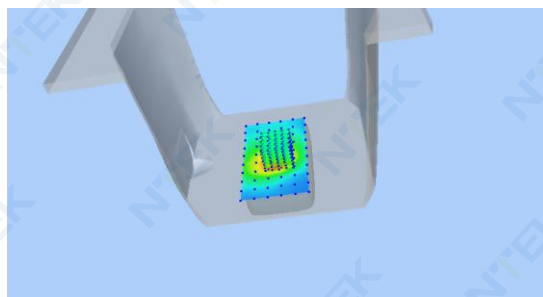
Maximum location: X=3.00, Y=-13.00

SAR Peak: 2.49 W/kg

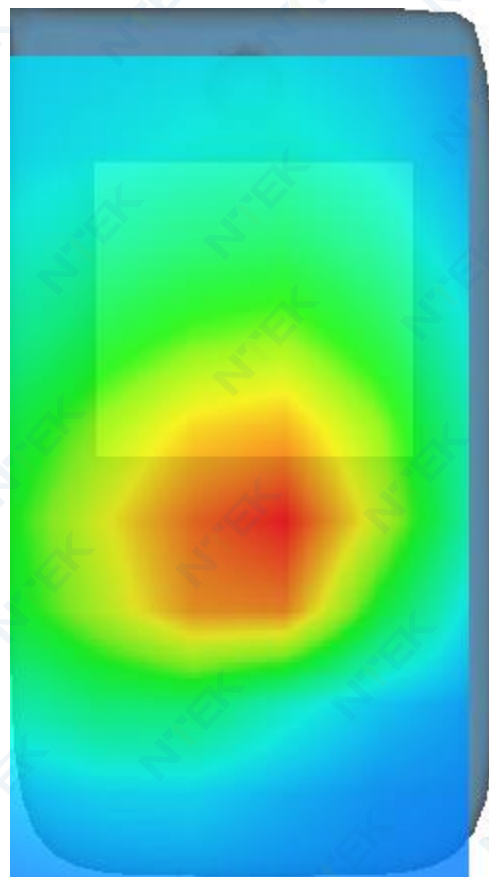
SAR 10g (W/Kg)	0.817805
SAR 1g (W/Kg)	1.484834



3D screen shot



Hot spot position



MEASUREMENT 9

Date of measurement: 21/10/2023

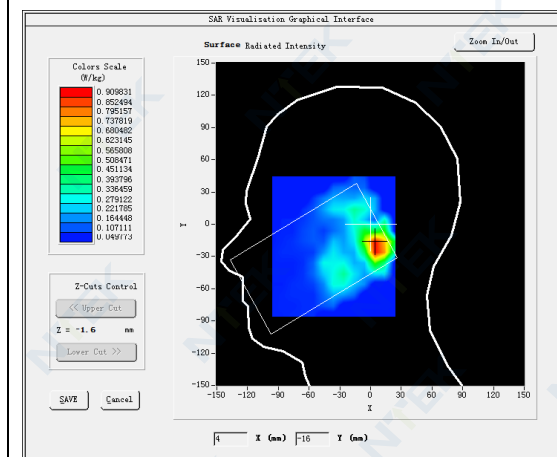
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.07</u>

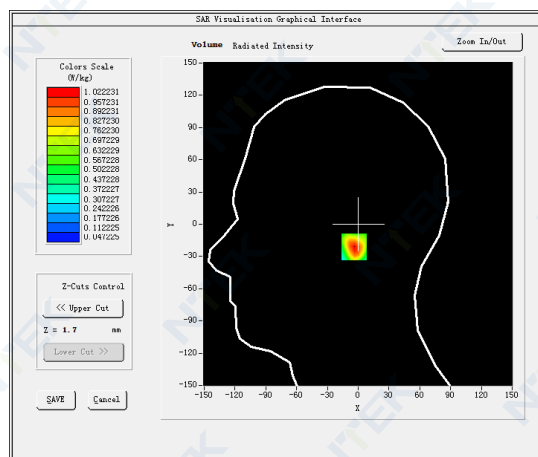
B. SAR Measurement Results

Frequency (MHz)	5210.000000
Relative permittivity (real part)	35.709979
Relative permittivity (imaginary part)	15.793786
Conductivity (S/m)	4.571424
Variation (%)	0.040000

SURFACE SAR



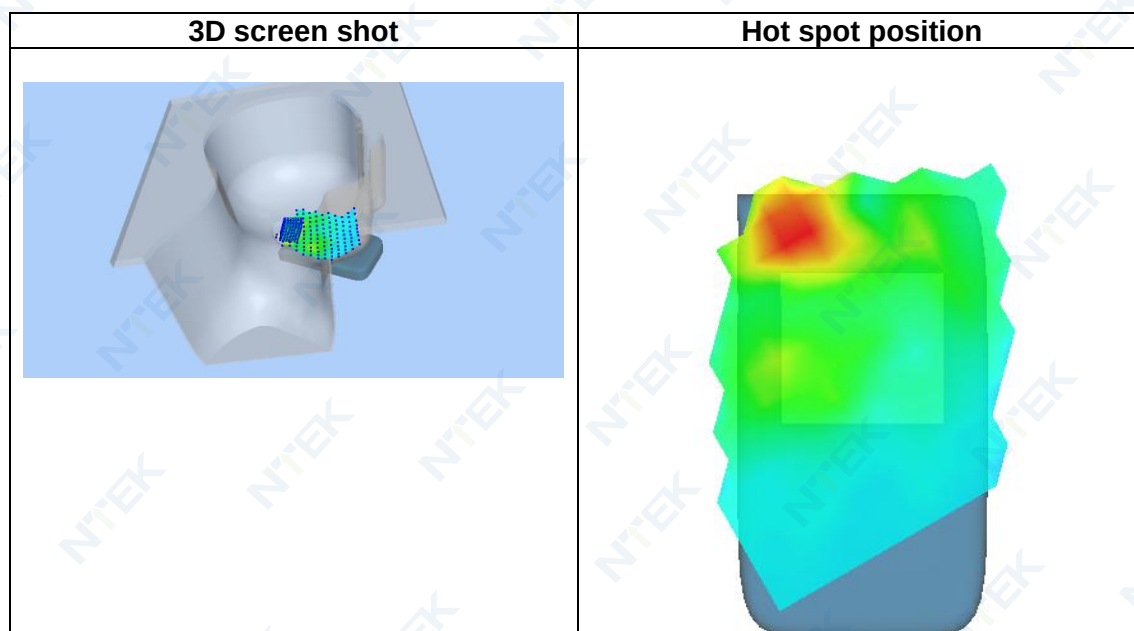
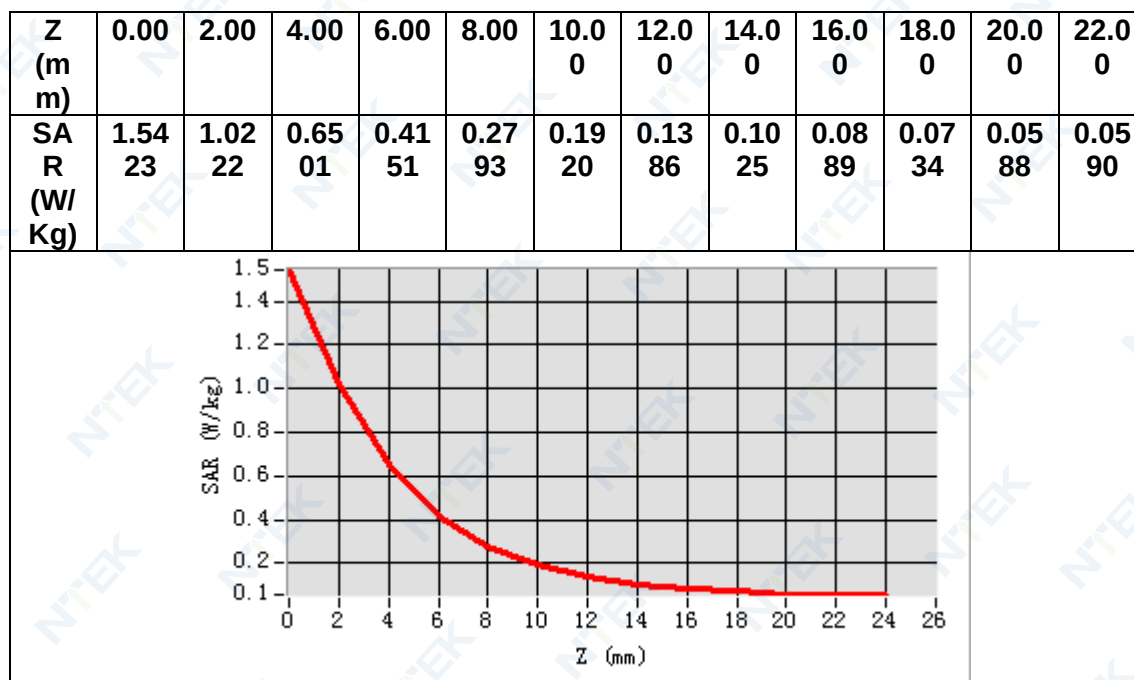
VOLUME SAR



Maximum location: X=6.00, Y=-21.00

SAR Peak: 2.23 W/kg

SAR 10g (W/Kg)	0.425593
SAR 1g (W/Kg)	0.974139



MEASUREMENT 10

Date of measurement: 22/10/2023

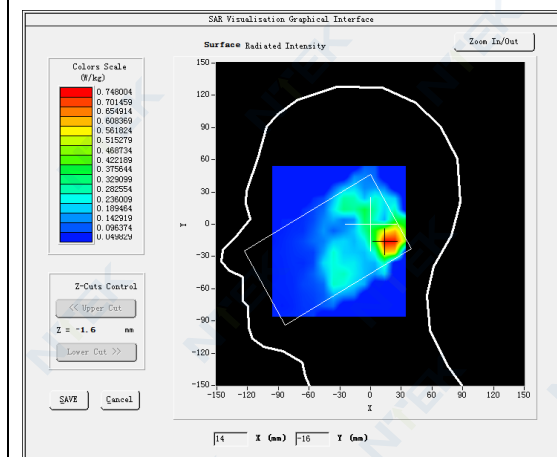
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>High</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.04</u>

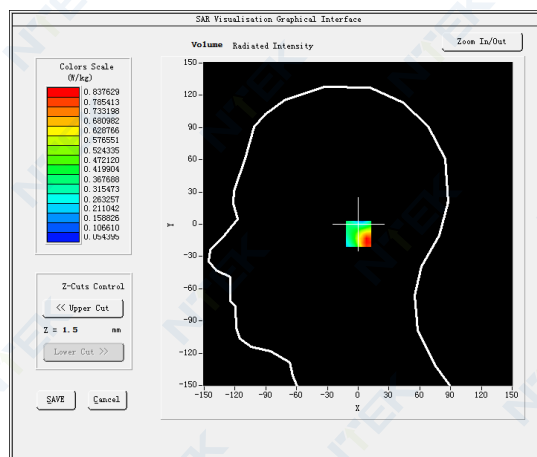
B. SAR Measurement Results

Frequency (MHz)	5795.000000
Relative permittivity (real part)	35.167582
Relative permittivity (imaginary part)	15.992082
Conductivity (S/m)	5.148562
Variation (%)	0.360000

SURFACE SAR



VOLUME SAR

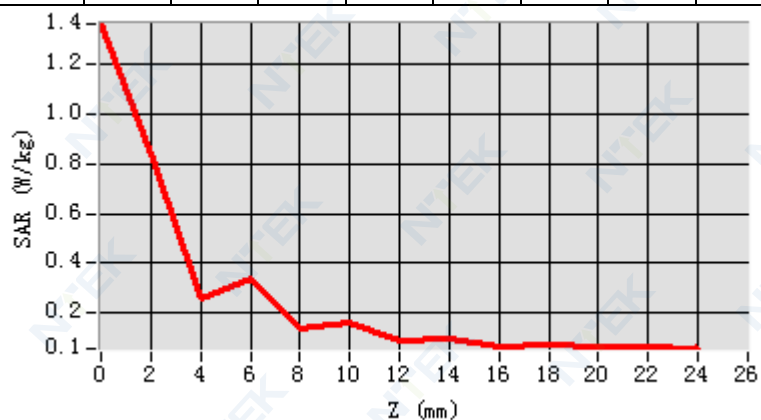


Maximum location: X=9.00, Y=-9.00

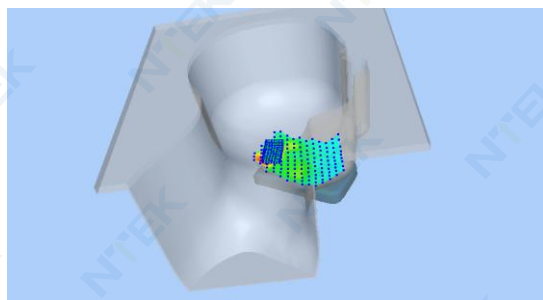
SAR Peak: 1.89 W/kg

SAR 10g (W/Kg)	0.313588
SAR 1g (W/Kg)	0.791516

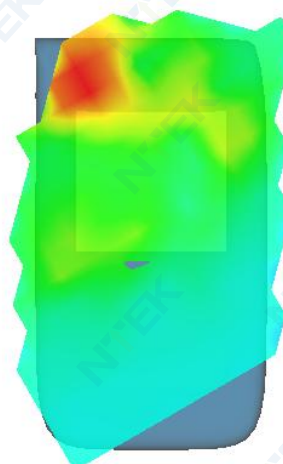
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0 0	12.0 0	14.0 0	16.0 0	18.0 0	20.0 0	22.0 0
SAR (W/ Kg)	1.36 50	0.83 76	0.25 35	0.33 61	0.13 36	0.15 87	0.08 80	0.09 70	0.06 43	0.07 18	0.06 62	0.06 56



3D screen shot



Hot spot position



MEASUREMENT 11

Date of measurement: 21/10/2023

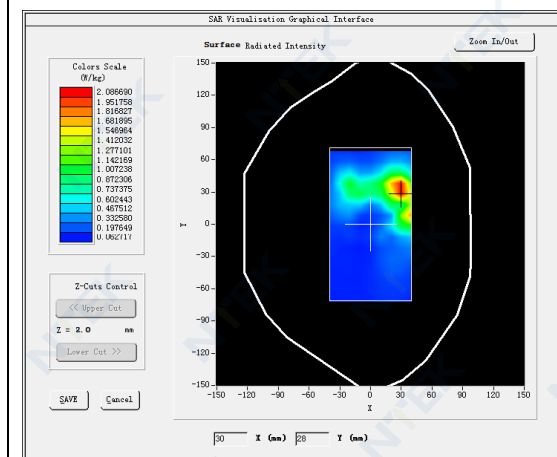
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.07</u>

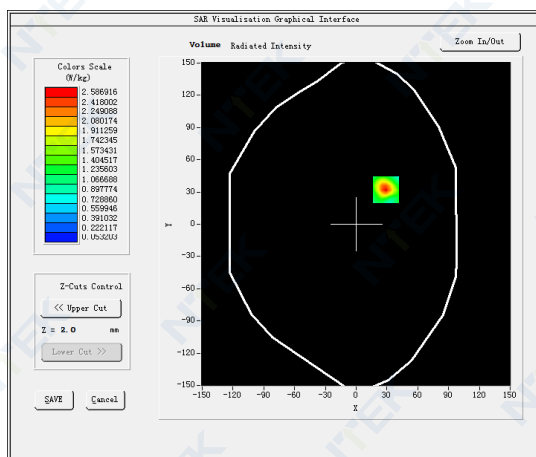
B. SAR Measurement Results

Frequency (MHz)	5210.000000
Relative permittivity (real part)	35.709979
Relative permittivity (imaginary part)	15.793786
Conductivity (S/m)	4.571424
Variation (%)	-2.370000

SURFACE SAR



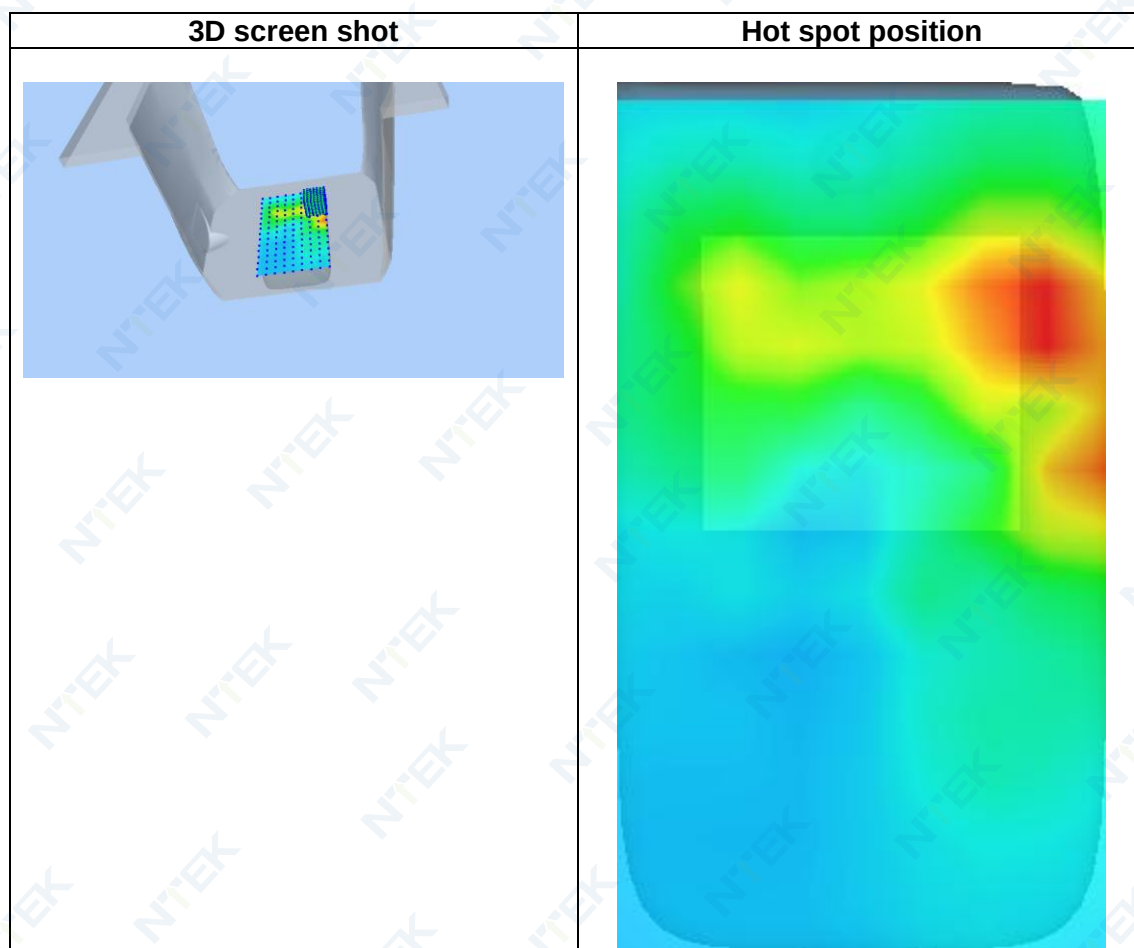
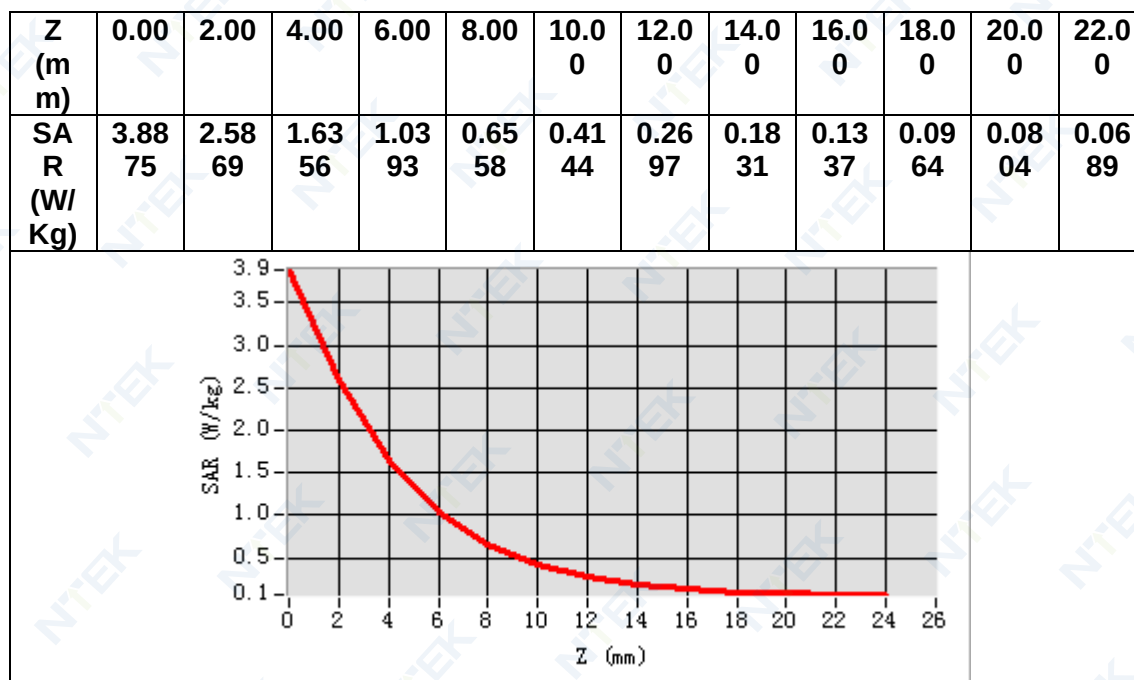
VOLUME SAR



Maximum location: X=29.00, Y=32.00

SAR Peak: 4.00 W/kg

SAR 10g (W/Kg)	0.615229
SAR 1g (W/Kg)	1.553590



MEASUREMENT 12

Date of measurement: 22/10/2023

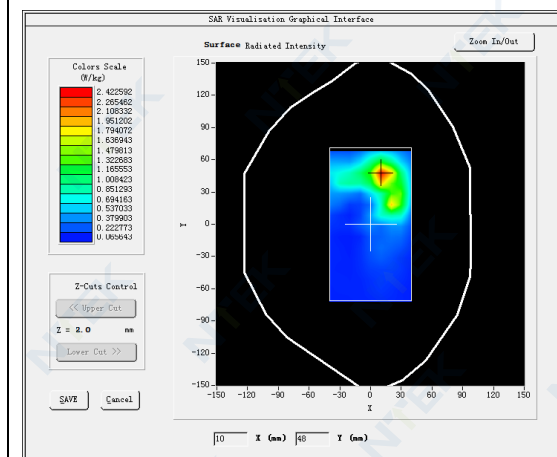
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>High</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.04</u>

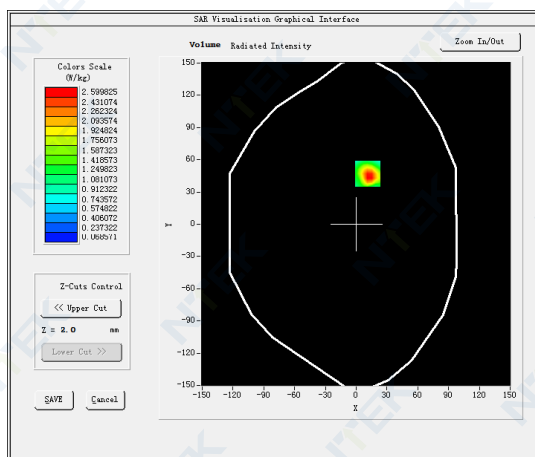
B. SAR Measurement Results

Frequency (MHz)	5795.000000
Relative permittivity (real part)	35.167582
Relative permittivity (imaginary part)	15.992082
Conductivity (S/m)	5.148562
Variation (%)	3.890000

SURFACE SAR



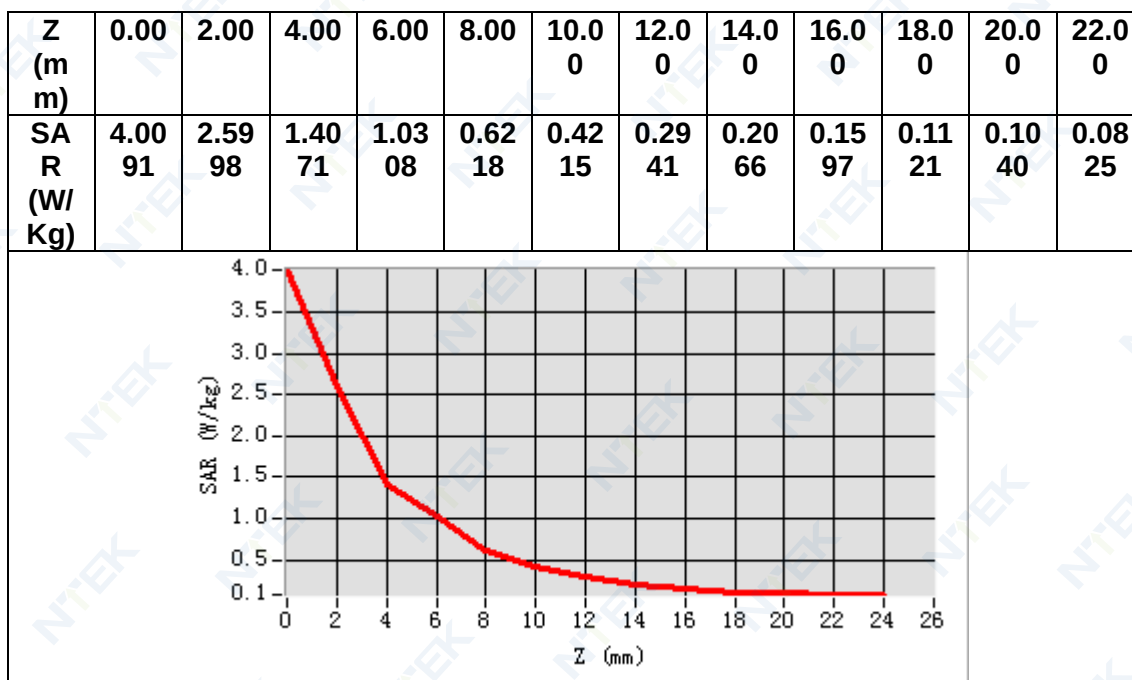
VOLUME SAR



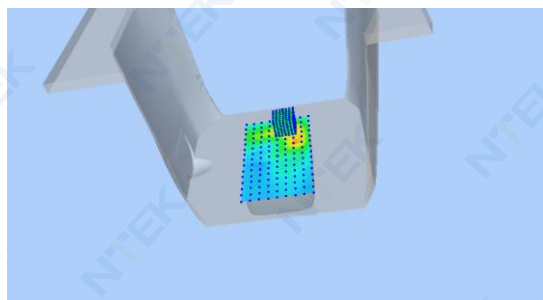
Maximum location: X=11.00, Y=47.00

SAR Peak: 4.16 W/kg

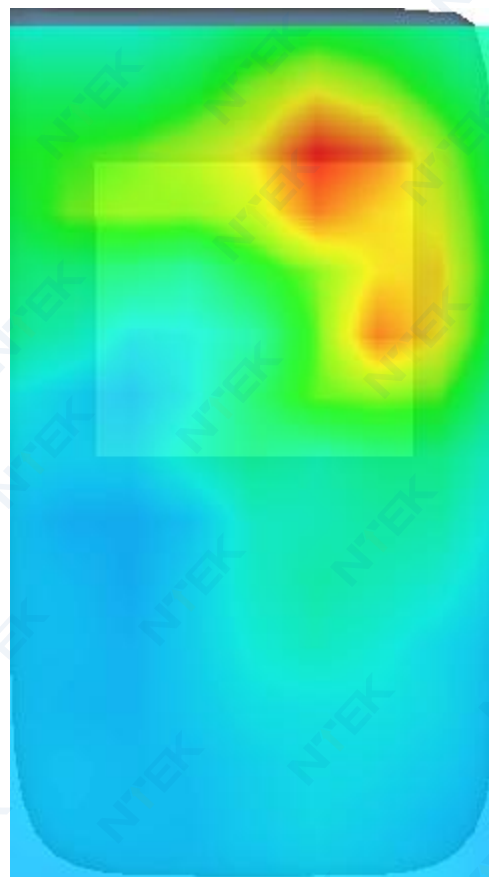
SAR 10g (W/Kg)	0.665037
SAR 1g (W/Kg)	1.639805



3D screen shot



Hot spot position



MEASUREMENT 13

Date of measurement: 28/10/2023

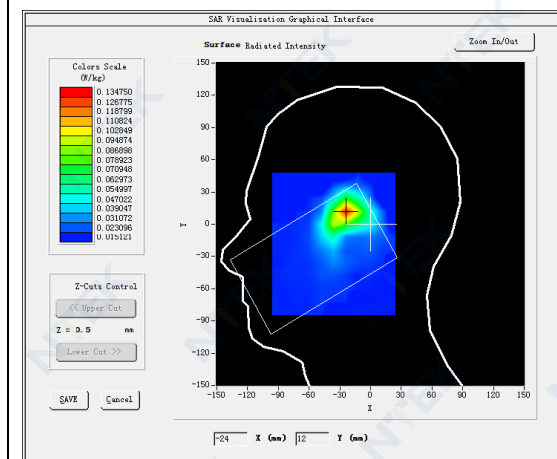
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

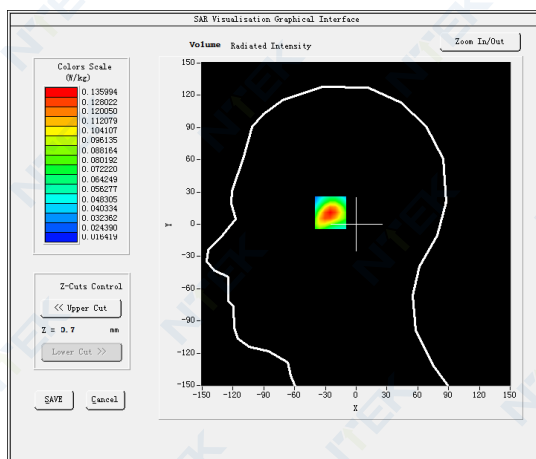
B. SAR Measurement Results

Frequency (MHz)	2442.000000
Relative permittivity (real part)	38.803932
Relative permittivity (imaginary part)	13.209110
Conductivity (S/m)	1.792036
Variation (%)	2.730000

SURFACE SAR



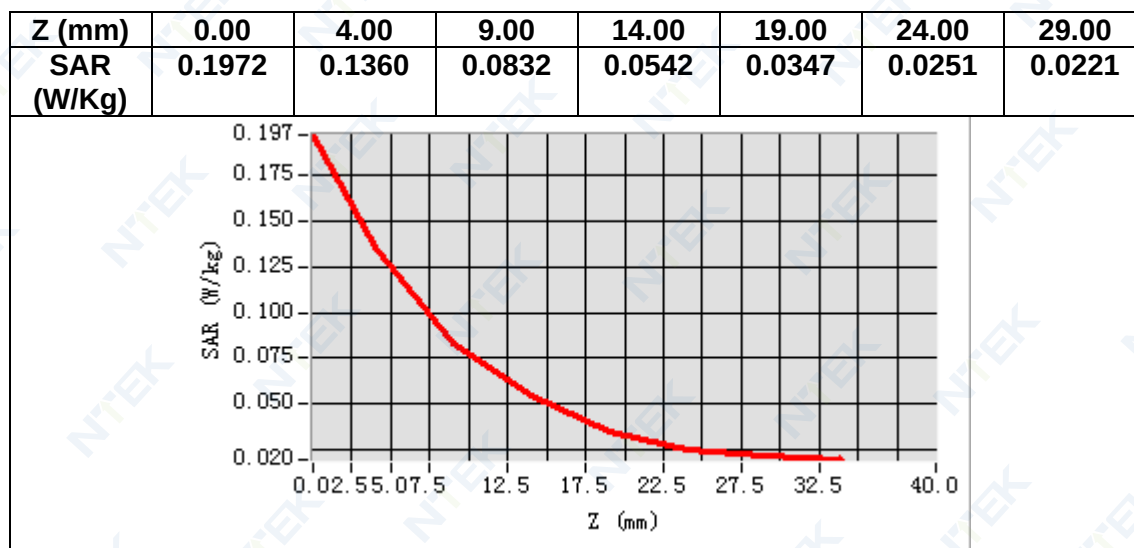
VOLUME SAR



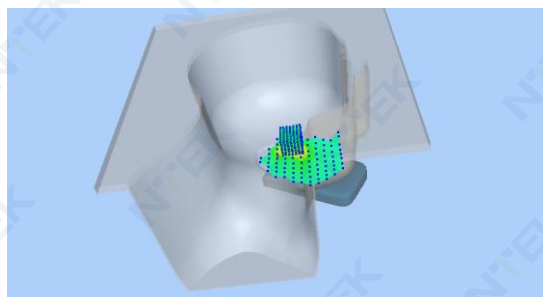
Maximum location: X=-24.00, Y=12.00

SAR Peak: 0.20 W/kg

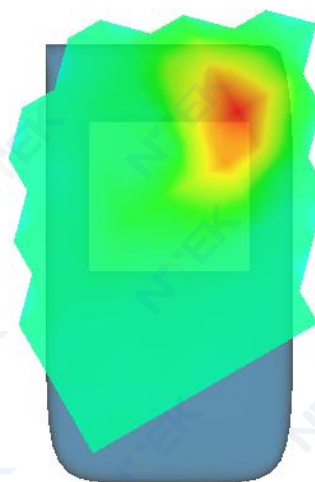
SAR 10g (W/Kg)	0.070650
SAR 1g (W/Kg)	0.125285



3D screen shot



Hot spot position



MEASUREMENT 14

Date of measurement: 28/10/2023

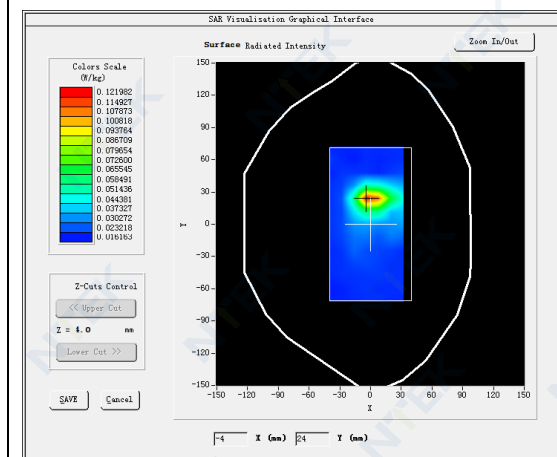
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

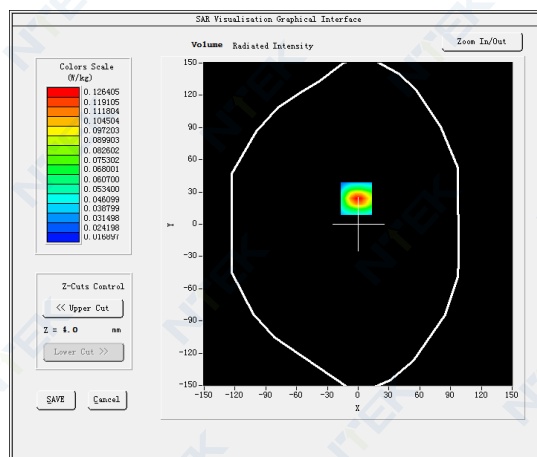
B. SAR Measurement Results

Frequency (MHz)	2442.000000
Relative permittivity (real part)	38.803932
Relative permittivity (imaginary part)	13.209110
Conductivity (S/m)	1.792036
Variation (%)	0.540000

SURFACE SAR



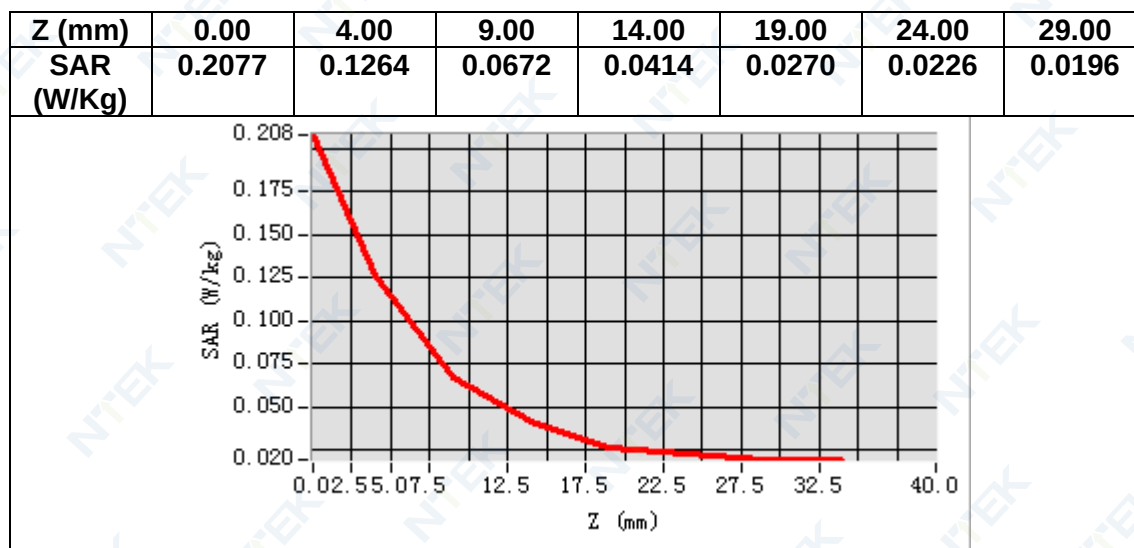
VOLUME SAR



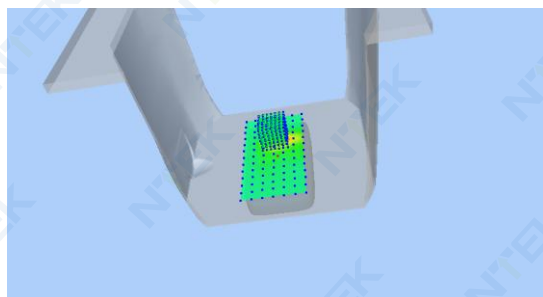
Maximum location: X=-2.00, Y=24.00

SAR Peak: 0.21 W/kg

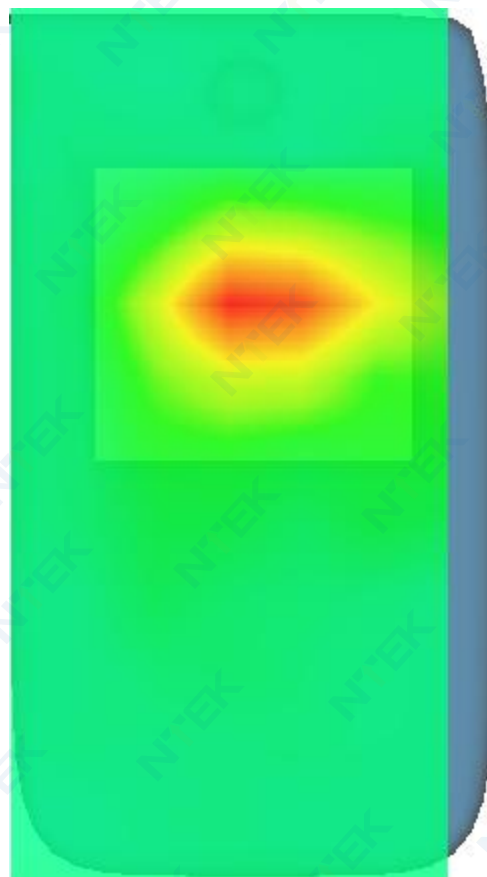
SAR 10g (W/Kg)	0.059549
SAR 1g (W/Kg)	0.116586



3D screen shot



Hot spot position



MEASUREMENT 15

Date of measurement: 27/10/2023

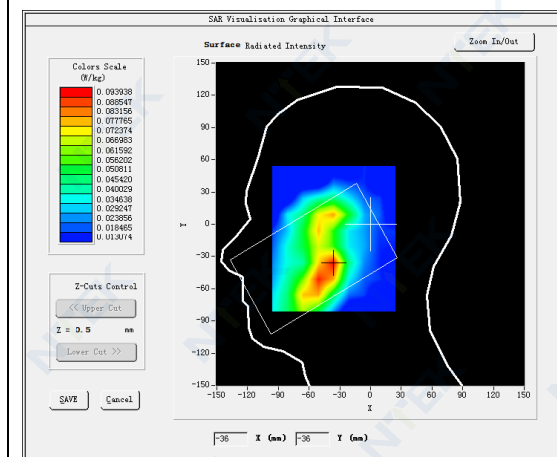
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

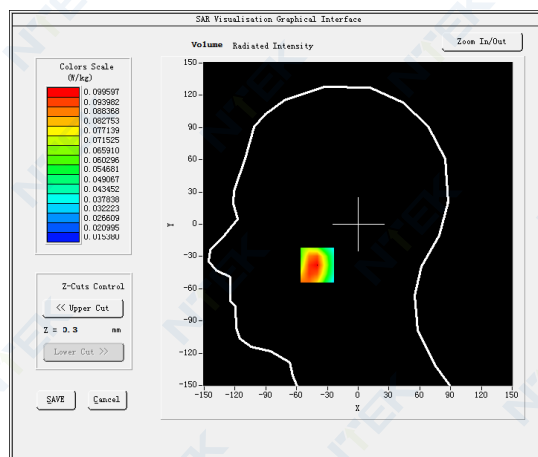
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	2.100000

SURFACE SAR



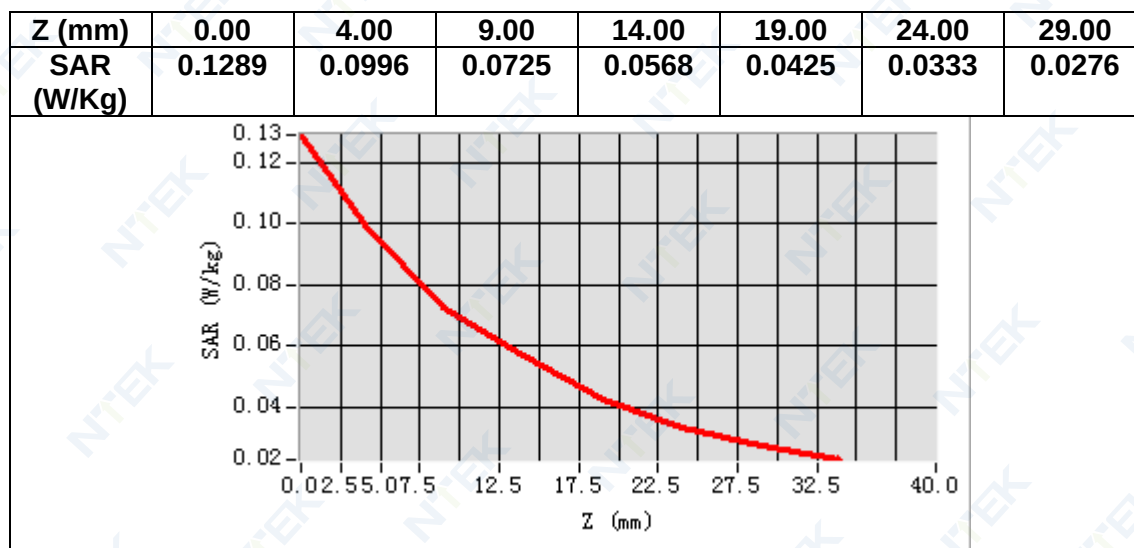
VOLUME SAR



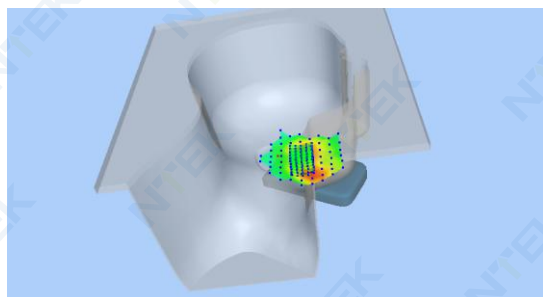
Maximum location: X=-38.00, Y=-38.00

SAR Peak: 0.13 W/kg

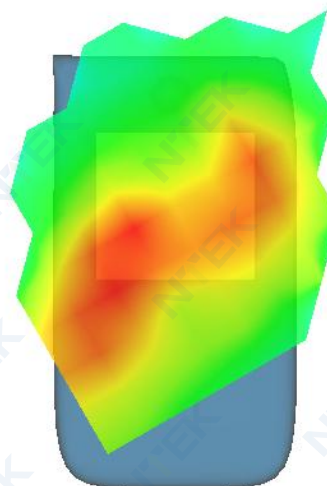
SAR 10g (W/Kg)	0.064031
SAR 1g (W/Kg)	0.097501



3D screen shot



Hot spot position



MEASUREMENT 16

Date of measurement: 27/10/2023

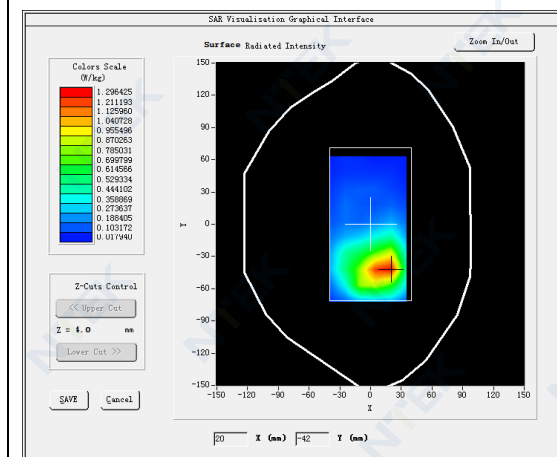
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

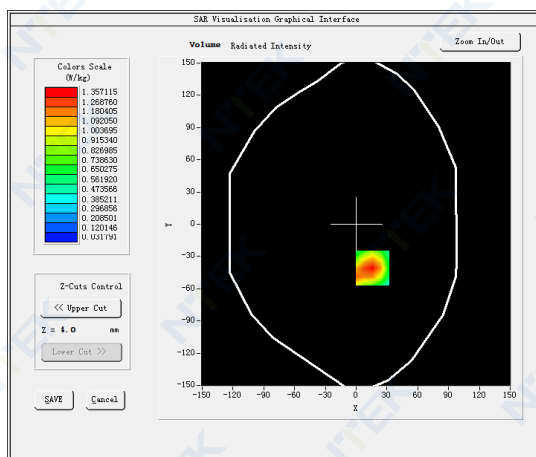
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	-0.370000

SURFACE SAR



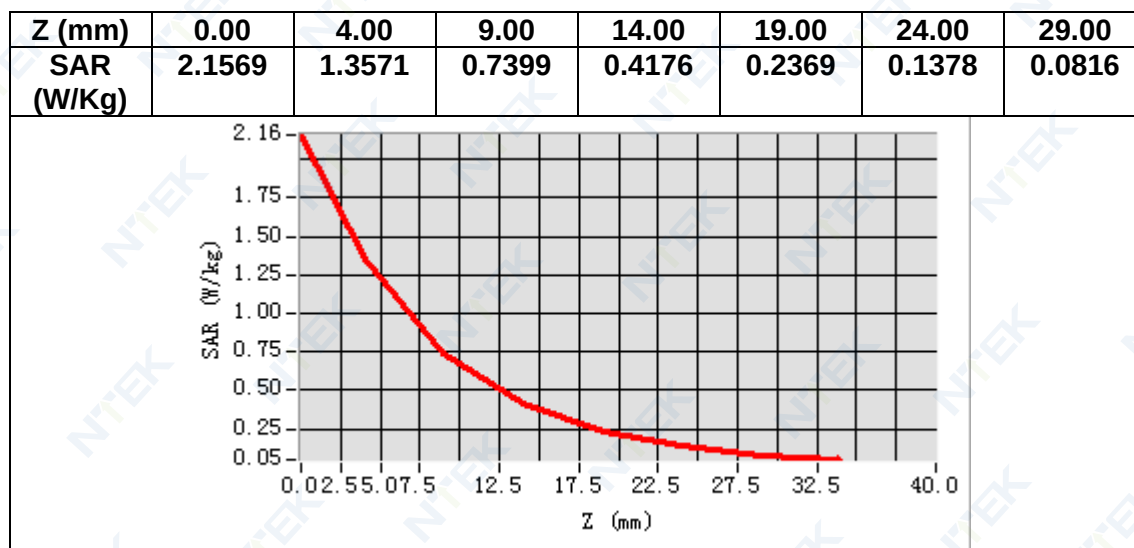
VOLUME SAR



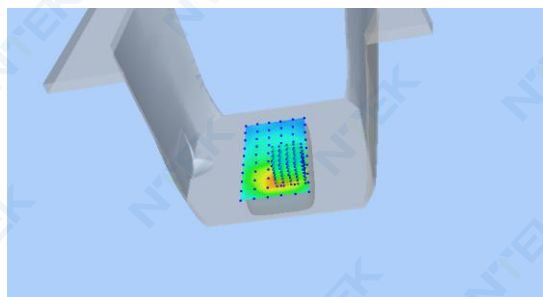
Maximum location: X=16.00, Y=-41.00

SAR Peak: 2.15 W/kg

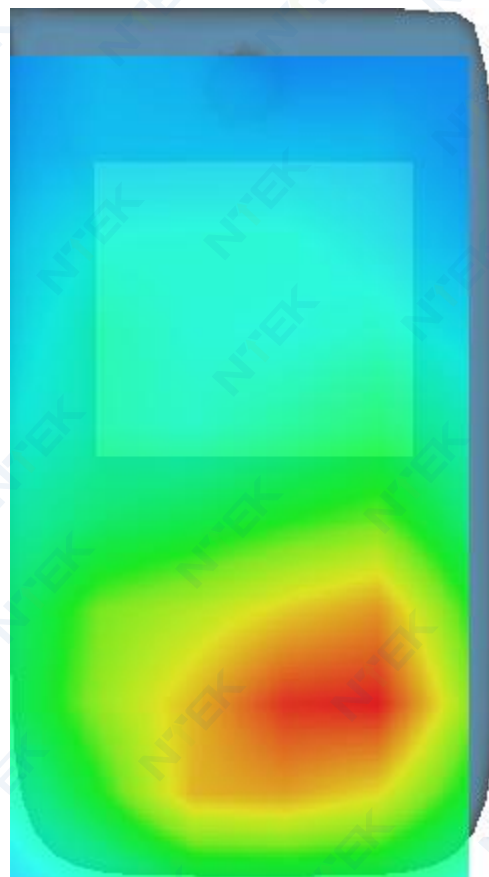
SAR 10g (W/Kg)	0.706206
SAR 1g (W/Kg)	1.291685



3D screen shot



Hot spot position



MEASUREMENT 17

Date of measurement: 18/10/2023

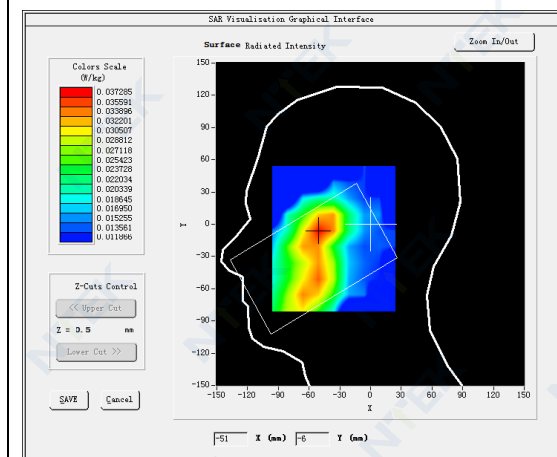
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

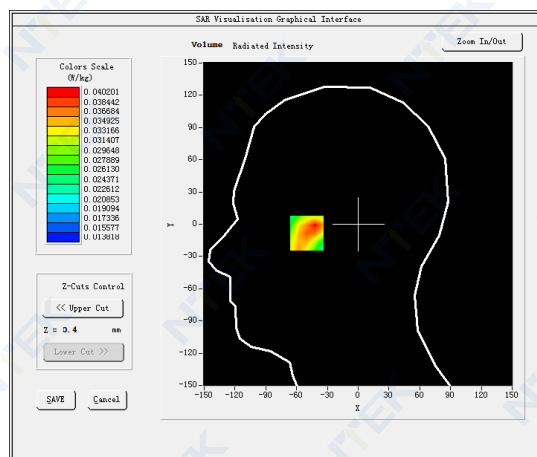
B. SAR Measurement Results

Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.745342
Relative permittivity (imaginary part)	13.621142
Conductivity (S/m)	1.322008
Variation (%)	2.640000

SURFACE SAR



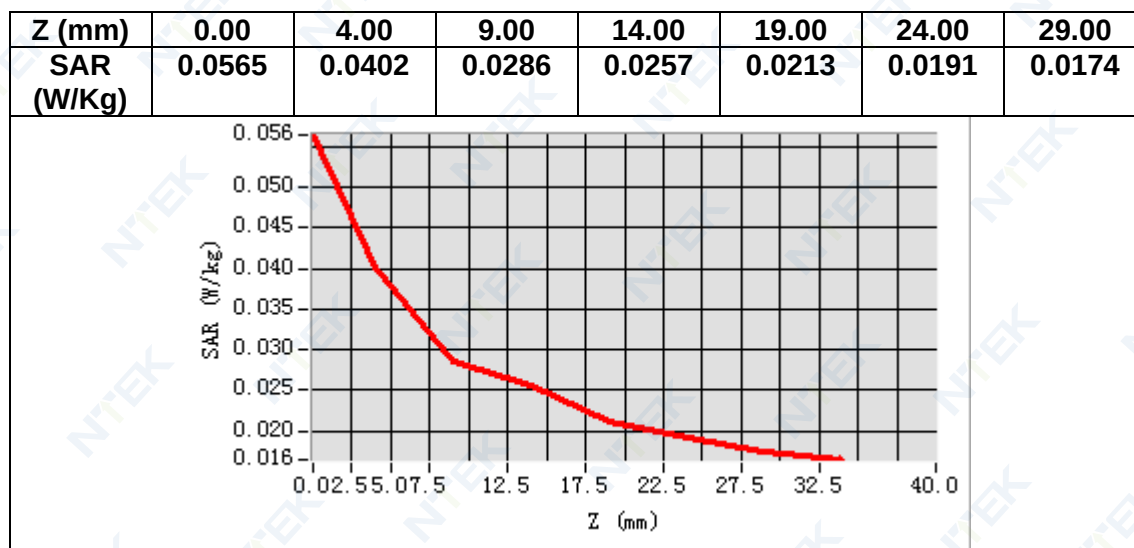
VOLUME SAR



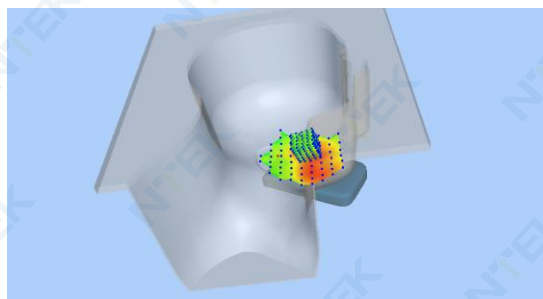
Maximum location: X=-50.00, Y=-6.00

SAR Peak: 0.05 W/kg

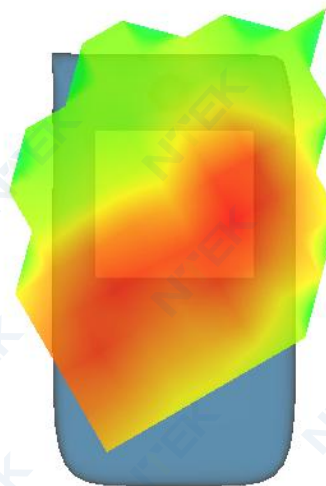
SAR 10g (W/Kg)	0.028620
SAR 1g (W/Kg)	0.038047



3D screen shot



Hot spot position



MEASUREMENT 18

Date of measurement: 18/10/2023

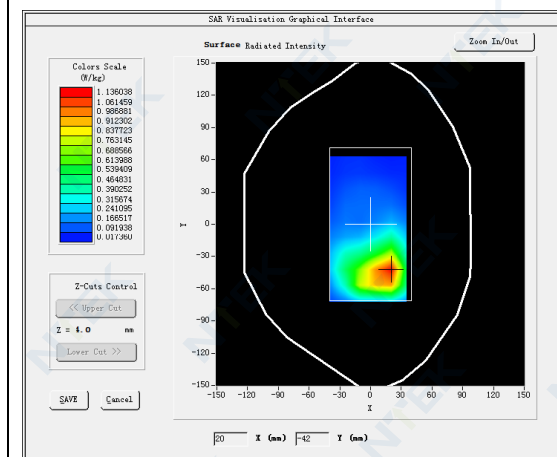
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

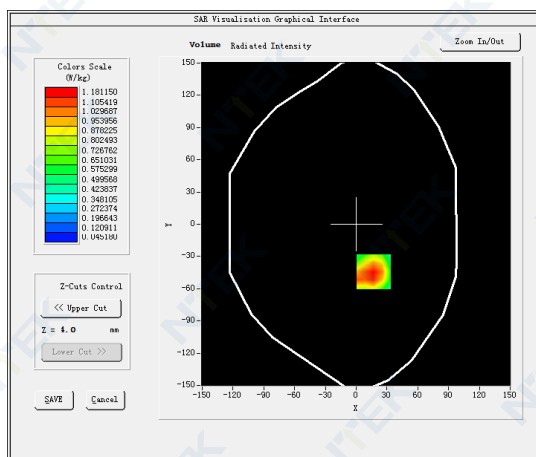
B. SAR Measurement Results

Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.745342
Relative permittivity (imaginary part)	13.621142
Conductivity (S/m)	1.322008
Variation (%)	-0.170000

SURFACE SAR



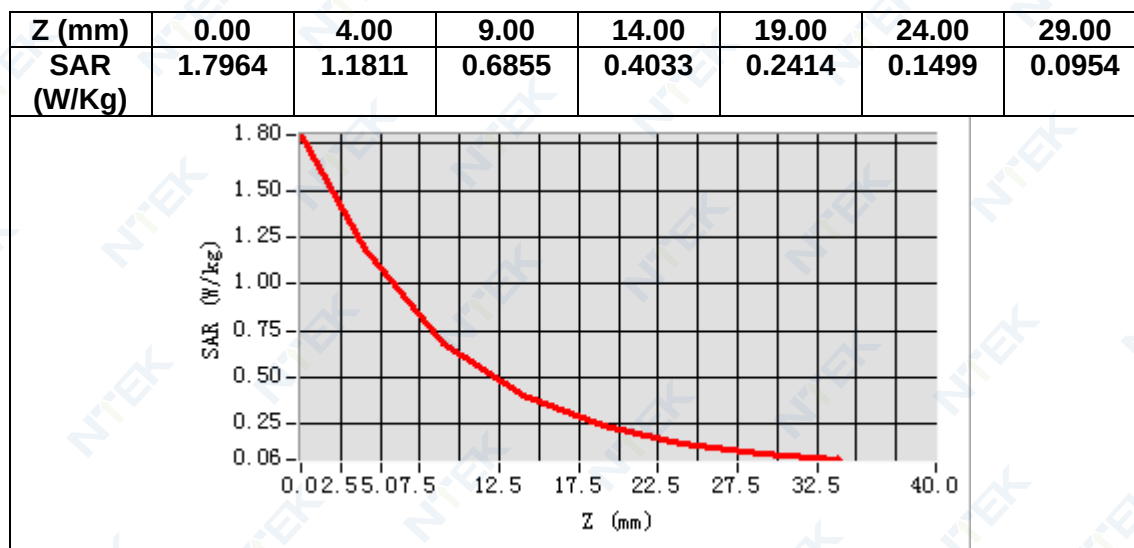
VOLUME SAR



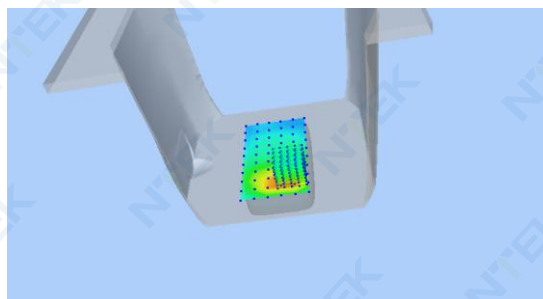
Maximum location: X=17.00, Y=-44.00

SAR Peak: 1.88 W/kg

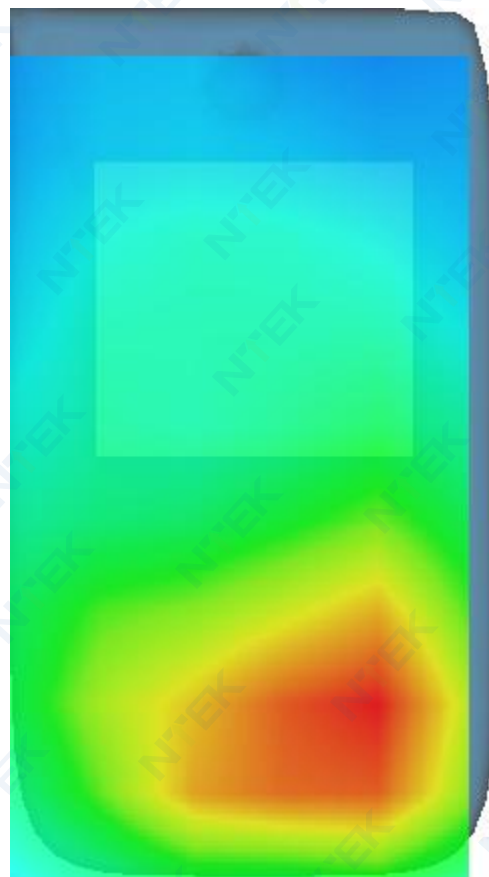
SAR 10g (W/Kg)	0.642596
SAR 1g (W/Kg)	1.144486



3D screen shot



Hot spot position



MEASUREMENT 19

Date of measurement: 16/10/2023

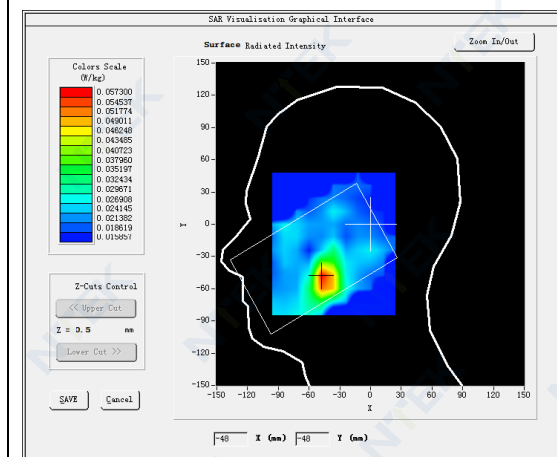
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 7</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

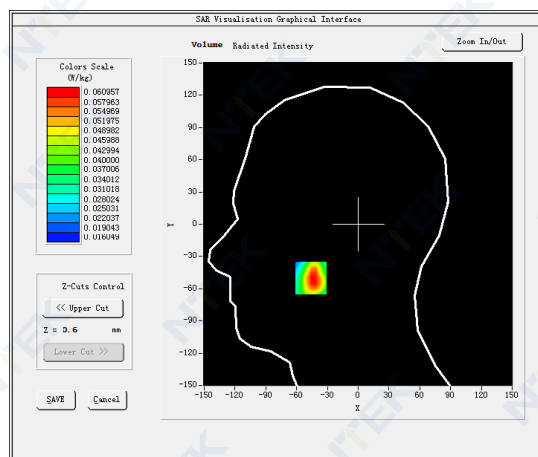
B. SAR Measurement Results

Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.056892
Relative permittivity (imaginary part)	13.222972
Conductivity (S/m)	1.862235
Variation (%)	3.550000

SURFACE SAR



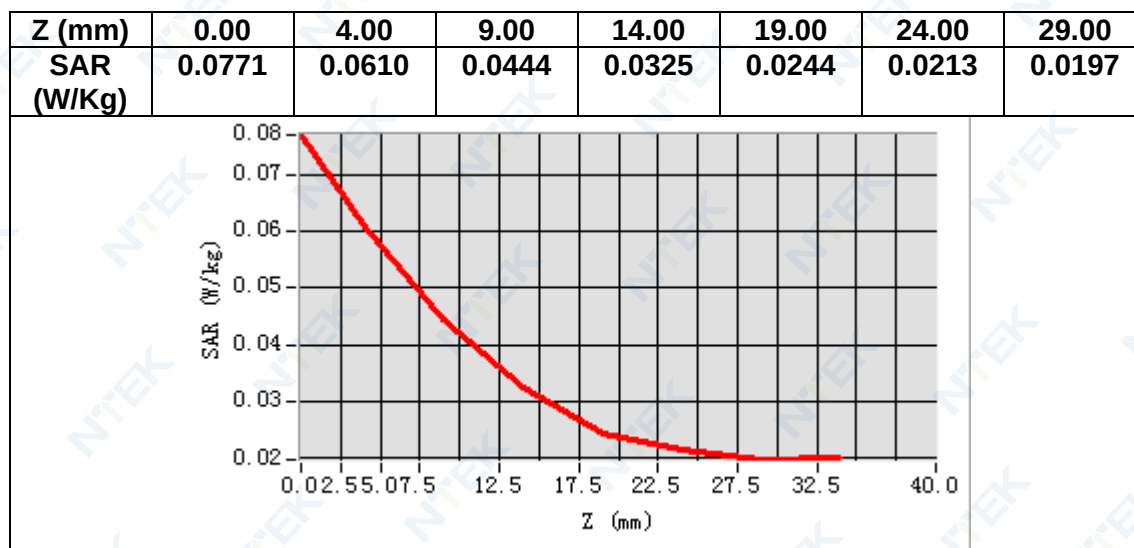
VOLUME SAR



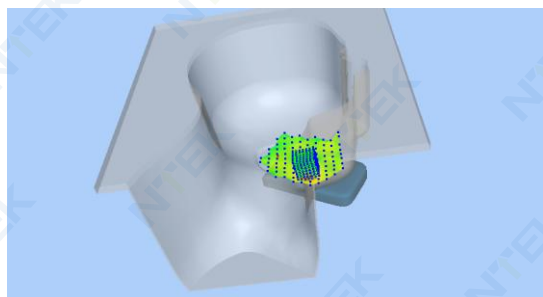
Maximum location: X=-46.00, Y=-50.00

SAR Peak: 0.09 W/kg

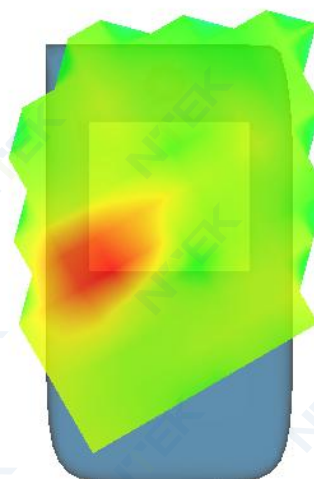
SAR 10g (W/Kg)	0.037385
SAR 1g (W/Kg)	0.057435



3D screen shot



Hot spot position



MEASUREMENT 20

Date of measurement: 16/10/2023

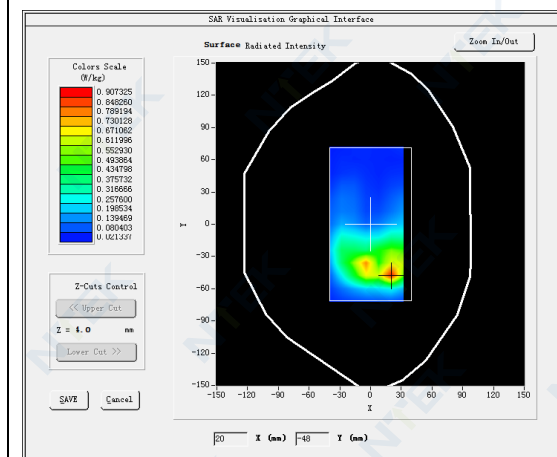
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 7</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

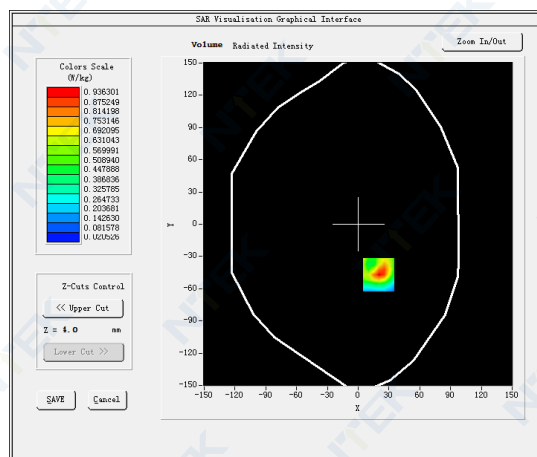
B. SAR Measurement Results

Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.056892
Relative permittivity (imaginary part)	13.222972
Conductivity (S/m)	1.862235
Variation (%)	0.510000

SURFACE SAR



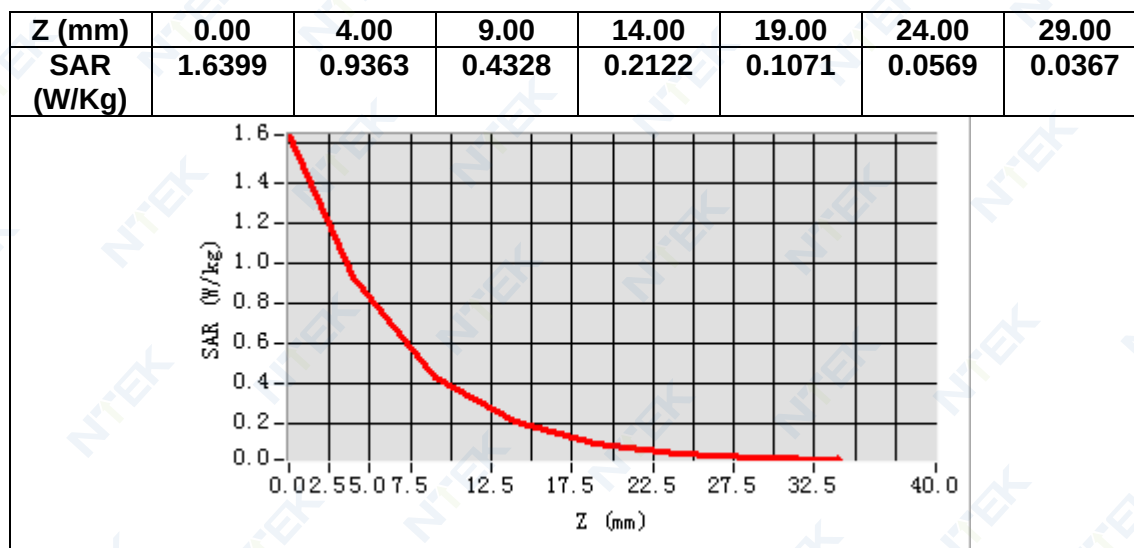
VOLUME SAR



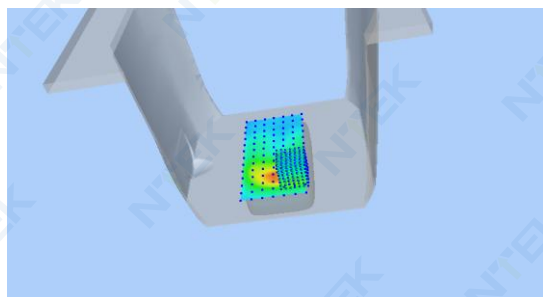
Maximum location: X=20.00, Y=-47.00

SAR Peak: 1.64 W/kg

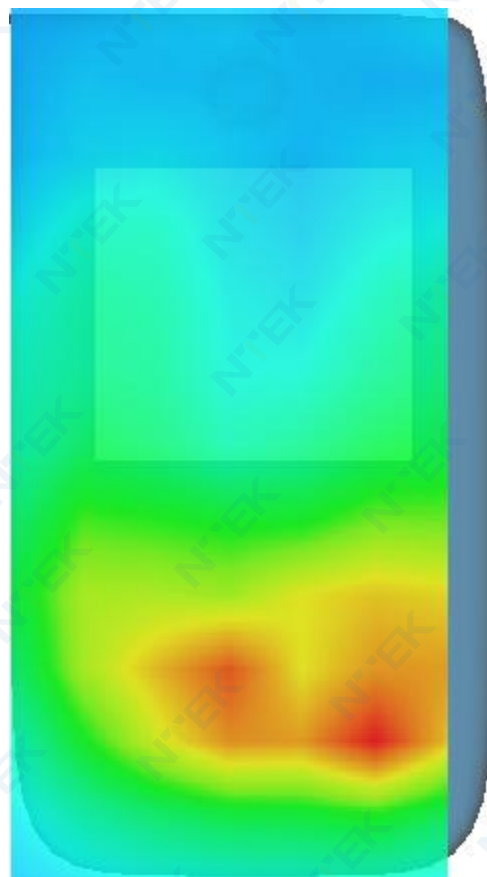
SAR 10g (W/Kg)	0.383569
SAR 1g (W/Kg)	0.857460



3D screen shot



Hot spot position



MEASUREMENT 21

Date of measurement: 17/10/2023

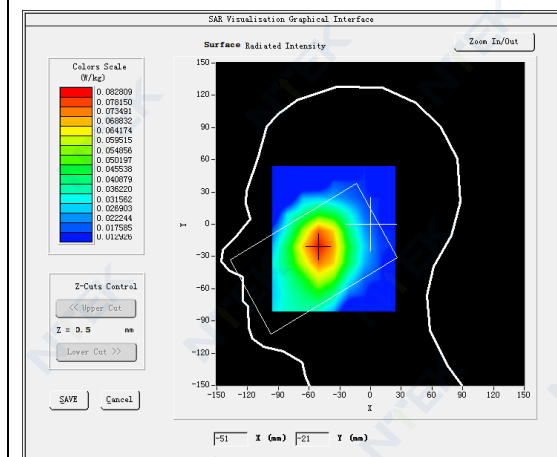
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

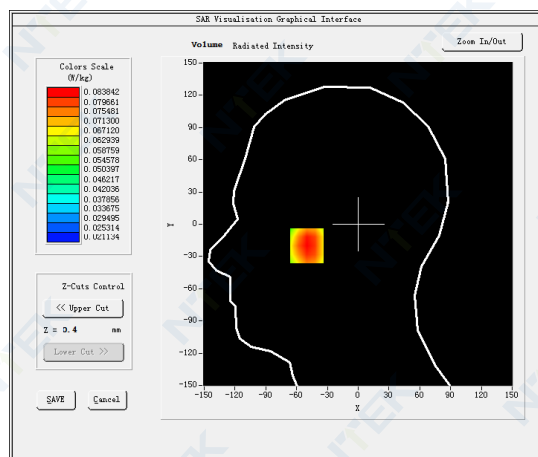
B. SAR Measurement Results

Frequency (MHz)	897.500000
Relative permittivity (real part)	42.240650
Relative permittivity (imaginary part)	19.917082
Conductivity (S/m)	0.992535
Variation (%)	0.310000

SURFACE SAR



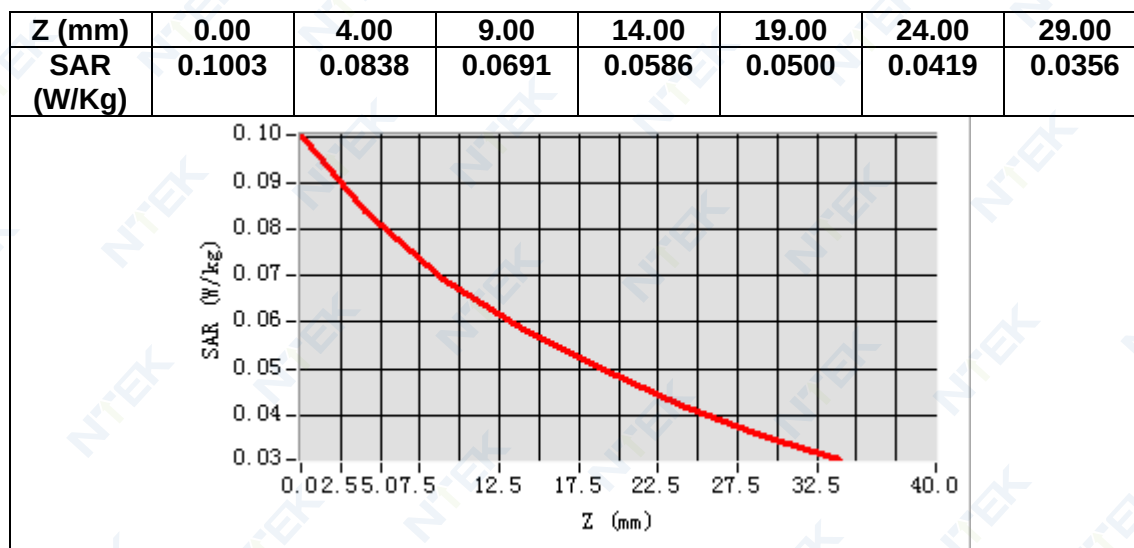
VOLUME SAR



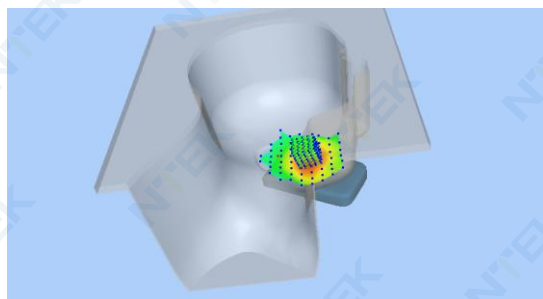
Maximum location: X=-50.00, Y=-20.00

SAR Peak: 0.10 W/kg

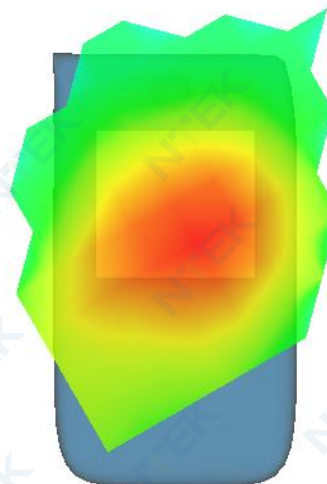
SAR 10g (W/Kg)	0.065125
SAR 1g (W/Kg)	0.083436



3D screen shot



Hot spot position



MEASUREMENT 22

Date of measurement: 17/10/2023

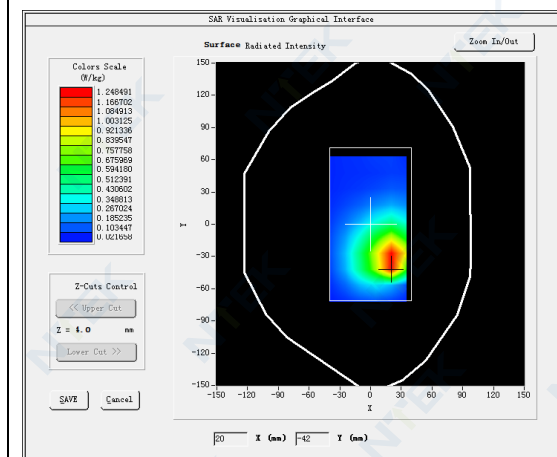
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

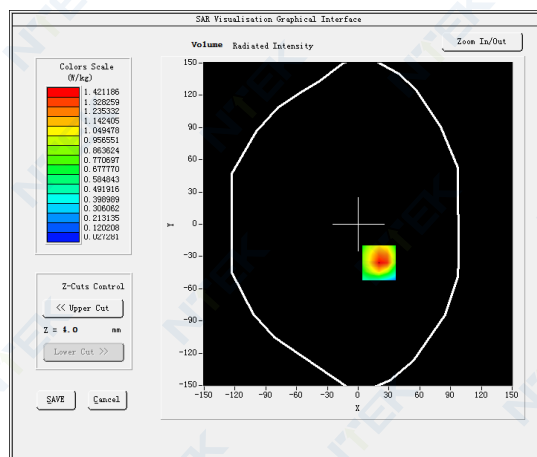
B. SAR Measurement Results

Frequency (MHz)	897.500000
Relative permittivity (real part)	42.240650
Relative permittivity (imaginary part)	19.917082
Conductivity (S/m)	0.992535
Variation (%)	-0.780000

SURFACE SAR



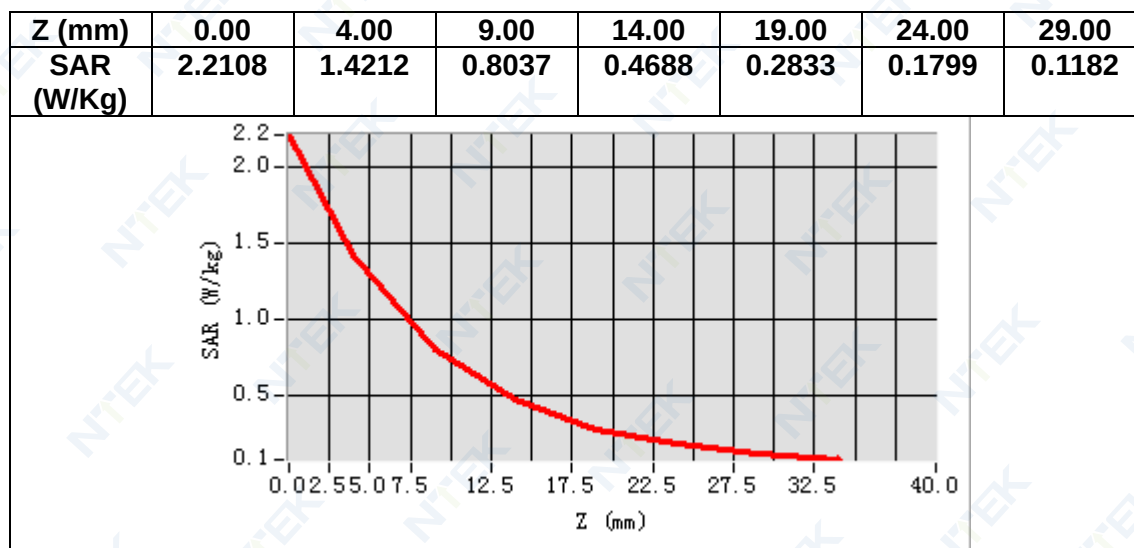
VOLUME SAR



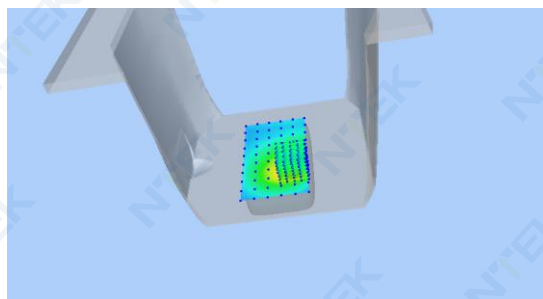
Maximum location: X=20.00, Y=-36.00

SAR Peak: 2.33 W/kg

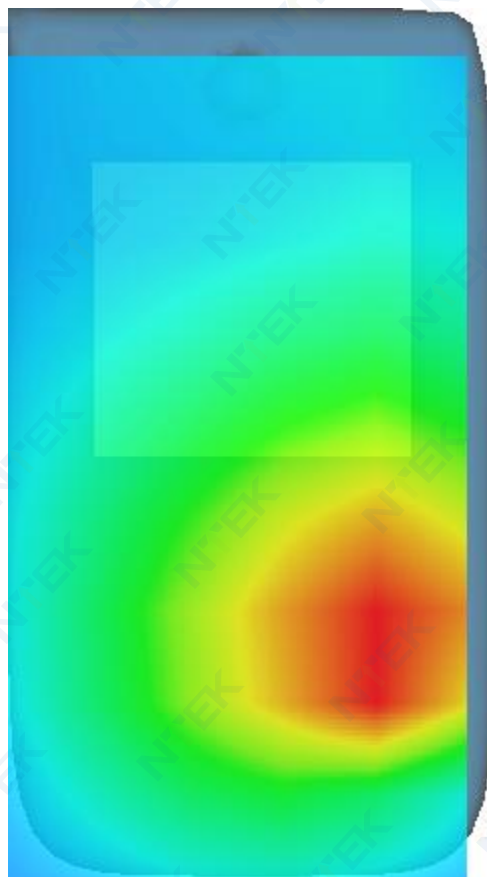
SAR 10g (W/Kg)	0.763454
SAR 1g (W/Kg)	1.393694



3D screen shot



Hot spot position



MEASUREMENT 23

Date of measurement: 17/10/2023

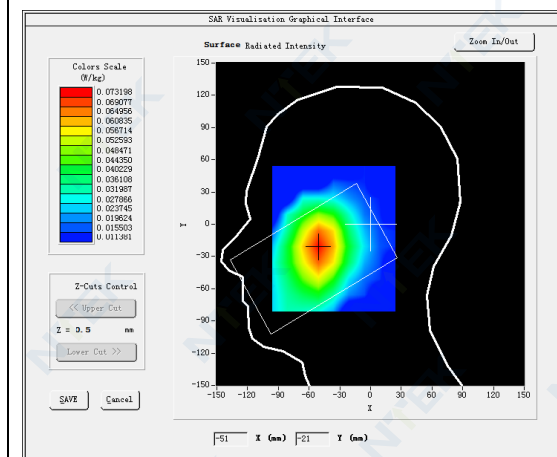
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

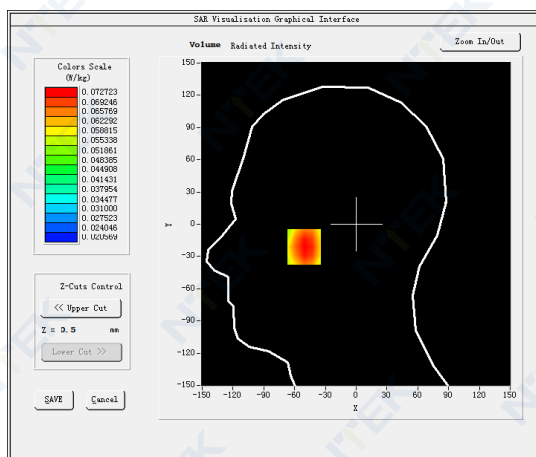
B. SAR Measurement Results

Frequency (MHz)	847.000000
Relative permittivity (real part)	42.859451
Relative permittivity (imaginary part)	19.702181
Conductivity (S/m)	0.927097
Variation (%)	4.510000

SURFACE SAR



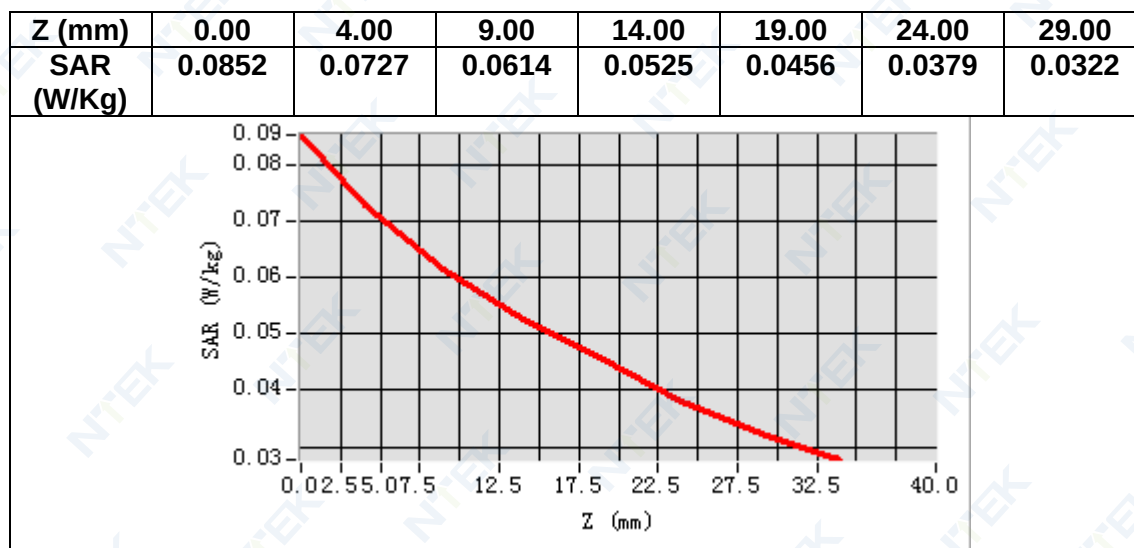
VOLUME SAR



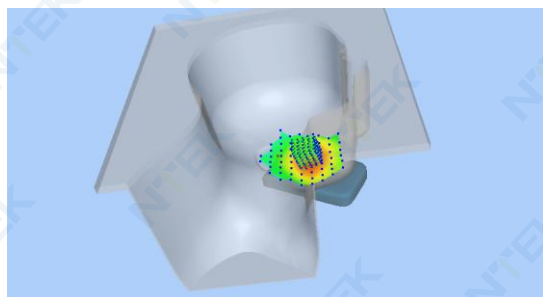
Maximum location: X=-51.00, Y=-21.00

SAR Peak: 0.09 W/kg

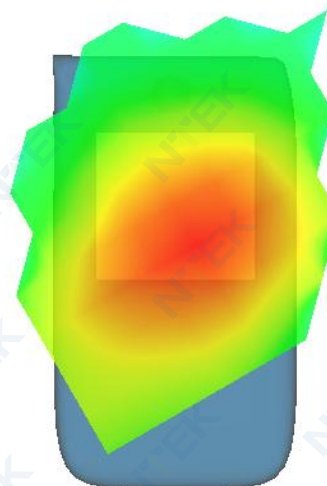
SAR 10g (W/Kg)	0.057272
SAR 1g (W/Kg)	0.072122



3D screen shot



Hot spot position



MEASUREMENT 24

Date of measurement: 17/10/2023

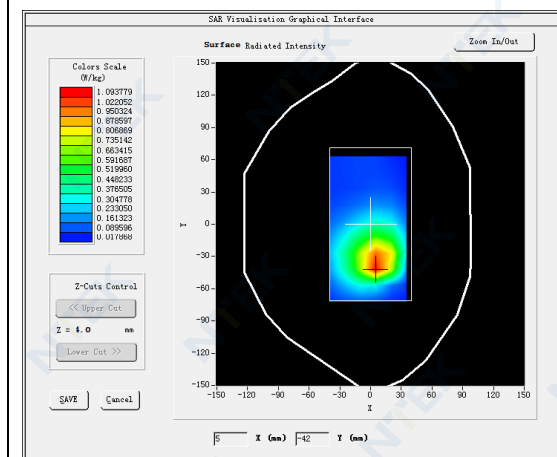
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

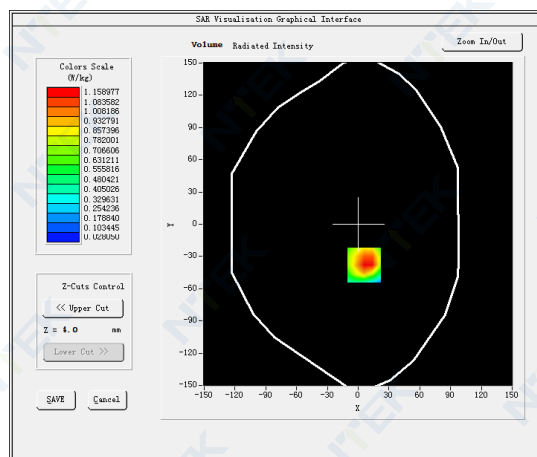
B. SAR Measurement Results

Frequency (MHz)	847.000000
Relative permittivity (real part)	42.859451
Relative permittivity (imaginary part)	19.702181
Conductivity (S/m)	0.927097
Variation (%)	-0.220000

SURFACE SAR



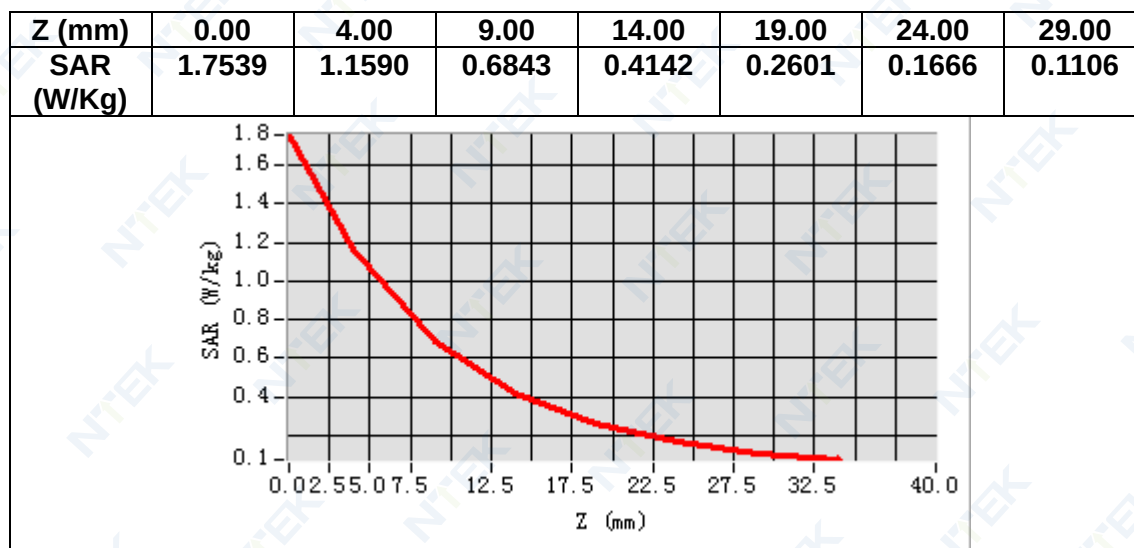
VOLUME SAR



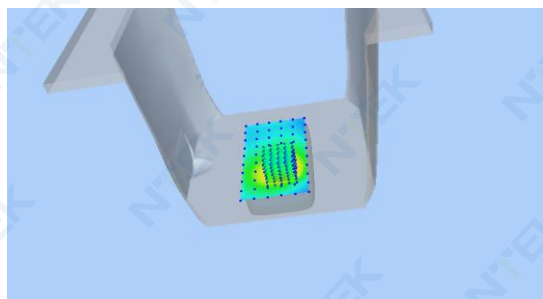
Maximum location: X=6.00, Y=-38.00

SAR Peak: 1.90 W/kg

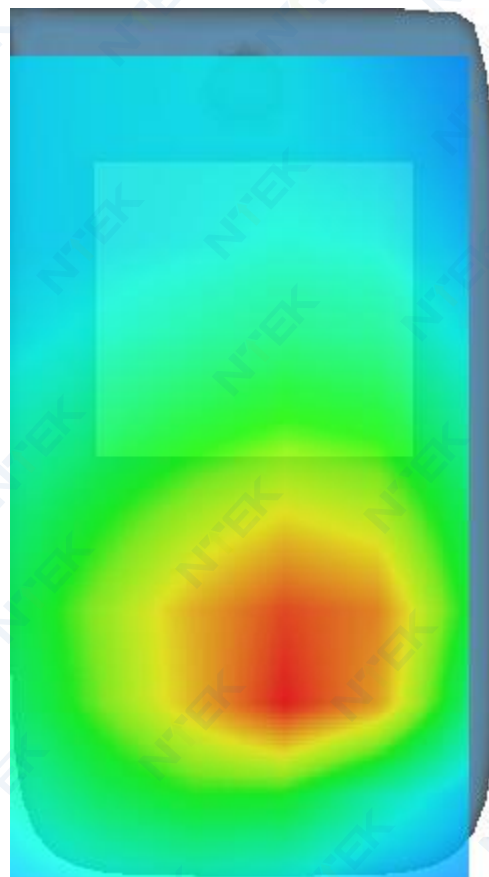
SAR 10g (W/Kg)	0.644714
SAR 1g (W/Kg)	1.142110



3D screen shot



Hot spot position



MEASUREMENT 25

Date of measurement: 16/10/2023

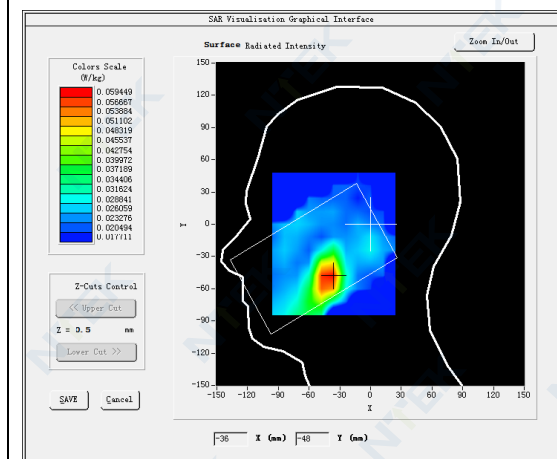
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

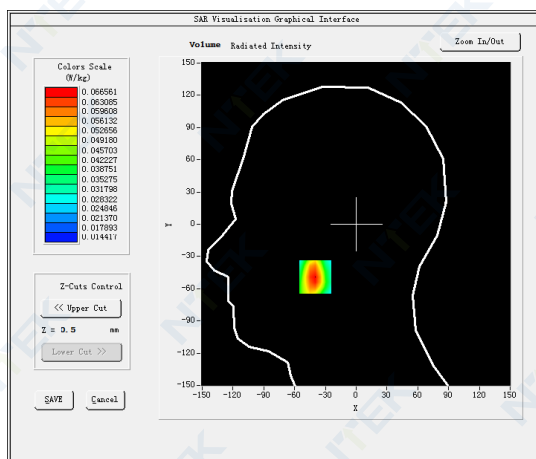
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	38.688992
Relative permittivity (imaginary part)	13.436772
Conductivity (S/m)	1.937135
Variation (%)	-2.030000

SURFACE SAR



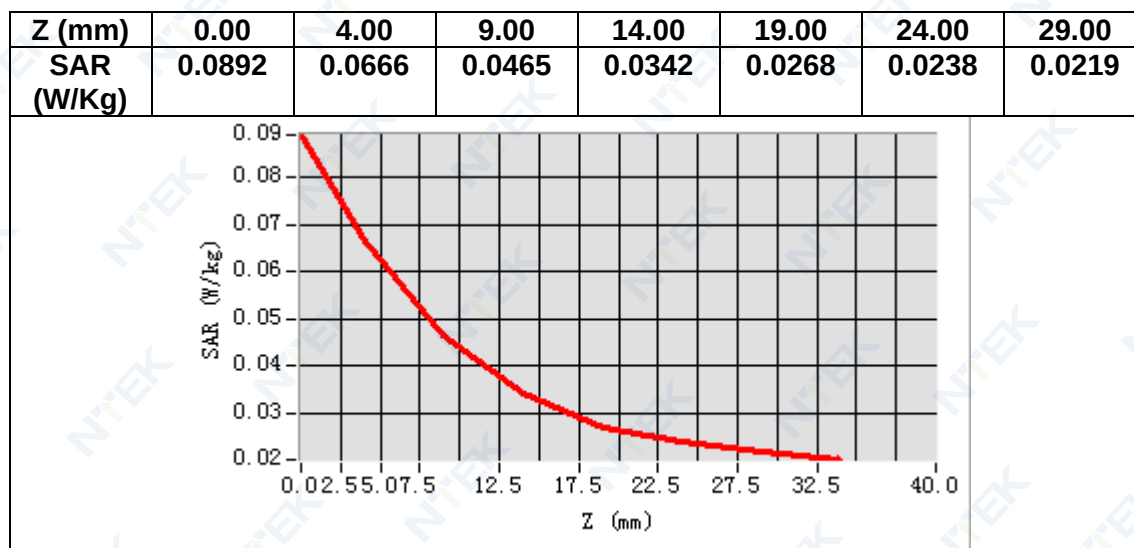
VOLUME SAR



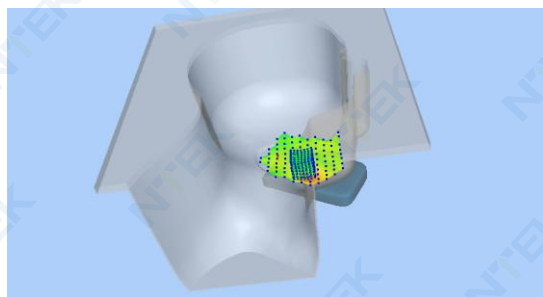
Maximum location: X=-40.00, Y=-49.00

SAR Peak: 0.09 W/kg

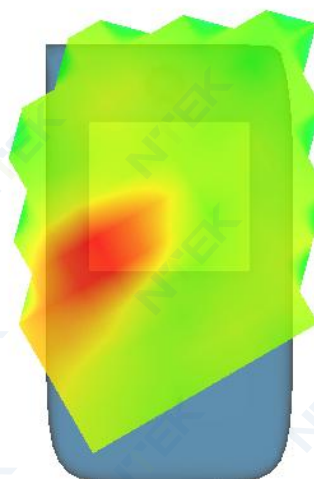
SAR 10g (W/Kg)	0.040147
SAR 1g (W/Kg)	0.059709



3D screen shot



Hot spot position



MEASUREMENT 26

Date of measurement: 16/10/2023

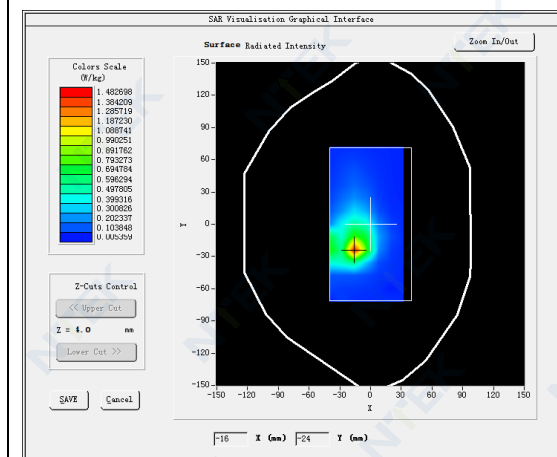
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

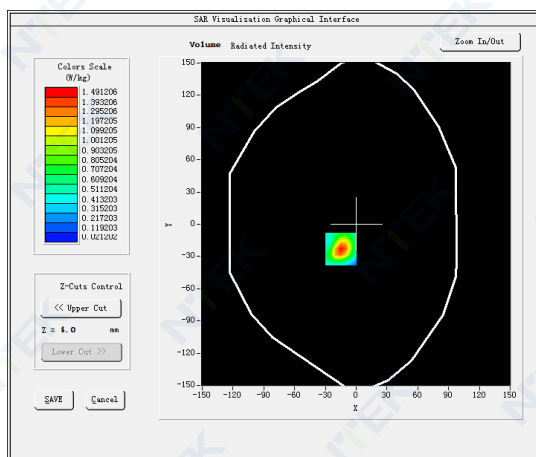
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	38.688992
Relative permittivity (imaginary part)	13.436772
Conductivity (S/m)	1.937135
Variation (%)	-0.030000

SURFACE SAR



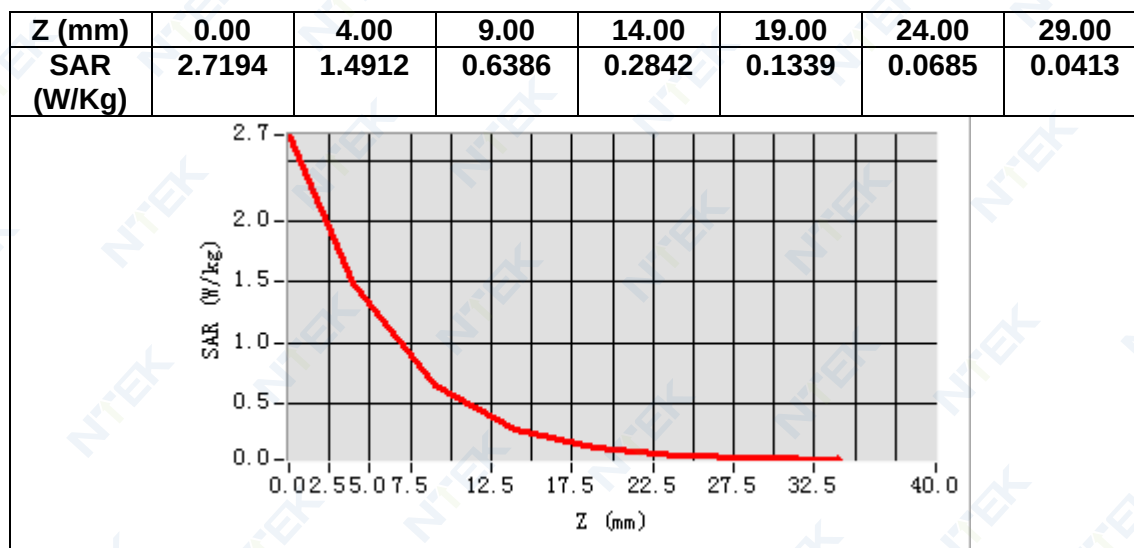
VOLUME SAR



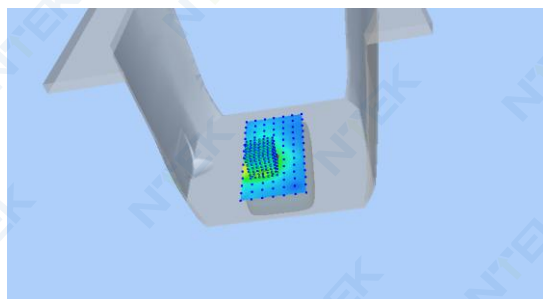
Maximum location: X=-15.00, Y=-23.00

SAR Peak: 2.69 W/kg

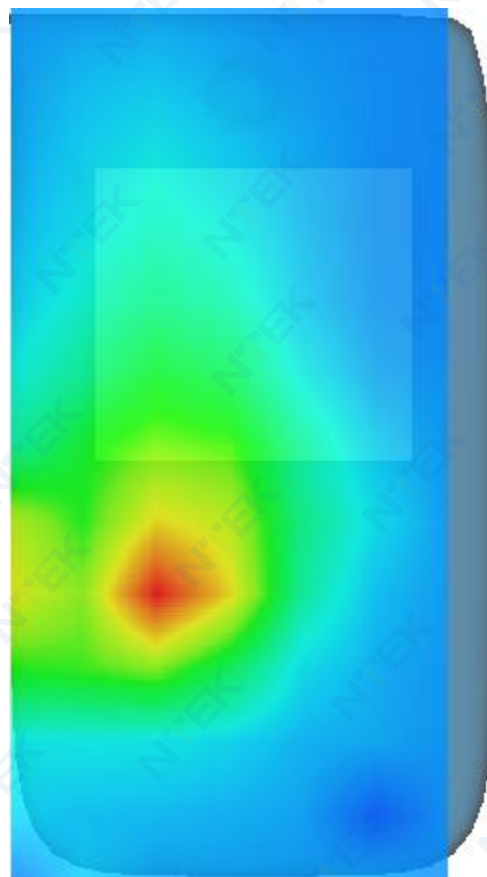
SAR 10g (W/Kg)	0.561206
SAR 1g (W/Kg)	1.355346



3D screen shot



Hot spot position



MEASUREMENT 27

Date of measurement: 25/10/2023

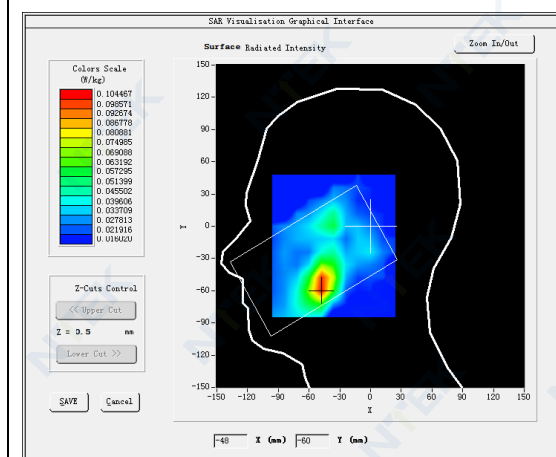
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

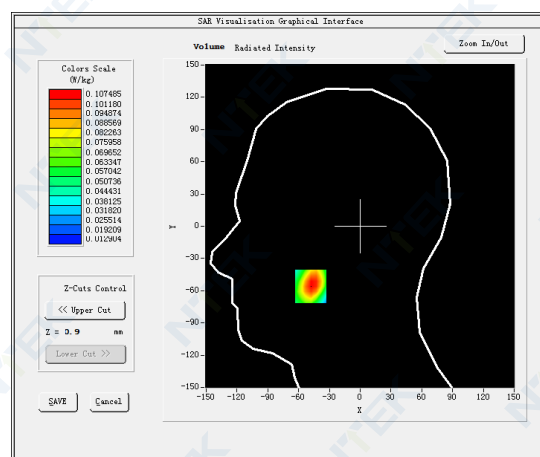
B. SAR Measurement Results

Frequency (MHz)	2350.000000
Relative permittivity (real part)	39.668613
Relative permittivity (imaginary part)	13.066293
Conductivity (S/m)	1.705877
Variation (%)	-1.060000

SURFACE SAR



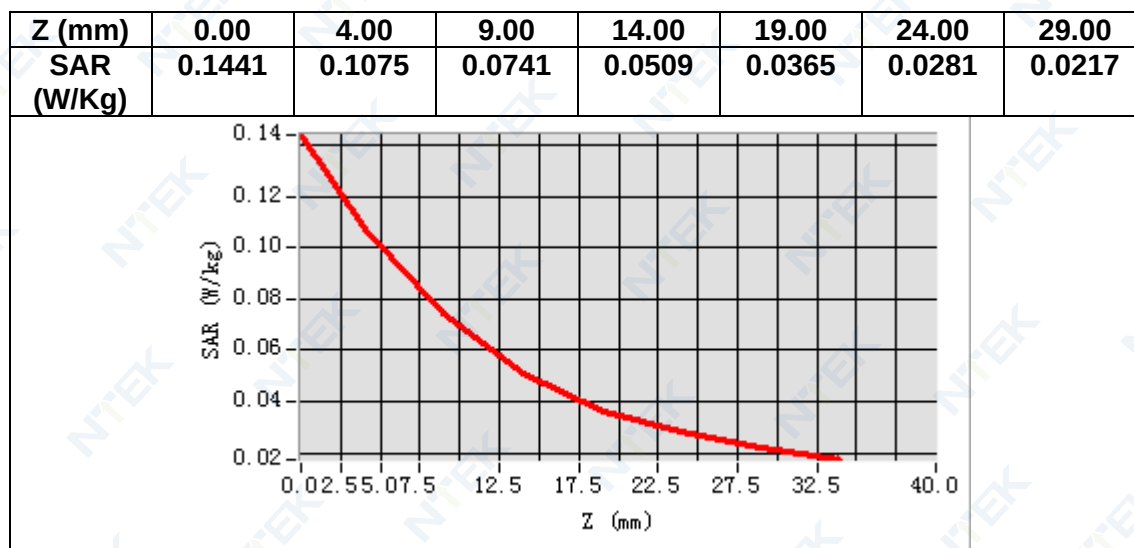
VOLUME SAR



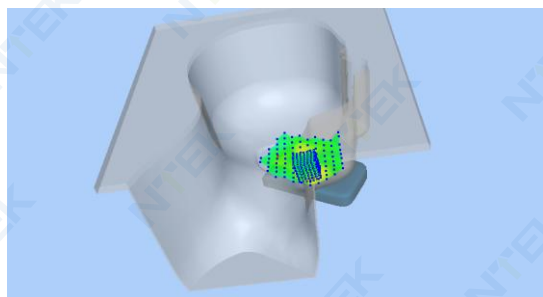
Maximum location: X=-48.00, Y=-56.00

SAR Peak: 0.15 W/kg

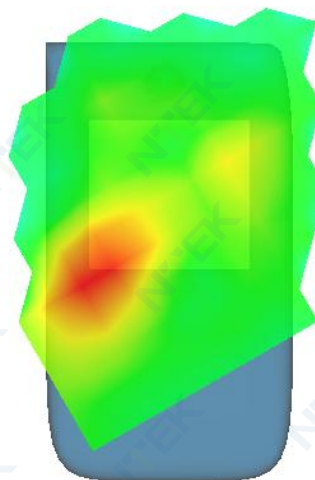
SAR 10g (W/Kg)	0.062464
SAR 1g (W/Kg)	0.101485



3D screen shot



Hot spot position



MEASUREMENT 28

Date of measurement: 25/10/2023

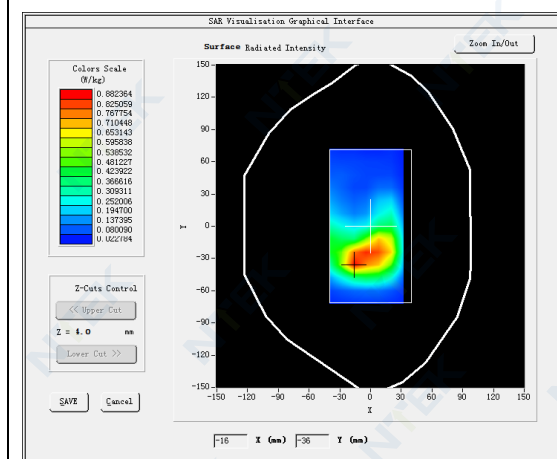
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

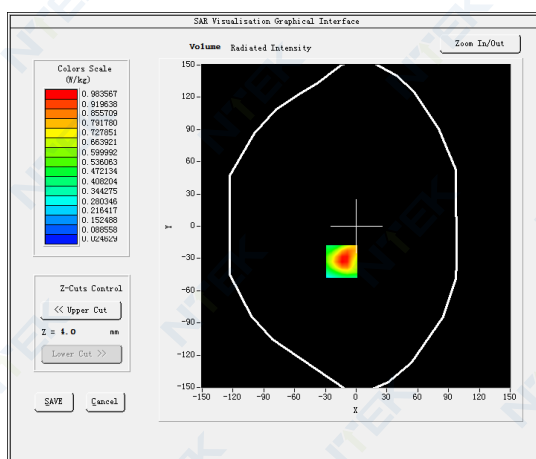
B. SAR Measurement Results

Frequency (MHz)	2350.000000
Relative permittivity (real part)	39.668613
Relative permittivity (imaginary part)	13.066293
Conductivity (S/m)	1.705877
Variation (%)	0.610000

SURFACE SAR



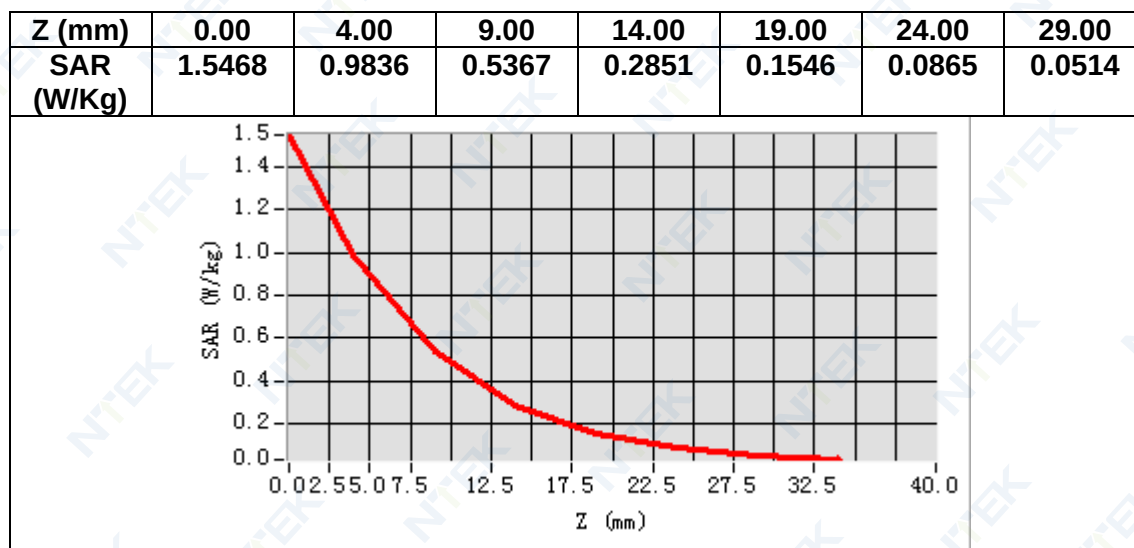
VOLUME SAR



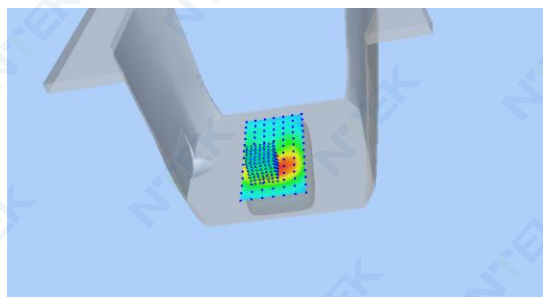
Maximum location: X=-14.00, Y=-33.00

SAR Peak: 1.59 W/kg

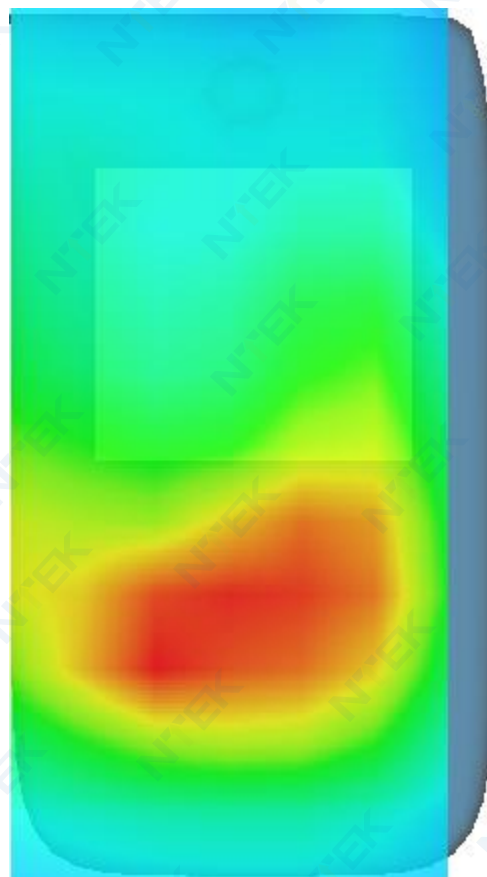
SAR 10g (W/Kg)	0.479895
SAR 1g (W/Kg)	0.931943



3D screen shot



Hot spot position



MEASUREMENT 29

Date of measurement: 16/10/2023

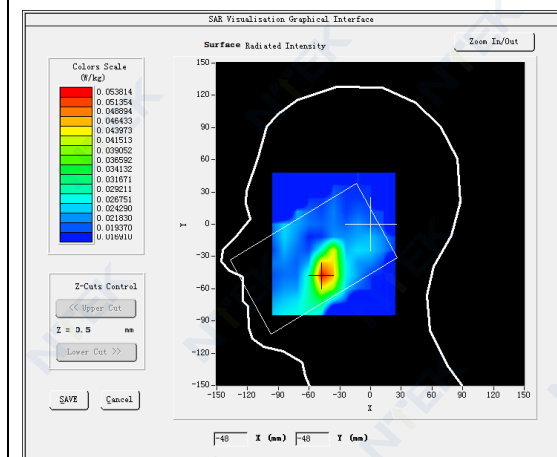
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>LTE band 41</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

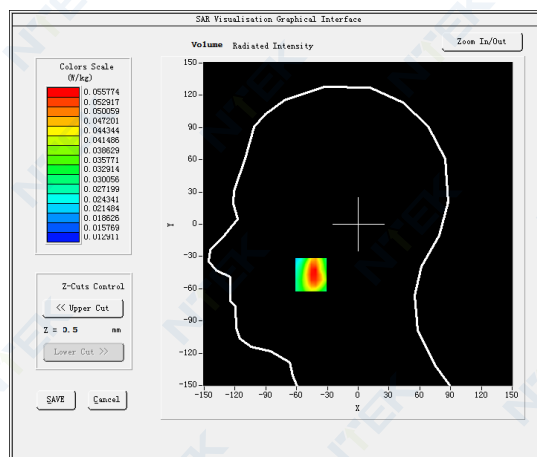
B. SAR Measurement Results

Frequency (MHz)	2593.000000
Relative permittivity (real part)	38.775394
Relative permittivity (imaginary part)	13.386572
Conductivity (S/m)	1.928410
Variation (%)	-2.280000

SURFACE SAR



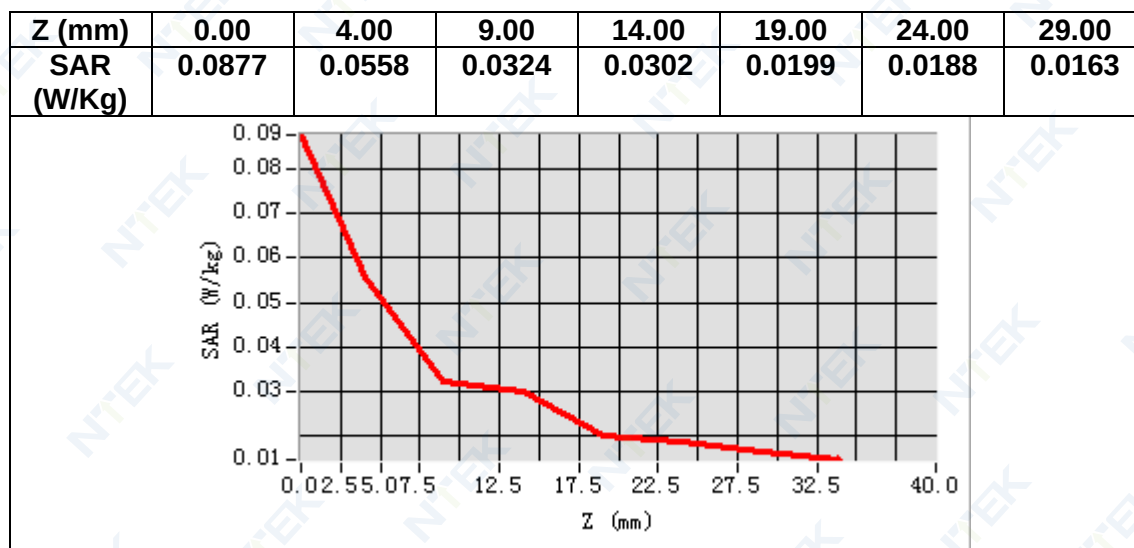
VOLUME SAR



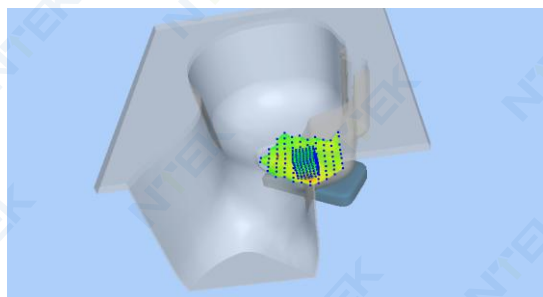
Maximum location: X=-46.00, Y=-47.00

SAR Peak: 0.08 W/kg

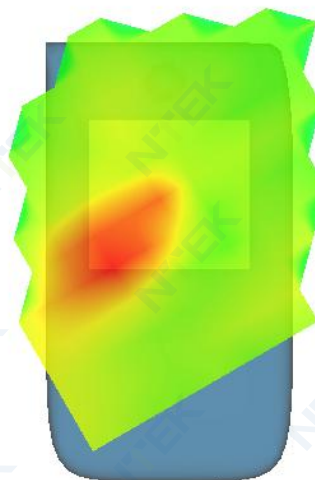
SAR 10g (W/Kg)	0.034367
SAR 1g (W/Kg)	0.052657



3D screen shot



Hot spot position



MEASUREMENT 30

Date of measurement: 16/10/2023

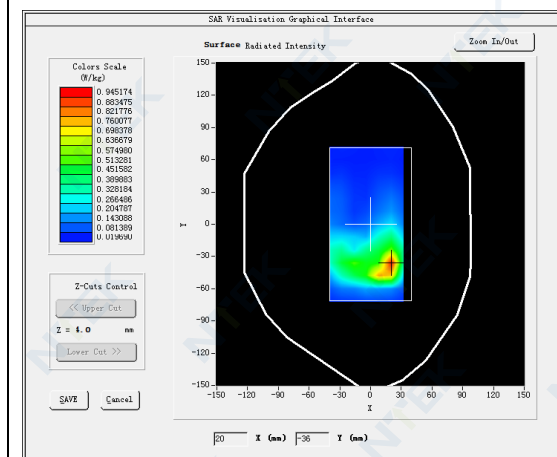
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>LTE band 41</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>LTE (Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

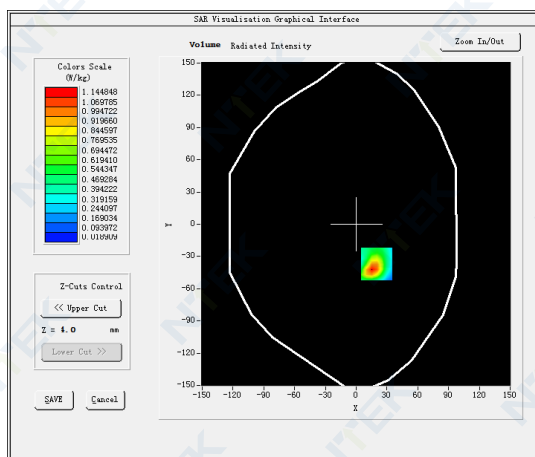
B. SAR Measurement Results

Frequency (MHz)	2593.000000
Relative permittivity (real part)	38.775394
Relative permittivity (imaginary part)	13.386572
Conductivity (S/m)	1.928410
Variation (%)	0.230000

SURFACE SAR



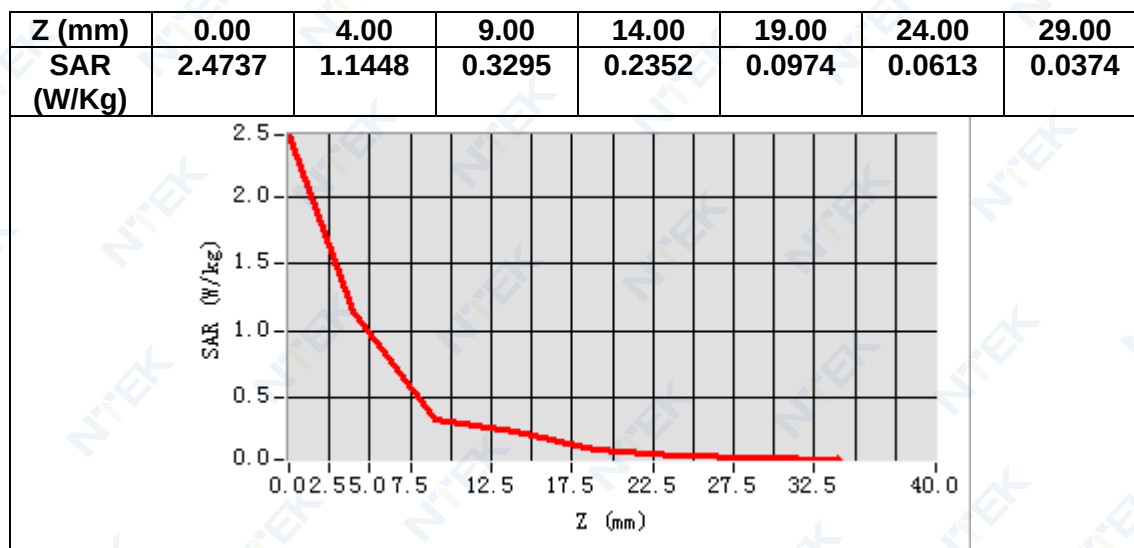
VOLUME SAR



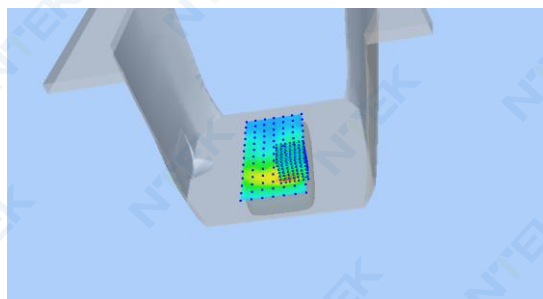
Maximum location: X=20.00, Y=-37.00

SAR Peak: 2.02 W/kg

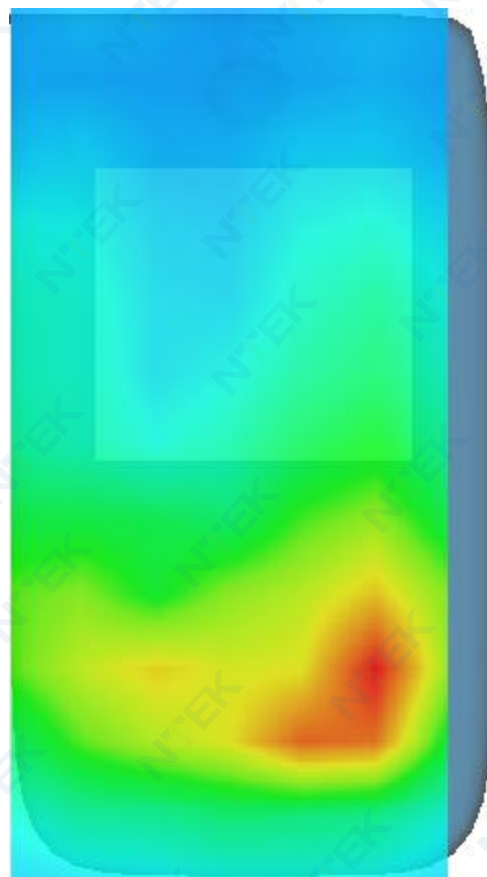
SAR 10g (W/Kg)	0.426797
SAR 1g (W/Kg)	1.030283



3D screen shot



Hot spot position



MEASUREMENT 31

Date of measurement: 16/10/2023

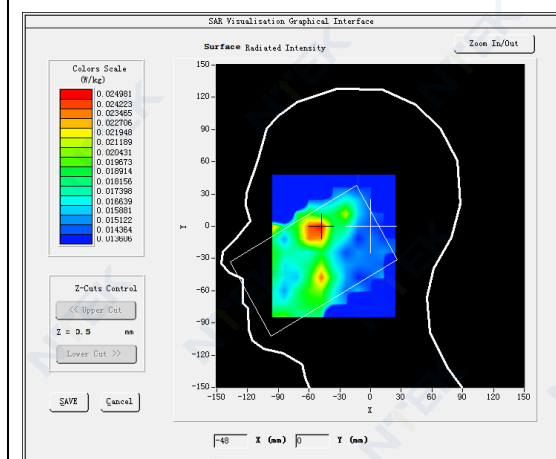
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n7</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

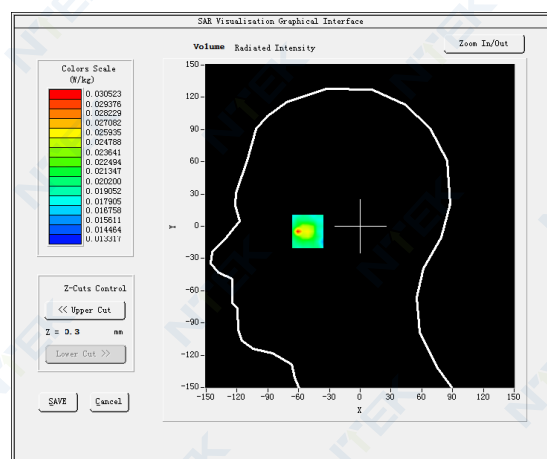
B. SAR Measurement Results

Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.056892
Relative permittivity (imaginary part)	13.222972
Conductivity (S/m)	1.862235
Variation (%)	-2.010000

SURFACE SAR



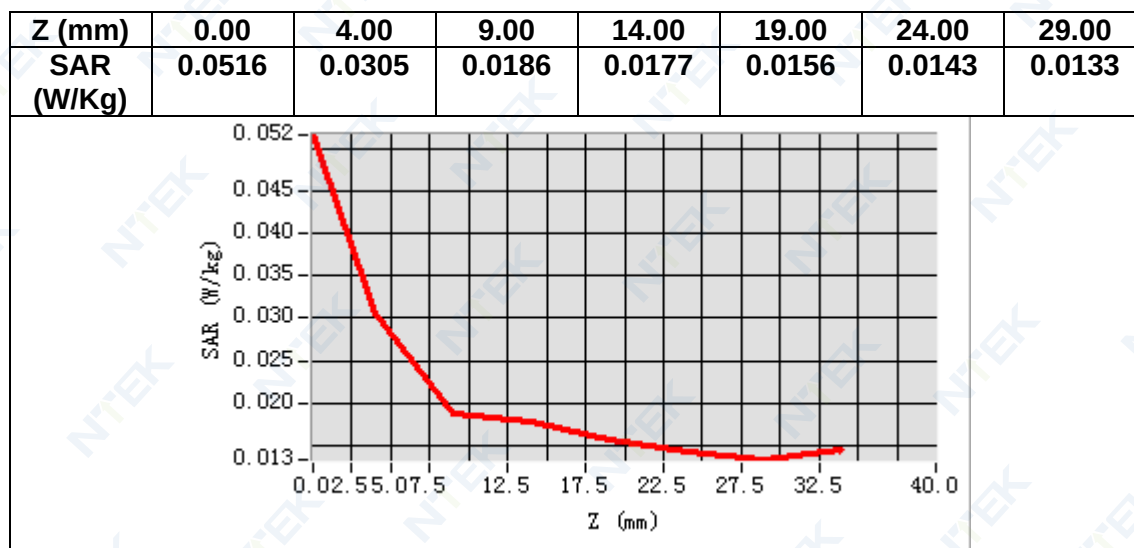
VOLUME SAR



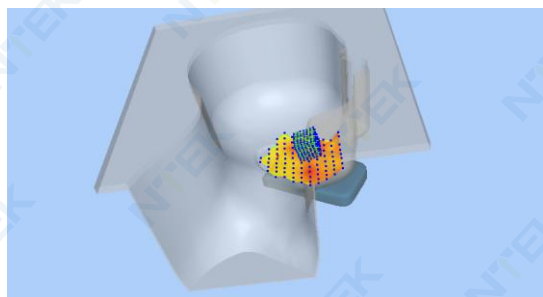
Maximum location: X=-51.00, Y=-3.00

SAR Peak: 0.05 W/kg

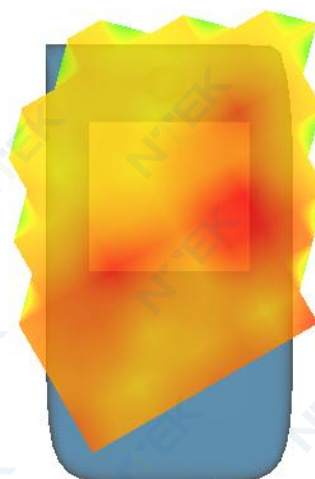
SAR 10g (W/Kg)	0.019731
SAR 1g (W/Kg)	0.026038



3D screen shot



Hot spot position



MEASUREMENT 32

Date of measurement: 16/10/2023

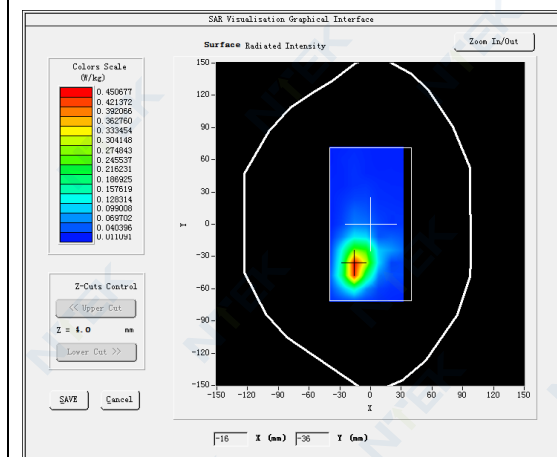
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n7</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.65</u>

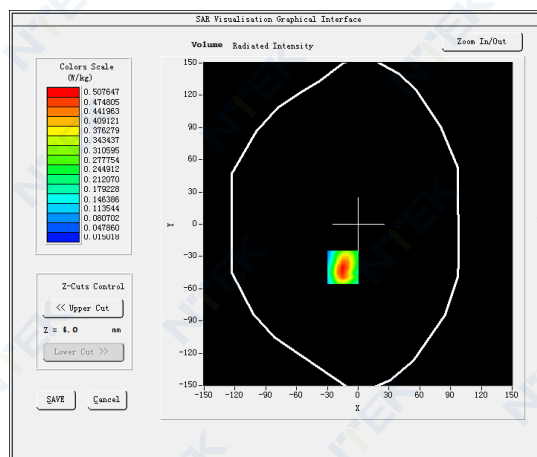
B. SAR Measurement Results

Frequency (MHz)	2535.000000
Relative permittivity (real part)	39.056892
Relative permittivity (imaginary part)	13.222972
Conductivity (S/m)	1.862235
Variation (%)	2.010000

SURFACE SAR



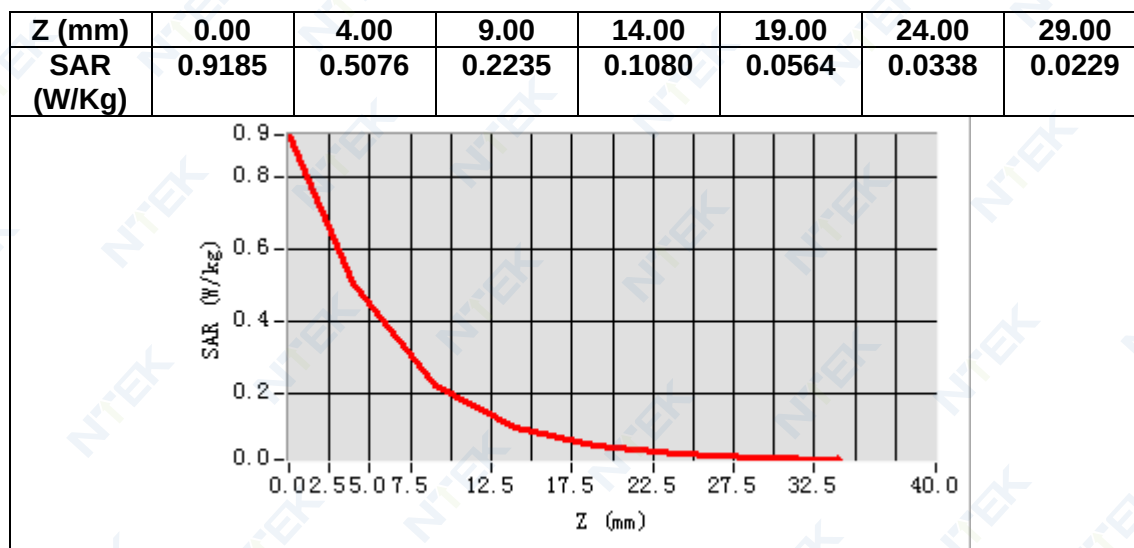
VOLUME SAR



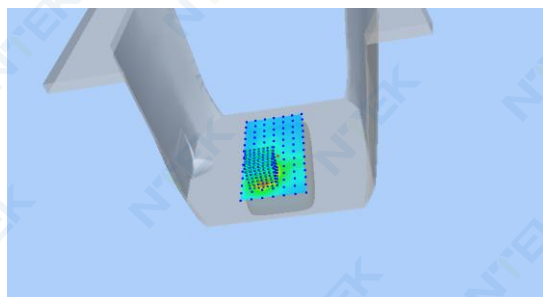
Maximum location: X=-15.00, Y=-40.00

SAR Peak: 0.90 W/kg

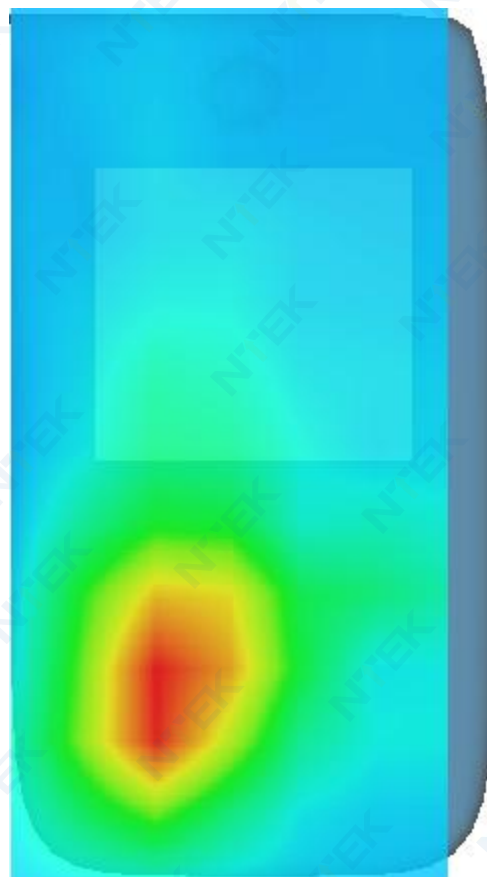
SAR 10g (W/Kg)	0.220134
SAR 1g (W/Kg)	0.468910



3D screen shot



Hot spot position



MEASUREMENT 33

Date of measurement: 25/10/2023

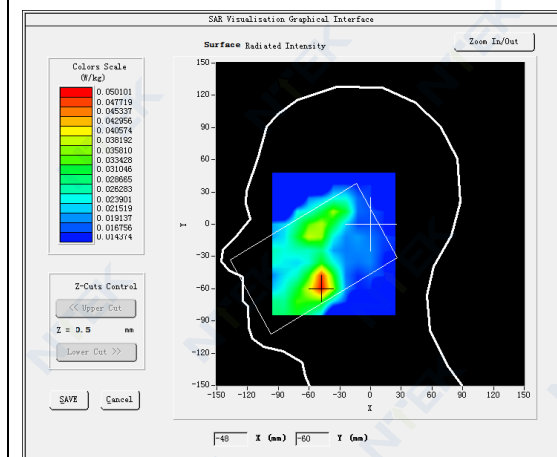
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

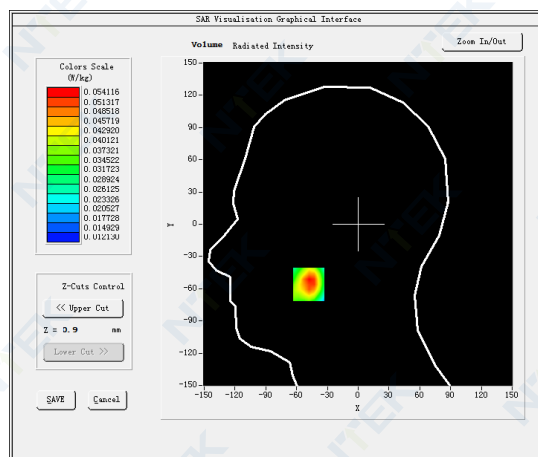
B. SAR Measurement Results

Frequency (MHz)	2350.000000
Relative permittivity (real part)	39.668613
Relative permittivity (imaginary part)	13.066293
Conductivity (S/m)	1.705877
Variation (%)	1.750000

SURFACE SAR



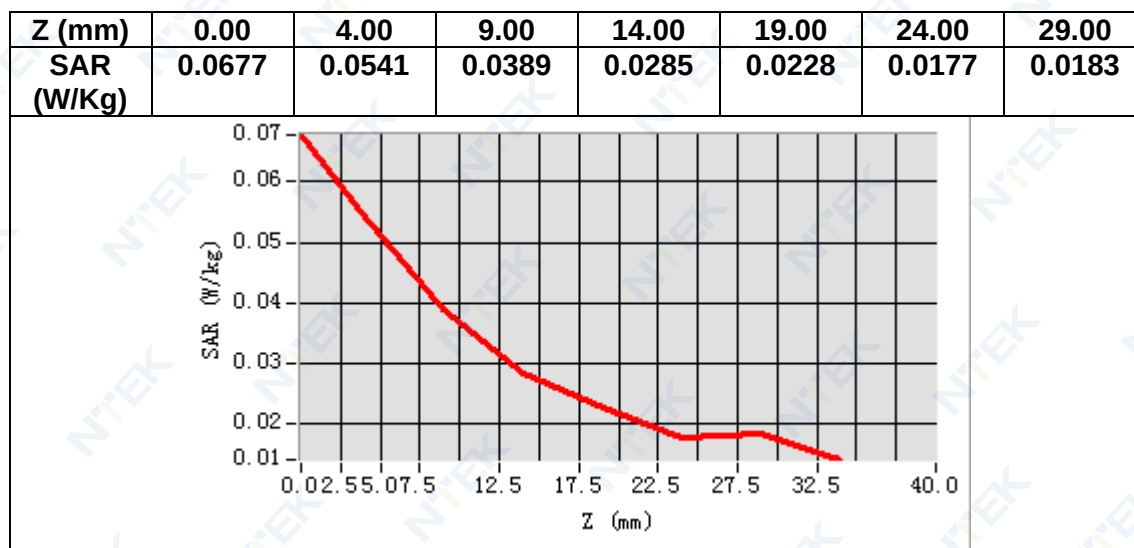
VOLUME SAR



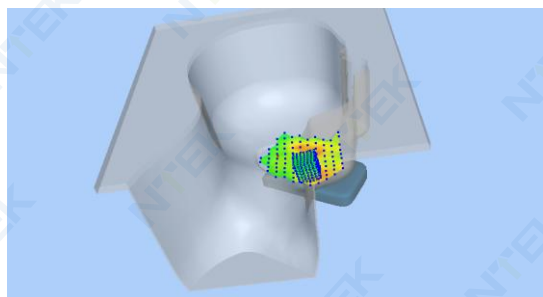
Maximum location: X=-48.00, Y=-56.00

SAR Peak: 0.07 W/kg

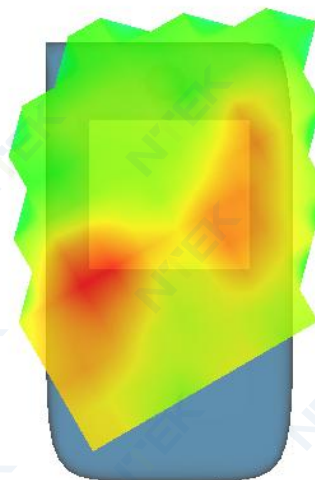
SAR 10g (W/Kg)	0.033054
SAR 1g (W/Kg)	0.049518



3D screen shot



Hot spot position



MEASUREMENT 34

Date of measurement: 25/10/2023

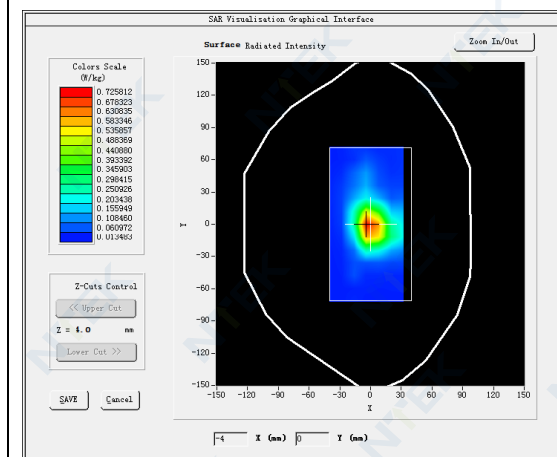
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n40</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.81</u>

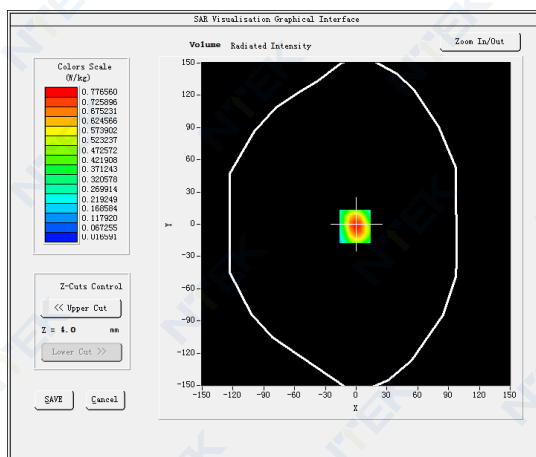
B. SAR Measurement Results

Frequency (MHz)	2350.000000
Relative permittivity (real part)	39.668613
Relative permittivity (imaginary part)	13.066293
Conductivity (S/m)	1.705877
Variation (%)	-0.430000

SURFACE SAR



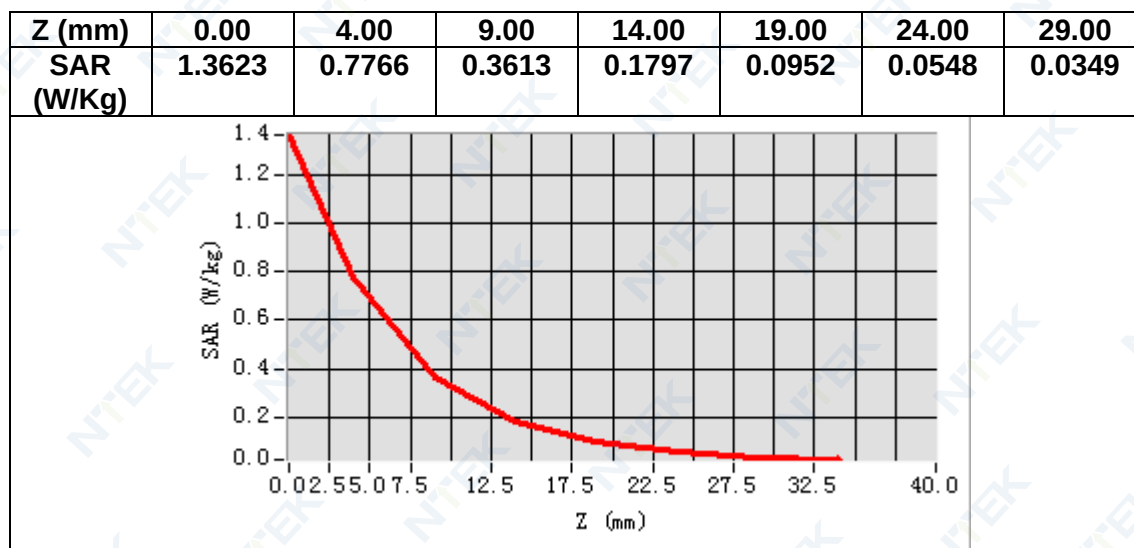
VOLUME SAR



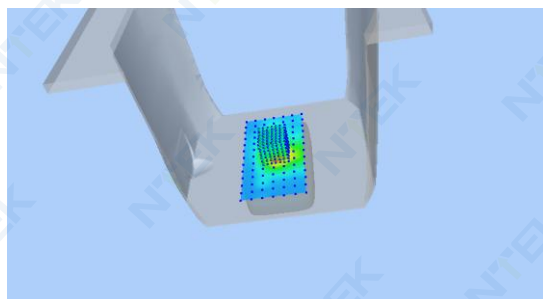
Maximum location: X=-1.00, Y=-2.00

SAR Peak: 1.34 W/kg

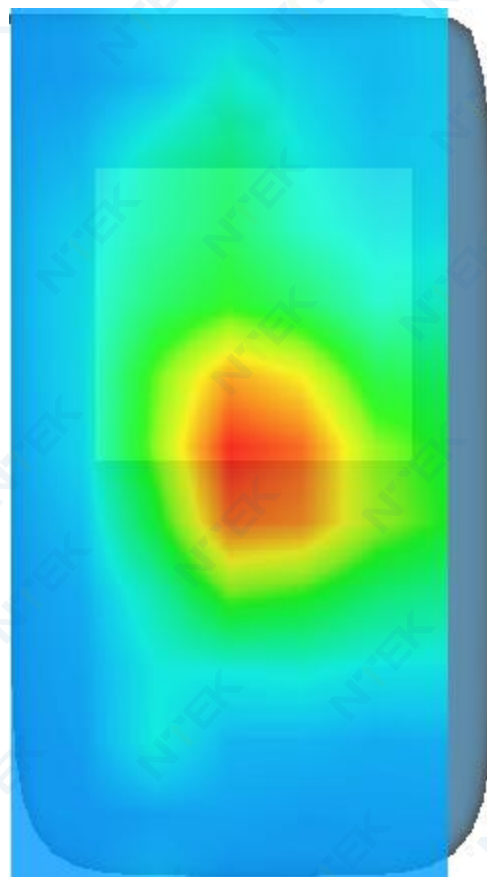
SAR 10g (W/Kg)	0.362209
SAR 1g (W/Kg)	0.728800



3D screen shot



Hot spot position



MEASUREMENT 35

Date of measurement: 17/10/2023

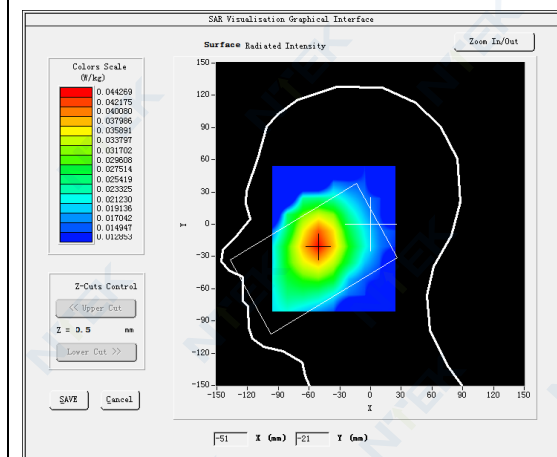
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

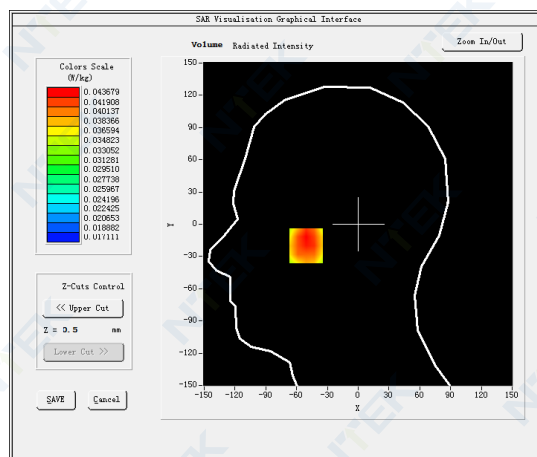
B. SAR Measurement Results

Frequency (MHz)	847.000000
Relative permittivity (real part)	42.859451
Relative permittivity (imaginary part)	19.702181
Conductivity (S/m)	0.927097
Variation (%)	1.310000

SURFACE SAR



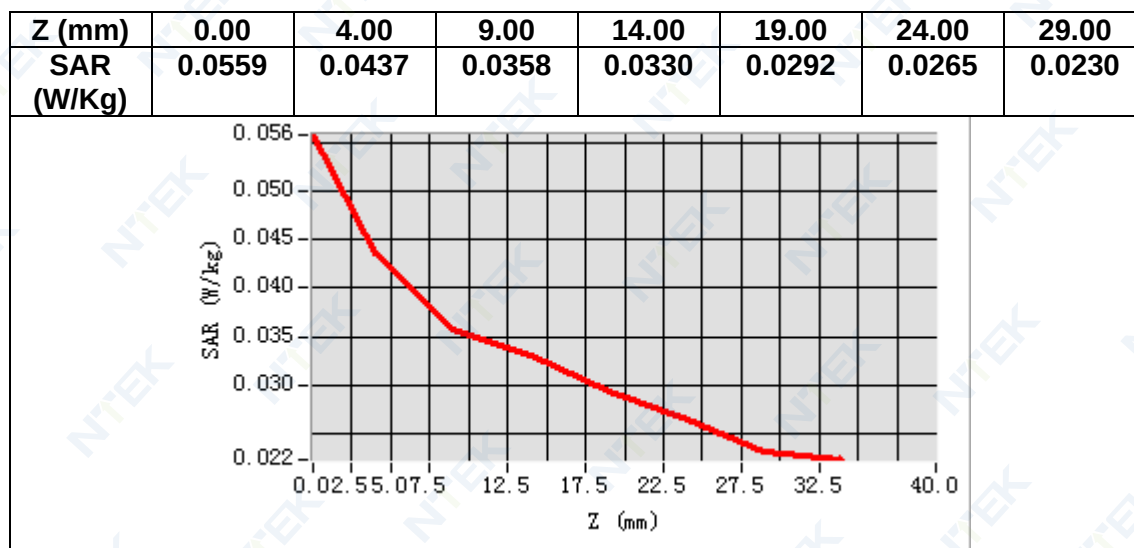
VOLUME SAR



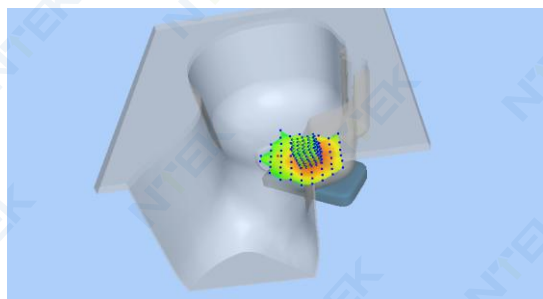
Maximum location: X=-51.00, Y=-20.00

SAR Peak: 0.05 W/kg

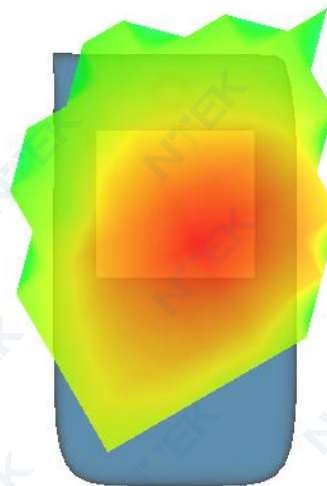
SAR 10g (W/Kg)	0.035835
SAR 1g (W/Kg)	0.043218



3D screen shot



Hot spot position



MEASUREMENT 36

Date of measurement: 17/10/2023

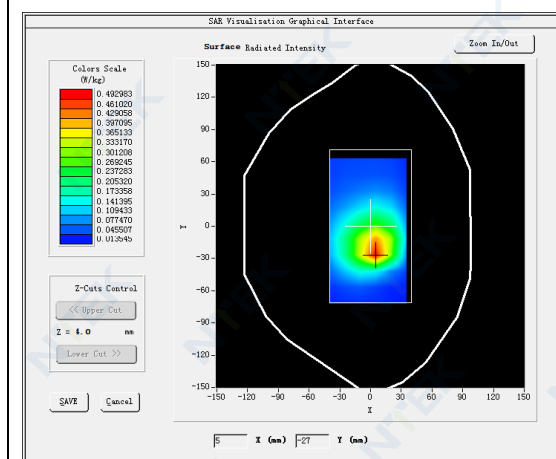
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n20</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

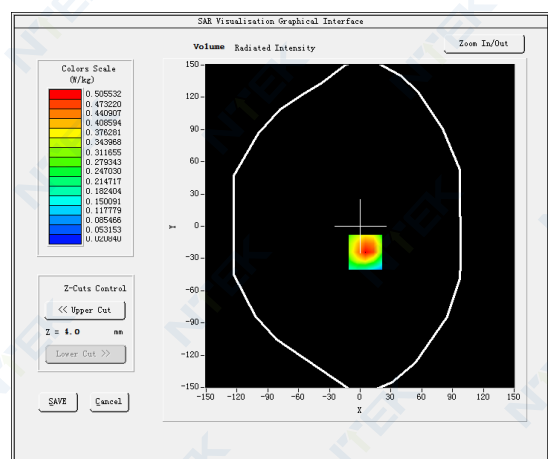
B. SAR Measurement Results

Frequency (MHz)	847.000000
Relative permittivity (real part)	42.859451
Relative permittivity (imaginary part)	19.702181
Conductivity (S/m)	0.927097
Variation (%)	1.730000

SURFACE SAR



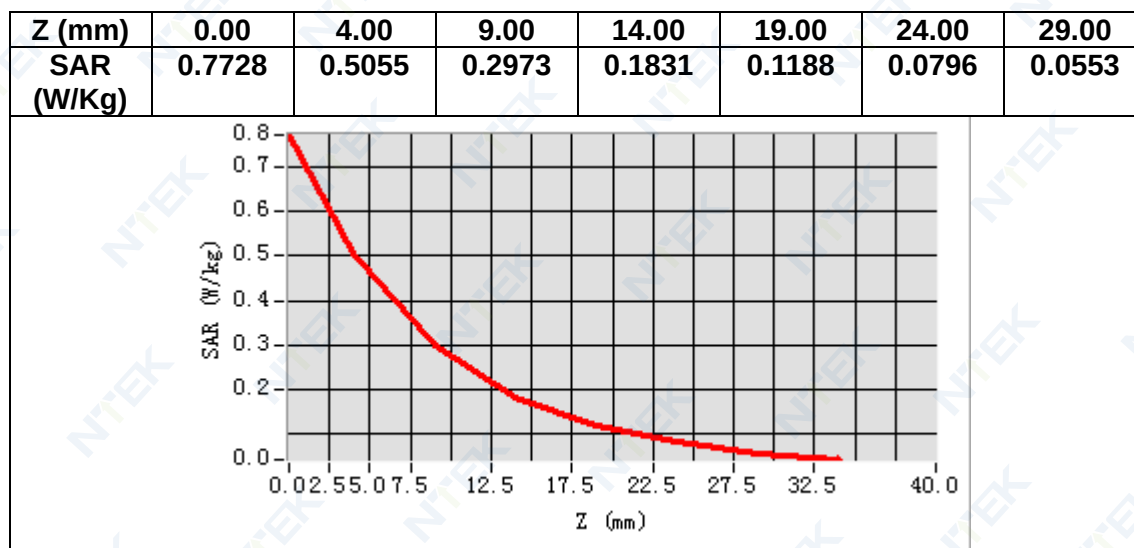
VOLUME SAR



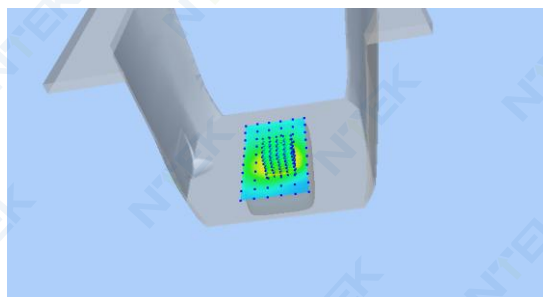
Maximum location: X=5.00, Y=-24.00

SAR Peak: 0.80 W/kg

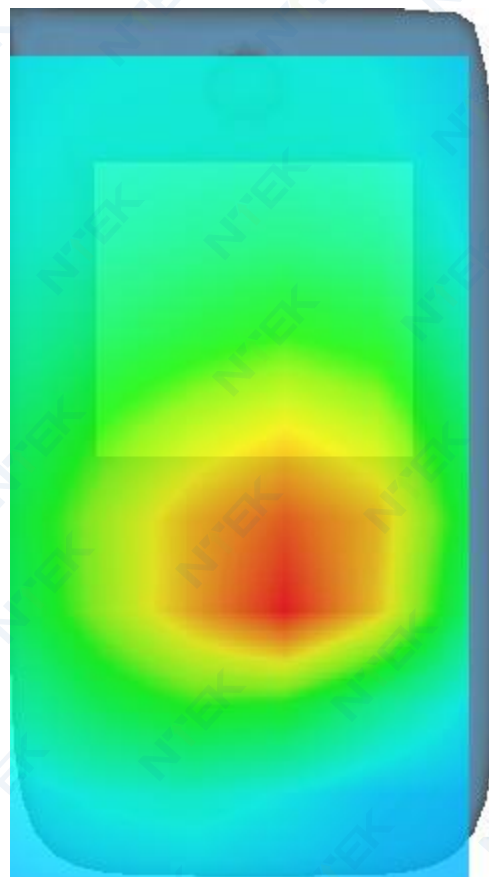
SAR 10g (W/Kg)	0.280242
SAR 1g (W/Kg)	0.486085



3D screen shot



Hot spot position



MEASUREMENT 37

Date of measurement: 16/10/2023

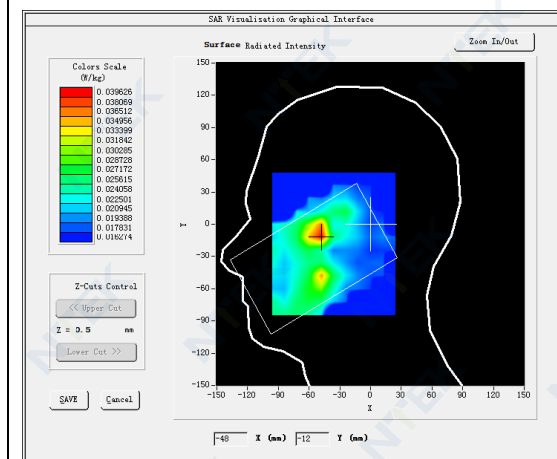
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n41</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

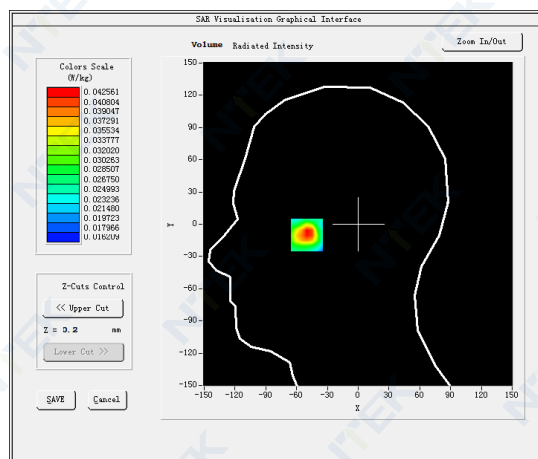
B. SAR Measurement Results

Frequency (MHz)	2592.990000
Relative permittivity (real part)	38.774712
Relative permittivity (imaginary part)	13.386813
Conductivity (S/m)	1.928437
Variation (%)	2.240000

SURFACE SAR



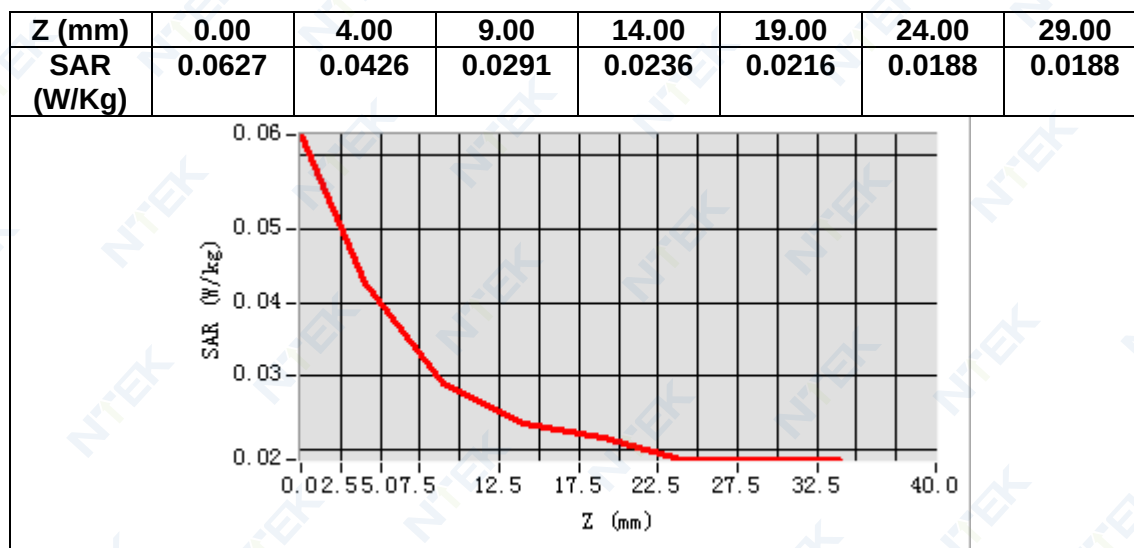
VOLUME SAR



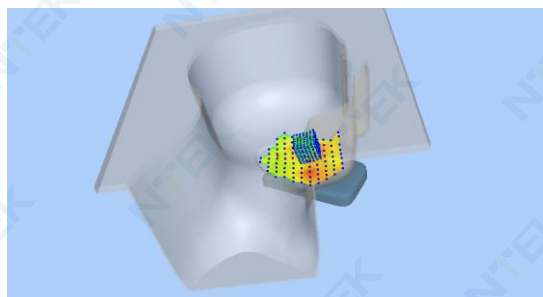
Maximum location: X=-50.00, Y=-9.00

SAR Peak: 0.07 W/kg

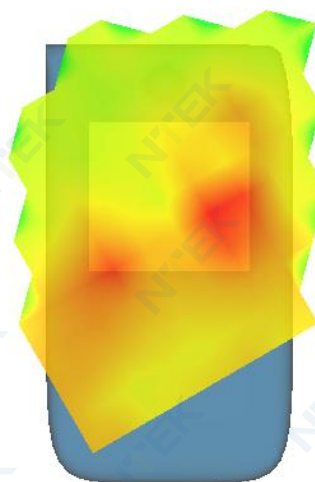
SAR 10g (W/Kg)	0.027582
SAR 1g (W/Kg)	0.040507



3D screen shot



Hot spot position



MEASUREMENT 38

Date of measurement: 16/10/2023

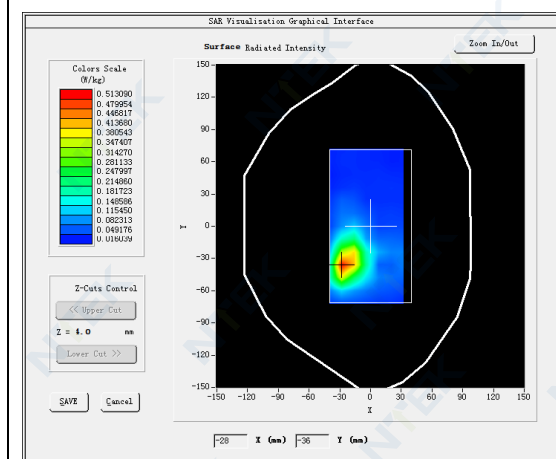
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n41</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

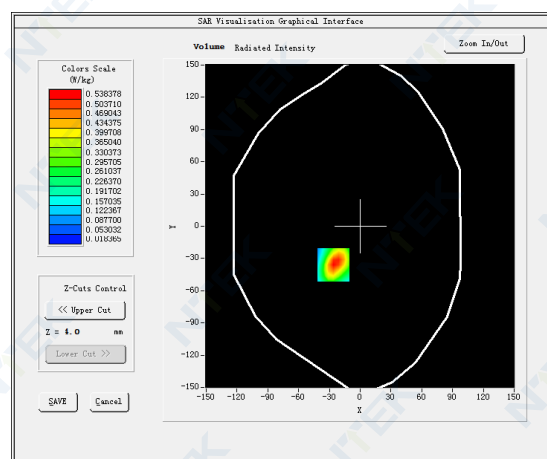
B. SAR Measurement Results

Frequency (MHz)	2592.990000
Relative permittivity (real part)	38.774712
Relative permittivity (imaginary part)	13.386813
Conductivity (S/m)	1.928437
Variation (%)	0.410000

SURFACE SAR



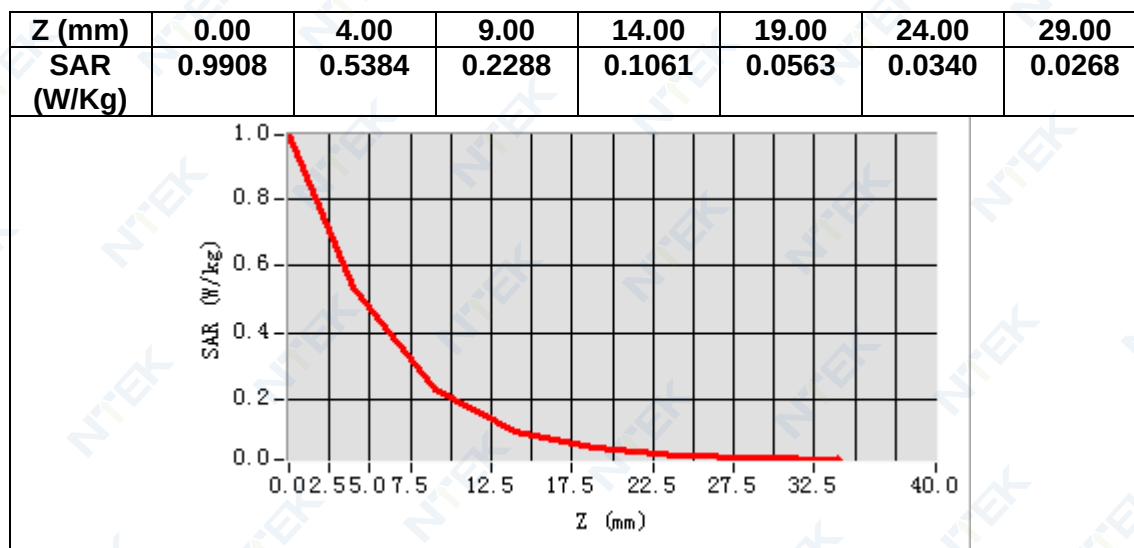
VOLUME SAR



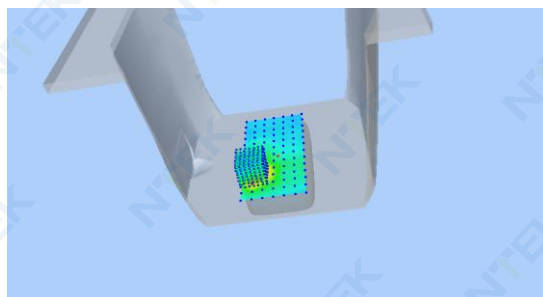
Maximum location: X=-26.00, Y=-36.00

SAR Peak: 0.98 W/kg

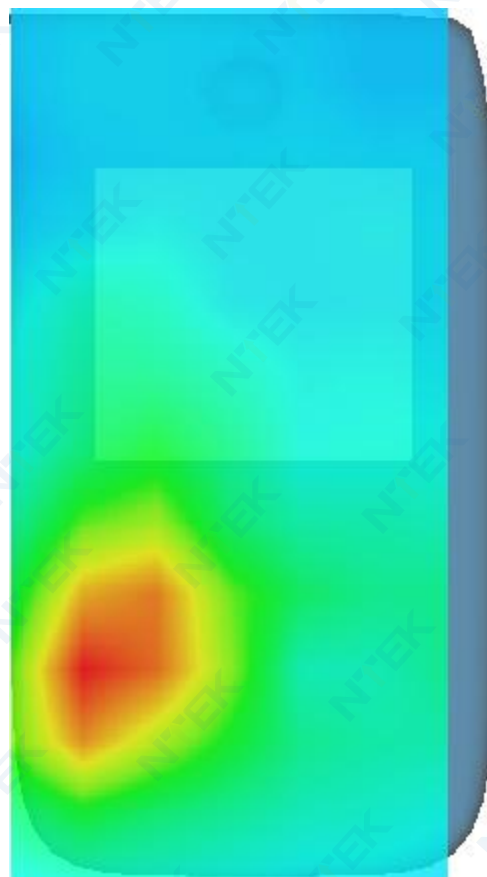
SAR 10g (W/Kg)	0.236033
SAR 1g (W/Kg)	0.507473



3D screen shot



Hot spot position



MEASUREMENT 39

Date of measurement: 26/10/2023

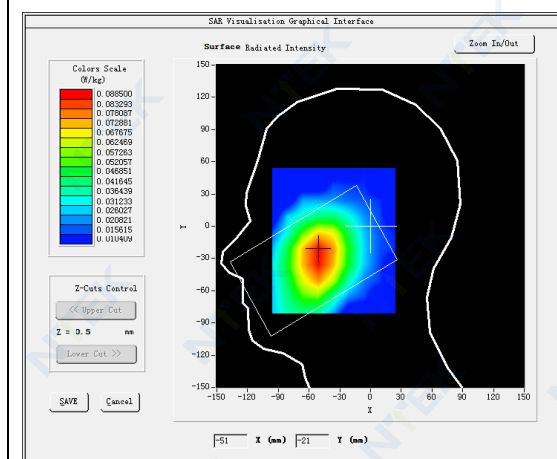
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7, dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>FDDBand28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

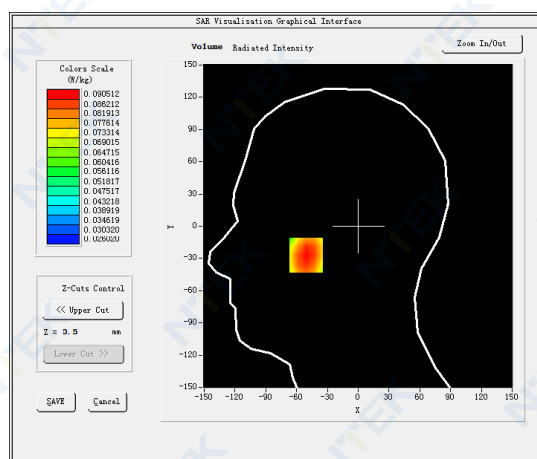
B. SAR Measurement Results

Frequency (MHz)	728.000000
Relative permittivity (real part)	42.646347
Relative permittivity (imaginary part)	22.145126
Conductivity (S/m)	0.895647
Variation (%)	1.540000

SURFACE SAR



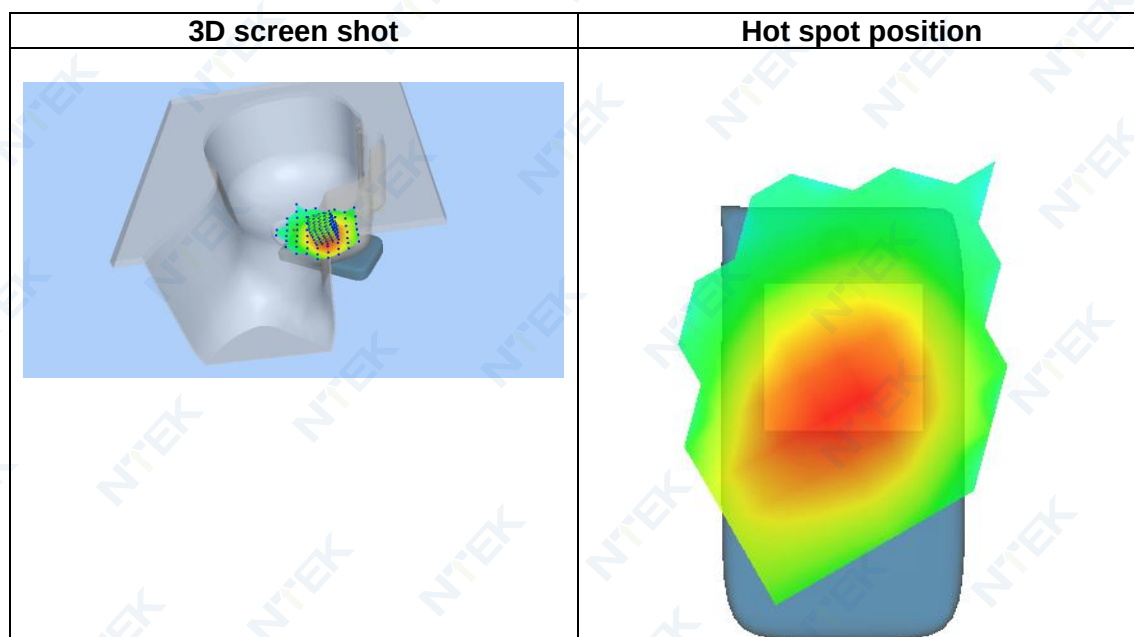
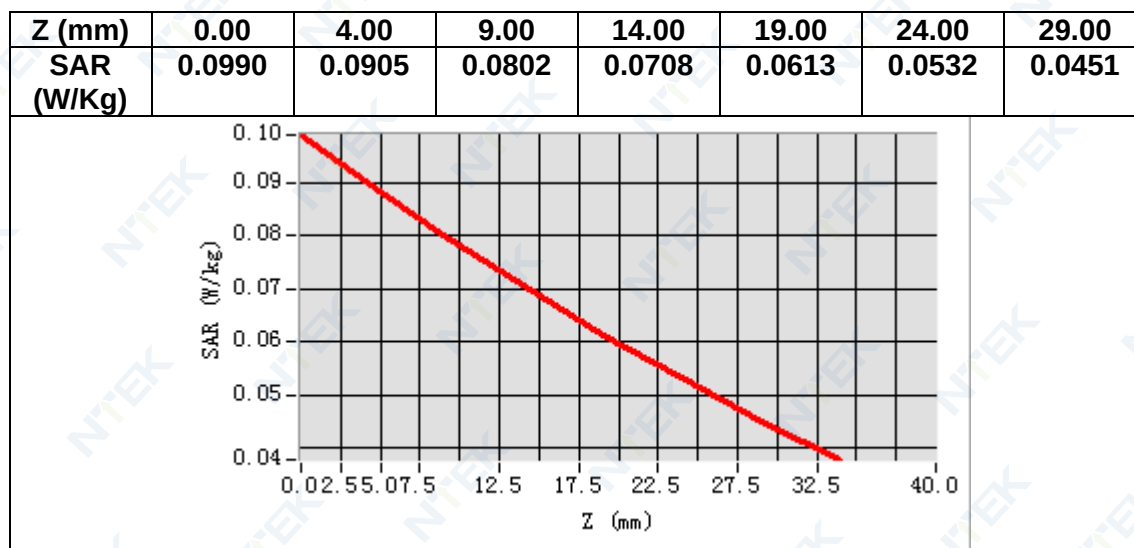
VOLUME SAR



Maximum location: X=-51.00, Y=-27.00

SAR Peak: 0.10 W/kg

SAR 10g (W/Kg)	0.073390
SAR 1g (W/Kg)	0.088544



MEASUREMENT 40

Date of measurement: 26/10/2023

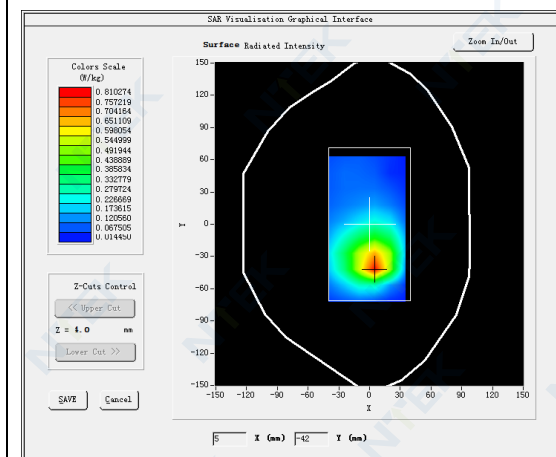
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>FDDBand28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

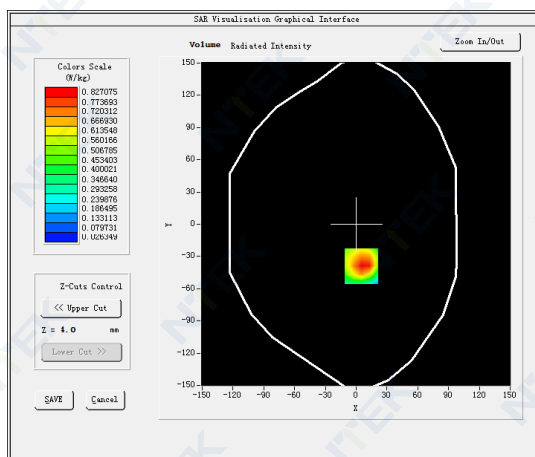
B. SAR Measurement Results

Frequency (MHz)	728.000000
Relative permittivity (real part)	42.646347
Relative permittivity (imaginary part)	22.145126
Conductivity (S/m)	0.895647
Variation (%)	-0.320000

SURFACE SAR



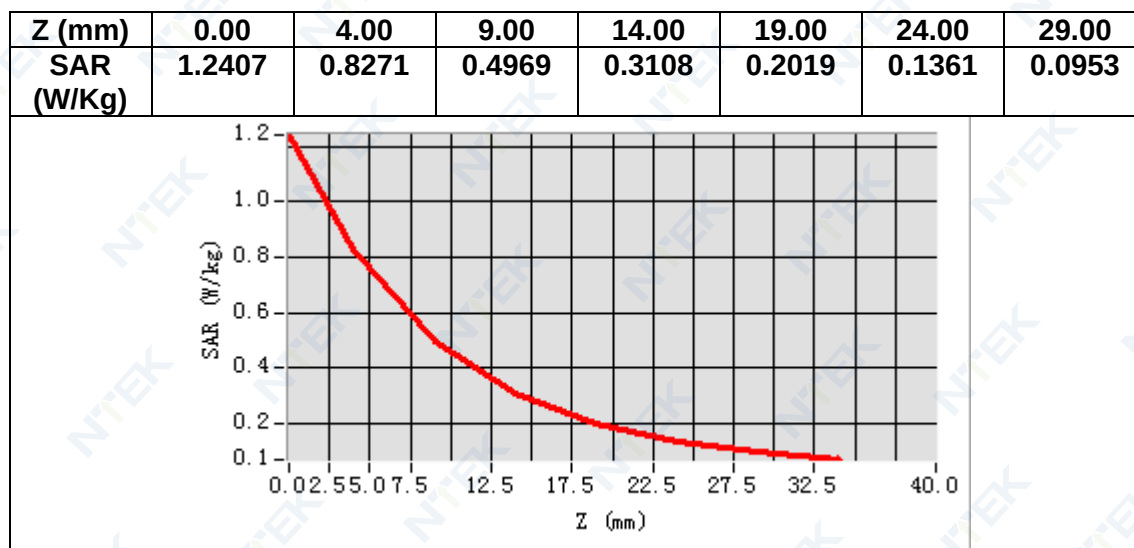
VOLUME SAR



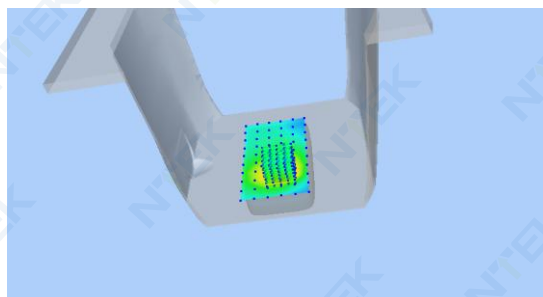
Maximum location: X=5.00, Y=-39.00

SAR Peak: 1.36 W/kg

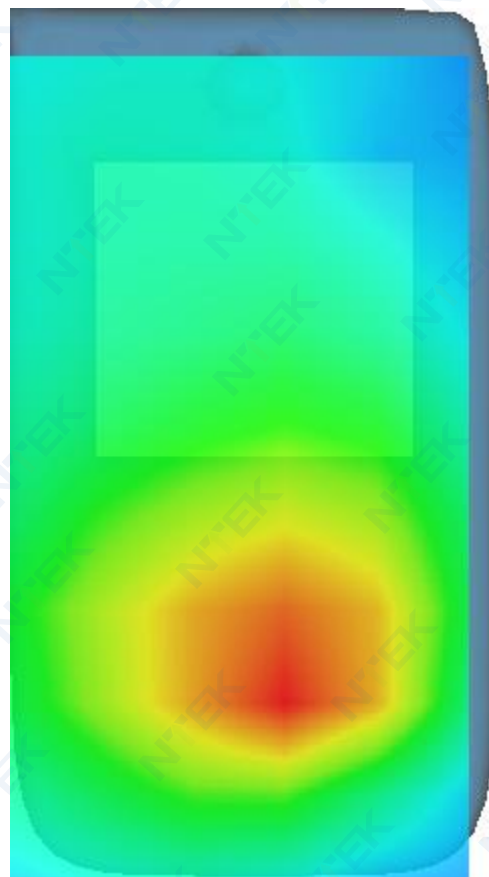
SAR 10g (W/Kg)	0.465438
SAR 1g (W/Kg)	0.804737



3D screen shot



Hot spot position



MEASUREMENT 41

Date of measurement: 27/10/2023

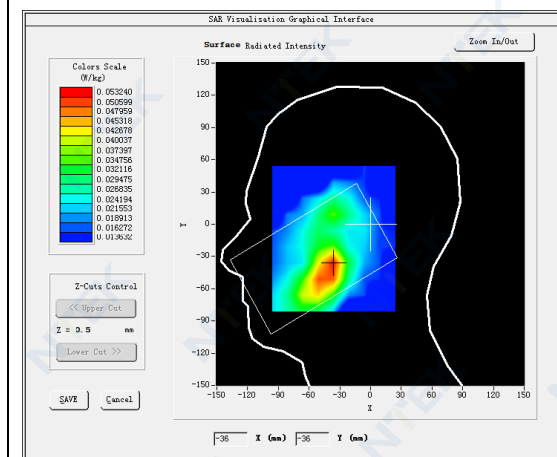
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>TDDBand34</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.83</u>

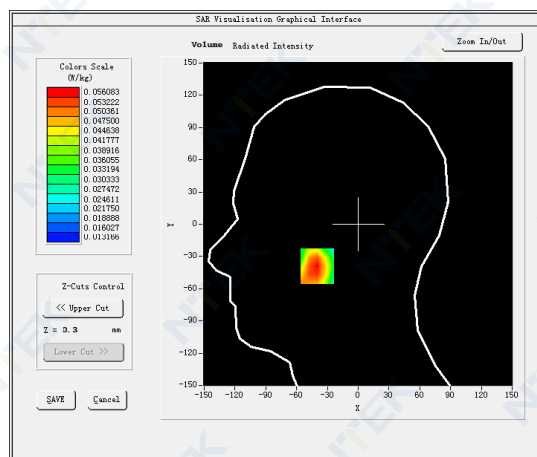
B. SAR Measurement Results

Frequency (MHz)	2017.500000
Relative permittivity (real part)	38.856880
Relative permittivity (imaginary part)	12.932206
Conductivity (S/m)	1.449485
Variation (%)	1.320000

SURFACE SAR



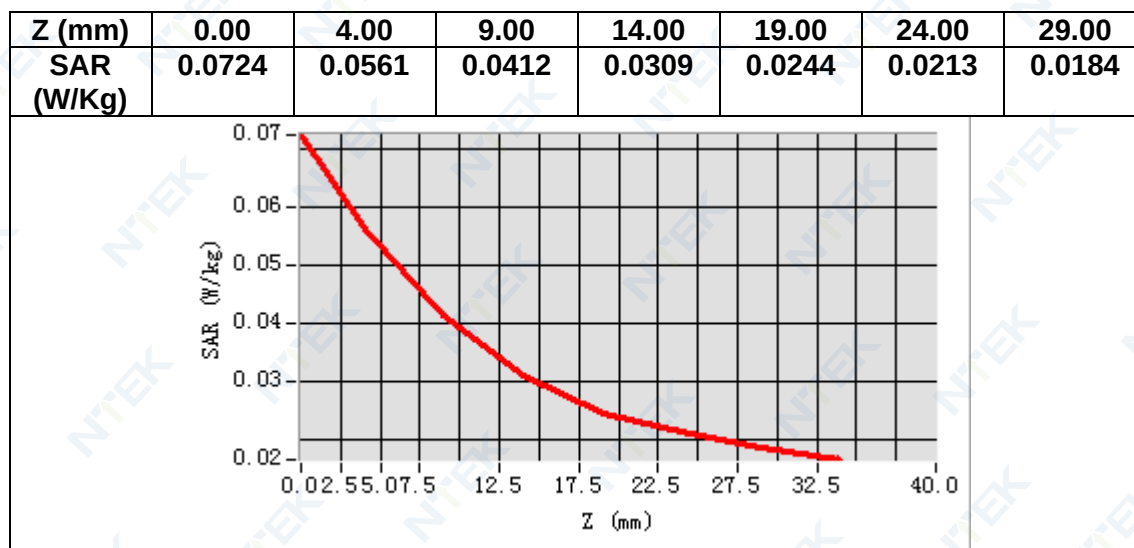
VOLUME SAR



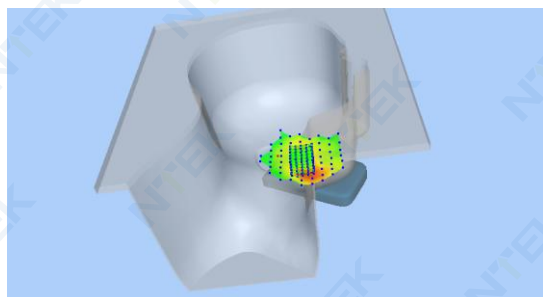
Maximum location: X=-38.00, Y=-39.00

SAR Peak: 0.08 W/kg

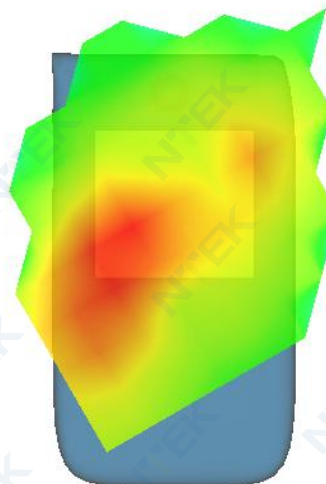
SAR 10g (W/Kg)	0.037410
SAR 1g (W/Kg)	0.055375



3D screen shot



Hot spot position



MEASUREMENT 42

Date of measurement: 27/10/2023

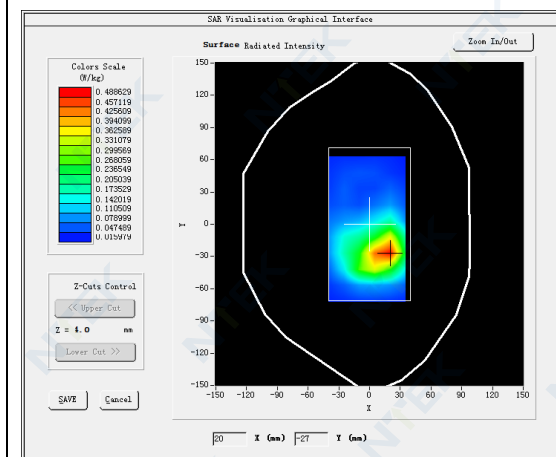
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>TDDBand34</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.83</u>

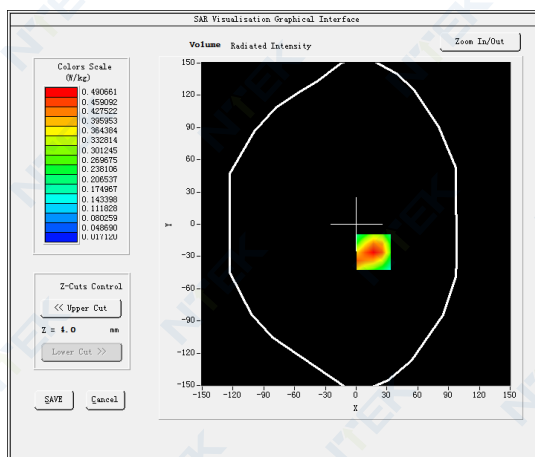
B. SAR Measurement Results

Frequency (MHz)	2017.500000
Relative permittivity (real part)	38.856880
Relative permittivity (imaginary part)	12.932206
Conductivity (S/m)	1.449485
Variation (%)	0.360000

SURFACE SAR



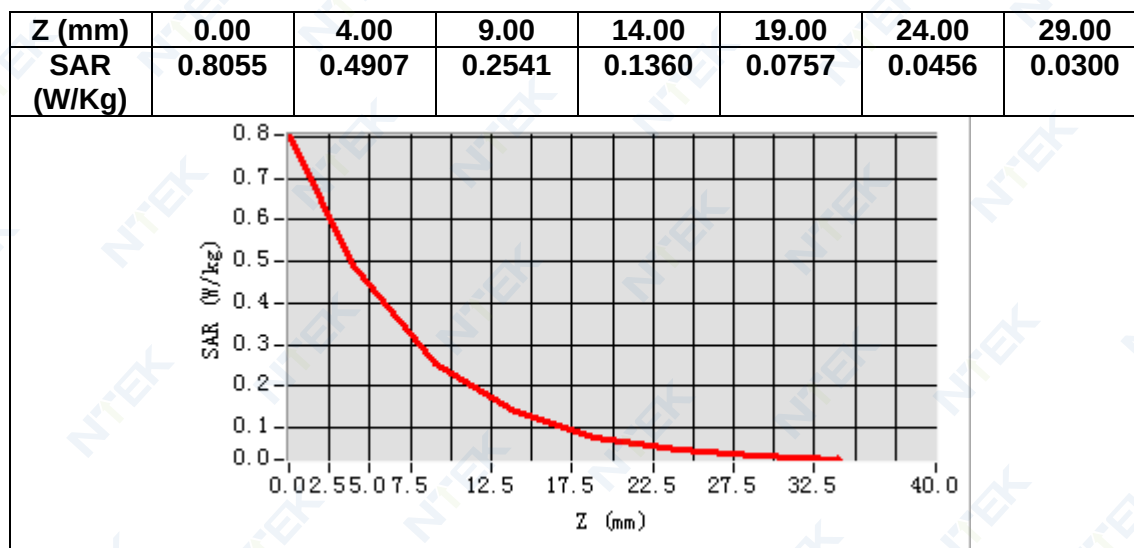
VOLUME SAR



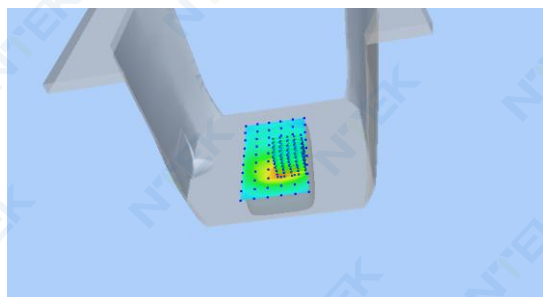
Maximum location: X=17.00, Y=-26.00

SAR Peak: 0.81 W/kg

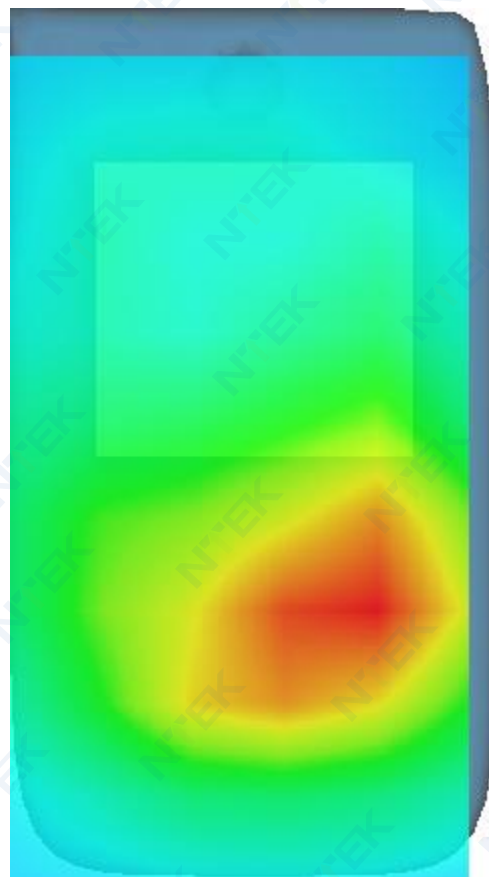
SAR 10g (W/Kg)	0.248021
SAR 1g (W/Kg)	0.474829



3D screen shot



Hot spot position



MEASUREMENT 43

Date of measurement: 27/10/2023

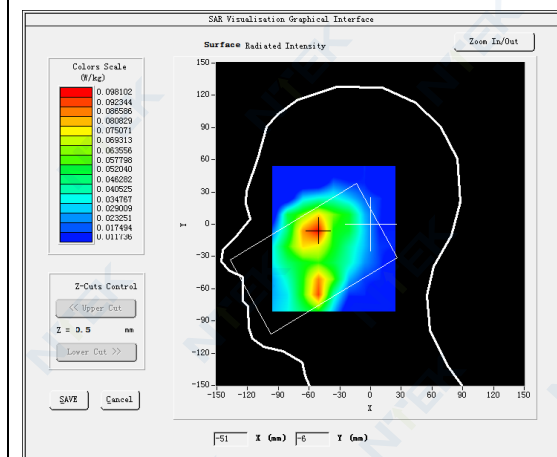
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA n1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

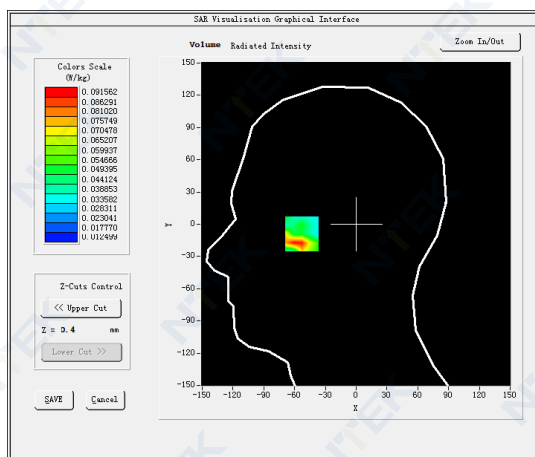
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	2.450000

SURFACE SAR



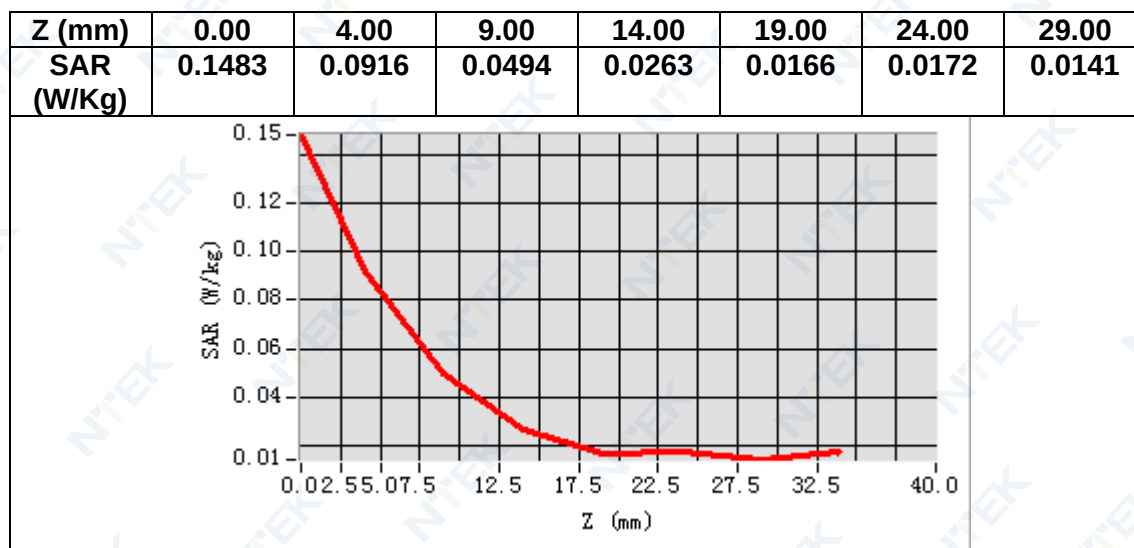
VOLUME SAR



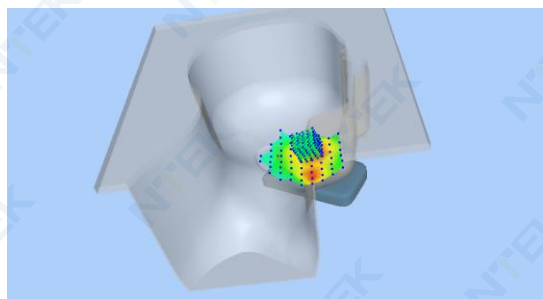
Maximum location: X=-53.00, Y=-6.00

SAR Peak: 0.15 W/kg

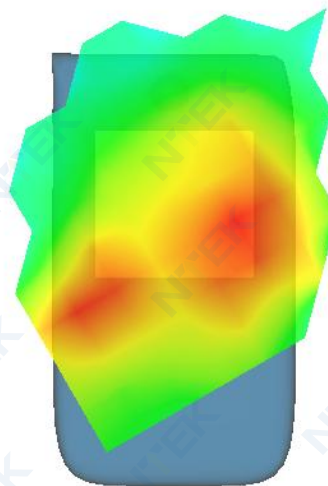
SAR 10g (W/Kg)	0.044641
SAR 1g (W/Kg)	0.082254



3D screen shot



Hot spot position



MEASUREMENT 44

Date of measurement: 27/10/2023

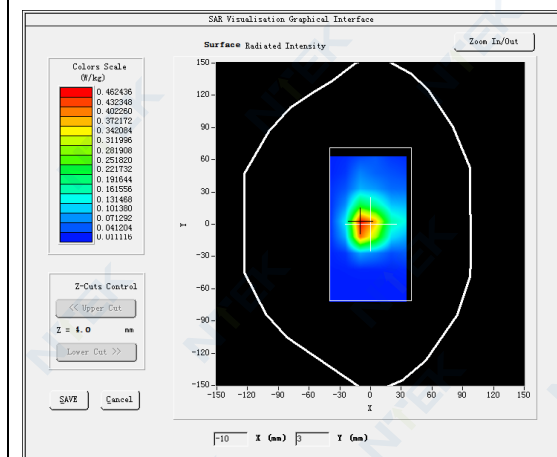
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA n1</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.83</u>

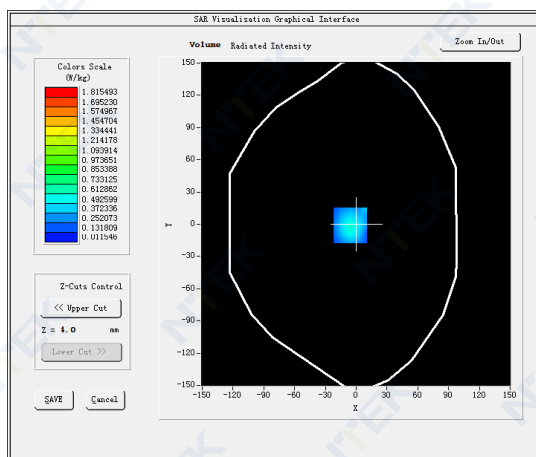
B. SAR Measurement Results

Frequency (MHz)	1950.000000
Relative permittivity (real part)	39.128979
Relative permittivity (imaginary part)	12.871956
Conductivity (S/m)	1.394462
Variation (%)	-0.770000

SURFACE SAR



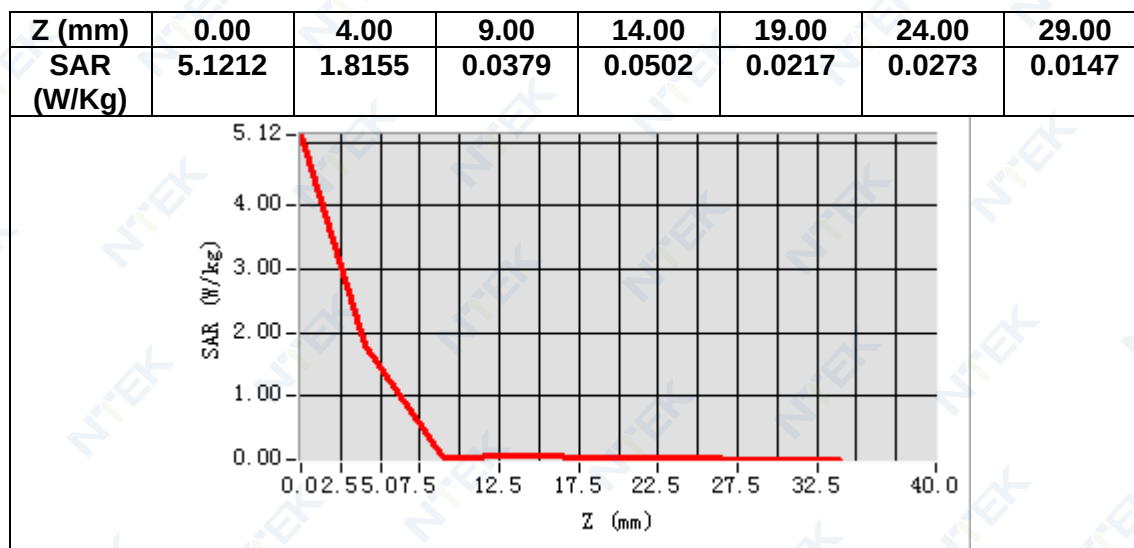
VOLUME SAR



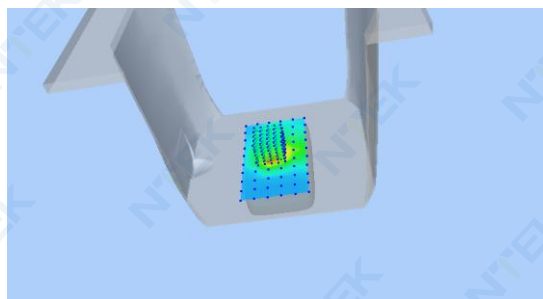
Maximum location: X=-6.00, Y=-1.00

SAR Peak: 1.08 W/kg

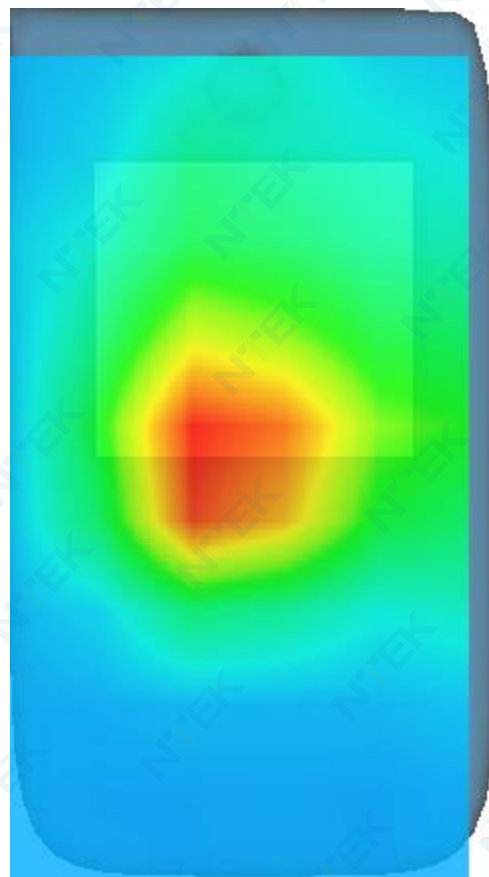
SAR 10g (W/Kg)	0.294810
SAR 1g (W/Kg)	0.558939



3D screen shot



Hot spot position



MEASUREMENT 45

Date of measurement: 26/10/2023

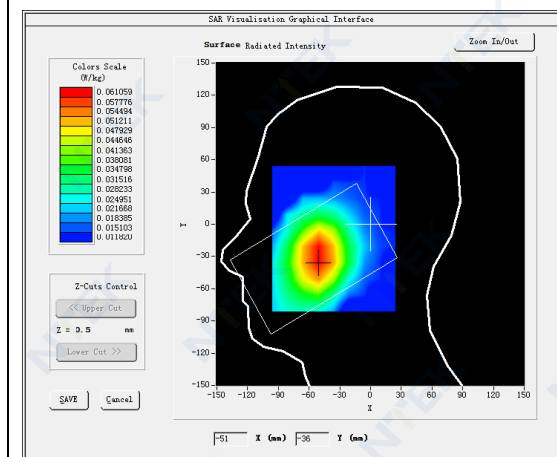
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

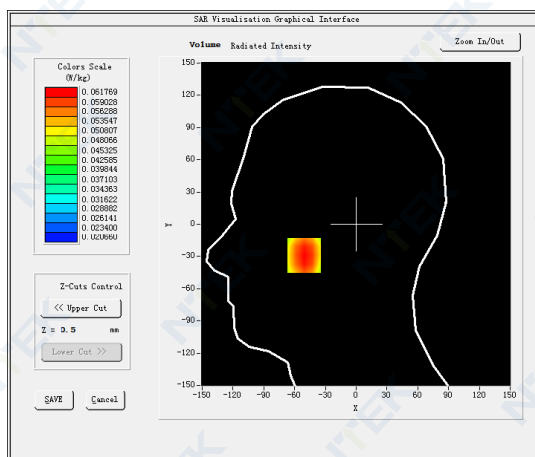
B. SAR Measurement Results

Frequency (MHz)	725.500000
Relative permittivity (real part)	42.643745
Relative permittivity (imaginary part)	22.097128
Conductivity (S/m)	0.890637
Variation (%)	-2.770000

SURFACE SAR



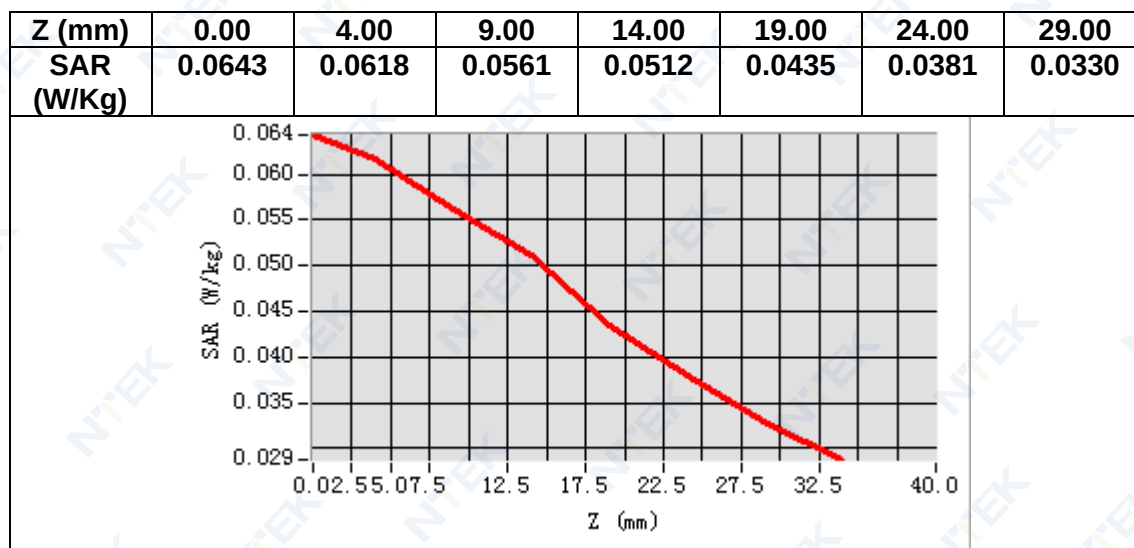
VOLUME SAR



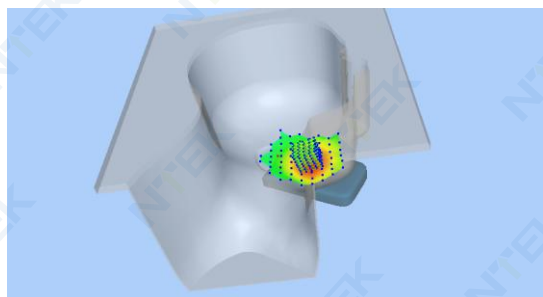
Maximum location: X=-51.00, Y=-29.00

SAR Peak: 0.07 W/kg

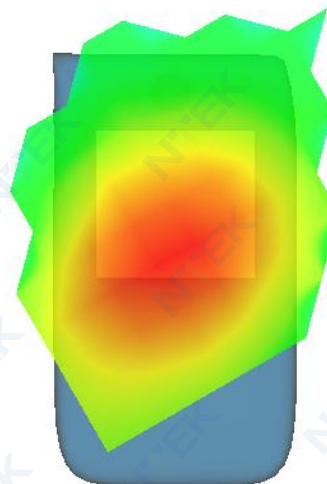
SAR 10g (W/Kg)	0.051052
SAR 1g (W/Kg)	0.060708



3D screen shot



Hot spot position



MEASUREMENT 46

Date of measurement: 26/10/2023

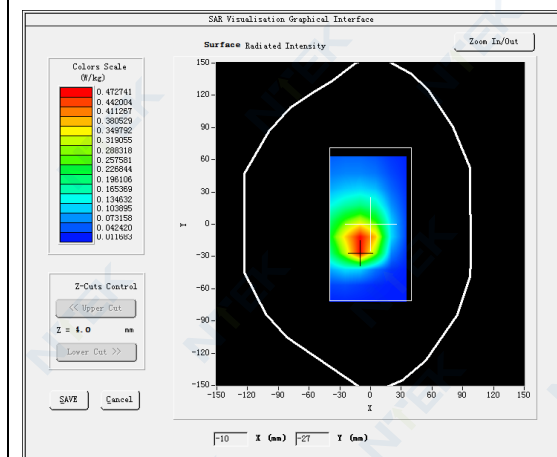
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n28</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.37</u>

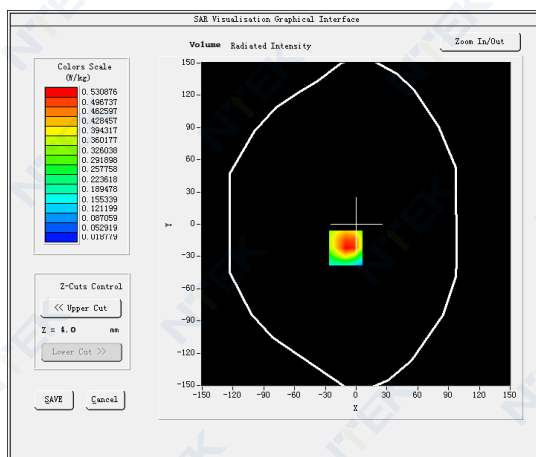
B. SAR Measurement Results

Frequency (MHz)	725.500000
Relative permittivity (real part)	42.643745
Relative permittivity (imaginary part)	22.097128
Conductivity (S/m)	0.890637
Variation (%)	-0.410000

SURFACE SAR



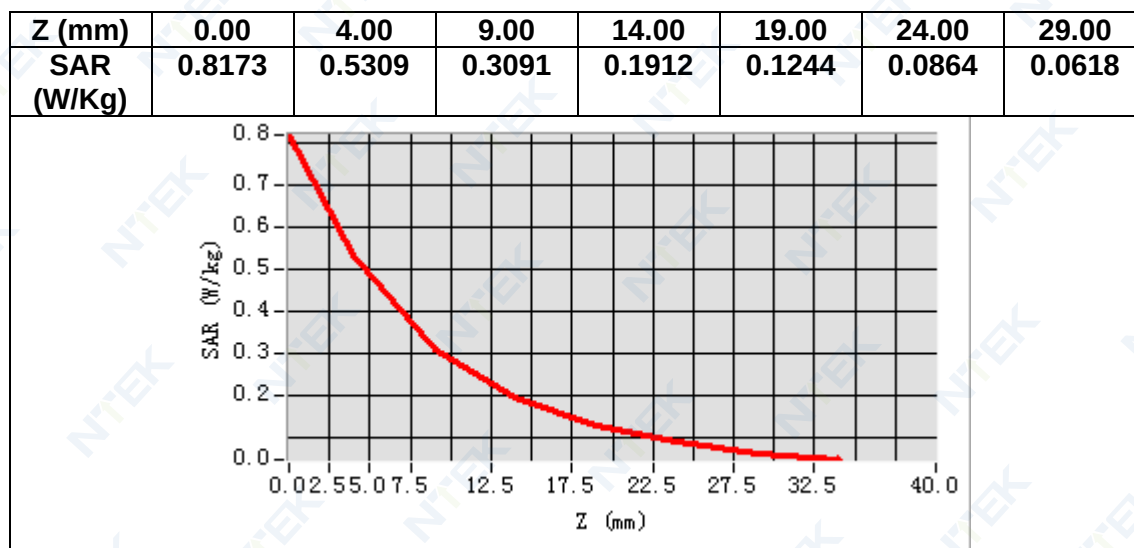
VOLUME SAR



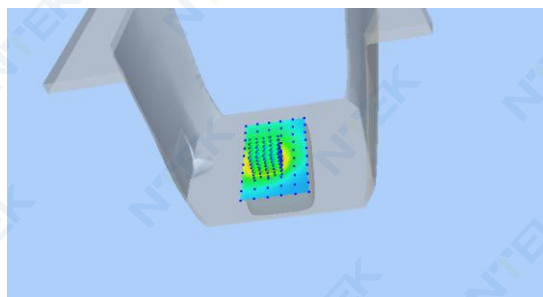
Maximum location: X=-10.00, Y=-22.00

SAR Peak: 0.87 W/kg

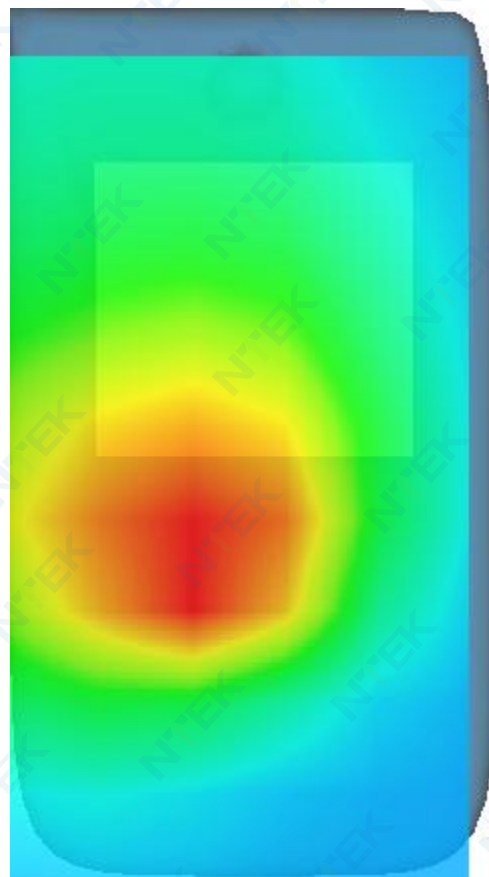
SAR 10g (W/Kg)	0.301286
SAR 1g (W/Kg)	0.519632



3D screen shot



Hot spot position



MEASUREMENT 47

Date of measurement: 20/10/2023

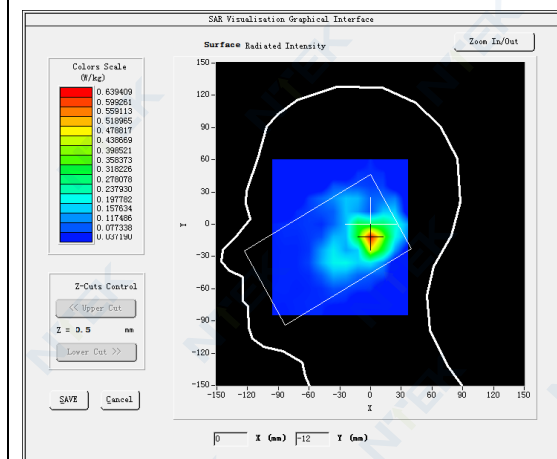
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n77</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.11</u>

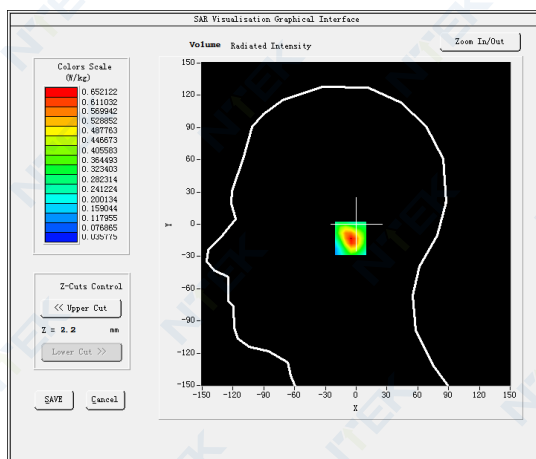
B. SAR Measurement Results

Frequency (MHz)	3750.000000
Relative permittivity (real part)	37.223724
Relative permittivity (imaginary part)	14.955540
Conductivity (S/m)	3.115737
Variation (%)	-0.850000

SURFACE SAR



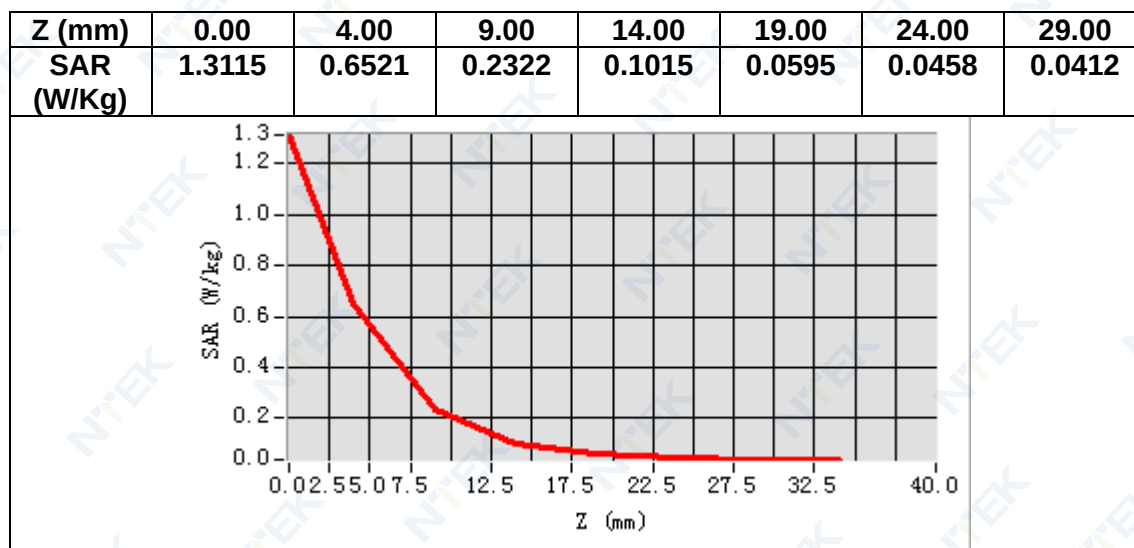
VOLUME SAR



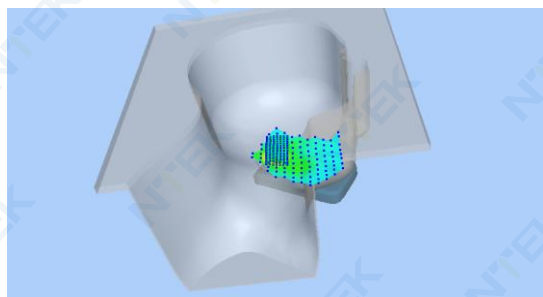
Maximum location: X=0.00, Y=-13.00

SAR Peak: 1.30 W/kg

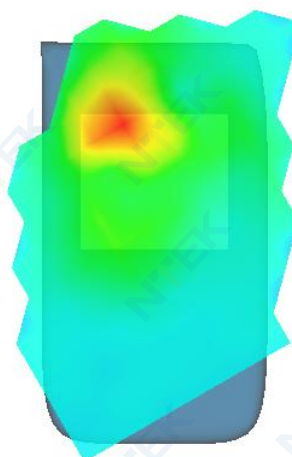
SAR 10g (W/Kg)	0.266456
SAR 1g (W/Kg)	0.624702



3D screen shot



Hot spot position



MEASUREMENT 48

Date of measurement: 20/10/2023

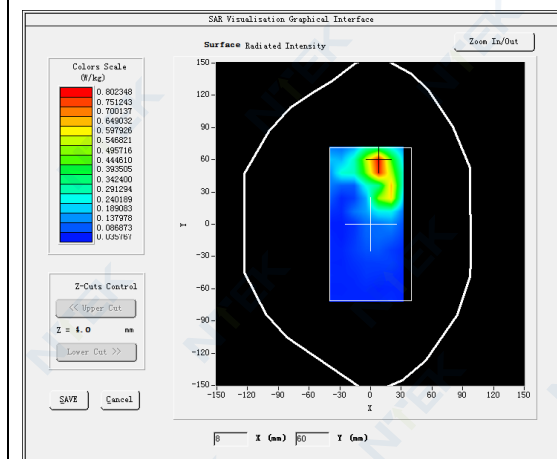
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n77</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.11</u>

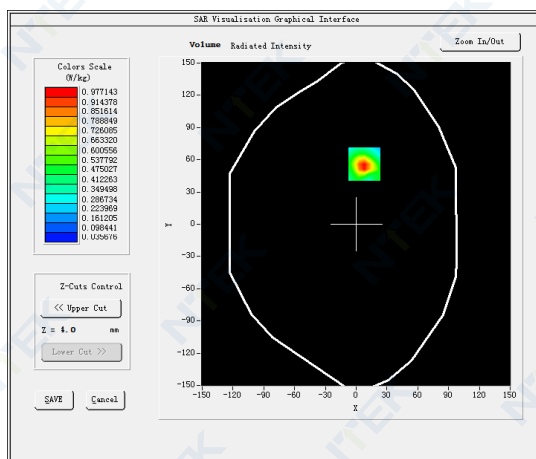
B. SAR Measurement Results

Frequency (MHz)	3750.000000
Relative permittivity (real part)	37.223724
Relative permittivity (imaginary part)	14.955540
Conductivity (S/m)	3.115737
Variation (%)	2.470000

SURFACE SAR



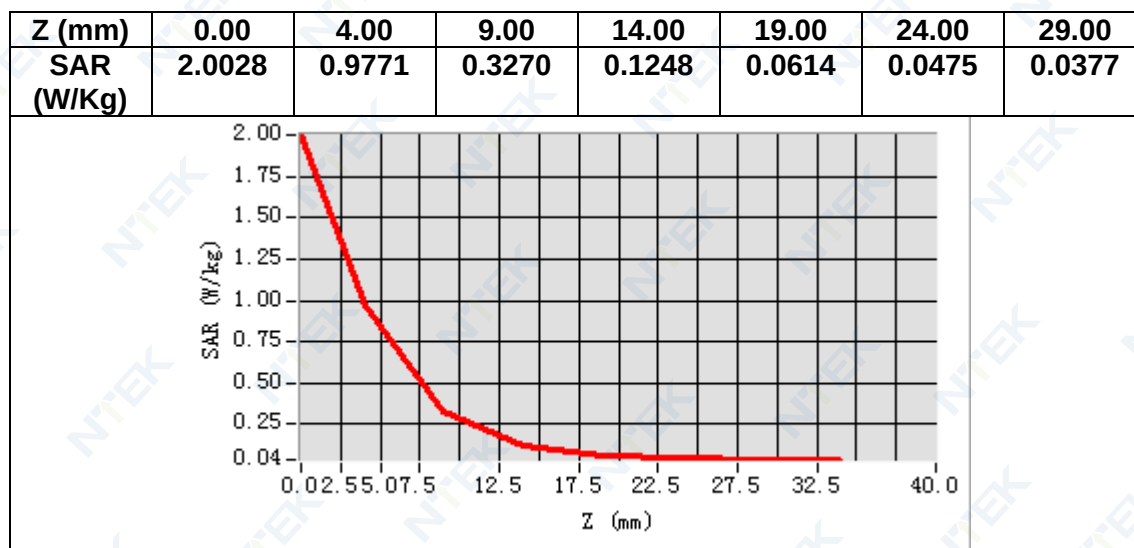
VOLUME SAR



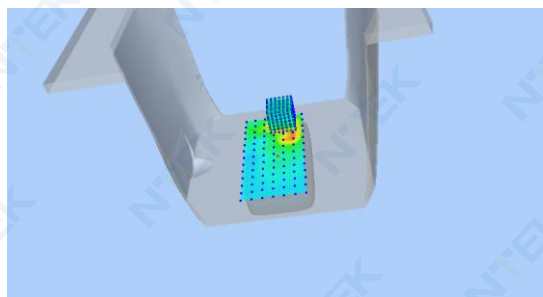
Maximum location: X=8.00, Y=56.00

SAR Peak: 2.06 W/kg

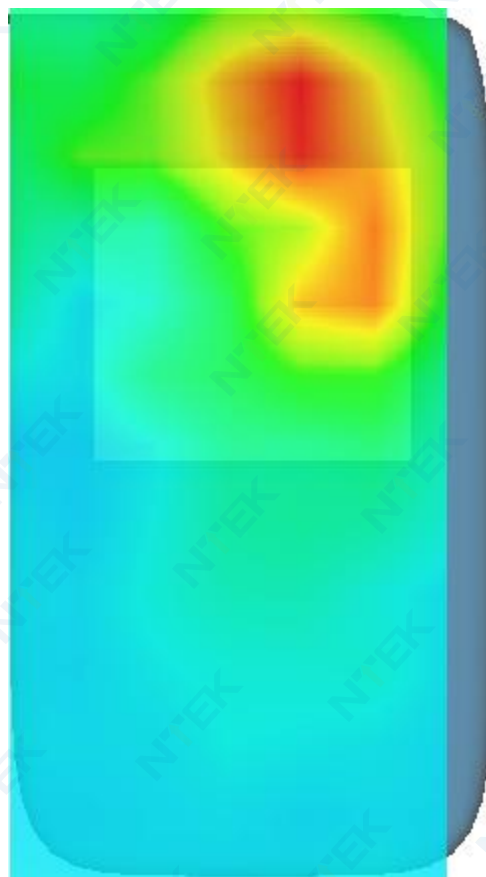
SAR 10g (W/Kg)	0.360740
SAR 1g (W/Kg)	0.928081



3D screen shot



Hot spot position



MEASUREMENT 49

Date of measurement: 19/10/2023

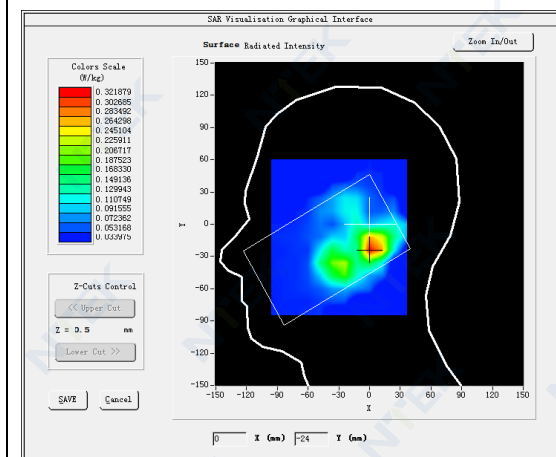
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n78</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.20</u>

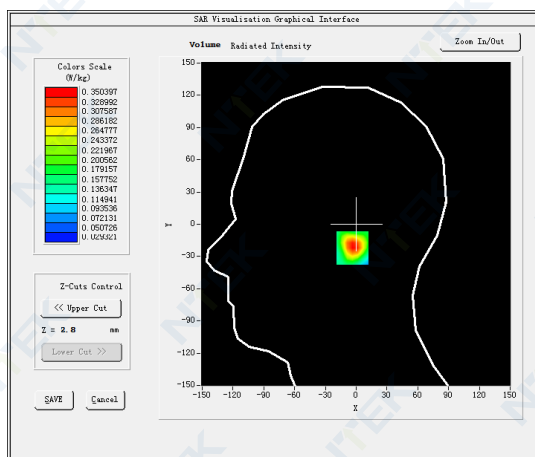
B. SAR Measurement Results

Frequency (MHz)	3549.990000
Relative permittivity (real part)	37.686995
Relative permittivity (imaginary part)	14.367288
Conductivity (S/m)	2.853468
Variation (%)	-2.420000

SURFACE SAR



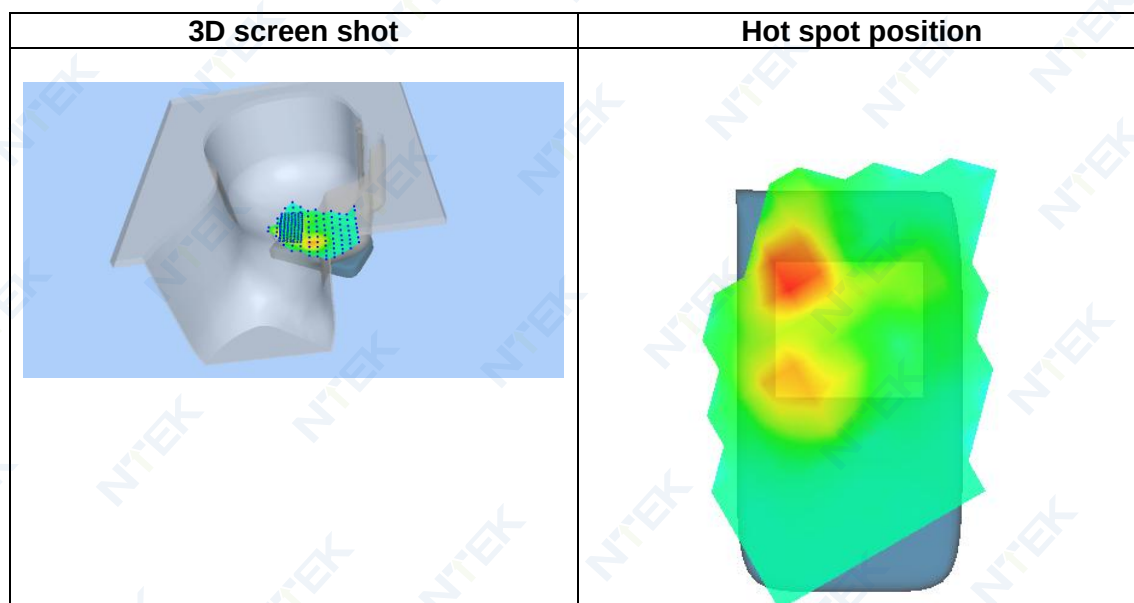
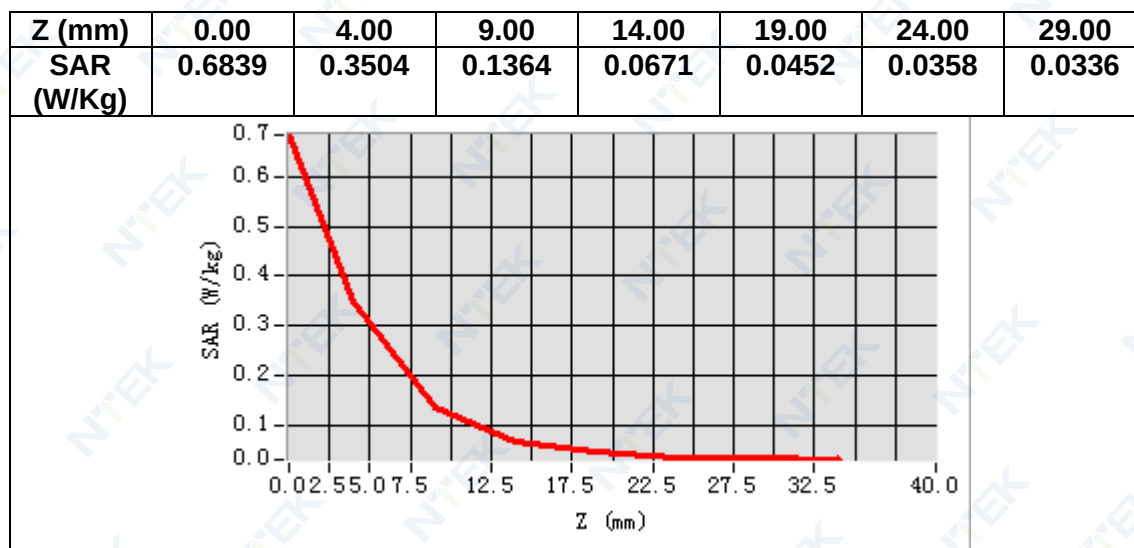
VOLUME SAR



Maximum location: X=3.00, Y=-22.00

SAR Peak: 0.69 W/kg

SAR 10g (W/Kg)	0.155044
SAR 1g (W/Kg)	0.341025



MEASUREMENT 50

Date of measurement: 19/10/2023

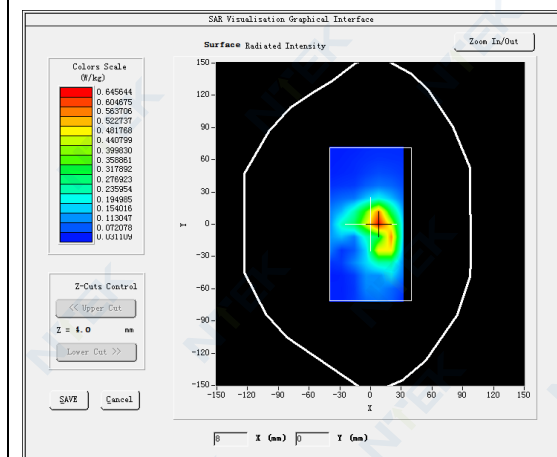
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n78</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.20</u>

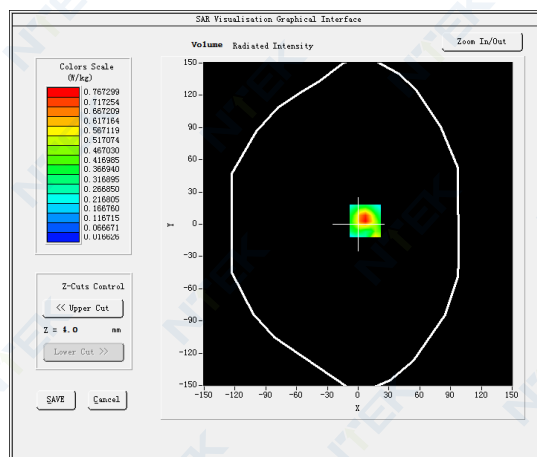
B. SAR Measurement Results

Frequency (MHz)	3549.990000
Relative permittivity (real part)	37.686995
Relative permittivity (imaginary part)	14.367488
Conductivity (S/m)	2.853468
Variation (%)	1.400000

SURFACE SAR



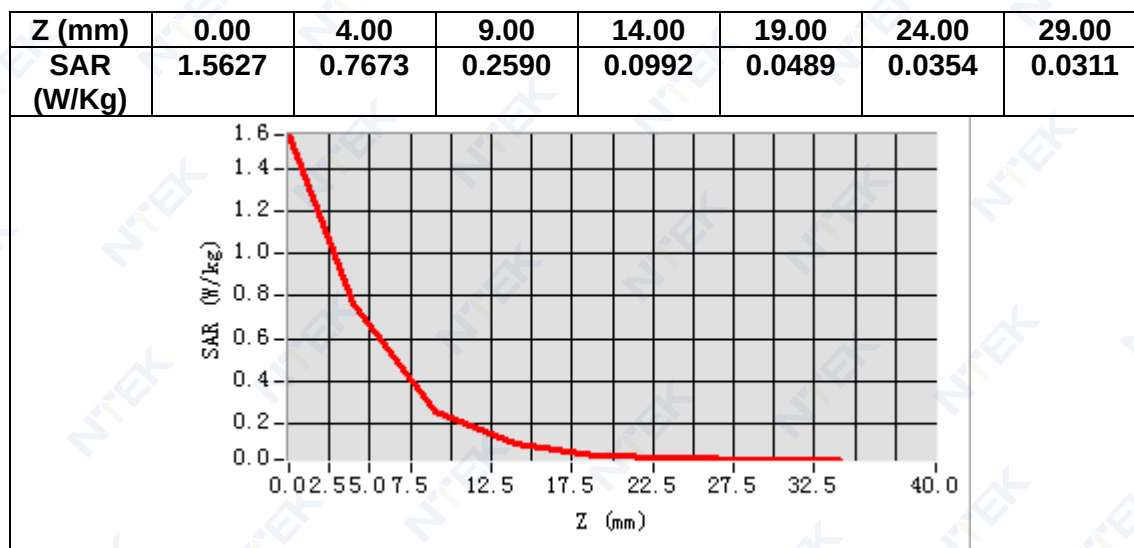
VOLUME SAR



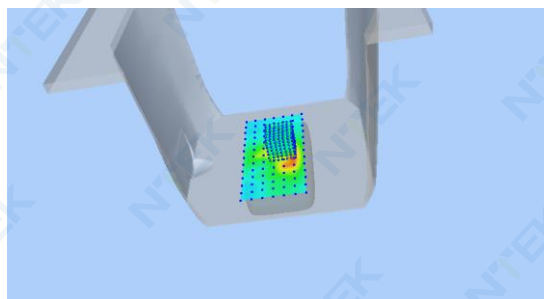
Maximum location: X=7.00, Y=3.00

SAR Peak: 1.55 W/kg

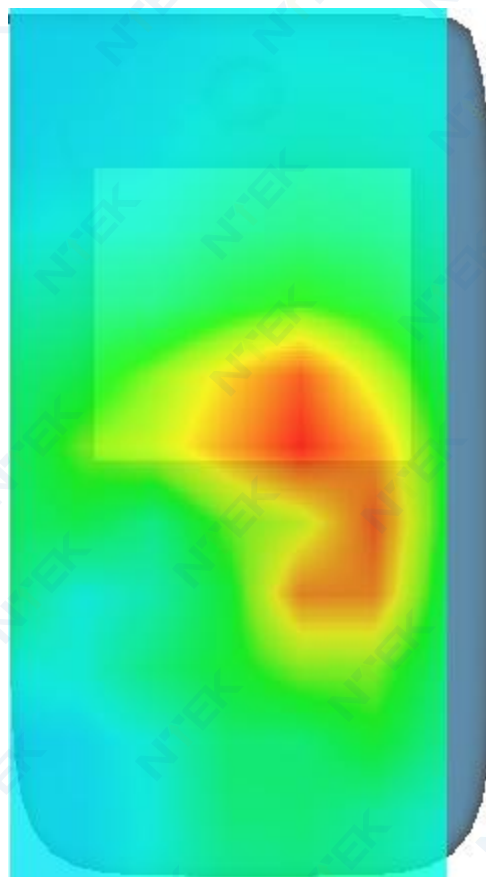
SAR 10g (W/Kg)	0.283578
SAR 1g (W/Kg)	0.715278



3D screen shot



Hot spot position



MEASUREMENT 51

Date of measurement: 18/10/2023

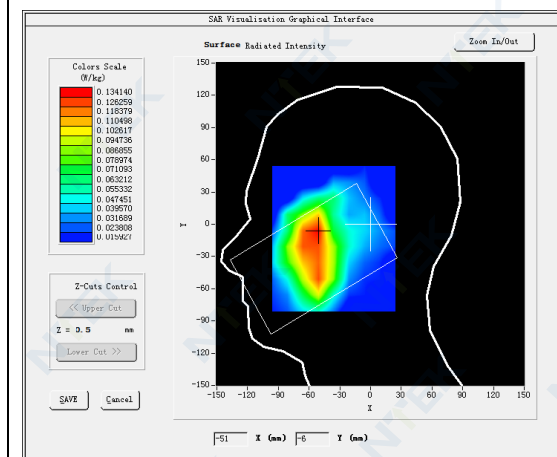
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

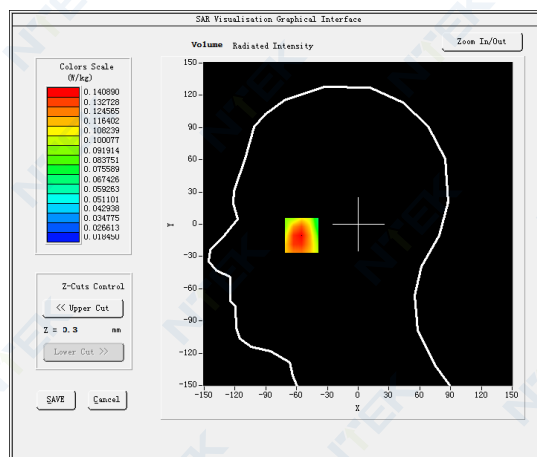
B. SAR Measurement Results

Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.731693
Relative permittivity (imaginary part)	13.583192
Conductivity (S/m)	1.318702
Variation (%)	-3.220000

SURFACE SAR



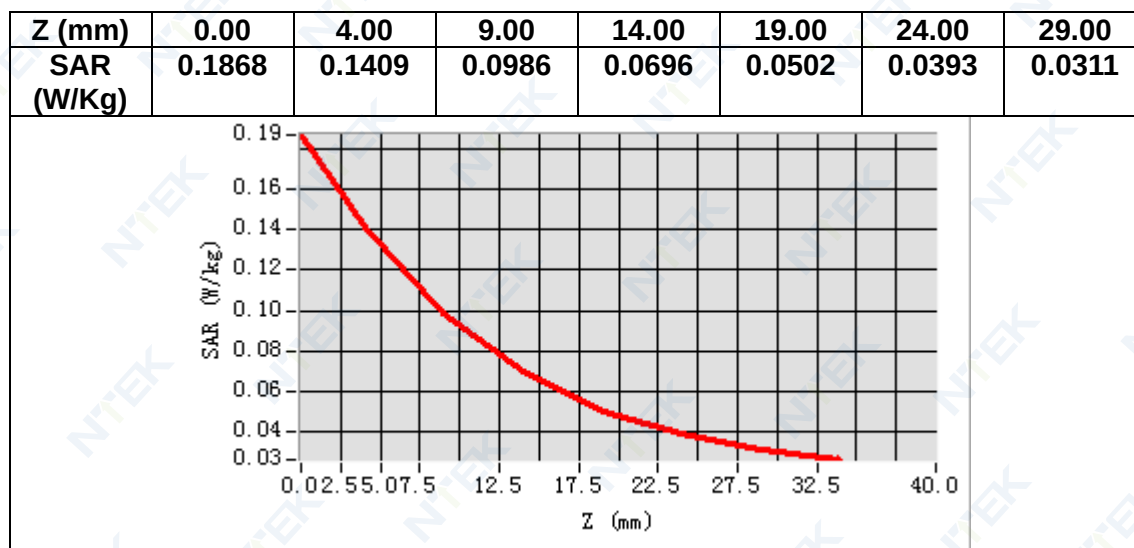
VOLUME SAR



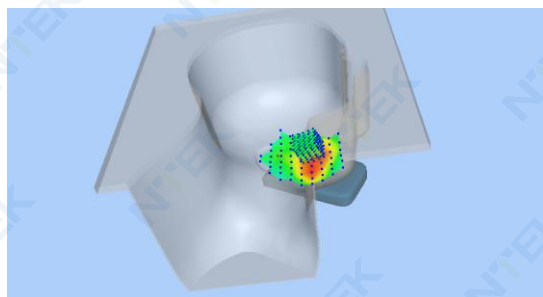
Maximum location: X=-55.00, Y=-8.00

SAR Peak: 0.19 W/kg

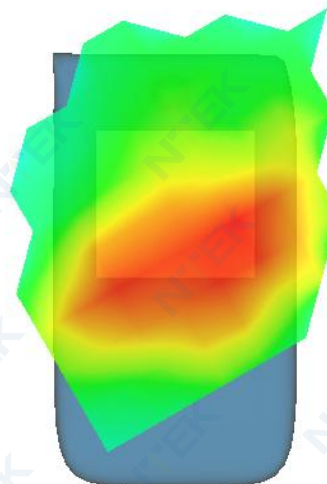
SAR 10g (W/Kg)	0.091408
SAR 1g (W/Kg)	0.136050



3D screen shot



Hot spot position



MEASUREMENT 52

Date of measurement: 18/10/2023

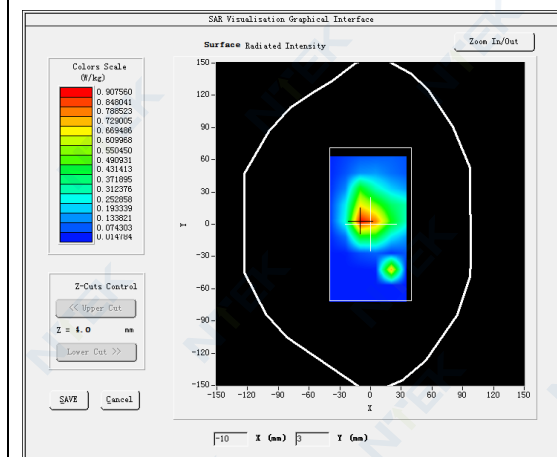
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n3</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.45</u>

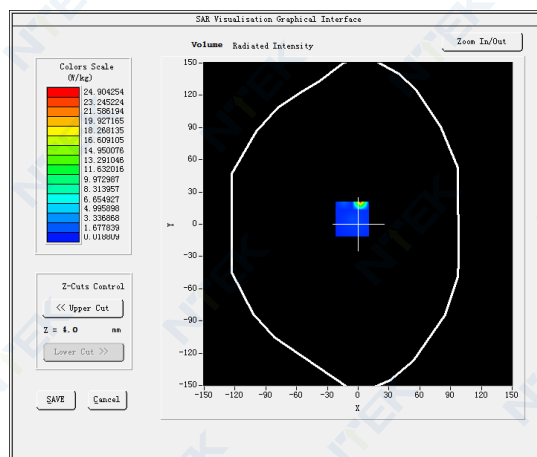
B. SAR Measurement Results

Frequency (MHz)	1747.500000
Relative permittivity (real part)	39.731693
Relative permittivity (imaginary part)	13.583192
Conductivity (S/m)	1.318702
Variation (%)	-1.260000

SURFACE SAR



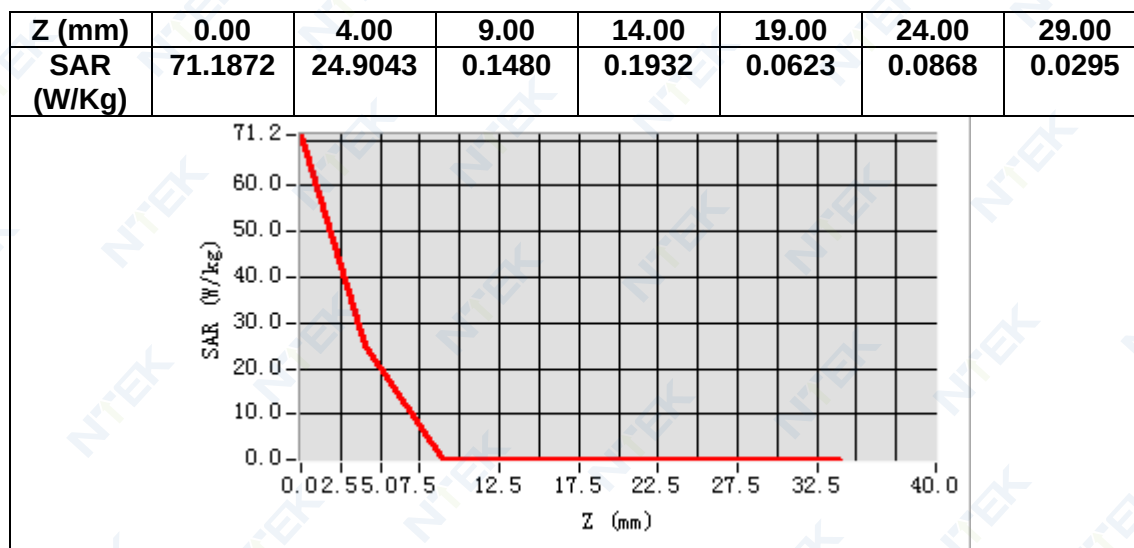
VOLUME SAR



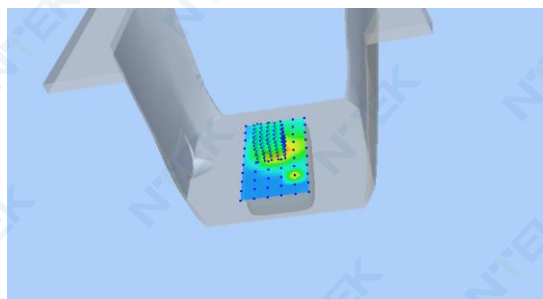
Maximum location: X=-6.00, Y=5.00

SAR Peak: 49.95 W/kg

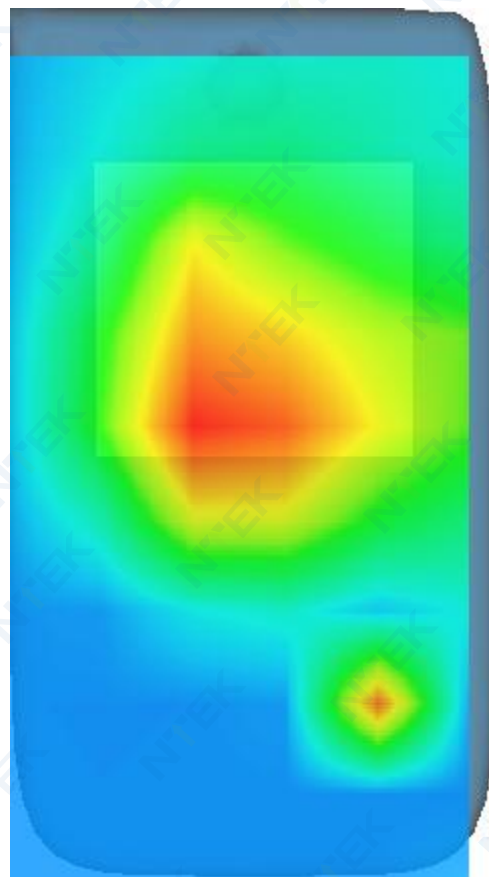
SAR 10g (W/Kg)	1.226237
SAR 1g (W/Kg)	9.558755



3D screen shot



Hot spot position



MEASUREMENT 53

Date of measurement: 16/10/2023

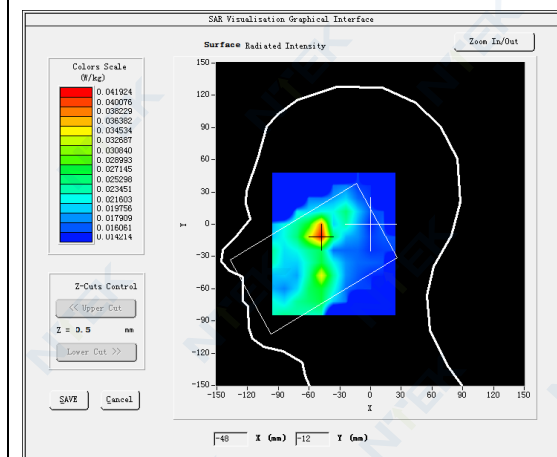
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

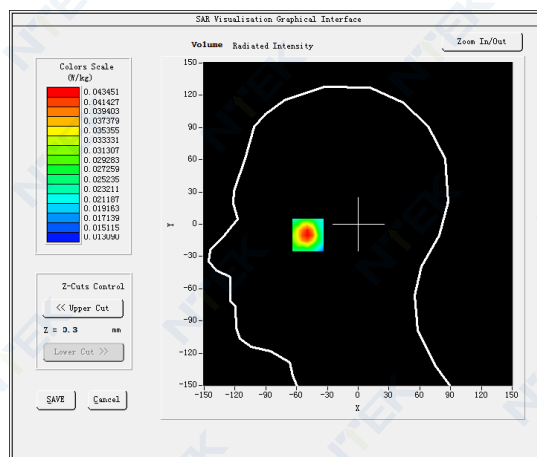
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	38.688992
Relative permittivity (imaginary part)	13.436772
Conductivity (S/m)	1.937135
Variation (%)	2.390000

SURFACE SAR



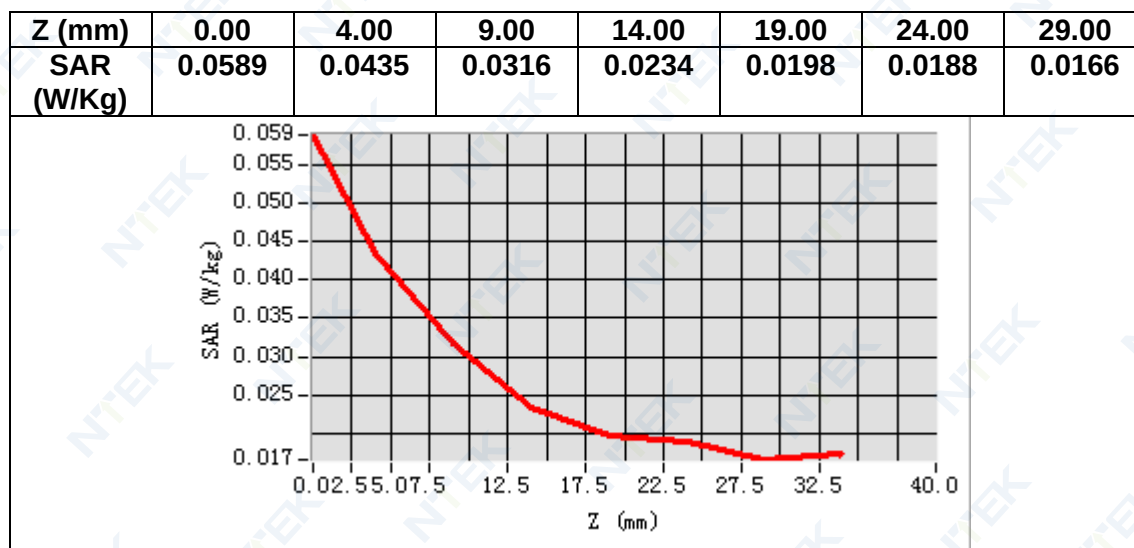
VOLUME SAR



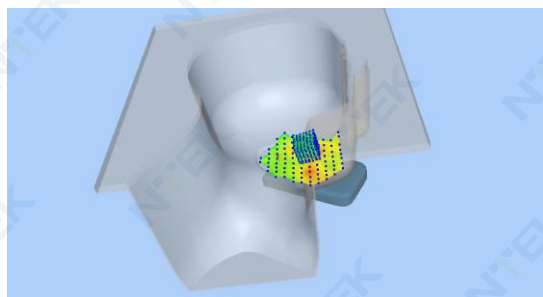
Maximum location: X=-49.00, Y=-9.00

SAR Peak: 0.06 W/kg

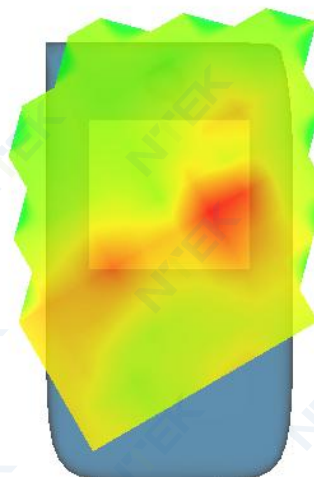
SAR 10g (W/Kg)	0.027227
SAR 1g (W/Kg)	0.041164



3D screen shot



Hot spot position



MEASUREMENT 54

Date of measurement: 16/10/2023

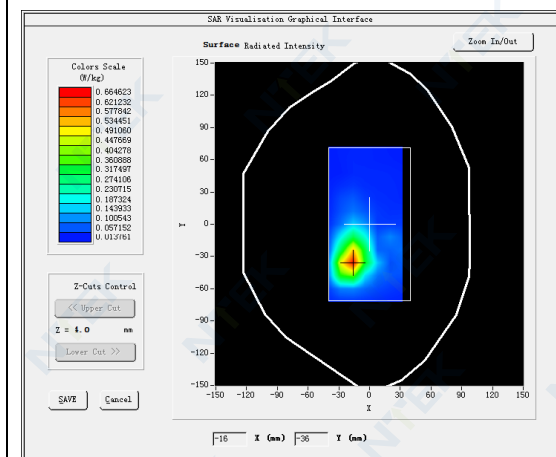
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n38</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.6)</u>
<u>ConvF</u>	<u>2.65</u>

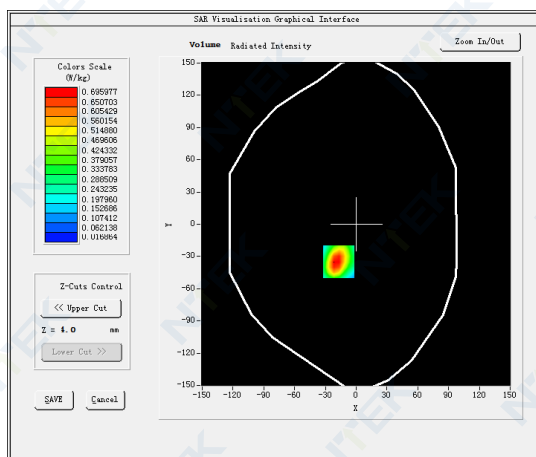
B. SAR Measurement Results

Frequency (MHz)	2595.000000
Relative permittivity (real part)	38.688992
Relative permittivity (imaginary part)	13.436772
Conductivity (S/m)	1.937135
Variation (%)	1.500000

SURFACE SAR



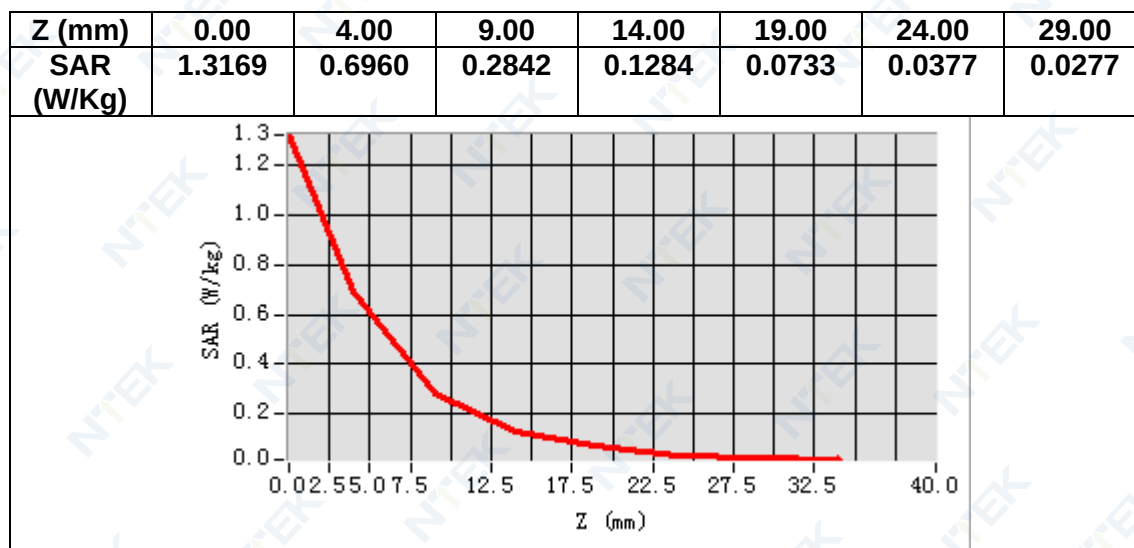
VOLUME SAR



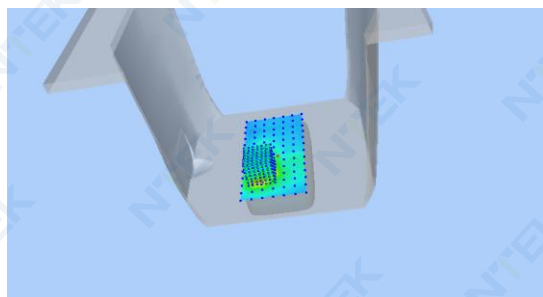
Maximum location: X=-17.00, Y=-35.00

SAR Peak: 1.30 W/kg

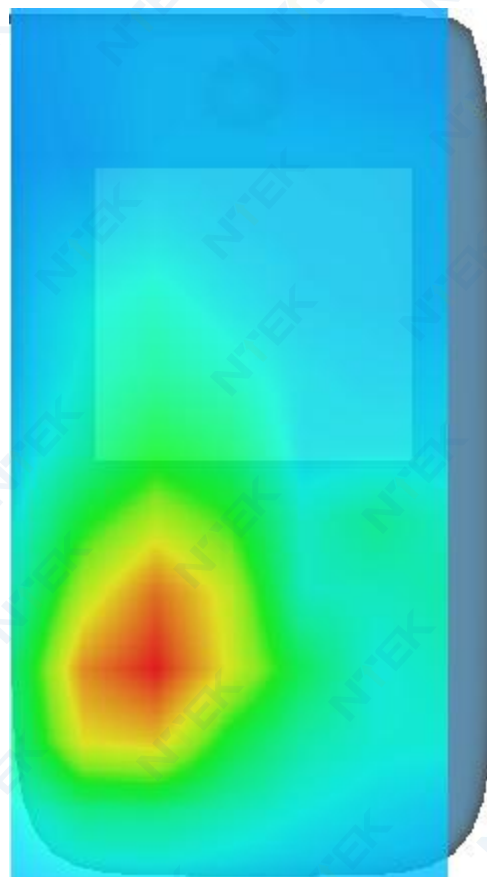
SAR 10g (W/Kg)	0.304735
SAR 1g (W/Kg)	0.671824



3D screen shot



Hot spot position



MEASUREMENT 55

Date of measurement: 17/10/2023

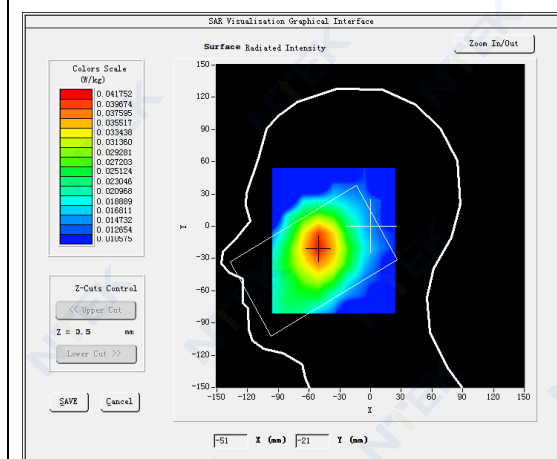
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>SA_n8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

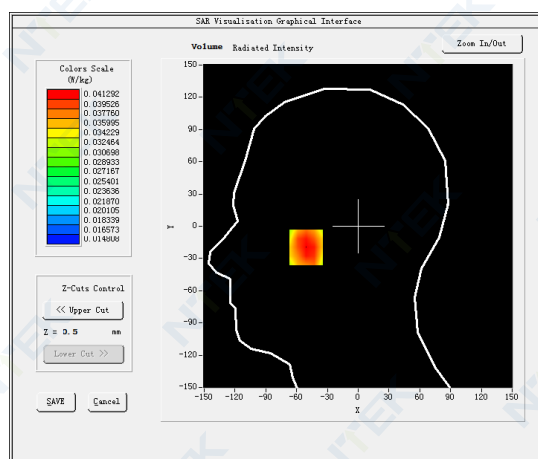
B. SAR Measurement Results

Frequency (MHz)	897.500000
Relative permittivity (real part)	42.228451
Relative permittivity (imaginary part)	19.949930
Conductivity (S/m)	0.994726
Variation (%)	-1.600000

SURFACE SAR



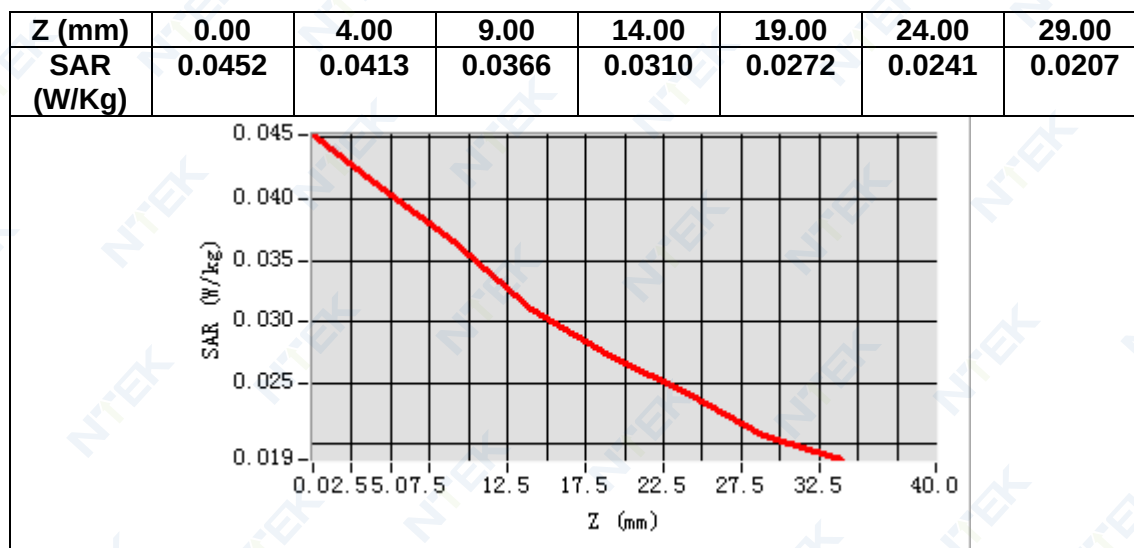
VOLUME SAR



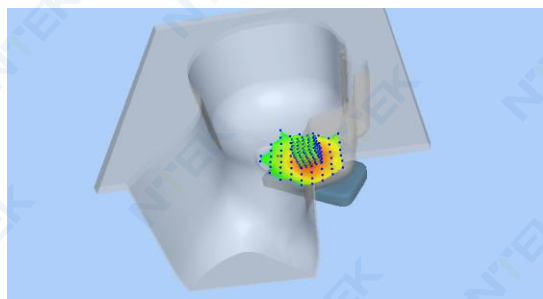
Maximum location: X=-51.00, Y=-19.00

SAR Peak: 0.05 W/kg

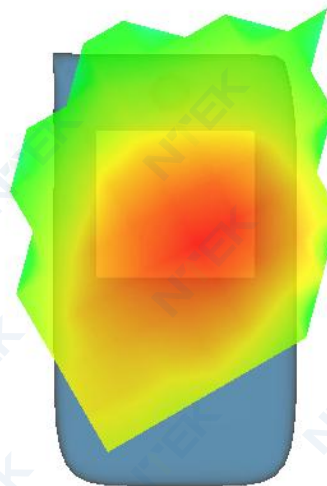
SAR 10g (W/Kg)	0.033838
SAR 1g (W/Kg)	0.041649



3D screen shot



Hot spot position



MEASUREMENT 56

Date of measurement: 17/10/2023

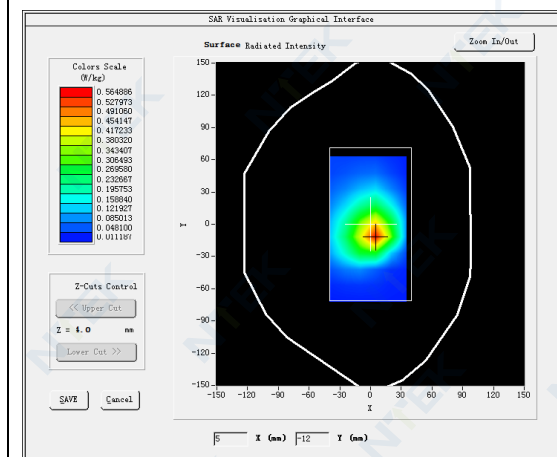
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=15mm dy=15mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>5x5x7,dx=8mm dy=8mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>SA_n8</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>(Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.23</u>

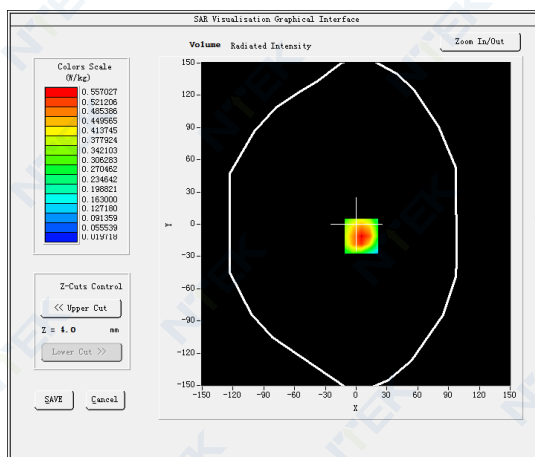
B. SAR Measurement Results

Frequency (MHz)	897.500000
Relative permittivity (real part)	42.228451
Relative permittivity (imaginary part)	19.949930
Conductivity (S/m)	0.994726
Variation (%)	0.070000

SURFACE SAR



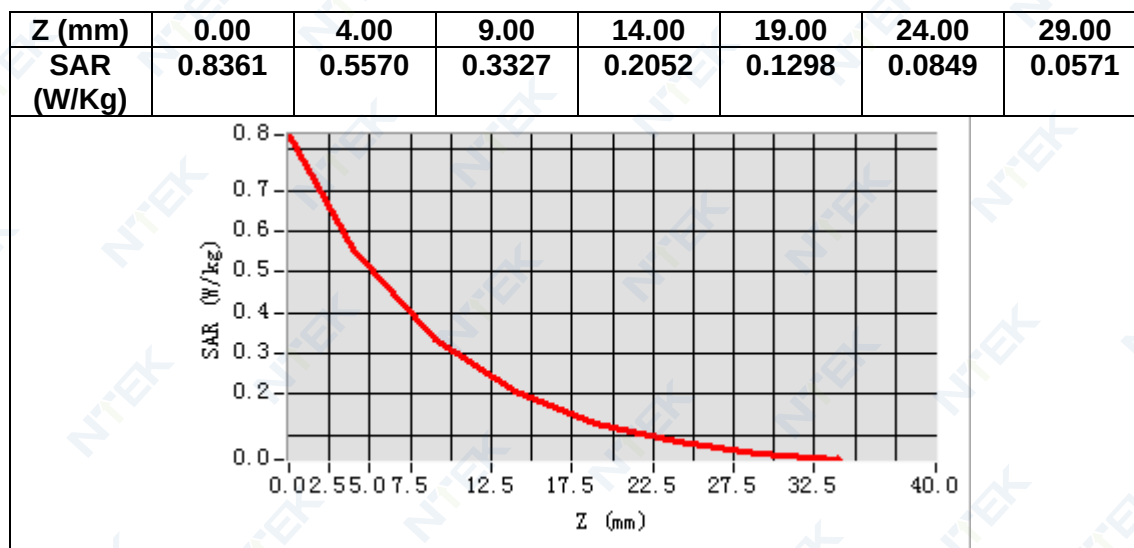
VOLUME SAR



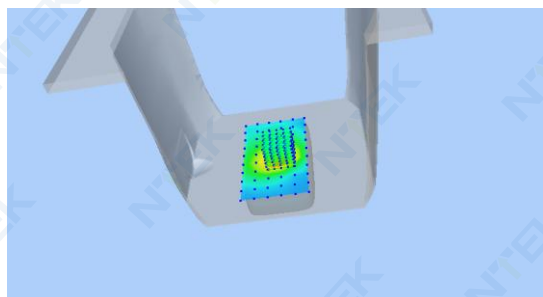
Maximum location: X=5.00, Y=-11.00

SAR Peak: 0.91 W/kg

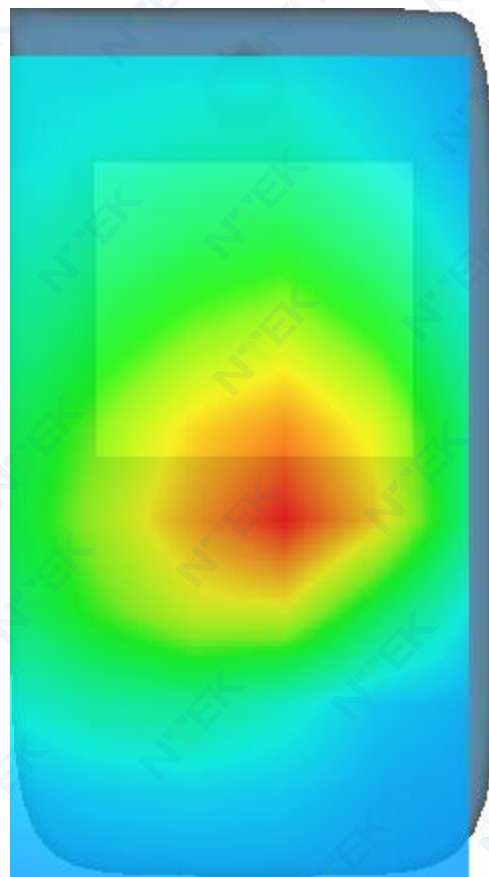
SAR 10g (W/Kg)	0.309639
SAR 1g (W/Kg)	0.554191



3D screen shot



Hot spot position



MEASUREMENT 57

Date of measurement: 21/10/2023

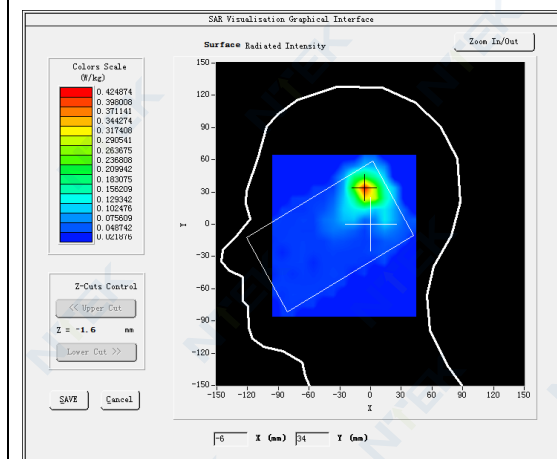
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Low</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.07</u>

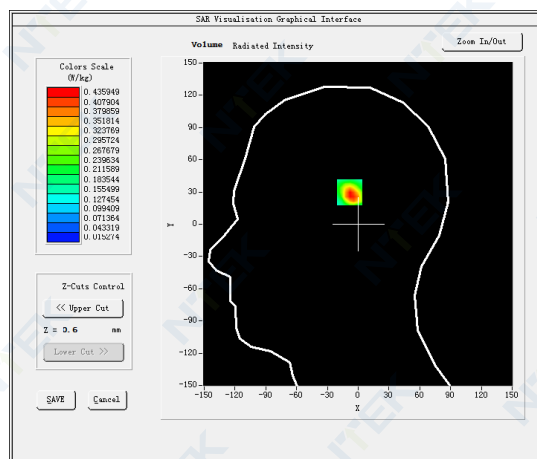
B. SAR Measurement Results

Frequency (MHz)	5190.000000
Relative permittivity (real part)	35.696372
Relative permittivity (imaginary part)	15.619851
Conductivity (S/m)	4.503723
Variation (%)	0.180000

SURFACE SAR



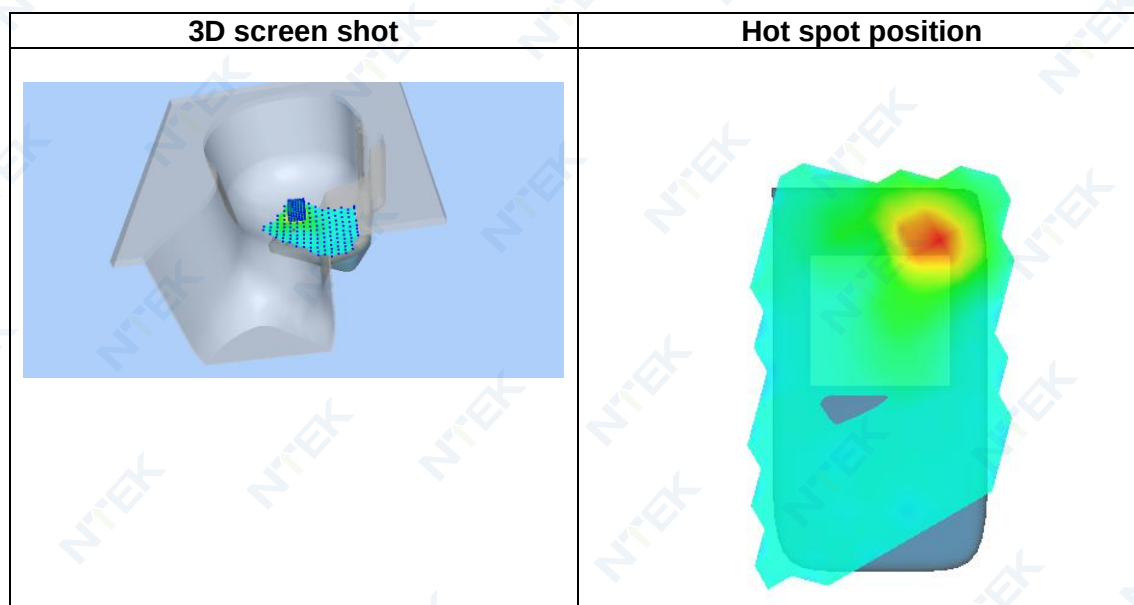
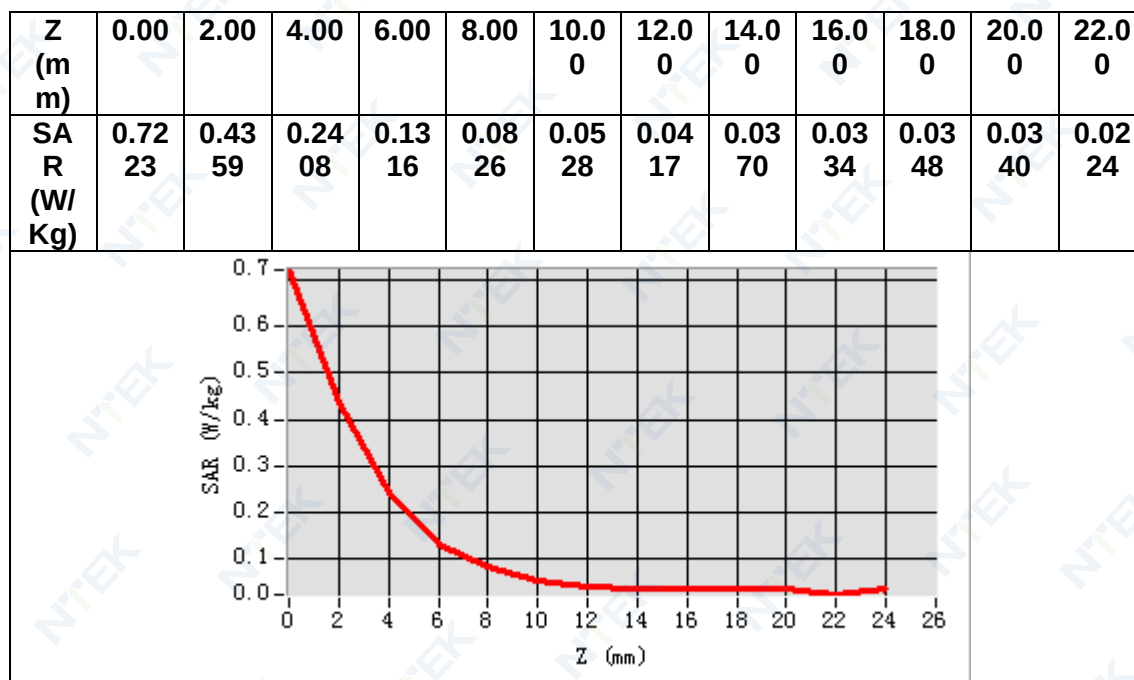
VOLUME SAR



Maximum location: X=-6.00, Y=33.00

SAR Peak: 1.14 W/kg

SAR 10g (W/Kg)	0.167887
SAR 1g (W/Kg)	0.422578



MEASUREMENT 58

Date of measurement: 22/10/2023

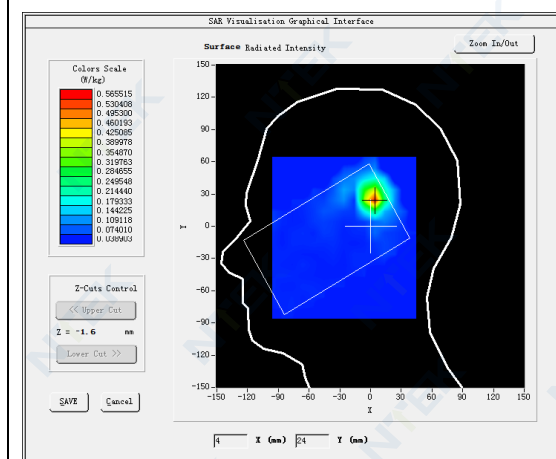
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.04</u>

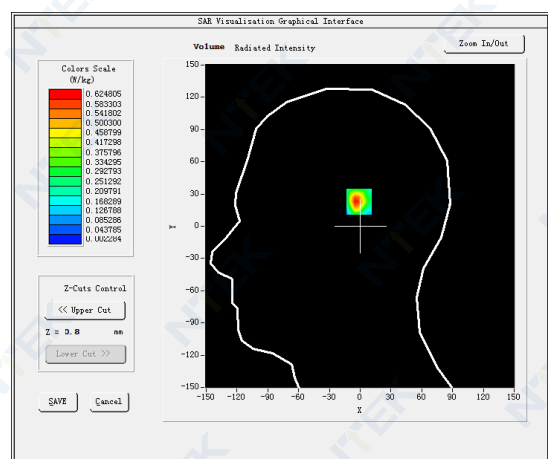
B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	35.253325
Relative permittivity (imaginary part)	15.820963
Conductivity (S/m)	5.084681
Variation (%)	-1.080000

SURFACE SAR



VOLUME SAR

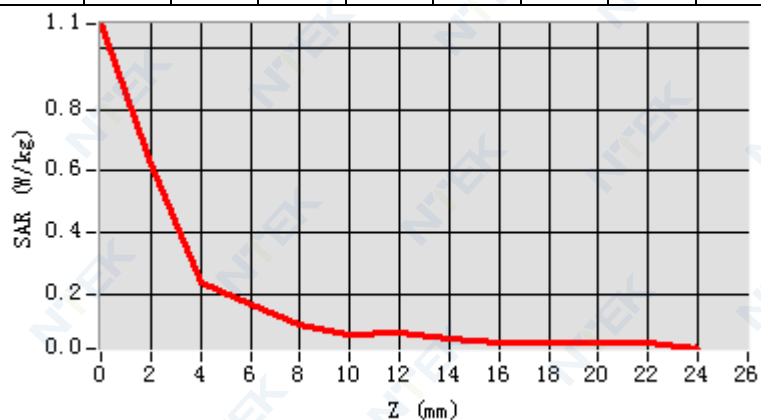


Maximum location: X=3.00, Y=25.00

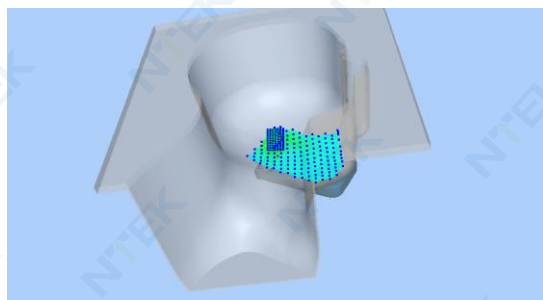
SAR Peak: 1.80 W/kg

SAR 10g (W/Kg)	0.219225
SAR 1g (W/Kg)	0.617807

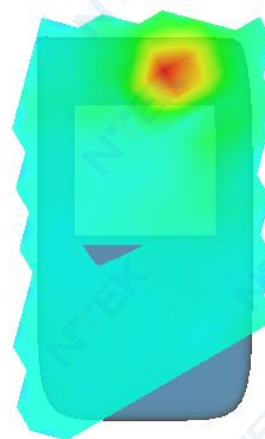
Z (m m)	0.00	2.00	4.00	6.00	8.00	10.0 0	12.0 0	14.0 0	16.0 0	18.0 0	20.0 0	22.0 0
SAR (W/ Kg)	1.07 90	0.62 48	0.23 84	0.16 52	0.09 83	0.07 03	0.07 27	0.05 40	0.04 11	0.04 08	0.04 11	0.04 26



3D screen shot



Hot spot position



MEASUREMENT 59

Date of measurement: 21/10/2023

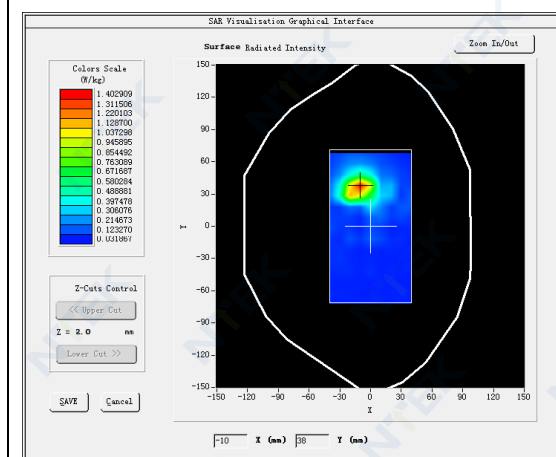
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Low</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.07</u>

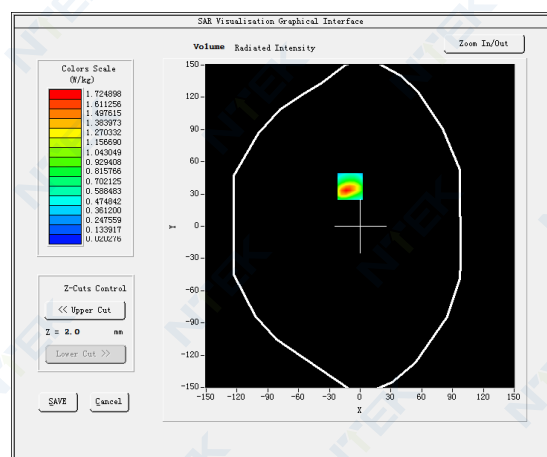
B. SAR Measurement Results

Frequency (MHz)	5190.000000
Relative permittivity (real part)	35.696372
Relative permittivity (imaginary part)	15.619851
Conductivity (S/m)	4.503723
Variation (%)	1.240000

SURFACE SAR



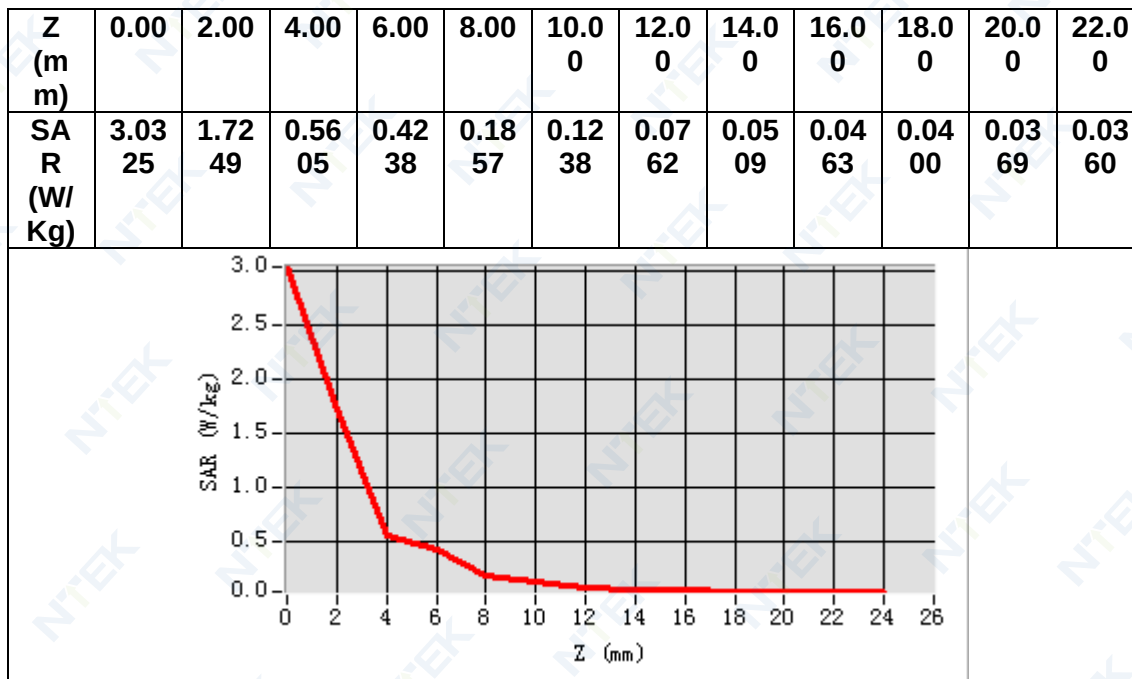
VOLUME SAR



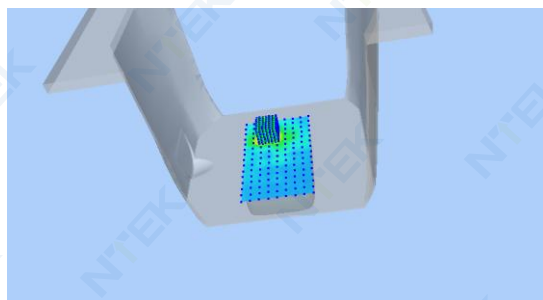
Maximum location: X=-10.00, Y=37.00

SAR Peak: 3.03 W/kg

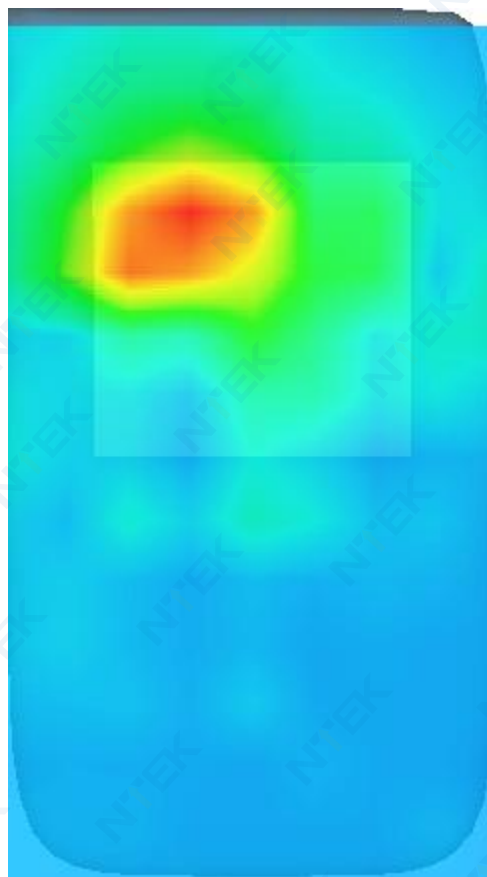
SAR 10g (W/Kg)	0.346182
SAR 1g (W/Kg)	0.943192



3D screen shot



Hot spot position



MEASUREMENT 60

Date of measurement: 22/10/2023

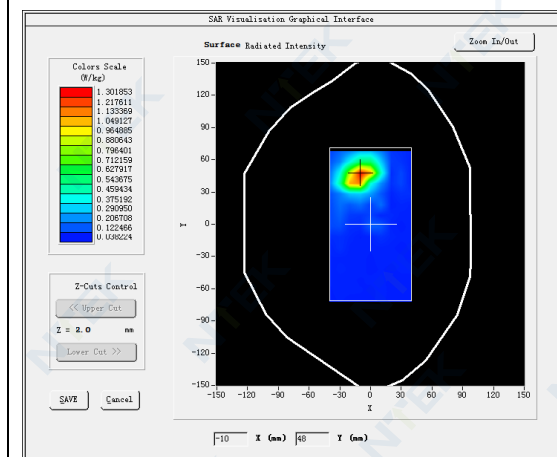
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=10mm dy=10mm, h= 2.00 mm</u>
<u>ZoomScan</u>	<u>7x7x12,dx=4mm dy=4mm dz=2mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11ax U-NII</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11ax (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.04</u>

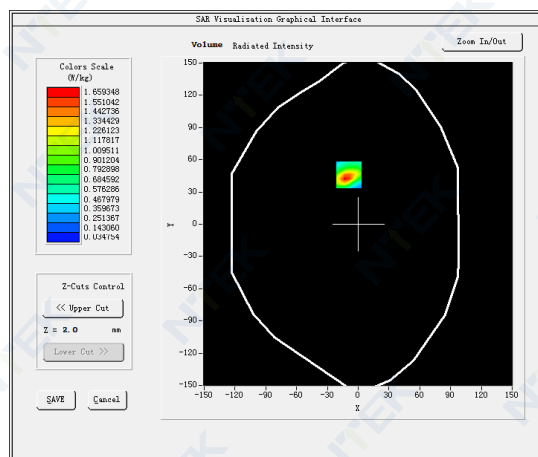
B. SAR Measurement Results

Frequency (MHz)	5785.000000
Relative permittivity (real part)	35.253325
Relative permittivity (imaginary part)	15.820963
Conductivity (S/m)	5.084681
Variation (%)	-3.430000

SURFACE SAR



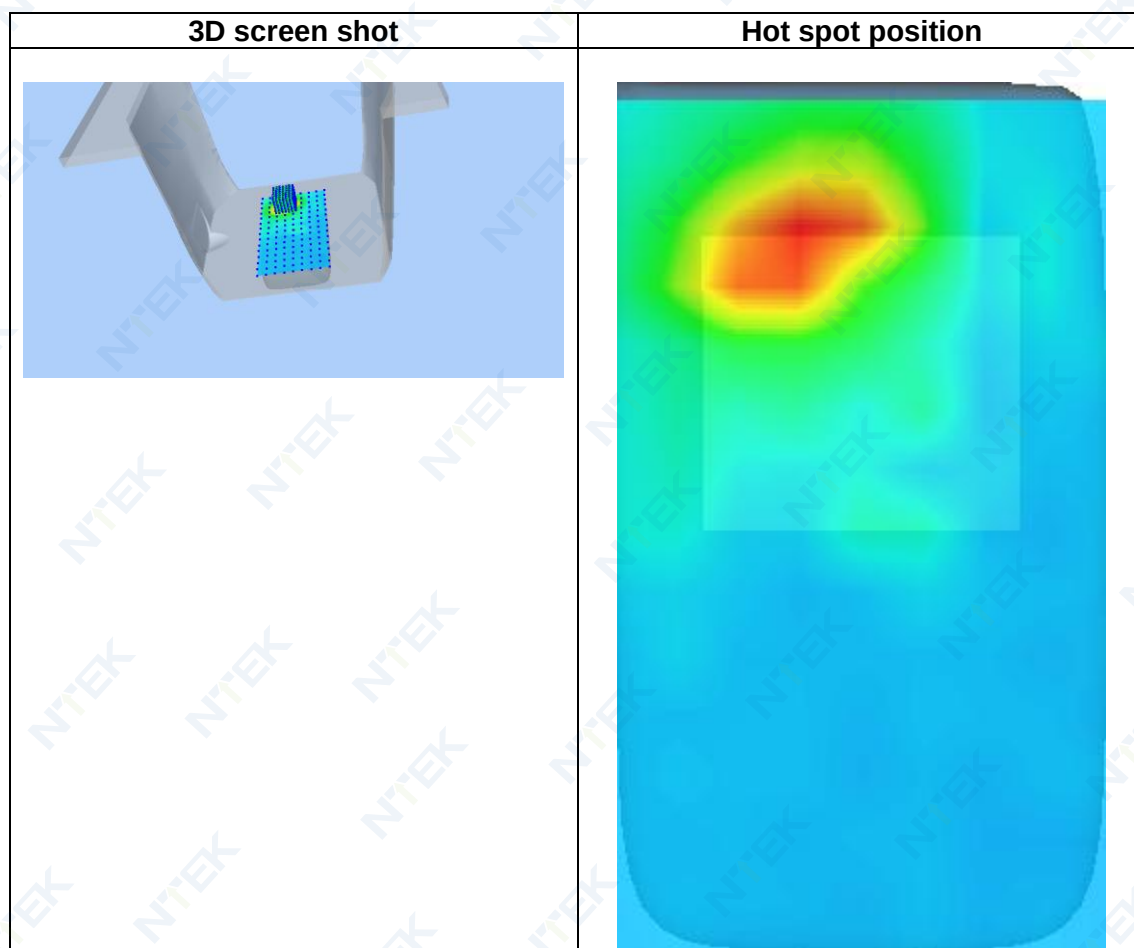
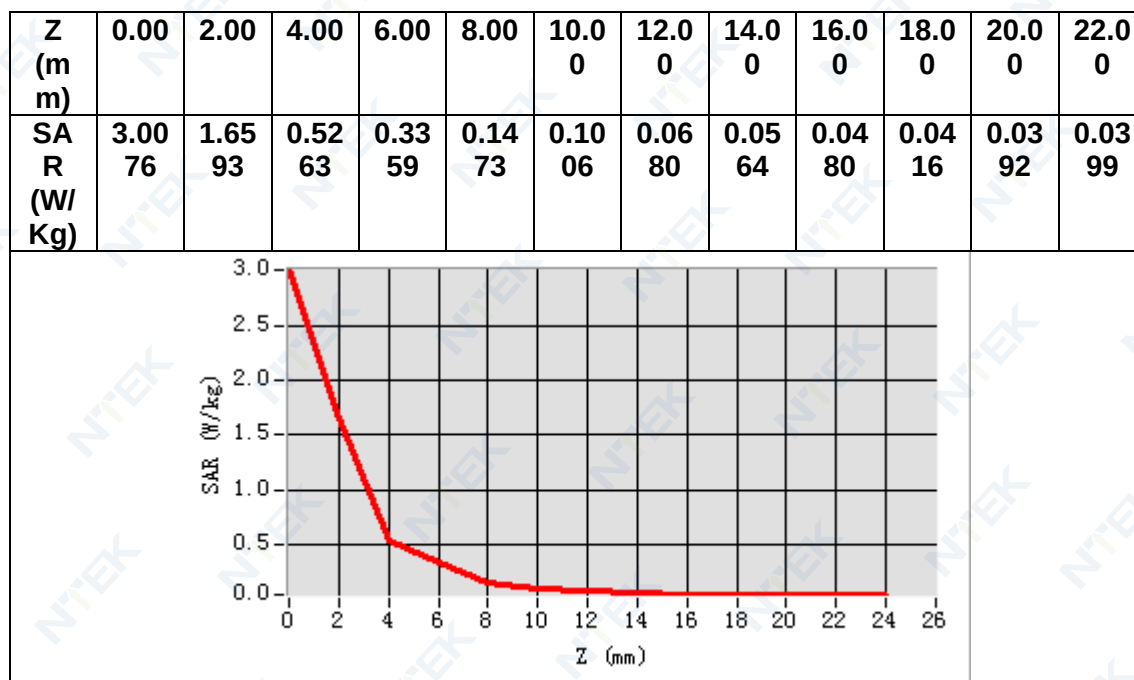
VOLUME SAR



Maximum location: X=-9.00, Y=46.00

SAR Peak: 3.13 W/kg

SAR 10g (W/Kg)	0.326343
SAR 1g (W/Kg)	0.906440



MEASUREMENT 61

Date of measurement: 28/10/2023

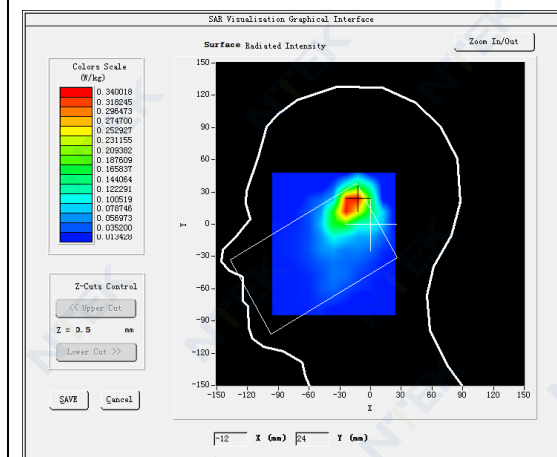
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Left head</u>
<u>Device Position</u>	<u>Cheek</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>2.85</u>

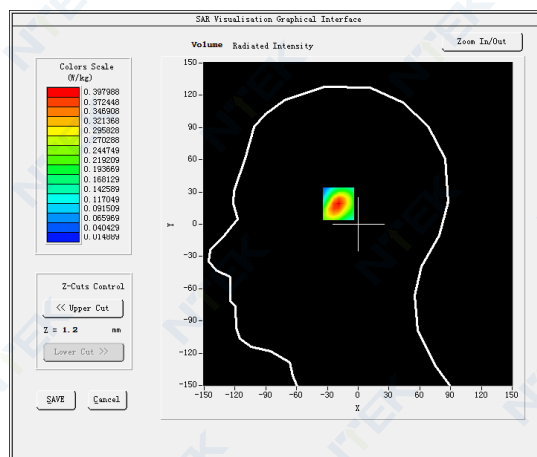
B. SAR Measurement Results

Frequency (MHz)	2442.000000
Relative permittivity (real part)	38.803932
Relative permittivity (imaginary part)	13.209110
Conductivity (S/m)	1.792036
Variation (%)	-0.420000

SURFACE SAR



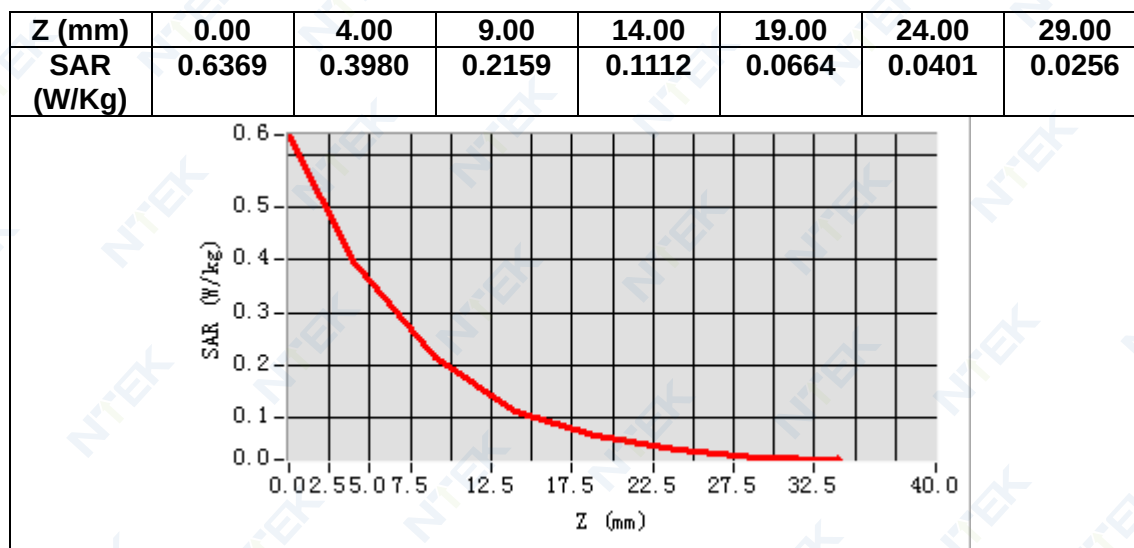
VOLUME SAR



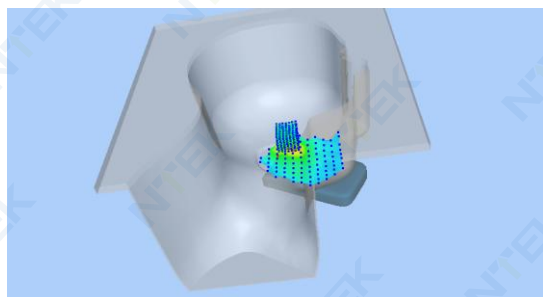
Maximum location: X=-18.00, Y=21.00

SAR Peak: 0.63 W/kg

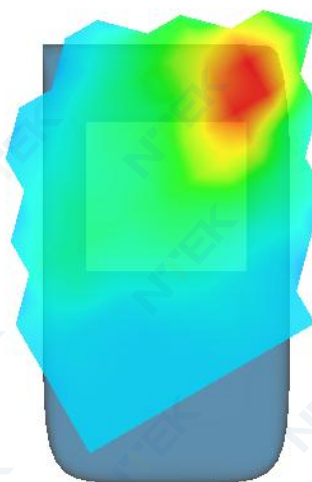
SAR 10g (W/Kg)	0.186407
SAR 1g (W/Kg)	0.372301



3D screen shot



Hot spot position



MEASUREMENT 62

Date of measurement: 28/10/2023

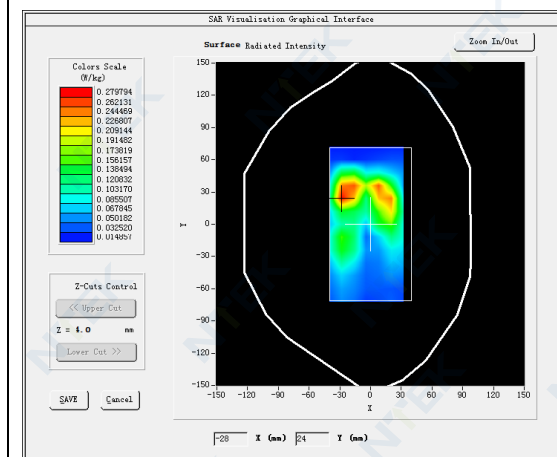
A. Experimental conditions.

<u>Area Scan</u>	<u>dx=12mm dy=12mm, h= 5.00 mm</u>
<u>ZoomScan</u>	<u>7x7x7,dx=5mm dy=5mm dz=5mm</u>
<u>Phantom</u>	<u>Validation plane</u>
<u>Device Position</u>	<u>Body</u>
<u>Band</u>	<u>IEEE 802.11b ISM</u>
<u>Channels</u>	<u>Middle</u>
<u>Signal</u>	<u>IEEE802.11b (Crest factor: 1.0)</u>
<u>ConvF</u>	<u>1.98</u>

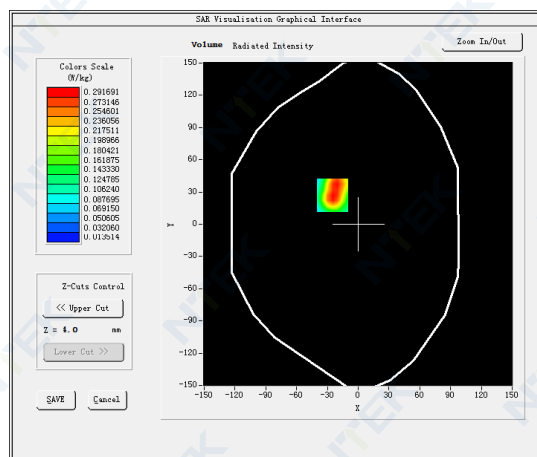
B. SAR Measurement Results

Frequency (MHz)	2442.000000
Relative permittivity (real part)	38.803932
Relative permittivity (imaginary part)	13.209110
Conductivity (S/m)	1.792036
Variation (%)	-1.130000

SURFACE SAR



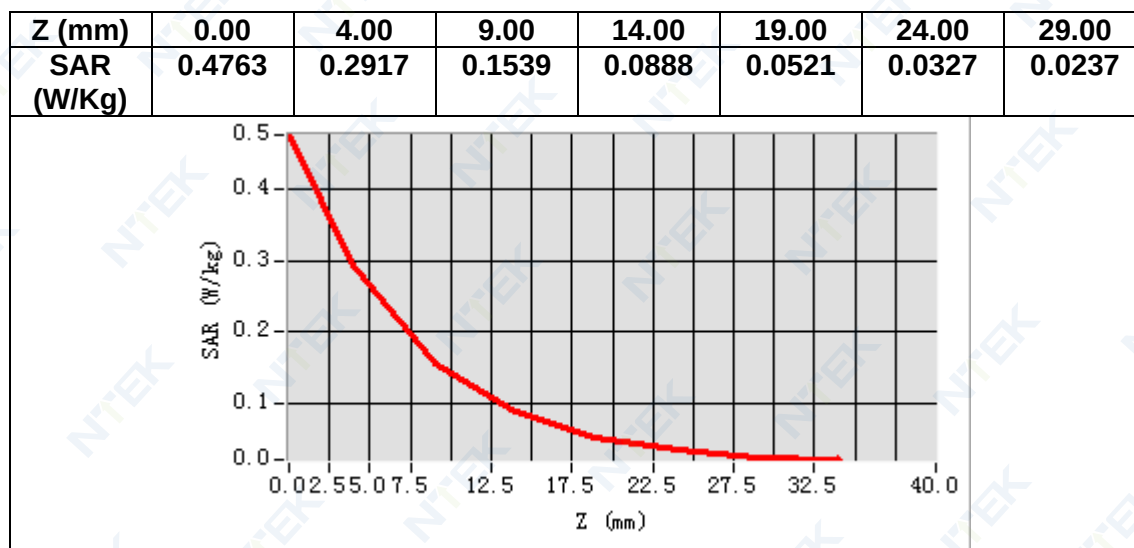
VOLUME SAR



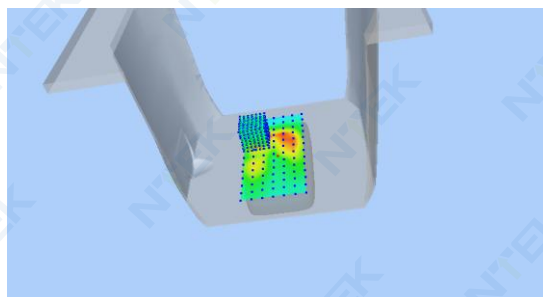
Maximum location: X=-25.00, Y=27.00

SAR Peak: 0.50 W/kg

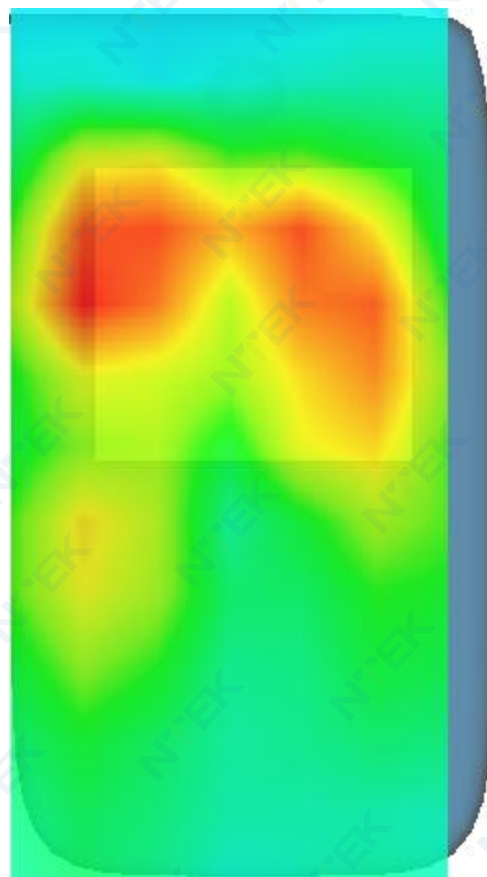
SAR 10g (W/Kg)	0.147822
SAR 1g (W/Kg)	0.283862



3D screen shot



Hot spot position



13. Appendix D. Calibration Certificate

Table of contents
E Field Probe - 3423-EPGO-426
750 MHz Dipole - SN 03/15 DIP 0G750-355
900 MHz Dipole - SN 03/15 DIP 0G900-348
1800 MHz Dipole - SN 03/15 DIP 1G800-349
2000 MHz Dipole - SN 03/15 DIP 2G000-351
2300 MHz Dipole - SN 03/16 DIP 2G300-358
2450 MHz Dipole - SN 03/15 DIP 2G450-352
2600 MHz Dipole - SN 03/15 DIP 2G600-356
3500 MHz Dipole - SN 09/12 DIP 3G500-360
3700 MHz Dipole - SN 09/12 DIP 3G700-361
5000-6000 MHz Dipole - SN 13/14 WGA 33



COMOSAR E-Field Probe Calibration Report

Ref : ACR.261.11.23.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.: 3423-EPGO-426

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 09/18/2023



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

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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.261.11.23.BES.A

	Name	Function	Date	Signature
Prepared by :	Cyrille ONNEE	Measurement Responsible	9/18/2023	
Checked & approved by:	Jérôme Luc	Technical Manager	9/18/2023	
Authorized by:	Yann Toutain	Laboratory Director	9/19/2023	

Yann
Toutain IDSignature
numérique de
Yann Toutain ID
Date : 2023.09.19
09:08:14 +02'00'

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

Issue	Name	Date	Modifications
A	Cyrille ONNEE	9/18/2023	Initial release



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

1 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR DOSIMETRIC E FIELD PROBE
Manufacturer	MVG
Model	SSE2
Serial Number	3423-EPGO-426
Product Condition (new / used)	New
Frequency Range of Probe	0.15 GHz-7.5GHz
Resistance of Three Dipoles at Connector	Dipole 1: R1=0.261 MΩ Dipole 2: R2=0.213 MΩ Dipole 3: R3=0.233 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.



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

3.2 LINEARITY

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

3.3 ISOTROPY

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

3.4 BOUNDARY EFFECT

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

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

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

where

$SAR_{uncertainty}$	is the uncertainty in percent of the probe boundary effect
d_{be}	is the distance between the surface and the closest <i>zoom-scan</i> 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 $SAR_{uncertainty}[\%]$ for scanning distances larger than 4mm is 1.0% Limit ,2%).



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

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.

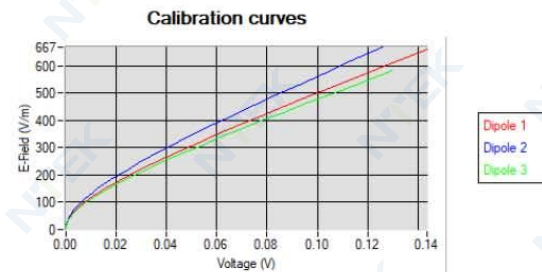
The estimated expanded uncertainty (k=2) in calibration for SAR (W/kg) is +/-14% for the frequency range 600-7500MHz.

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

V_i =voltage readings on the 3 channels of the probe

DCP_i =diode compression point given below for the 3 channels of the probe

$Norm_i$ =dipole sensitivity given below for the 3 channels of the probe



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

Normx dipole 1 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normy dipole 2 ($\mu\text{V}/(\text{V}/\text{m})^2$)	Normz dipole 3 ($\mu\text{V}/(\text{V}/\text{m})^2$)
0.78	0.62	0.85

DCP dipole 1 (mV)	DCP dipole 2 (mV)	DCP dipole 3 (mV)
105	108	107

5.2 CALIBRATION IN LIQUID

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

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

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

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

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:

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

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:

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

where

a =the larger cross-sectional of the waveguide

b =the smaller cross-sectional of the waveguide

δ =the skin depth for the liquid in the waveguide

P_W =the power delivered to the liquid



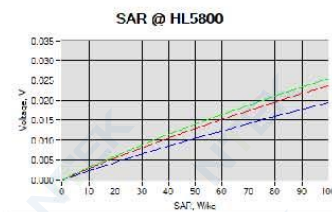
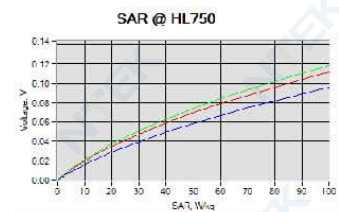
COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

The below table summarize the ConvF for the calibrated liquid. The curves give examples for the measured SAR depending on the voltage in some liquid.

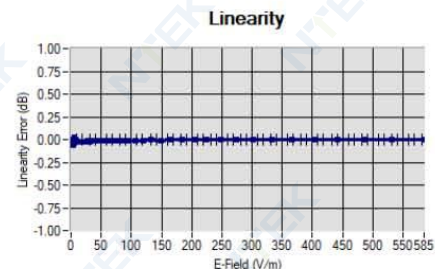
Liquid	Frequency (MHz*)	ConvF
HL750	750	2.37
HL850	835	2.32
HL900	900	2.23
HL1800	1800	2.45
HL1900	1900	2.63
HL2000	2000	2.83
HL2300	2300	2.81
HL2450	2450	2.85
HL2600	2600	2.65
HL3300	3300	2.21
HL3500	3500	2.20
HL3700	3700	2.11
HL3900	3900	2.40
HL4200	4200	2.40
HL4600	4600	2.33
HL4900	4900	2.37
HL5200	5200	2.07
HL5400	5400	2.11
HL5600	5600	2.20
HL5800	5800	2.04

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

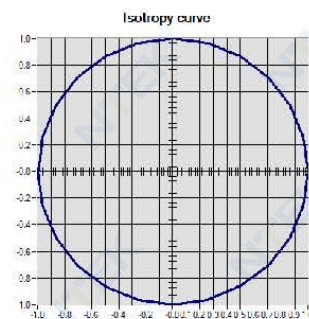


6 VERIFICATION RESULTS

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



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



Isotropy +/- 0.21% (+/- 0.01 dB)



COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

7 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
CALIPROBE Test Bench	Version 2	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	08/2021	08/2024
Network Analyzer	Agilent 8753ES	MY40003210	10/2019	10/2023
Network Analyzer – Calibration kit	HP 85033D	3423A08186	06/2021	06/2027
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	07/2022	07/2025
Multimeter	Keithley 2000	4013982	02/2023	02/2026
Signal Generator	Rohde & Schwarz SMB	106589	03/2022	03/2025
Amplifier	MVG	MODU-023-C-0002	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	06/2021	06/2024
Power Meter	Keysight U2000A	SN: MY62340002	10/2022	10/2025
Directional Coupler	Krytar 158020	131467	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Fluoroptic Thermometer	LumaSense Luxtron 812	94264	09/2022	09/2025
Coaxial cell	MVG	SN 32/16 COAXCELL_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG2_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G600_1	Validated. No cal required.	Validated. No cal required.

Page: 9/10

Template_ACR.DDD.N.YY.MVGB.ISSUE_COMOSAR Probe vL

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COMOSAR E-FIELD PROBE CALIBRATION REPORT

Ref: ACR.261.11.23.BES.A

Waveguide	MVG	SN 32/16 WG4_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_0G900_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG6_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG8_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800B_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_1G800H_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG10_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_3G500_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG12_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_5G000_1	Validated. No cal required.	Validated. No cal required.
Waveguide	MVG	SN 32/16 WG14_1	Validated. No cal required.	Validated. No cal required.
Liquid transition	MVG	SN 32/16 WGLIQ_7G000_1	Validated. No cal required.	Validated. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44225320	06/2021	06/2024



SAR Reference Dipole Calibration Report

Ref : ACR.60.2.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 750 MHZ

SERIAL NO.: SN 03/15 DIP0G750-355

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

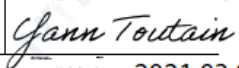
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.2.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.2.21.MVGB.A

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8	List of Equipment	10



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.2.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.221.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



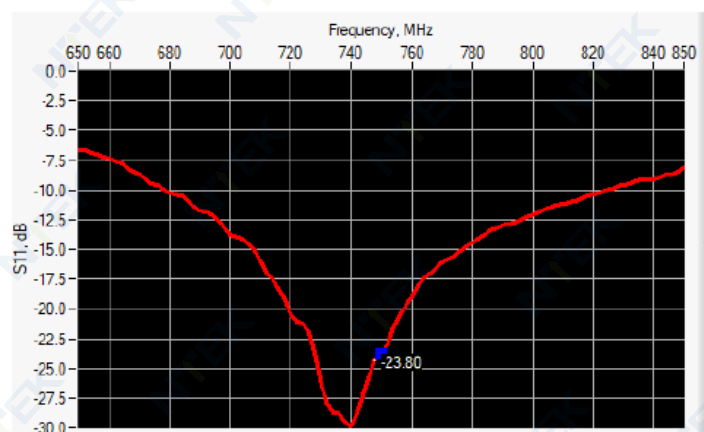
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.2.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
750	-23.80	-20	56.4 Ω - 0.1 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.	-	100.0 $\pm$ 1 %.	-	6.35 $\pm$ 1 %.	-
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vG

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.2.21.MVGB.A

2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: ϵ_p' : 41.8 σ : 0.82
Distance between dipole center and liquid	15.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	750750 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %	41.8	0.89 ±10 %	0.82
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

Page: 7/10

Template: ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vG

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.2.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

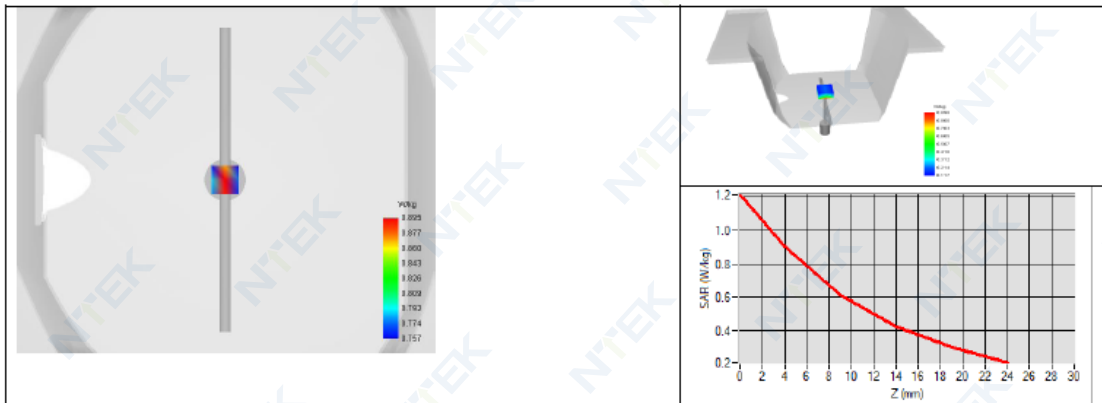
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49	8.53 (0.85)	5.55	5.56 (0.56)
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.2.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.2.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.4.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 900 MHZ

SERIAL NO.: SN 03/15 DIP0G900-348

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

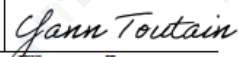
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.4.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	
				Made d'emploi 2021.03.0 1 13:09:56 +01'00'

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.4.21.MVGB.A

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5	Measurement Uncertainty.....	5
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.4.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 900 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID900
Serial Number	SN 03/15 DIP0G900-348
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.4.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



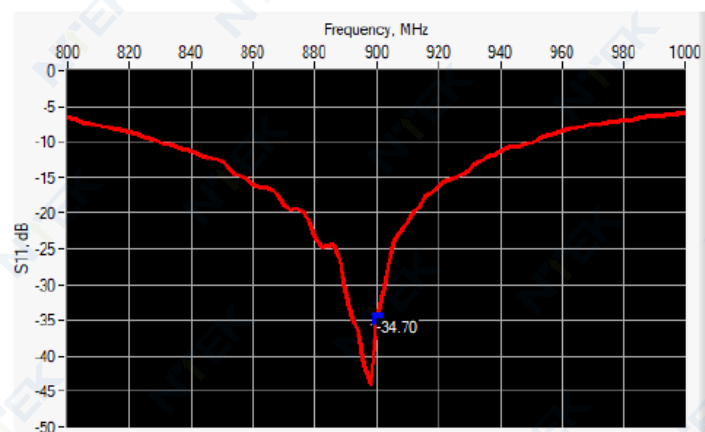
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.4.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
900	-34.70	-20	51.0 Ω - 1.5 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.	-	83.3 $\pm$ 1 %.	-	3.6 $\pm$ 1 %.	-
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vG

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.4.21.MVGB.A

2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: ϵ_p' : 39.8 σ : 0.97
Distance between dipole center and liquid	15.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	900900 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %	39.8	0.97 ±10 %	0.97
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

Page: 7/10

Template_ACR.DDD.N.YY.MVGB.ISSUE_SAR Reference Dipole vG

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.4.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

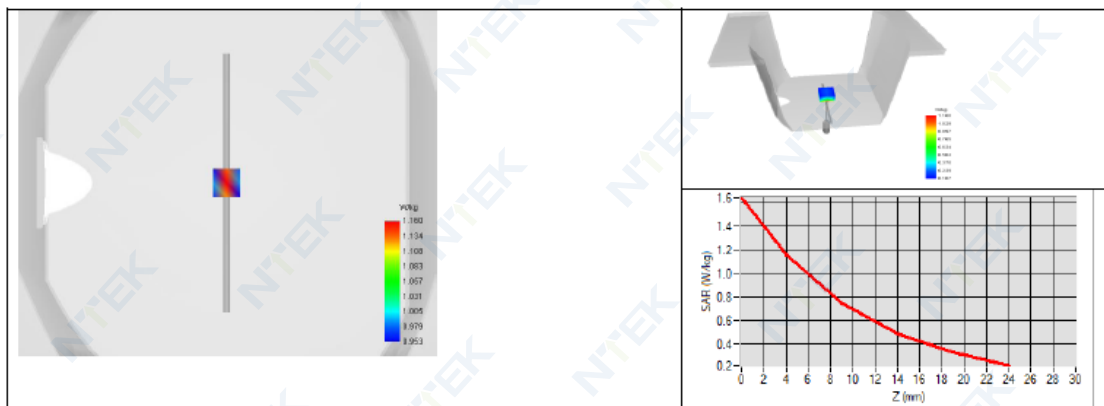
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9	11.08 (1.11)	6.99	6.81 (0.68)
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.4.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.4.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.5.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 1800 MHZ

SERIAL NO.: SN 03/15 DIP1G800-349

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

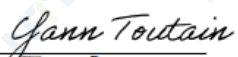
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.5.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.5.21.MVGB.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.5.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.5.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



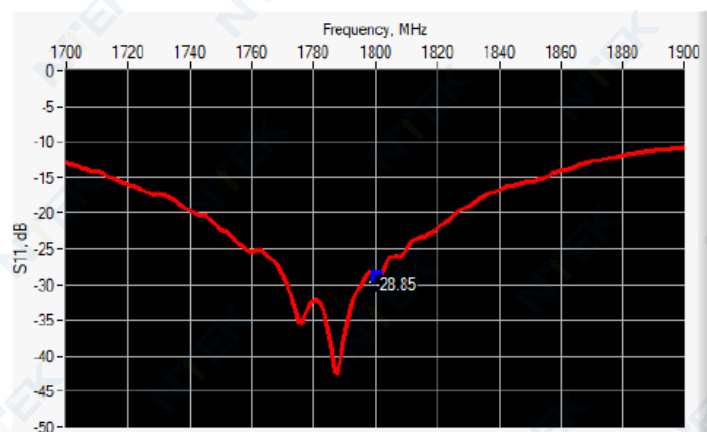
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.5.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
1800	-28.85	-20	47.9 Ω + 2.9 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.	-	41.7 $\pm$ 1 %.	-	3.6 $\pm$ 1 %.	-
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: ϵ_r' : 43.7 sigma : 1.34
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=8mm/dy=8mm/dz=5mm$
Frequency	18001800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %	43.7	1.40 ±10 %	1.34
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

Page: 7/10

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.5.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

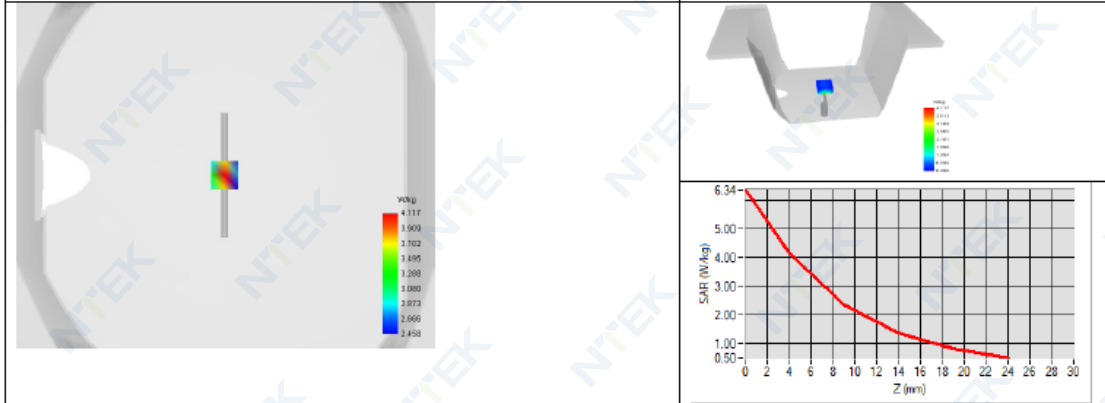
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4	37.96 (3.80)	20.1	19.81 (1.98)
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.5.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.5.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.7.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 2000 MHZ

SERIAL NO.: SN 03/15 DIP2G000-351

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

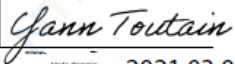
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.7.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	 2021.03.01 13:12:43 +01'00'

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A

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4.2	Mechanical Requirements	5
5	Measurement Uncertainty.....	5
5.1	Return Loss	5
5.2	Dimension Measurement	5
5.3	Validation Measurement	5
6	Calibration Measurement Results.....	6
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6.2	Mechanical Dimensions	6
7	Validation measurement	7
7.1	Measurement Condition	7
7.2	Head Liquid Measurement	7
7.3	Measurement Result	8
8	List of Equipment	10



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2000 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2000
Serial Number	SN 03/15 DIP2G000-351
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



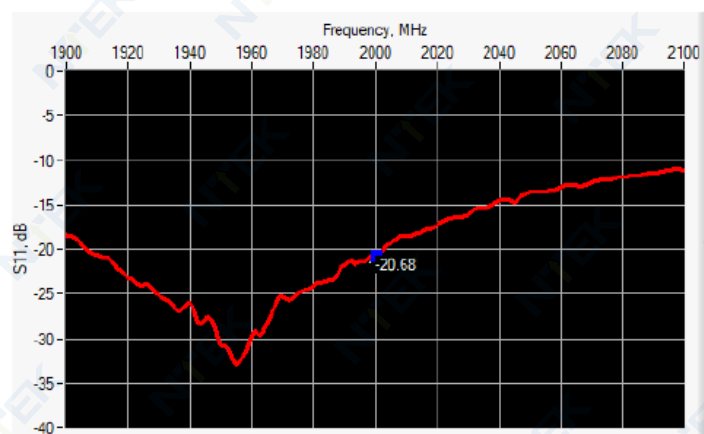
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2000	-20.68	-20	60.3 Ω + 0.1 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.	-	37.5 $\pm$ 1 %.	-	3.6 $\pm$ 1 %.	-
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPGO333
Liquid	Head Liquid Values: ϵ_r : 43.1 σ : 1.48
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	20002000 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r)		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %	43.1	1.40 ±10 %	1.48

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2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

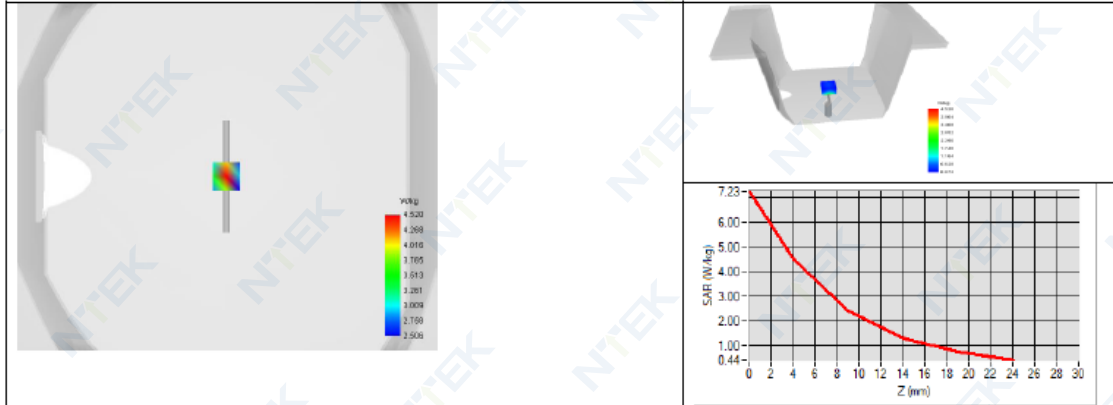
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1	41.26 (4.13)	21.1	20.52 (2.05)
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.7.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.11.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

MVG COMOSAR REFERENCE DIPOLE

FREQUENCY: 2300 MHZ

SERIAL NO.: SN 03/16 DIP2G300-358

Calibrated at MVG

Z.I. de la pointe du diable

Technopôle Brest Iroise – 295 avenue Alexis de Rochon

29280 PLOUZANE - FRANCE

Calibration date: 03/01/2021



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

Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.11.21.MVGB A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Technical Manager	3/1/2021	<i>JL</i>
Checked by :	Jérôme LUC	Technical Manager	3/1/2021	<i>JL</i>
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	<i>Yann Toutain</i>

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PHILIPS

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

Issue	Name	Date	Modifications
A	Jérôme LE GALL	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.11.21.MVGB.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.11.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 2300 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID2300
Serial Number	SN 03/15 DIP2G300-358
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.11.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



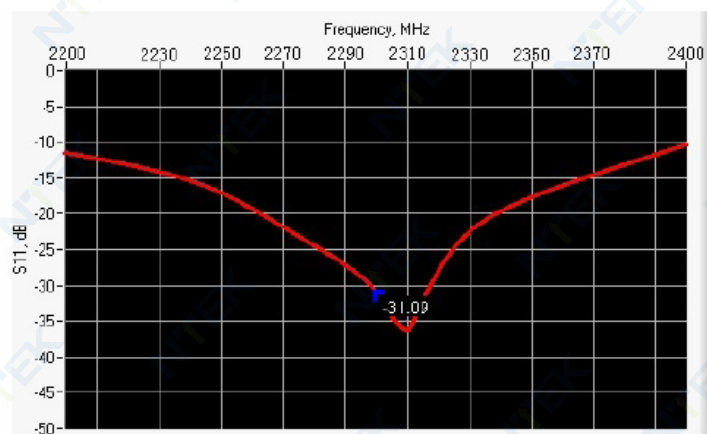
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.11.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2300	-31.09	-20	56.3 Ω - 2.9 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.	-	32.6 $\pm$ 1 %.	-	3.6 $\pm$ 1 %.	-
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: $\epsilon_r' : 42.0$ $\sigma : 1.80$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	23002300 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

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Ref: ACR.60.11.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %	42.2	1.67 ±10 %	1.75
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

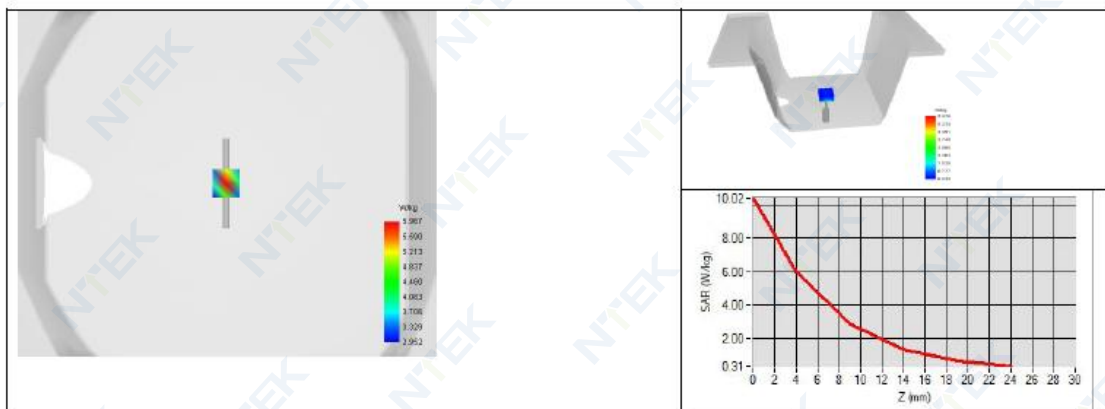
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7	50.65 (5.07)	23.3	23.55 (2.36)
2450	52.4		24	
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.11.21.MVGB A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.11.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.8.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 2450 MHZ

SERIAL NO.: SN 03/15 DIP2G450-352

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

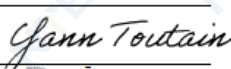
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.8.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Technical Manager	3/1/2021	
Checked by :	Jérôme LUC	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	

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

Issue	Name	Date	Modifications
A	Jérôme LE GALL	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.8.21.MVGB.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.8.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.8.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



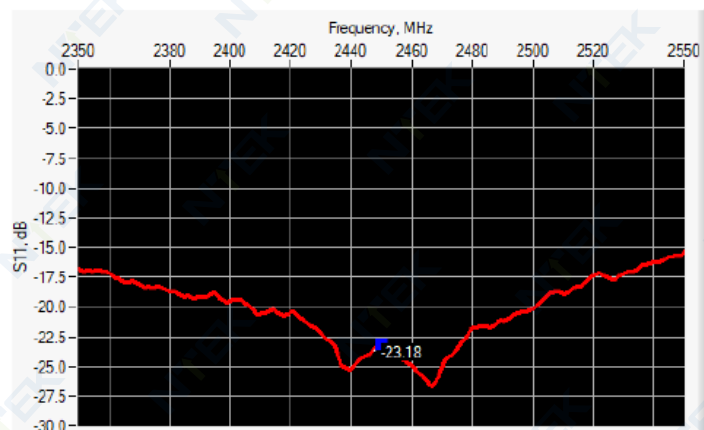
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.8.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2450	-23.18	-20	56.3 Ω - 2.9 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.	-	30.4 $\pm$ 1 %.	-	3.6 $\pm$ 1 %.	-

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.8.21.MVGB.A

2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: ϵ_p' : 41.9 σ : 1.88
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	24502450 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.8.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %	41.9	1.80 ±10 %	1.88
2600	39.0 ±10 %		1.96 ±10 %	
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

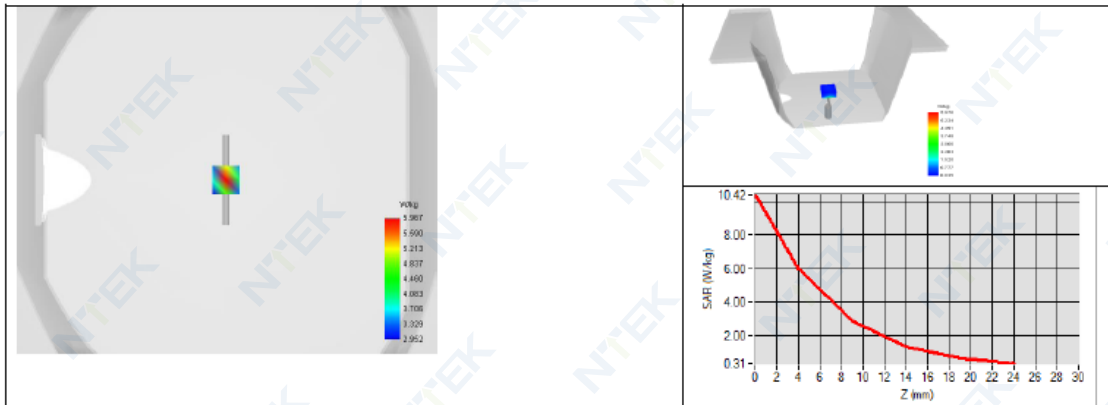
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4	53.69 (5.37)	24	23.94 (2.39)
2600	55.3		24.6	
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.8.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.8.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.60.9.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 2600 MHZ

SERIAL NO.: SN 03/15 DIP2G600-356

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

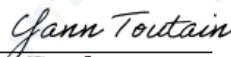
Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.9.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.9.21.MVGB.A

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4.2	Mechanical Requirements	5
5	Measurement Uncertainty.....	5
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.9.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

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

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.9.21.MVGB.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimension's frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness. A direct method is used with a ISO17025 calibrated caliper.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm
300 - 450	0.44 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
-------------	----------------------



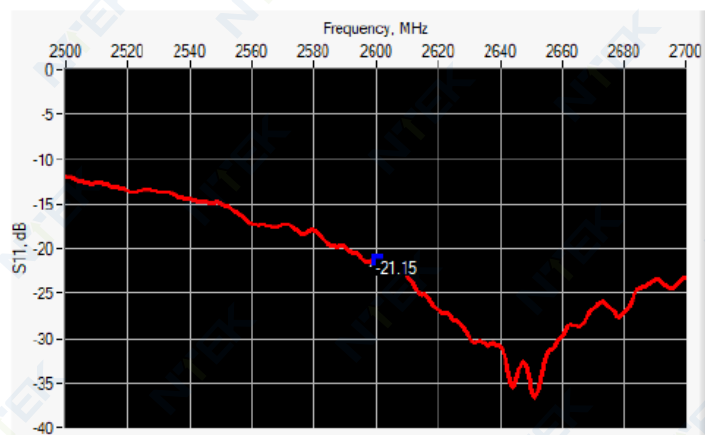
SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.9.21.MVGB.A

1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
2600	-21.15	-20	52.7 Ω - 8.3 j Ω

6.2 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
450	290.0 $\pm$ 1 %.		166.7 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
750	176.0 $\pm$ 1 %.		100.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	
835	161.0 $\pm$ 1 %.		89.8 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
900	149.0 $\pm$ 1 %.		83.3 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1450	89.1 $\pm$ 1 %.		51.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1500	80.5 $\pm$ 1 %.		50.0 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1640	79.0 $\pm$ 1 %.		45.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1750	75.2 $\pm$ 1 %.		42.9 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1800	72.0 $\pm$ 1 %.		41.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1900	68.0 $\pm$ 1 %.		39.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
1950	66.3 $\pm$ 1 %.		38.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2000	64.5 $\pm$ 1 %.		37.5 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2100	61.0 $\pm$ 1 %.		35.7 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2300	55.5 $\pm$ 1 %.		32.6 $\pm$ 1 %.		3.6 $\pm$ 1 %.	
2450	51.5 $\pm$ 1 %.		30.4 $\pm$ 1 %.		3.6 $\pm$ 1 %.	

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2600	48.5 ±1 %.	-	28.8 ±1 %.	-	3.6 ±1 %.	-
3000	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 MEASUREMENT CONDITION

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values: ϵ_r' : 41.5 σ : 2.03
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	2600/2600 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %

7.2 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±10 %		0.87 ±10 %	
450	43.5 ±10 %		0.87 ±10 %	
750	41.9 ±10 %		0.89 ±10 %	
835	41.5 ±10 %		0.90 ±10 %	
900	41.5 ±10 %		0.97 ±10 %	
1450	40.5 ±10 %		1.20 ±10 %	
1500	40.4 ±10 %		1.23 ±10 %	
1640	40.2 ±10 %		1.31 ±10 %	
1750	40.1 ±10 %		1.37 ±10 %	
1800	40.0 ±10 %		1.40 ±10 %	
1900	40.0 ±10 %		1.40 ±10 %	
1950	40.0 ±10 %		1.40 ±10 %	
2000	40.0 ±10 %		1.40 ±10 %	

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.9.21.MVGB.A

2100	39.8 ±10 %		1.49 ±10 %	
2300	39.5 ±10 %		1.67 ±10 %	
2450	39.2 ±10 %		1.80 ±10 %	
2600	39.0 ±10 %	41.5	1.96 ±10 %	2.03
3000	38.5 ±10 %		2.40 ±10 %	
3500	37.9 ±10 %		2.91 ±10 %	

7.3 MEASUREMENT RESULT

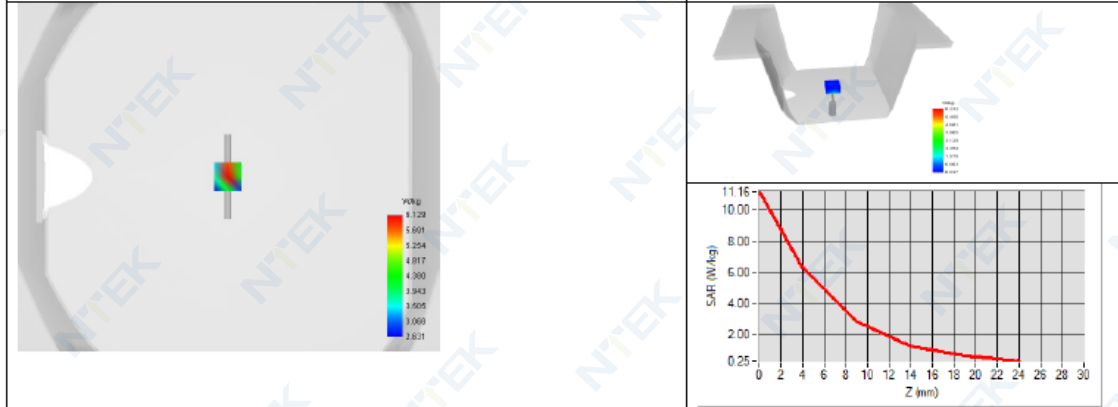
The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements should produce the SAR values shown below (for phantom thickness of 2 mm), within the uncertainty for the system validation. All SAR values are normalized to 1 W forward power. In bracket, the measured SAR is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

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	
1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3	55.83 (5.58)	24.6	24.19 (2.42)
3000	63.8		25.7	
3500	67.1		25	



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.60.9.21.MVGB.A





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref. ACR.60.9.21.MVGB.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023



SAR Reference Dipole Calibration Report

Ref : ACR.139.15.20.SATU.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 3500 MHZ
SERIAL NO.: SN 09/12 DIP 3G500-360

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144



10/15/2022

Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.15.20.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/15/2022	
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Approved by :	Kim RUTKOWSKI	Quality Manager	10/15/2022	

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

Issue	Date	Modifications
A	10/15/2022	Initial release



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.15.20.SATU.A

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.15.20.SATU.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 3500 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID3500
Serial Number	SN 09/12 DIP 3G500-360
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.15.20.SATU.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %



SAR REFERENCE DIPOLE CALIBRATION REPORT

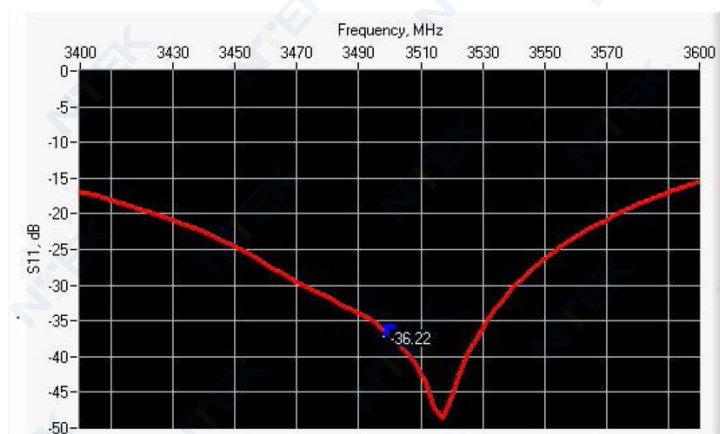
Ref: ACR.139.15.20.SATU.A

10 g

20.1 %

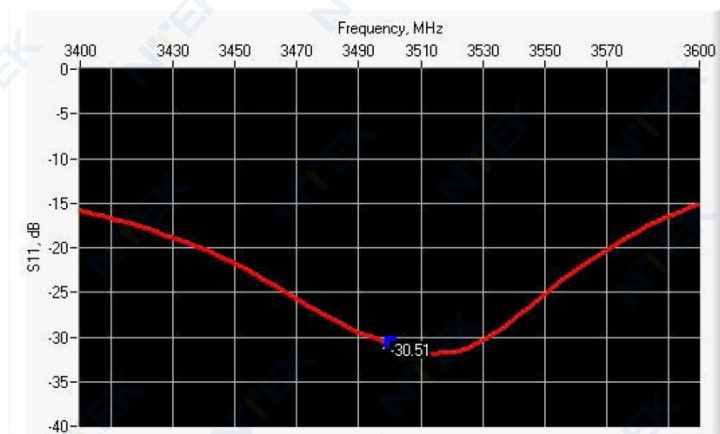
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
3500	-36.22	-20	48.9 Ω + 1.1 jΩ

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
3500	-30.51	-20	52.2 Ω + 2.0 jΩ

6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 ±1 %.		250.0 ±1 %.		6.35 ±1 %.	

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450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3400	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3500	37.0 ±1 %.	PASS	26.4 ±1 %.	PASS	3.6 ±1 %.	PASS
3800	34.7 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	

7 VALIDATION MEASUREMENT

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

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r)		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	

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1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
2600	39.0 ±5 %		1.96 ±5 %	
3400	38.0 ±5 %		2.81 ±5 %	
3500	37.9 ±5 %	PASS	2.91 ±5 %	PASS

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

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

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: eps' : 37.9 sigma : 2.95
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	3500 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	

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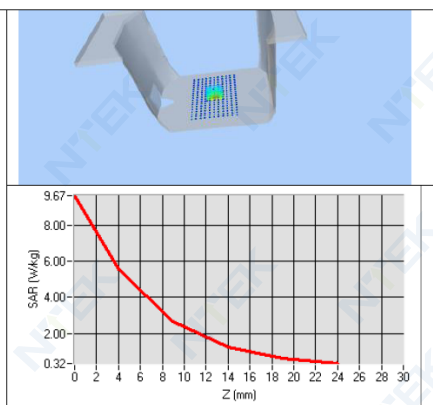
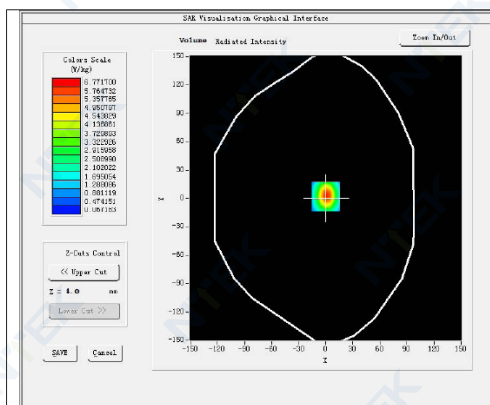
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1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3400	66.4		25.1	
3500	67.1	67.18 (6.72)	25	24.50 (2.45)



7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 $\pm$ 5 %		0.80 $\pm$ 5 %	
300	58.2 $\pm$ 5 %		0.92 $\pm$ 5 %	
450	56.7 $\pm$ 5 %		0.94 $\pm$ 5 %	
750	55.5 $\pm$ 5 %		0.96 $\pm$ 5 %	
835	55.2 $\pm$ 5 %		0.97 $\pm$ 5 %	
900	55.0 $\pm$ 5 %		1.05 $\pm$ 5 %	
915	55.0 $\pm$ 5 %		1.06 $\pm$ 5 %	
1450	54.0 $\pm$ 5 %		1.30 $\pm$ 5 %	
1610	53.8 $\pm$ 5 %		1.40 $\pm$ 5 %	
1800	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
1900	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
2000	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
2100	53.2 $\pm$ 5 %		1.62 $\pm$ 5 %	
2450	52.7 $\pm$ 5 %		1.95 $\pm$ 5 %	

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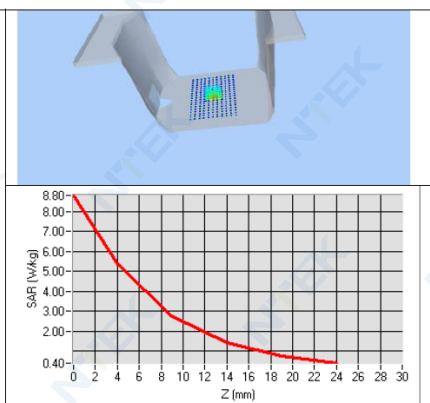
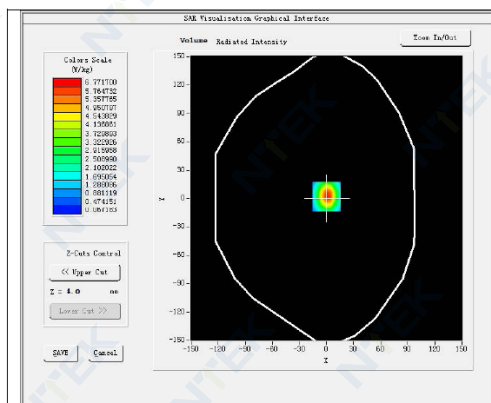
Ref. ACR.139.15.20.SATU.A

3400	51.5 ±5 %		3.20 ±5 %	
3500	51.3 ±5 %	PASS	3.31 ±5 %	PASS
3800	50.9 ±5 %		3.66 ±5 %	
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: $\epsilon_{ps}' : 51.4$ $\sigma : 3.40$
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	3500 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
3500	59.22(5.92)	23.80 (2.38)





SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.15.20.SATU.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2020	02/2023
Calipers	Carrera	CALIPER-01	01/2020	01/2023
Reference Probe	MVG	EPG122 SN 18/11	06/2022	06/2023
Multimeter	Keithley 2000	1188656	01/2020	01/2023
Signal Generator	Agilent E4438C	MY49070581	01/2020	01/2023
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2020	01/2023
Power Sensor	HP ECP-E26A	US37181460	01/2020	01/2023
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	11/2019	11/2022



SAR Reference Dipole Calibration Report

Ref : ACR.139.16.20.SATU.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.
BUILDING E, FENDA SCIENCE PARK, SANWEI
COMMUNITY, XIXIANG STREET,
BAO'AN DISTRICT, SHENZHEN GUANGDONG, CHINA
MVG COMOSAR REFERENCE DIPOLE
FREQUENCY: 3700 MHZ
SERIAL NO.: SN 09/12 DIP 3G700-361

Calibrated at MVG US
2105 Barrett Park Dr. - Kennesaw, GA 30144



10/15/2022

Summary:

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



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.16.20.SATU.A

	Name	Function	Date	Signature
Prepared by :	Jérôme LUC	Product Manager	10/15/2022	
Checked by :	Jérôme LUC	Product Manager	10/15/2022	
Approved by :	Kim RUTKOWSKI	Quality Manager	10/15/2022	

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

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SAR REFERENCE DIPOLE CALIBRATION REPORT

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5.3	Validation Measurement	5
6	Calibration Measurement Results	6
6.1	Return Loss and Impedance In Head Liquid	6
6.2	Return Loss and Impedance In Body Liquid	6
6.3	Mechanical Dimensions	6
7	Validation measurement	7
7.1	Head Liquid Measurement	7
7.2	SAR Measurement Result With Head Liquid	8
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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.16.20.SATU.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 3700 MHz REFERENCE DIPOLE
Manufacturer	MVG
Model	SID3700
Serial Number	SN 09/12 DIP 3G700-361
Product Condition (new / used)	New

A yearly calibration interval is recommended.

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

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



Figure 1 – MVG COMOSAR Validation Dipole



SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.16.20.SATU.A

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The dipole used for SAR system validation measurements and checks must have a return loss of -20 dB or better. The return loss measurement shall be performed against a liquid filled flat phantom, with the phantom constructed as outlined in the fore mentioned standards.

4.2 MECHANICAL REQUIREMENTS

The IEEE Std. 1528 and CEI/IEC 62209 standards specify the mechanical components and dimensions of the validation dipoles, with the dimensions frequency and phantom shell thickness dependent. The COMOSAR test bench employs a 2 mm phantom shell thickness therefore the dipoles sold for use with the COMOSAR test bench comply with the requirements set forth for a 2 mm phantom shell thickness.

5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.1 dB

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
3 - 300	0.05 mm

5.3 VALIDATION MEASUREMENT

The guidelines outlined in the IEEE 1528, FCC KDBs, CENELEC EN50361 and CEI/IEC 62209 standards were followed to generate the measurement uncertainty for validation measurements.

Scan Volume	Expanded Uncertainty
1 g	20.3 %



SAR REFERENCE DIPOLE CALIBRATION REPORT

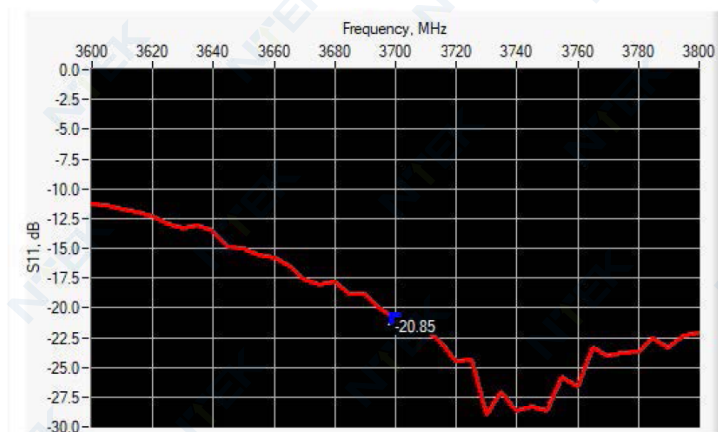
Ref: ACR.139.16.20.SATU.A

10 g

20.1 %

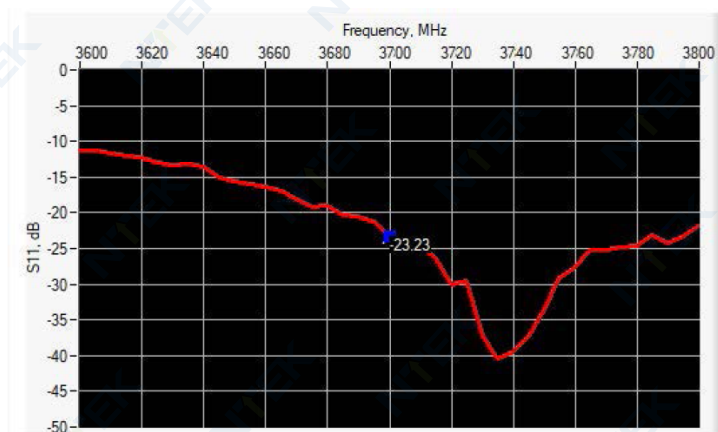
6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS AND IMPEDANCE IN HEAD LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
3700	-20.85	-20	54.9 Ω - 8.3 j Ω

6.2 RETURN LOSS AND IMPEDANCE IN BODY LIQUID



Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
3700	-23.23	-20	50.6 Ω - 7.0 j Ω

6.3 MECHANICAL DIMENSIONS

Frequency MHz	L mm		h mm		d mm	
	required	measured	required	measured	required	measured
300	420.0 $\pm$ 1 %.		250.0 $\pm$ 1 %.		6.35 $\pm$ 1 %.	

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450	290.0 ±1 %.		166.7 ±1 %.		6.35 ±1 %.	
750	176.0 ±1 %.		100.0 ±1 %.		6.35 ±1 %.	
835	161.0 ±1 %.		89.8 ±1 %.		3.6 ±1 %.	
900	149.0 ±1 %.		83.3 ±1 %.		3.6 ±1 %.	
1450	89.1 ±1 %.		51.7 ±1 %.		3.6 ±1 %.	
1500	80.5 ±1 %.		50.0 ±1 %.		3.6 ±1 %.	
1640	79.0 ±1 %.		45.7 ±1 %.		3.6 ±1 %.	
1750	75.2 ±1 %.		42.9 ±1 %.		3.6 ±1 %.	
1800	72.0 ±1 %.		41.7 ±1 %.		3.6 ±1 %.	
1900	68.0 ±1 %.		39.5 ±1 %.		3.6 ±1 %.	
1950	66.3 ±1 %.		38.5 ±1 %.		3.6 ±1 %.	
2000	64.5 ±1 %.		37.5 ±1 %.		3.6 ±1 %.	
2100	61.0 ±1 %.		35.7 ±1 %.		3.6 ±1 %.	
2300	55.5 ±1 %.		32.6 ±1 %.		3.6 ±1 %.	
2450	51.5 ±1 %.		30.4 ±1 %.		3.6 ±1 %.	
2600	48.5 ±1 %.		28.8 ±1 %.		3.6 ±1 %.	
3400	41.5 ±1 %.		25.0 ±1 %.		3.6 ±1 %.	
3600	37.0 ±1 %.		26.4 ±1 %.		3.6 ±1 %.	
3700	34.7 ±1 %.	PASS	26.4 ±1 %.	PASS	3.6 ±1 %.	PASS

7 VALIDATION MEASUREMENT

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

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
300	45.3 ±5 %		0.87 ±5 %	
450	43.5 ±5 %		0.87 ±5 %	
750	41.9 ±5 %		0.89 ±5 %	
835	41.5 ±5 %		0.90 ±5 %	
900	41.5 ±5 %		0.97 ±5 %	
1450	40.5 ±5 %		1.20 ±5 %	
1500	40.4 ±5 %		1.23 ±5 %	
1640	40.2 ±5 %		1.31 ±5 %	
1750	40.1 ±5 %		1.37 ±5 %	

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SAR REFERENCE DIPOLE CALIBRATION REPORT

Ref: ACR.139.16.20.SATU.A

1800	40.0 ±5 %		1.40 ±5 %	
1900	40.0 ±5 %		1.40 ±5 %	
1950	40.0 ±5 %		1.40 ±5 %	
2000	40.0 ±5 %		1.40 ±5 %	
2100	39.8 ±5 %		1.49 ±5 %	
2300	39.5 ±5 %		1.67 ±5 %	
2450	39.2 ±5 %		1.80 ±5 %	
3400	38.0 ±5 %		2.81 ±5 %	
3600	37.8 ±5 %		3.02 ±5 %	
3700	37.7 ±5 %	PASS	3.12 ±5 %	PASS

7.2 SAR MEASUREMENT RESULT WITH HEAD LIQUID

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

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Head Liquid Values: ϵ_{ps} : 37.8 σ : 3.25
Distance between dipole center and liquid	10.0 mm
Area scan resolution	$dx=8mm/dy=8mm$
Zoon Scan Resolution	$dx=5mm/dy=5mm/dz=5mm$
Frequency	3700 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)		10 g SAR (W/kg/W)	
	required	measured	required	measured
300	2.85		1.94	
450	4.58		3.06	
750	8.49		5.55	
835	9.56		6.22	
900	10.9		6.99	
1450	29		16	
1500	30.5		16.8	
1640	34.2		18.4	
1750	36.4		19.3	
1800	38.4		20.1	

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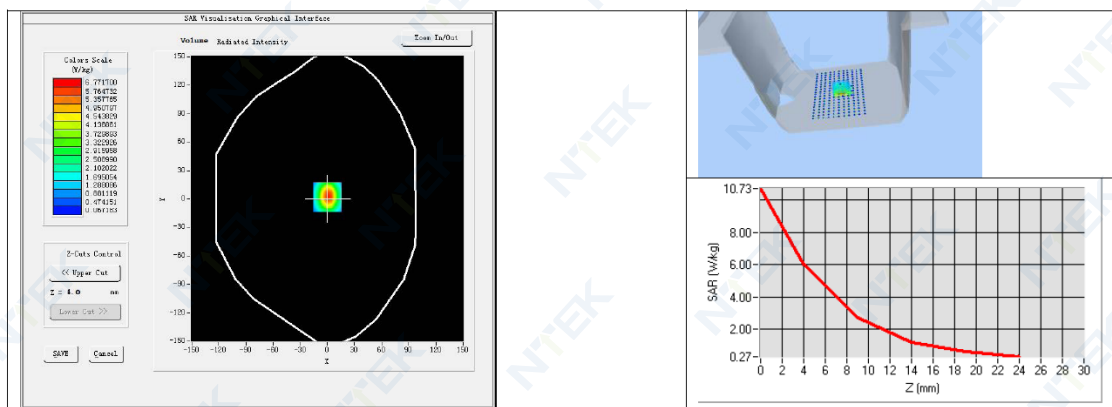
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Ref: ACR.139.16.20.SATU.A

1900	39.7		20.5	
1950	40.5		20.9	
2000	41.1		21.1	
2100	43.6		21.9	
2300	48.7		23.3	
2450	52.4		24	
2600	55.3		24.6	
3400	66.4		25.1	
3600	67.3		24.6	
3700	67.4	66.30 (6.63)	24.2	24.16 (2.42)



7.3 BODY LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
150	61.9 $\pm$ 5 %		0.80 $\pm$ 5 %	
300	58.2 $\pm$ 5 %		0.92 $\pm$ 5 %	
450	56.7 $\pm$ 5 %		0.94 $\pm$ 5 %	
750	55.5 $\pm$ 5 %		0.96 $\pm$ 5 %	
835	55.2 $\pm$ 5 %		0.97 $\pm$ 5 %	
900	55.0 $\pm$ 5 %		1.05 $\pm$ 5 %	
915	55.0 $\pm$ 5 %		1.06 $\pm$ 5 %	
1450	54.0 $\pm$ 5 %		1.30 $\pm$ 5 %	
1610	53.8 $\pm$ 5 %		1.40 $\pm$ 5 %	
1800	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
1900	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
2000	53.3 $\pm$ 5 %		1.52 $\pm$ 5 %	
2100	53.2 $\pm$ 5 %		1.62 $\pm$ 5 %	

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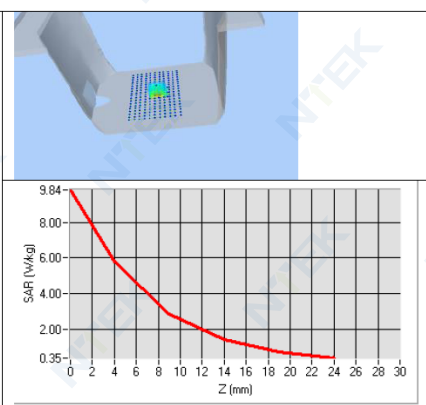
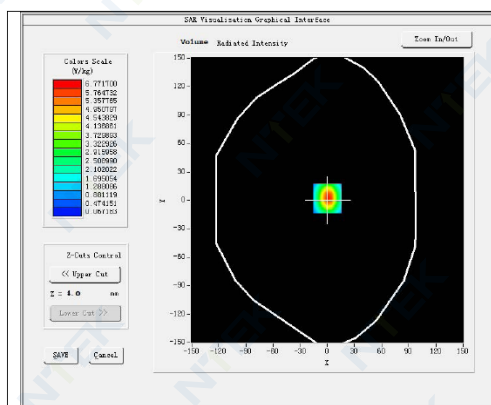
Ref: ACR.139.16.20.SATU.A

2300	52.9 ±5 %		1.81 ±5 %	
2450	52.7 ±5 %		1.95 ±5 %	
2600	52.5 ±5 %		2.16 ±5 %	
3400	51.5 ±5 %		3.20 ±5 %	
3600	51.2 ±5 %		3.43 ±5 %	
3700	51.1 ±5 %	PASS	3.55 ±5 %	PASS
5200	49.0 ±10 %		5.30 ±10 %	
5300	48.9 ±10 %		5.42 ±10 %	
5400	48.7 ±10 %		5.53 ±10 %	
5500	48.6 ±10 %		5.65 ±10 %	
5600	48.5 ±10 %		5.77 ±10 %	
5800	48.2 ±10 %		6.00 ±10 %	

7.4 SAR MEASUREMENT RESULT WITH BODY LIQUID

Software	OPENSAR V4
Phantom	SN 20/09 SAM71
Probe	SN 18/11 EPG122
Liquid	Body Liquid Values: eps' : 51.3 sigma : 3.56
Distance between dipole center and liquid	10.0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=5mm/dy=5mm/dz=5mm
Frequency	3700 MHz
Input power	20 dBm
Liquid Temperature	21 °C
Lab Temperature	21 °C
Lab Humidity	45 %

Frequency MHz	1 g SAR (W/kg/W)	10 g SAR (W/kg/W)
	measured	measured
3700	62.36 (6.24)	23.56 (2.35)



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Ref: ACR.139.16.20.SATU.A

8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
SAM Phantom	MVG	SN-20/09-SAM71	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rhode & Schwarz ZVA	SN100132	02/2020	02/2023
Calipers	Carrera	CALIPER-01	01/2020	01/2023
Reference Probe	MVG	EPG122 SN 18/11	06/2022	06/2023
Multimeter	Keithley 2000	1188656	01/2020	01/2023
Signal Generator	Agilent E4438C	MY49070581	01/2020	01/2023
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	HP E4418A	US38261498	01/2020	01/2023
Power Sensor	HP ECP-E26A	US37181460	01/2020	01/2023
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature and Humidity Sensor	Control Company	11-661-9	11/2019	11/2022



SAR Reference Waveguide Calibration Report

Ref : ACR.60.10.21.MVGB.A

SHENZHEN NTEK TESTING TECHNOLOGY CO., LTD.

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

FREQUENCY: 5000-6000 MHZ
SERIAL NO.: SN 13/14 WGA33

Calibrated at MVG

Z.I. de la pointe du diable

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

Calibration date: 03/01/2021



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

Summary:

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



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

	Name	Function	Date	Signature
Prepared by :	Jérôme Luc	Technical Manager	3/1/2021	
Checked by :	Jérôme Luc	Technical Manager	3/1/2021	
Approved by :	Yann Toutain	Laboratory Director	3/1/2021	

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PHILIPS

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

Issue	Name	Date	Modifications
A	Jérôme Luc	3/1/2021	Initial release



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

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SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

1 INTRODUCTION

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

2 DEVICE UNDER TEST

Device Under Test	
Device Type	COMOSAR 5000-6000 MHz REFERENCE WAVEGUIDE
Manufacturer	MVG
Model	SWG5500
Serial Number	SN 13/14 WGA33
Product Condition (new / used)	Used

3 PRODUCT DESCRIPTION

3.1 GENERAL INFORMATION

MVG's COMOSAR Validation Waveguides are built in accordance to the IEEE 1528 and CEI/IEC 62209 standards.

4 MEASUREMENT METHOD

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

4.1 RETURN LOSS REQUIREMENTS

The waveguide used for SAR system validation measurements and checks must have a return loss of -8 dB or better. The return loss measurement shall be performed with matching layer placed in the open end of the waveguide, with the waveguide and matching layer in direct contact with the phantom shell as outlined in the fore mentioned standards. A direct method is used with a network analyser and its calibration kit, both with a valid ISO17025 calibration.

4.2 MECHANICAL REQUIREMENTS

The IEEE 1528 and CEI/IEC 62209 standards specify the mechanical dimensions of the validation waveguide, the specified dimensions are as shown in Section 6.2. Figure 1 shows how the dimensions relate to the physical construction of the waveguide. A direct method is used with a ISO17025 calibrated caliper.

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5 MEASUREMENT UNCERTAINTY

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.

5.1 RETURN LOSS

The following uncertainties apply to the return loss measurement:

Frequency band	Expanded Uncertainty on Return Loss
400-6000MHz	0.08 LIN

5.2 DIMENSION MEASUREMENT

The following uncertainties apply to the dimension measurements:

Length (mm)	Expanded Uncertainty on Length
0 - 300	0.20 mm

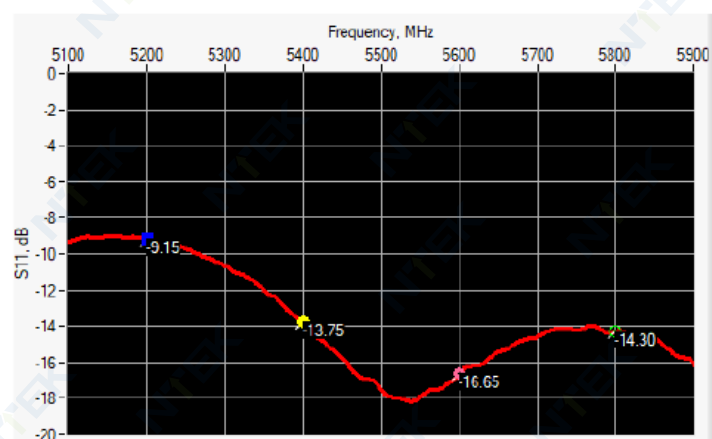
5.3 VALIDATION MEASUREMENT

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

Scan Volume	Expanded Uncertainty
1 g	19 % (SAR)
10 g	19 % (SAR)

6 CALIBRATION MEASUREMENT RESULTS

6.1 RETURN LOSS



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Frequency (MHz)	Return Loss (dB)	Requirement (dB)	Impedance
5200	-9.15	-8	$21.17 \Omega + 13.26 j\Omega$
5400	-13.75	-8	$68.57 \Omega + 6.68 j\Omega$
5600	-16.65	-8	$35.76 \Omega - 2.15 j\Omega$
5800	-14.30	-8	$54.74 \Omega + 18.27 j\Omega$

6.2 MECHANICAL DIMENSIONS

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

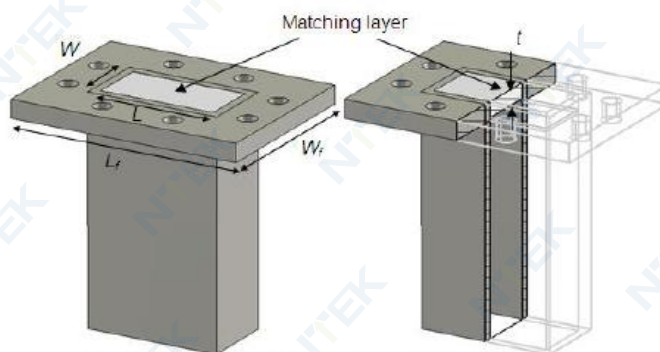


Figure 1: Validation Waveguide Dimensions

7 VALIDATION MEASUREMENT

The IEEE Std. 1528 and CEI/IEC 62209 standards state that the system validation measurements must be performed using a reference waveguide meeting the fore mentioned return loss and mechanical dimension requirements. The validation measurement must be performed with the matching layer placed in the open end of the waveguide, with the waveguide and matching layer in direct contact with the phantom shell.



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

Measurement Condition

Software	OPENSAR V5
Phantom	SN 13/09 SAM68
Probe	SN 41/18 EPG0333
Liquid	Head Liquid Values 5200 MHz: eps' :34.06 sigma : 4.70 Head Liquid Values 5400 MHz: eps' :33.39 sigma : 4.91 Head Liquid Values 5600 MHz: eps' :32.77 sigma : 5.13 Head Liquid Values 5800 MHz: eps' :32.40 sigma : 5.34
Distance between dipole waveguide and liquid	0 mm
Area scan resolution	dx=8mm/dy=8mm
Zoon Scan Resolution	dx=4mm/dy=4m/dz=2mm
Frequency	5200 MHz 5400 MHz 5600 MHz 5800 MHz
Input power	20 dBm
Liquid Temperature	20 +/- 1 °C
Lab Temperature	20 +/- 1 °C
Lab Humidity	30-70 %



SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

7.1 HEAD LIQUID MEASUREMENT

Frequency MHz	Relative permittivity (ϵ_r')		Conductivity (σ) S/m	
	required	measured	required	measured
5000	36.2 $\pm$ 10 %		4.45 $\pm$ 10 %	
5100	36.1 $\pm$ 10 %		4.56 $\pm$ 10 %	
5200	36.0 $\pm$ 10 %	34.06	4.66 $\pm$ 10 %	4.70
5300	35.9 $\pm$ 10 %		4.76 $\pm$ 10 %	
5400	35.8 $\pm$ 10 %	33.39	4.86 $\pm$ 10 %	4.91
5500	35.6 $\pm$ 10 %		4.97 $\pm$ 10 %	
5600	35.5 $\pm$ 10 %	32.77	5.07 $\pm$ 10 %	5.13
5700	35.4 $\pm$ 10 %		5.17 $\pm$ 10 %	
5800	35.3 $\pm$ 10 %	32.40	5.27 $\pm$ 10 %	5.34
5900	35.2 $\pm$ 10 %		5.38 $\pm$ 10 %	
6000	35.1 $\pm$ 10 %		5.48 $\pm$ 10 %	

7.2 MEASUREMENT RESULT

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

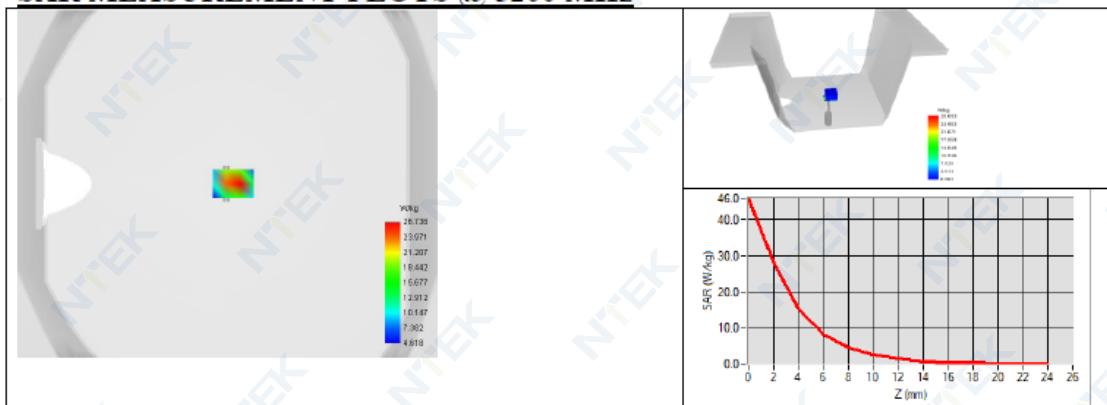
Frequency (MHz)	1 g SAR (W/kg)		10 g SAR (W/kg)	
	required	measured	required	measured
5200	159.00	162.34 (16.23)	56.90	55.42 (5.54)
5400	166.40	168.48 (16.85)	58.43	57.03 (5.70)
5600	173.80	174.92 (17.49)	59.97	58.63 (5.86)
5800	181.20	178.89 (17.89)	61.50	59.32 (5.93)



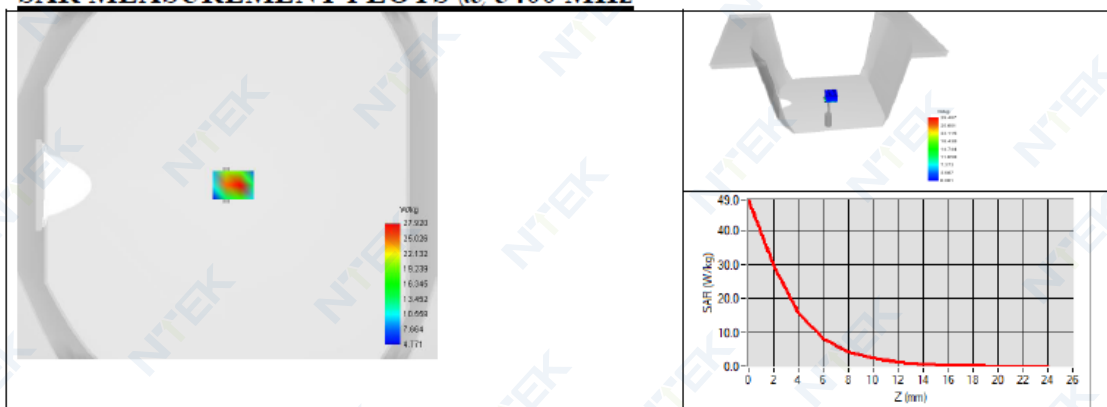
SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

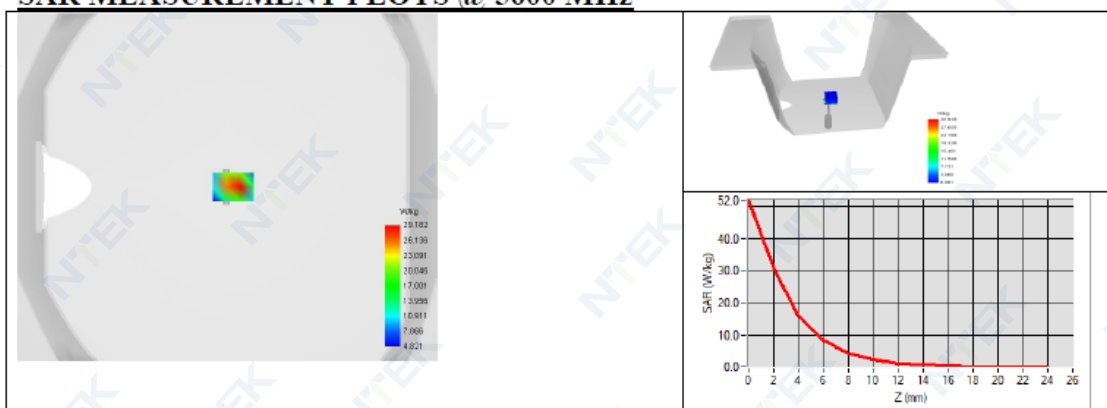
SAR MEASUREMENT PLOTS @ 5200 MHz



SAR MEASUREMENT PLOTS @ 5400 MHz



SAR MEASUREMENT PLOTS @ 5600 MHz

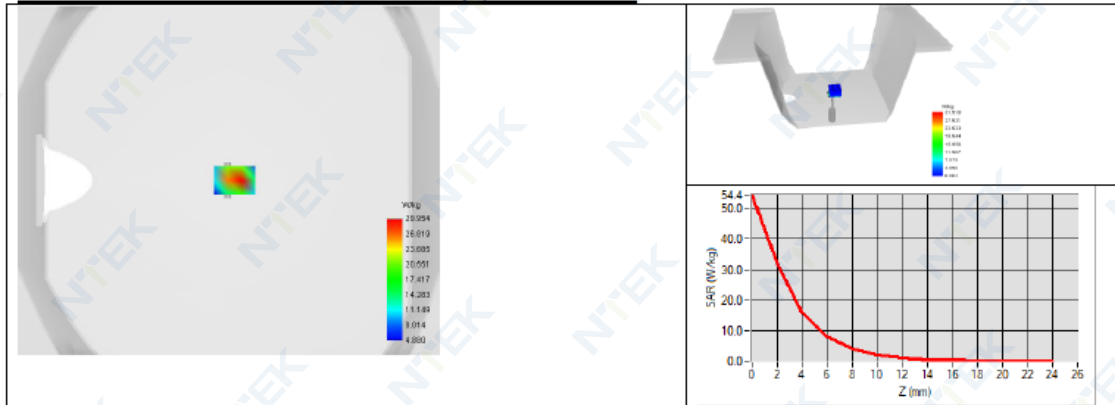




SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

Ref: ACR.60.10.21.MVGB.A

SAR MEASUREMENT PLOTS @ 5800 MHz





SAR REFERENCE WAVEGUIDE CALIBRATION REPORT

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8 LIST OF EQUIPMENT

Equipment Summary Sheet				
Equipment Description	Manufacturer / Model	Identification No.	Current Calibration Date	Next Calibration Date
Flat Phantom	MVG	SN-13/09-SAM68	Validated. No cal required.	Validated. No cal required.
COMOSAR Test Bench	Version 3	NA	Validated. No cal required.	Validated. No cal required.
Network Analyzer	Rohde & Schwarz ZVM	100203	05/2019	05/2022
Network Analyzer – Calibration kit	Rohde & Schwarz ZV-Z235	101223	05/2019	05/2022
Calipers	Mitutoyo	SN 0009732	10/2019	10/2022
Reference Probe	MVG	EPGO333 SN 41/18	05/2020	05/2021
Multimeter	Keithley 2000	1160271	02/2020	02/2023
Signal Generator	Rohde & Schwarz SMB	106589	04/2019	04/2022
Amplifier	Aethercomm	SN 046	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Power Meter	NI-USB 5680	170100013	05/2019	05/2022
Directional Coupler	Narda 4216-20	01386	Characterized prior to test. No cal required.	Characterized prior to test. No cal required.
Temperature / Humidity Sensor	Testo 184 H1	44220687	05/2020	05/2023

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